



From facilitator to navigator: Leading effective and engaging hybrid meetings

A design science approach for improving requirement elicitation in hybrid setting

MSC THESIS COMPLEX SYSTEMS ENGINEERING
AND MANAGEMENT

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August 2025

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From facilitator to navigator: Leading and engaging hybrid meetings

**A design science approach for improving requirement
elicitation in hybrid setting**

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February 2025 - August 2025

In partial fulfilment of the requirements for the degree of:

Master of Complex System Engineering & Management
in Technology, Policy & Management

at the Delft University of Technology,
to be defended publicly on Thursday 28th of August 2025

Preface

With a strong interest in human interaction, software development and the optimisation of processes within organisations, I was eager to choose a thesis topic that would combine these domains. I wanted to explore how people collaborate in hybrid environments, especially in settings where technology needs to be translated into business goals and vice versa. My aim was to contribute to better collaboration practices and, in doing so, support innovation and development within companies. While I was confident about the topic, the research process still surprised me in many ways. It required me to bring together technical knowledge and behavioural insights, and to work across both theory and practice. At first, I expected to focus mostly on tooling and techniques. Instead, I found myself diving into the human side of agile development: how people collaborate, where communication falters, and how design interventions might offer support. That shift was not always easy, but it turned out to be one of the most valuable aspects of the project. The interviews, observations, and workshops brought a wide range of perspectives. The demonstrations were a highlight, because seeing ideas work in practice made the research come alive.

I want to thank everyone who supported me throughout this process, starting with my TU Delft supervisors. Sepinoud Azimi Rashti, our conversations were always a pleasure, not just about the thesis but also about everyday life and what's next. Your guidance was thoughtful and encouraging. Jan Anne Annema, your positivity is contagious and has always been so. We already worked closely together during my board year in the early days of the pandemic, finding ways to make hybrid and online education work under tight constraints. It was great to now return to this topic and explore it in depth from a research perspective. I would also like to thank Info Support, and particularly Marc Valkenier, for making this research possible and for all the insights that were shared with me. I genuinely enjoyed working together, both professionally and personally. To all participants in this study: thank you. It was remarkable to see how open and willing everyone was to contribute. This research would not have been possible without your input.

Lastly, I want to thank my friends, roommates, brother, sister, and grandparents for their continuous support during this thesis. To my parents who supported me throughout my entire academic journey which went smoothly partly thanks to their involvement whether through a call to discuss ideas or a welcome distraction. Thanks to my girlfriend, going through the thesis phase together at the same time made it a lot easier and more fun: Mutual pep talks, shared progress pings, and lots of laughs about how chaotic things sometimes got.

With this thesis, I hope to contribute, even in a small way, to making hybrid collaboration in software development just a little less painful, and a lot more productive.

*Thomas Swuste
Rotterdam, August 2025*

Executive summary

In the context of the increased adoption of hybrid working models in the Netherlands, remote collaboration has become the standard in many sectors, including the ICT domain and agile software development teams. An important consequence of this shift is that more meetings are now held in a hybrid format, with some participants joining from the office and others remotely. While this setup offers flexibility, it also introduces new challenges for effective collaboration, especially in meetings that require high levels of interaction and alignment, such as requirement elicitation sessions. Although hybrid collaboration has been studied in general terms, there is a lack of research into how these challenges specifically affect high-interaction processes such as requirements elicitation. Most existing literature focuses on tools or general barriers but does not address how collaboration breaks down in hybrid settings with requirement elicitation techniques. This study deals with that gap by identifying specific obstacles in hybrid requirements engineering and by simultaneously offering requirements engineers strategies to address these hybrid collaboration challenges. Therefore, this research was guided by the following main question:

What strategies can be introduced to improve collaboration in hybrid meetings for requirements elicitation in agile software development?

This thesis highlights the need for an innovation that goes beyond ad hoc solutions and provides a structured response to the collaboration issues in hybrid meetings. To answer this question, a structured design science approach was used, dividing the research into five distinct phases: 1. problem identification, 2. designing solution objectives, 3. design and development, 4. demonstration and evaluation, and 5. communication. Each phase contributed to building a clear understanding of the problem and shaping a practical strategy.

In the problem identification phase, general collaboration challenges in hybrid meetings are derived from literature. These are complemented by a deeper analysis of challenges specific to requirement elicitation through additional literature review and a series of interviews with requirements engineers, product owners, and clients. This resulted in three key challenges:

- Unequal participation between remote and on-site participants
- Insufficient engagement and focus during meetings
- Difficulties in facilitating hybrid sessions

These insights are used to define the goals for a potential strategy. Based on the interviews and problem analysis, a system requirements structure was created to outline what the intervention strategy should achieve. This structure also included non-functional criteria to evaluate and compare potential strategies.

Based on these objectives, during the design and development phase three alternative intervention strategies are explored. These approaches each addressed different layers of the collaboration problem. These are combined into one comprehensive strategy, structured around three reinforcing pillars:

- Setup: focuses on the physical and digital meeting environment.
- Structure: concerns how the meeting is designed and led.
- Awareness: relates to participant behavior and mindset.

These three elements strengthen each other. A better setup supports a clear meeting structure, while a clear structure creates space for more inclusive behavior. Together, they help teams move beyond surface-level fixes and work towards meaningful improvements.

A central strength of this research is the empirical demonstration of the strategy. It was tested in three real hybrid meetings in the field, with structured evaluation after each session. All facilitators reported improvements in focus and balance, and participants reacted positively to the changes. These pilot sessions show that the strategy is not just theoretically sound, but also feasible and positively received in practice.

All gathered insights of previous phases allowed to shape a final strategy into a roadmap, designed to guide teams in applying the interventions step by step. The roadmap organizes the interventions across three levels:

- Quick wins for facilitators: Small, easy-to-apply changes that immediately improve meeting dynamics
- Facilitator behavioral adjustment strategies: Structured interventions that require preparation and a proactive facilitation style
- Collective behavioral adjustment strategies: Interventions that involve the entire team, focusing on shared norms and collaboration culture

This study contributes to science by identifying specific collaboration challenges in hybrid requirements elicitation which are in line with current already existing literature with general barriers. The novelty of this lies in identifying these challenges, but more importantly this study offers some concrete, layered strategy to address them. This has already been tested in three demonstrations with positive outcomes. It also contributes to practice by providing a low-barrier, tool-independent solution that teams can adopt without major system changes. While the research was conducted in a single organization, the findings are likely relevant across many agile teams. Still, generalizability depends on context factors such as digital infrastructure, team culture and facilitation readiness. Future studies should test the roadmap in other organizations and examine whether the effects observed in the pilots are sustained over time. To conclude, this strategy supports a shift from ad hoc facilitation to purposeful navigation. It positions the requirements engineer not only as a technical expert but as a navigator who actively shapes effective collaboration in hybrid settings.

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1 Introduction

Five years ago, in March 2020, the Dutch government introduced the first work-from-home restrictions to reduce the spread of the COVID-19 virus. Until that time, working in the office was the standard, and only a small number of businesses let their employees work from home (Jongen et al., 2021). During the COVID-19 pandemic, this changed drastically. People became accustomed to remote work, and it quickly became apparent that working from home was more feasible than initially thought (Jongen et al., 2021). This trend continued after the pandemic because many employees wanted to continue working from home for a better work-life balance (Kaushik & Guleria, 2020). To mitigate the drawbacks of remote work, such as reduced personal contact among employees, hybrid work emerged, allowing people to divide their time between home and the office (Müller et al., 2023).

These hybrid working models has become the most adopted work model for organizations in the Netherlands (Centraal Bureau voor de Statistiek, 2024). This trend is not expected to change in the coming years (Basekin, 2025), since many organizations are restructuring their office environments and therefore office capacity is no longer tailored to accommodate all employees simultaneously. ICT is one of the sectors that has embraced hybrid working models the most (Centraal Bureau voor de Statistiek, 2024). For instance, hybrid working has become common practice in agile software development (Tang et al., 2025), which is an iterative and flexible approach that emphasizes collaboration, customer feedback, and continuous improvement to deliver functional software in smaller pieces (Rasheed et al., 2021). While hybrid work offers benefits to employees, it also introduces significant challenges for effective teamwork and collaboration, particularly during meetings in which some participants are co-located and others join remotely. (Williams & Shaw, 2024).

One of the key areas within agile software development where challenges arise during hybrid work is the requirements elicitation phase. This is the process of gathering and defining system requirements for agile software development with stakeholders (Nguyen-Duc et al., 2023). This traditionally relied on extensive face-to-face discussions to ensure clear communication and alignment, requiring a high level of collaboration (Gregory, 2021). In hybrid work settings, interaction processes like requirement elicitation face new challenges. Since not all team members are co-located, the opportunities for spontaneous interaction and rich face-to-face communication are limited (Canedo et al., 2024). This shift complicates the process of building mutual understanding and aligning stakeholder needs. For example, a certain lack of common ground in hybrid meetings, can lead to ambiguous or incomplete requirements, thereby negatively impacting project outcomes (Okpara et al., 2023; Bogolii, 2023). According to Müller et al. (2023) as hybrid work continues to develop, the difficulties in balancing remote and in-office participation will keep affecting the processes of requirements engineering.

The previous paragraph outlines that challenges arise when collaboration is done in hybrid meetings. Within the context of agile software development, requirement elicitation and early-stage project management are among the most affected processes in hybrid work settings (Nguyen-Duc et al., 2023; Gregory, 2021; Hidellaarachchi et al., 2021). This could lead to reduced shared understanding, limited participation, and challenges in non-verbal communication (Canedo et al., 2024; Obal et al., 2024). Simply going back to only face-to-face meetings to overcome these challenges is not feasible since studies also show that the hybrid working model is here to stay (Tang et al., 2025).

While existing studies acknowledge that hybrid settings impact development processes like requirement elicitation (Nguyen-Duc et al., 2023; Müller et al., 2023), the specific challenges of hybrid requirement elicitation meetings remain unknown. In addition, literature lacks concrete, structured intervention strategies specific to this context. As such, there is limited guidance for requirements engineers on how to improve collaboration and overcome the distinct challenges that arise in hybrid elicitation settings.

This research addresses this gap by first identifying the specific collaboration challenges present in hybrid requirements elicitation meetings and subsequently designing targeted intervention strategies to mitigate these challenges. In doing so, the study aims to contribute both to academic understanding and to practical methods that support more effective hybrid collaboration in requirements engineering. Therefore, based on the knowledge gap, the main research question for this research can be formulated as follows:

Main research question

What strategies can be introduced to improve collaboration in hybrid meetings for requirements elicitation in agile software development?

To answer this research question, multiple sub questions are developed:

1. What are the general challenges influencing effective collaboration in meetings that can be identified in literature?
2. What are the specific challenges for requirements elicitation in a hybrid setting that are identified by different stakeholders (e.g., requirements engineers, end-users, product-owners)?
3. What specific objectives for effective collaboration in hybrid requirements elicitation meetings can be defined by different stakeholder perspectives (e.g., requirements engineers, end-users, product-owners)?
4. Which requirements elicitation (RE) techniques are best suited for hybrid settings, and which are not viable?
5. What intervention strategies can be developed to improve collaboration in hybrid requirements elicitation meetings?
6. How do the developed intervention strategies impact collaboration in hybrid requirements elicitation meetings in an initial demonstration at Info Support?

This research is conducted as a case study within Info Support, a Dutch IT consultancy firm specializing in custom software development. Like many organizations in the software industry, Info Support has structurally adopted hybrid working practices, both

internally and in collaboration with clients. This also applies to requirements engineering processes, where elicitation meetings are held in a hybrid format.

The setting at Info Support provides relevant context for this research, as hybrid collaboration is part of their daily practice. It offers the opportunity to explore how hybrid work affects requirements elicitation and to examine potential ways to improve collaboration during such meetings. Insights from this specific environment are used to identify relevant challenges and inform the development of intervention strategies.

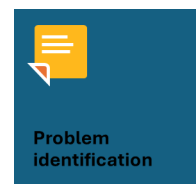
Research objective

The objective of this research is to design a structured approach in order to enhance collaboration during hybrid requirements elicitation sessions in software development projects. Specifically, this study aims to develop and evaluate intervention strategies that effectively address the challenges encountered when teams are partially remote and partially co-located. To achieve this, the research first identifies and analyzes the specific challenges present in the requirements elicitation phase under a hybrid setting. These findings serve as the foundation for formulating targeted intervention strategies.

Ultimately, the goal is to provide a set of practical, evidence-based measures that not only improve requirements elicitation but also facilitate smoother and more effective collaboration during hybrid meetings. This approach is intended to contribute to improved project outcomes and supports the agile development process by ensuring that effective communication and stakeholder alignment are maintained despite distributed working conditions.

Structure

This thesis is organized in different chapters: It begins with the background context and positioning, outlining the core concepts. The methodology chapter follows, describing the research approach and the phases used throughout the study. The subsequent chapters are each structured around one specific research phase, moving step by step from problem identification to the development and evaluation of intervention strategies. To enhance clarity and recognizability, each phase is marked with a visual icon, such as the one shown for *Problem identification* to the right. These icons help the reader follow the structure and see how the research progresses across the different stages. The introduction of each chapter specifies which sub-question is being addressed. Afterwards in the discussion the results are interpreted and reflected on. The main research question is answered in the conclusion, followed by directions for future research.



2 Background context & positioning

This chapter provides an understanding of the concepts and context relevant to this research. It begins with an overview of agile software development, which serves as the broader framework within which requirements engineering takes place. From there, the focus narrows to requirements engineering itself, before specifically addressing requirements elicitation and the techniques involved in this phase.

2.1 Agile software development

Agile software development is a dynamic and iterative approach to software creation that emphasizes flexibility, collaboration, and customer satisfaction. It is designed to accommodate changes and to deliver functional software quickly and efficiently. Agile methodologies are characterized by their focus on iterative development, where requirements and solutions evolve through the collaborative effort of cross-functional teams. Therefore, different phases are going through during the development in a cyclic way over and over again, as illustrated in figure 2.1.

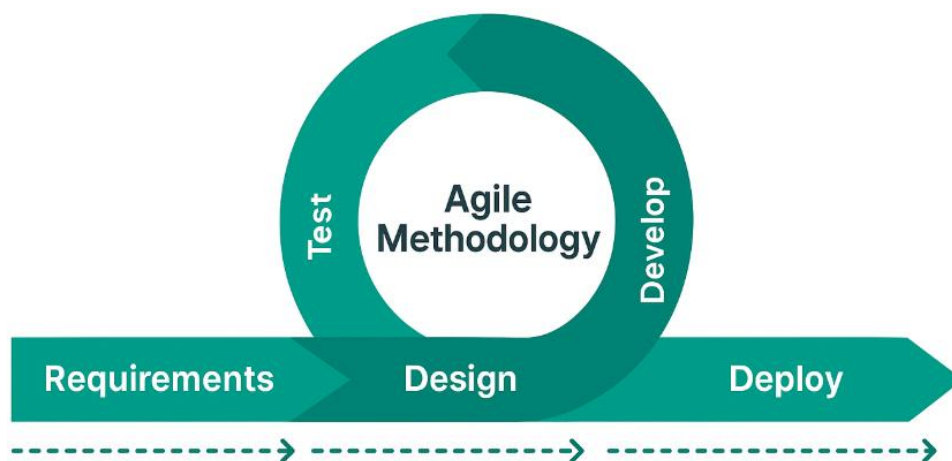


Figure 2.1: Visualization of the agile methodology

The first phase in agile software development is the *requirements engineering*, which involves eliciting, documenting, validating, negotiating, and managing the information necessary to build, operate, and maintain a software system. Agile methodologies prioritize direct communication and collaboration with stakeholders to gather requirements, often using user stories and backlogs to capture and manage these needs. This approach allows for flexibility and adaptability, accommodating changes in requirements as the project evolves (Moyano et al., 2022; Ghani et al., 2019).

The *design phase* in agile software development focuses on creating the architecture, user interface, and other design elements necessary for the software. Agile design is typically iterative and incremental, allowing for continuous refinement and improvement (Alrabaiah & Medina-Medina, 2021). During the *development phase*, the software is

implemented based on the design. Agile development is characterized by short, iterative cycles where code is written, tested, and integrated frequently (Ángel et al., 2020).

Testing in agile software development is an ongoing process that occurs throughout the development cycle. It involves verifying and validating the software to ensure quality and functionality. This approach helps maintain high quality and allows for quick adjustments in response to issues (Ángel et al., 2020; Ghani et al., 2019). The *deployment phase* involves making the software available to users. In agile, deployment is often incremental, with new features and updates released frequently. This approach allows users to benefit from improvements and new functionality as soon as they are ready, rather than waiting for a large, monolithic release (Alrabaiah & Medina-Medina, 2021; Abrahamsson et al., 2003). Maintenance in agile software development involves supporting and updating the software after deployment. Agile methodologies emphasize the importance of responding to user feedback and making necessary changes to improve the software. This phase ensures that the software remains relevant and functional over time, adapting to new requirements and technological advancements (Murugaiyan & Balaji, 2012).

2.2 Requirements engineering

Outlined in the previous paragraph, one of the phases of the agile software development cycle is the requirements engineering. This phase is the focus of this thesis. Requirements engineering is a systematic approach to the specification and management of requirement with the following goals (Improve, 2018):

1. Getting to know the relevant requirements, achieving a consensus among the stakeholders about these requirements, documenting these accordingly to the given standards and managing them systematically (Improve, 2018).
2. Understanding and documenting the stakeholders' desires and needs (Improve, 2018),
3. Specifying and managing requirements to deliver a system that meets the stakeholders' desires and needs (Improve, 2018).

Typically, requirements engineering exists of four main activities. The first activity is Requirement elicitation. This is the process of gathering, discovering, and understanding the needs, expectations, and constraints of stakeholders to define the requirements for a system or product. The second activity is requirements documentation (Improve, 2018). This is the formal process of recording, organizing, and communicating the gathered requirements in a clear and structured manner to ensure all stakeholders have a shared understanding of the system's needs and constraints (Improve, 2018). Thirdly, the validation and negotiation activity. Requirement validation is the process of ensuring that the documented requirements accurately reflect stakeholder needs and are feasible, while requirement negotiation involves resolving conflicts and reaching an agreement on priorities, scope, and constraints among stakeholders (Improve, 2018). Lastly, the management of requirements activity which entails the ongoing process of tracking, prioritizing, and maintaining requirements throughout the project lifecycle, ensuring they remain aligned with stakeholder needs, project goals, and changes in scope or context (Improve, 2018).

2.3 Requirement elicitation

This thesis focuses specifically on the requirement elicitation activity of requirements engineering. Requirements elicitation refers to the process of uncovering, understanding, and reaching agreement on what a software system should do, based on the desires and needs of its stakeholders (Pohl & Rupp, 2015). The role of the requirements engineer is to translate these often implicit needs into explicit, verifiable requirements while ensuring that the requirements are complete, consistent, and collected from all relevant sources (Brand et al., 2024). This means not only understanding the viewpoints of various stakeholders, but also knowing which sources to consult, which types of requirements exist, and how to select suitable techniques for elicitation. A key goal is to move from vague or unstated expectations to clearly defined requirements that can guide system development (IEEE SA, n.d.).

The quality and completeness of the requirements heavily depend on the sources used during elicitation (Brand et al., 2024). Overlooking a key source may result in an incomplete or biased understanding of the system and its environment. Commonly used sources include stakeholders, existing documentation, and related systems (Bühne et al., 2020). Stakeholders in particular form a central source of information and typically include direct users, clients, business or process managers, IT staff, and sometimes external actors such as regulatory bodies or competitors (Rupp et al., 2014). To gather input from these sources, various elicitation techniques are available. These techniques can be grouped into categories such as questioning, observation, collaboration, creativity, and artefact-based approaches (Brand et al., 2024). Each category contains methods suited for different types of information or interaction styles. The figure 2.2 below provides an overview of the most widely used techniques across these categories.

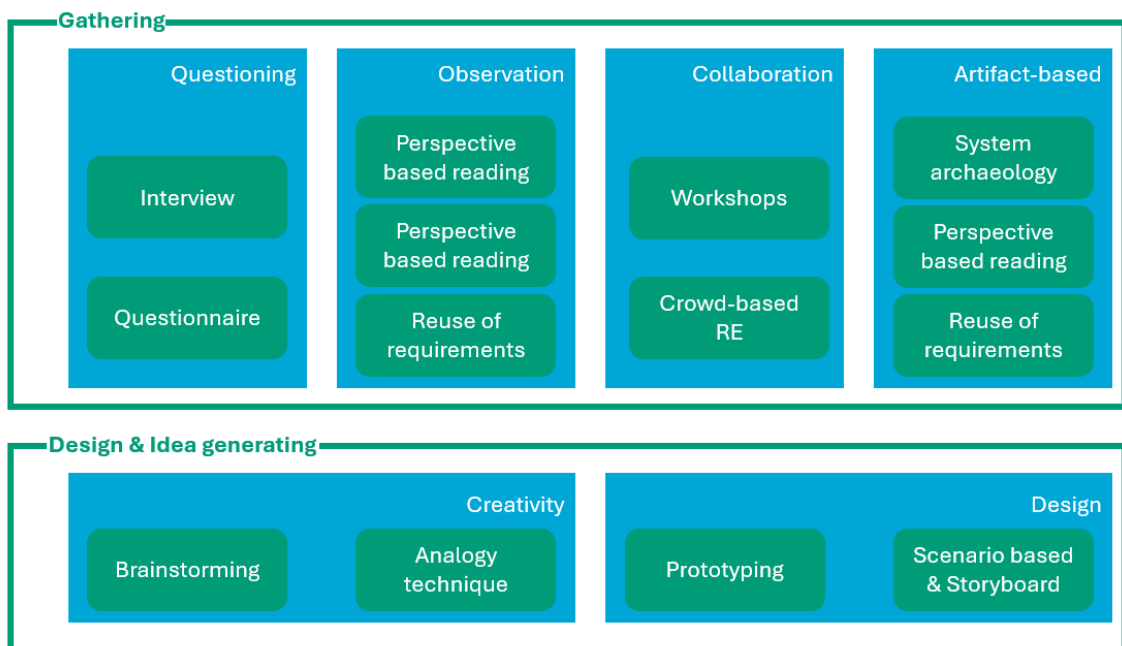


Figure 2.2: Overview elicitation techniques (Brand et al., 2024)

All these techniques are further elaborated below to have more understanding how requirements can be gathered.

2.3.1 Questioning techniques

Within requirement elicitation, interviews and questionnaires are part of the questioning techniques. The goal of these techniques is to gather information by asking questions to stakeholders, so that requirements can be derived from their answers (Brand et al., 2024).

Interviews are the most used technique, because they are easy to set up, require few resources, and can be used to elicit both high-level and detailed requirements (Brand et al., 2024). In an interview, a one-on-one conversation takes place, either in person or online, where the interviewer actively asks questions to better understand the stakeholder's needs and expectations. An interview is more than a simple conversation. It includes a clear role division, with one person asking and the other answering, is prepared in advance using an interview guide, and requires proper analysis afterwards. The interviewer needs to balance guiding the conversation with being open to new insights. While interviews often provide valuable input, they are time-consuming to conduct and analyze (Brand et al., 2024).

A questionnaire, on the other hand, is a written method used to collect data from a larger group. There are two types of questionnaires. Quantitative questionnaires are used to confirm previously identified requirements. These usually consist of closed questions and can be analyzed using statistical methods. Qualitative questionnaires are designed to elicit new requirements. They include open questions and often result in complex data that is more difficult and time-consuming to process. A common misconception is that questionnaires are quick to complete. In practice, designing good and unbiased questions, distributing the questionnaire, and analyzing the results often takes more time than expected (Baxter et al., 2015). Depending on the context and goals of the project, both interviews and questionnaires can be valuable elicitation techniques, if they are applied correctly. (Brand et al., 2024)

2.3.2 Observation techniques

Observational techniques in requirement elicitation aim to gather insights by observing users in their work environment. Techniques such as field observation, apprenticing, and contextual inquiry help uncover implicit requirements that may not surface through direct questioning.

In a field observation, the requirements engineer observes a user while they perform their tasks in their usual setting. The goal is to understand how a system is currently used or how it should support certain workflows (Brand et al., 2024). There is no interaction between the observer and the user during this process. This technique should never be used on its own, since observations can easily be influenced by the perspective of the observer (Brand et al., 2024). What seems clear from a distance may be misunderstood without further explanation. That is why field observations are best combined with other techniques to validate what has been observed.

Apprenticing builds further on this by letting the requirements engineer participate in the actual work. The engineer takes on the role of an apprentice, working side by side with an expert stakeholder (Brand et al., 2024). This allows the engineer to directly experience the tasks and challenges involved. Asking questions during the process is essential to avoid assumptions and gain a full understanding. The stakeholder plays an active role in guiding and explaining the tasks, which makes this technique suitable for gaining insights into complex or highly contextual work. The outcomes are usually reviewed together to confirm that the engineer's interpretation matches reality (S. Robertson & Robertson, 2013). Contextual inquiry combines the strengths of both observation and dialogue. The requirements engineer observes a stakeholder during their work while also asking questions about what they are doing and why. The aim is to uncover hidden needs, routines, and potential pain points. Interpretation is done jointly with the stakeholder, which helps avoid miscommunication. Data collection may include notes, work artefacts, or even recordings, depending on the situation. The results are analyzed collaboratively, often leading to rich qualitative input such as personas, workflows, or detailed requirements. This technique is especially useful when tasks are routine for the user, but the underlying logic or needs are not easily expressed (Brand et al., 2024).

2.3.3 Collaboration techniques

Collaboration techniques focus on co-creation among stakeholders to gather, evolve and refine (existing) requirements (Brand et al., 2024). Requirements workshops are structured meetings organized by requirements engineer designed to bring stakeholders together for such a collaborative requirement elicitation. They involve various roles, including a facilitator who guides the session, a recorder who documents the proceedings, and a workshop sponsor who legitimizes and funds the activity (Brand et al., 2024). Preparation is iterative, considering workshop objectives, room setup, participant numbers, and available tools. The workshop agenda serves as a guideline, allowing for flexibility during the session. The facilitator leads the group, ensuring participation and documenting input, while the recorder captures the discussions and decisions. After the workshop, the facilitator or recorder processes the documentation for distribution. Workshops aim to enhance team communication and decision-making, identifying and resolving potential conflicts. However, they require significant resources and depend on effective facilitation and planning (Brand et al., 2024).

Crowd-based requirement elicitation is a technique in which automated or semi-automated gathered information is analyzed from a crowd to derive user requirements (Groen et al., 2017). This technique requires defining the target crowd and establishing methods for engaging them and analyzing the resulting data. The process involves motivating crowd members to provide feedback, analyzing usage and contextual data, and iteratively refining requirements based on this feedback. The Requirements engineer plays a central role in eliciting and analyzing this data, often using text mining tools. The derived requirements are then implemented and validated by the crowd. Crowd-based RE can generate large volumes of data, presenting challenges in analysis and interpretation, but it offers the potential to gather diverse perspectives and insights (Brand et al., 2024).

2.3.4 Artefact-based techniques

Artefacts are products of human activity, such as IT systems, documents, or images. These artefacts can be valuable sources of input during requirement elicitation. Several techniques exist to gain insights from such artefacts.

One of these techniques is perspective-based reading. This method focuses on analyzing existing documents to identify potential requirements (Brand et al., 2024). It involves selecting relevant documents and approaching them from a particular viewpoint, such as the perspective of a user or developer. The process includes reading the material, marking important sections, and documenting the extracted information. This technique is especially useful when stakeholders are not readily available, as it allows the reuse of documented knowledge (Brand et al., 2024). However, the accuracy and relevance of the documents may be limited. Therefore, the extracted requirements should always be verified using other elicitation methods (Brand et al., 2024). The output typically consists of review notes, marked-up documents, and a list of identified requirements. Another artefact-based technique is system archaeology. This approach aims to understand an existing system by analyzing its artefacts, such as source code or user interface designs (Brand et al., 2024). The method involves studying the system's structure, functions, and interface behavior to uncover how it works and what requirements can be derived from it. For instance, reviewing the source code may provide insights into underlying logic, while tracing user interface flows can reveal how processes are implemented. System archaeology is especially useful when documentation is missing or outdated (Brand et al., 2024). Still, any findings must be cross-checked, as the current system might not reflect the needs of a future solution. Typical results include diagrams, screenshots, and descriptive documentation of the observed functionalities.

A third technique is the reuse of requirements. This method involves identifying requirements from earlier projects or related systems that could be applicable to a new context (Brand et al., 2024). It is particularly useful for reusing non-functional requirements, such as performance, security, or compliance standards, which tend to remain relevant across different systems. The process includes selecting relevant documents, scanning them for reusable elements, and adapting those to fit the new project. While this can save time and reduce duplication of effort, it is essential to assess whether the reused requirements still apply. Requirements that worked in one context may not automatically fit another. The outputs include documented reusable requirements, which need further refinement and validation through additional elicitation techniques (Brand et al., 2024).

2.3.5 Creativity design thinking techniques

Creativity techniques in requirement elicitation help generate new ideas, explore alternative solutions, and uncover requirements that may not surface through direct questioning or observation alone. These techniques are particularly useful in early design phases, where openness and exploration are needed. Two common techniques are brainstorming and analogy thinking. Brainstorming is a creativity technique used to generate a wide range of ideas in a short amount of time. In the context of requirement elicitation, it helps uncover potential features, solutions, or user needs that may not arise through more structured techniques (Brand et al., 2024). A brainstorming session

typically involves a group of stakeholders or team members who are encouraged to share ideas freely without immediate evaluation or criticism. This open environment supports divergent thinking and allows less obvious ideas to surface. After the initial idea generation, the group can cluster, evaluate, and refine the ideas to extract concrete requirements (Brand et al., 2024). Analogy thinking is a technique that uses comparisons with known systems or concepts to come up with ideas for a new system. The idea is to build on familiar knowledge and experiences by drawing parallels between different domains (Brand et al., 2024). This can help generate fresh insights or alternative ways of looking at a problem. It involves identifying a useful analogy and then translating elements from that analogy to the current context. The results are ideas or potential solutions that are shaped by this comparison, which are then evaluated for relevance. This technique is especially useful when teams are stuck or when conventional thinking does not lead to new ideas (Brand et al., 2024).

2.3.6 Design thinking techniques

While creativity techniques focus on generating a wide range of ideas, design thinking techniques take a more structured approach by placing the user and their context at the center. Common techniques are prototyping and scenario & storyboards. Prototyping is about creating early simplified versions of a system to explore and test requirements (Brand et al., 2024). These can be very basic, like paper sketches, or more advanced, like clickable mockups. The goal is to make ideas tangible so stakeholders can interact with them and give feedback. This helps identify missing requirements or usability issues early on. Prototyping is typically an iterative process, meaning the prototype is adjusted based on what is learned in each round of feedback. The main outputs are the prototypes themselves, and the insights gained from how users respond to them. Prototyping supports clearer communication, more accurate requirements, and better alignment with what users actually need (Brand et al., 2024).

Scenarios are narrative descriptions that show how users interact with a system to achieve specific goals. They help to bring the system to life by describing realistic situations in which the system is used (Brand et al., 2024). This makes it easier for stakeholders to understand the functionality of the system and to identify possible requirements or issues. A scenario usually includes a detailed story that outlines a specific use case, including the steps a user takes and the context in which the system is used. The result is a set of written scenarios that can be used to support discussions around system design and development. Scenarios are especially helpful when trying to clarify complex requirements or when validating whether the system supports the actual goals of its users (Brand et al., 2024). Storyboards are a visual version of scenarios. Instead of using text, they use a sequence of sketches or images to show how a user interacts with a system. A storyboard illustrates the steps in a scenario and helps to make abstract ideas more concrete (Brand et al., 2024). This is particularly useful when designing user interfaces or planning how a user moves through a system. The process involves drawing out key moments in the interaction, often in a comic-strip format, to show what the user sees and does at each step. The output is a set of images that can be used to communicate ideas and requirements during the design phase. Storyboards help to ensure that the system design aligns with user expectations and supports a smooth, intuitive user experience (Brand et al., 2024).

2.3.7 Overview techniques

To conclude this chapter, table 2.1 presents a structured overview of the techniques within the six categories of requirement elicitation previously discussed. Each technique is positioned along seven interaction strategies. These strategies, such as conversational, observational, artifact-based, and creativity stimulating, represent different modes through which techniques engage stakeholders and help uncover requirements. By mapping techniques against these strategies, the table highlights the diverse ways in which stakeholder knowledge can be accessed and elicited. This provides a conceptual foundation for the subsequent analysis of hybrid requirements elicitation.

Table 2.1: Elicitation techniques categorized by characteristics

Techniques	Conversational	Questioning	Observational	Provoking (dis-) agreement	Artifact based	Creativity stimulating	Experiencing
<i>Interview</i>	X	X					
<i>Questionnaire</i>		X					
<i>Field observation</i>			X				X
<i>Apprenticing</i>	X		X				X
<i>Contextual inquiry</i>	X		X				X
<i>Workshops</i>	X			X		X	
<i>Crowd based RE</i>					X		
<i>System archaeology</i>					X		
<i>Perspective based reading</i>					X		
<i>Reuse of requirements</i>					X		
<i>Brainstorming</i>	X			X		X	
<i>Analogy technique</i>	X			X		X	
<i>Prototyping</i>	X			X			
<i>Scenario & storyboards</i>	X			X			

3 Methodology

This chapter outlines the methodology used in this research. First, the overall research approach is introduced. This is followed by a breakdown of how the methodology is applied across the five phases of the research and how these phases relate to the sub-questions. After that, the data management process is briefly discussed, focusing on how data is handled and protected. To conclude, a flow diagram is included to give a clear overview of the research process.

3.1 Research method

The primary research question highlights the necessity for an innovation. Therefore, the selected research method is based on a practical design-science approach, focusing on a detailed case study at Info Support, a software development company in the Netherlands. This case study helps to explore hybrid requirements gathering in a real-world context, highlighting the complexities and teamwork dynamics in hybrid meetings. Info Support is a fitting choice for this research because it actively uses agile development methods, frequently engages in hybrid communication with clients, and continually seeks to improve its software development processes.

This qualitative method aims to connect theory with real-world applications, bridging theoretical insights with practical applications (Bakker & van Eerde, 2014). Given that this is a complex socio-technical problem involving various stakeholders, it fits well with the comprehensive nature of the design-science approach, as suggested by Plomp and Nieveen (2013). The problem-solving process of the design approach consists of six essential steps:

1. Problem identification
2. Defining solution objectives
3. Design and development
4. Demonstration
5. Evaluation
6. Communication

To ensure a structured approach in answering the main research question, sub-questions are formulated based on these steps and distinct phases of the research are determined. Step 4 and 5 of the design approach are combined into one phase because of time constraints of this research. Resulting in the five distinct phases of research shown in figure 3.1.

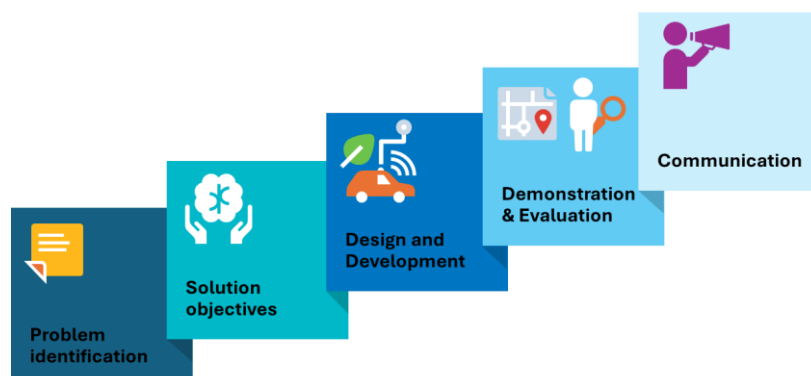
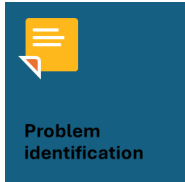


Figure 3.1: Phases of this research

3.2 Research approach in phases

The research is conducted in distinct phases, each aligning with the design-science methodology. Each phase builds upon the findings of the previous one, collectively contributing to the main research question. The phases are executed as follows:



3.2.1 Phase 1: Problem identification - desk research & interviews)

The research begins with identifying the challenges related to collaboration during hybrid requirements elicitation meetings. To explore this, a literature review was conducted focusing on both literature on challenges in general hybrid collaboration and challenges for specific requirements engineering processes. After the literature review, interviews are conducted to come to specific hybrid requirement elicitation challenges. During this phase sub-question 1 and 2 are addressed:

1. *What are the general challenges influencing effective hybrid collaboration in meetings that can be identified in literature & what are general challenges influencing requirements engineering?*
2. *What are the specific challenges for requirements elicitation in a hybrid setting that are identified by different stakeholders (e.g., requirements engineers, end-users, product-owners)?*

Literature review

For sub-question 1, a literature review of the literature regarding the challenges faced in collaborative meetings is conducted, with a focus on investigating general issues related to hybrid team collaboration to gain perspective on potential challenges in hybrid requirement elicitation. By using the PRISMA method, this phase aims to establish a clear and repeatable process for identifying relevant studies, selecting high-quality sources, and gathering valuable insights (Page et al., 2021). Two separate search strategies are followed to gather literature from different perspectives. The first search focuses on identifying general collaboration challenges in hybrid meetings. The second search aims to identify challenges specifically related to requirements engineering. Both search strings are constructed by combining keywords, using Boolean operators to structure the query. Table 3.1 presents the search strings used for the found literature. *Appendix A: PRISMA diagrams* provides the full PRISMA flow diagrams for study selection.

Table 3.1: Explanation components of search strings literature reviews

Search string 1 for general challenges		Search string 2 for specific challenges	
String element	Explanation	String element	Explanation
Collaborati* OR coordinat**OR communicat*	To connect to literature about collaborating elements	Requirement* AND engineer*	Specific for requirement engineering
Challenges OR barriers	To find challenges	Challenges OR barriers	To find challenges
work AND meeting*	To connect to meetings in workspace	Agile AND software AND development	To fit scope of research
hybrid or remote	To connect to hybrid or remote setting	Collaborati*	To connect to collaboration

Expert interviews

Insights from phase 1 informs the design of interviews conducted in this phase to address sub-questions 2. These interviews aimed to identify specific challenges for hybrid requirements elicitation. The interview setup is semi structured to allow for an open yet guided conversation. This approach enables the interviewer to explore specific themes in depth; while also giving participants the freedom to raise topics they consider relevant within their own context (Adams, 2015). The interview protocol shown in *Appendix B: Interview question list protocols*, is used to have the same structure in each interview. This version is reformulated to avoid technical jargon and to explore perceptions of both the hybrid meeting context and the role of the facilitator/requirements engineer within it. A convenience sampling strategy is used to select interviews. This is a strategy where a non-probability sampling technique where participants are chosen based on their ease of access and availability to the researcher (Golzar et al., 2022). This method was chosen for its practicality and less-time consuming benefits (Golzar et al., 2022). Interviews are conducted with requirements engineers, product owners, and end-users who have participated in requirements elicitation at Info Support. Requirements engineers facilitate the elicitation process by gathering, analyzing, and documenting requirements. Product owners prioritize and define requirements based on business needs. End-users provide insights into usability and expectations.

All interviews are held in Dutch and audio recorded. Afterwards each interview is transcribed using a built in Microsoft Teams transcription function whereafter it was reviewed and polished by the researcher, since errors occurred in the automatic tooling. Transcribing has been done verbatim, as prescribed to ensure accuracy and better understanding (Adeoye-Olatunde & Olenik, 2021), which is also the reason why the transcriptions are kept in Dutch to preserve the original meaning and nuances.

After transcribing a codebook is generated to analyze the interview transcriptions. In qualitative data analysis, two main approaches can be distinguished: inductive and deductive. In an inductive (bottom-up) approach, themes are derived directly from the data without relying on pre-existing frameworks or theoretical assumptions. This method is data-driven and closely aligned with grounded theory (Braun et al., 2021). In contrast, a deductive (top-down) approach is guided by existing theories or specific research questions, leading to a more focused analysis of aspects of the data rather than a broad thematic overview (Braun et al., 2021). In this research a combination of both the deductive and inductive approach is used. As a starting point, a codebook is made based on the categories of challenges that emerged during the literature review in the previous step, mirroring the deductive approach. During coding, other themes emerged, which are added to the already existing codebook, mirroring the inductive approach. The final codebook is included in *Appendix C: Codebook*. The analysis of the interviews is done in Atlas.ti, which is a qualitative data analysis software designed to support the systematic organization, coding, and interpretation of large volumes of textual or audiovisual data. It enables researchers to assign codes to segments of data, group related concepts and identify patterns or themes across interviews or documents (ATLAS.ti Scientific Software Development GmbH, 2025).



3.2.2 Phase 2: Solution objectives – expert interviews

The interviews of the previous phase are not only focused on the identification of specific hybrid requirement elicitation challenges, but they also focus on which objectives can be determined to improve requirement elicitation in hybrid settings. This way the key objectives for improving requirements elicitation in hybrid settings is determined with expert knowledge as well. During this phase sub-question 3 is addressed:

3. *What specific objectives for effective collaboration in hybrid requirements elicitation meetings can be defined by different stakeholder perspectives (e.g., requirements engineers, end-users, product-owners)?*

To ensure dedicated time to the forming of objectives, the interviews are therefore split into two parts, with the first part focusing on problem identification and the second on defining objectives. Based on the needs and objectives identified by the different interviewees, a system requirements structure is used to create a better understanding of the objectives. The system requirements structure proves to be helpful because it helps to break down the overall goal of improving collaboration in hybrid requirements elicitation meetings into more concrete and manageable objectives (Enserink et al., 2022). This structure helps to translate a high-level aim into specific sub-objectives, which form the basis for designing targeted intervention strategies. The lower-level objectives make it possible to define clear criteria to assess whether the strategies meet the needs identified earlier in the research (Enserink et al., 2022). The system requirements structure not only defines the functional and non-functional requirements but also serves as a tool to break down broader objectives into smaller, more manageable sub-objectives, this also helps in the next phase to design and develop intervention strategies.

The system requirements structure is made from functional requirement. The functional requirements describe what the intervention strategies should enable or support to improve collaboration during hybrid requirements elicitation meetings. These are derived from the core challenges identified earlier in the research and reflect the key functions the solutions must fulfil.

In addition to this, a set of non-functional requirements is formulated based on insights from the interviews. These requirements do not describe what the system should do, but rather under which conditions it should operate. They reflect expectations around aspects such as usability, flexibility, and feasibility, and are essential to ensure that the proposed interventions are practical and can be successfully adopted in real-life settings.

3.2.3 Phase 3: Design and development – focus group



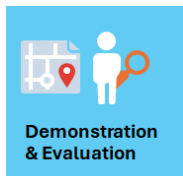
Based on the identified functional requirements from the previous phase, intervention strategies are developed. The focus lies on creating practical and realistic interventions that do not conflict with each other and that, when combined, strengthen each other's impact in improving hybrid collaboration during requirements elicitation meetings. This phase addresses sub-question 4 and 5:

4. *Which requirements elicitation (RE) techniques are best suited for hybrid settings, and which are not viable?*

5. *What intervention strategies can be developed to improve collaboration in hybrid requirements elicitation meetings?*

To answer sub-question 4, insights from both the interviews and the literature reviewed in the earlier phase are used to assess which requirement elicitation techniques are most suitable for hybrid settings. Sub-question 5 is addressed by making use of a morphological chart derived from the system requirements structure. A morphological chart is a structured method often used in design and engineering to systematically explore a wide variety of potential solutions to a given problem (Smith et al., 2006). It typically takes the form of a large table, in which the main functions of a system are listed along one axis, and for each function, multiple possible means or methods are defined. Morphological charts are particularly valuable in contexts where innovation is needed (Smith et al., 2006), making it a suitable method within the design science approach of this research. These charts are widely applied to support idea generation and structured decision-making in both system and product development processes (Gumulya et al., 2021). Based on the morphological chart, feasible combinations of means can be selected to form design alternatives (Smith, 2007). These alternatives represent different intervention strategies, from which one final concept is selected in the next phase of the research.

To generate a broad range of potential means for the morphological chart, a focus group was organized with requirements engineers. Focus groups are commonly used to stimulate idea generation, as the group setting encourages participants to build on each other's input and engage in deeper discussion (Parker & Tritter, 2021). This collaborative dynamic helps uncover more diverse and creative ideas than individual sessions might yield (Durgee, 1987). The group consisted of 5 participants, which falls within the range of a so-called mini focus group, allowing for active participation from each member (The Handbook for Focus Group Research, n.d.).



3.2.4 Phase 4: Initial demonstration & evaluation

After selecting the intervention strategy, this strategy can be regarded as a designed prototype. Demonstrating and evaluating such a prototype is an essential step within the design science methodology, as it helps to assess whether the design functions as intended and provide value in a real-world context (Venable et al., 2012). This phase therefore addresses the sixth sub-question of this research:

6. *How do the developed intervention strategies impact collaboration in hybrid requirements elicitation meetings in an initial demonstration at Info Support?*

To evaluate the strategy, real-life meetings are used to ensure that their effectiveness can be assessed in a realistic setting. In total, three meetings related to requirements engineering are selected, each involving different teams and clients. Prior to each meeting, the requirements engineer was briefed by the researcher about the intervention strategy and how to apply it in practice. The researcher is not present during the meetings to prevent influencing the natural course of collaboration.

In order to evaluate the demonstration and determine the perceived effect of the introduced intervention strategy two methods are used. First a short interview is held

with the requirements engineer to determine more in-depth evaluation of the intervention strategies. The questions that are asked during this interview can be found in *Appendix D: Demonstration interview protocol*. Second, all participants of the three demonstrations are asked to fill in a survey to have a broader view on the evaluation of the intervention strategy. The survey consisted of questions that are built upon the functional and non-functional requirement from the solution objectives phase and consisted of questions to determine the system usability scale.

The System Usability Scale (SUS) is widely used because it provides a quick, reliable, and standardized way to measure users' perceived usability of products, systems, or applications (Lewis, 2018). SUS scores are easy to interpret, with a benchmark average score of 68 often used to judge whether a system's usability is above or below average, and this benchmark has been validated across various contexts (Lewis, 2018). Another advantage is that even with small samples (N = 12), meaningful conclusions about system usability can be drawn (Lewis, 2018). To calculate the SUS score, each participant answers ten short statements on a 5-point scale, ranging from "Strongly disagree" to "Strongly agree." The statements alternate between positive and negative wording. For the positive worded questions, you subtract 1 from the score. For the negative worded ones, you subtract the score from 5. All values are then added together and multiplied by 2.5 to get a final score between 0 and 100 (Lewis, 2018).

In addition to the SUS score questions, based on the system requirements structure questions are added to also evaluate the perceived effect on the criteria that are set earlier. This resulted in the question list as presented in *Appendix E: Demonstration question list survey*. Qualtrics was used to distribute the survey because it is a user-friendly and reliable tool for collecting structured survey data. It allows researchers to easily design, share, and analyze questionnaires, while also ensuring that responses are stored securely and can be exported for further analysis (*Qualtrics XM - Experience Management Software, 2024*).



3.2.5 Phase 5: Communication

After demonstrating and evaluating the intervention strategy, an idea is formed about the usability of the intervention. This is used to translate the proposed intervention strategies from the previous phases into actionable steps. This contributes to addressing the main research question:

What strategies can be introduced to improve collaboration in hybrid meetings for requirements elicitation in agile software development?

This thesis provides a complete overview of how the strategies are developed, tested, and evaluated. It brings together the findings from literature, interviews, and the focus group, as well as insights from the demonstration. By combining all these elements, the communication phase ensures that the developed strategy is well-documented and accessible, both for academic purposes and for use in practice.

3.3 Data management plan

This research involves several data collection methods with human participants, including semi-structured interviews, a focus group, and a short questionnaire as part of the demonstration phase. These methods are used to explore stakeholder perspectives, generate ideas, and evaluate the proposed intervention strategy.

To ensure that the data was handled responsibly, a data management plan was created before the start of the data collection. This included considerations for data security, informed consent, and transparency towards participants. The full plan can be found in *Appendix F: Data management plan*. All participants signed an informed consent form, shown in *Appendix G: Informed consent forms*, making clear how their data would be used, stored, and anonymized. For the interviews, participants are given the opportunity to review and approve a summary of their interview to ensure the data was accurate and reflected their input. All collected data was stored securely on TU Delft's OneDrive environment, and only the researcher had access. Any personal information was anonymized during transcription. The focus group was also recorded with consent, and all identifiable information was removed during analysis. Questionnaire results from the demonstration are collected using Qualtrics, which complies with GDPR and TU Delft's data protection guidelines. By following this approach, the research ensures data confidentiality, traceability, and integrity, in line with TU Delft's standards for ethical research (*Human Research Ethics*, n.d.).

3.4 Research flow diagram

To provide a clear understanding of the five distinct phases of this research and their connection to data collection & results, a flow diagram has been created. Figure 3.1 (next page), the Research Flow Diagram, offers a schematic overview illustrating the relationships between the sub questions, research methods, and their contribution to the results of this research.

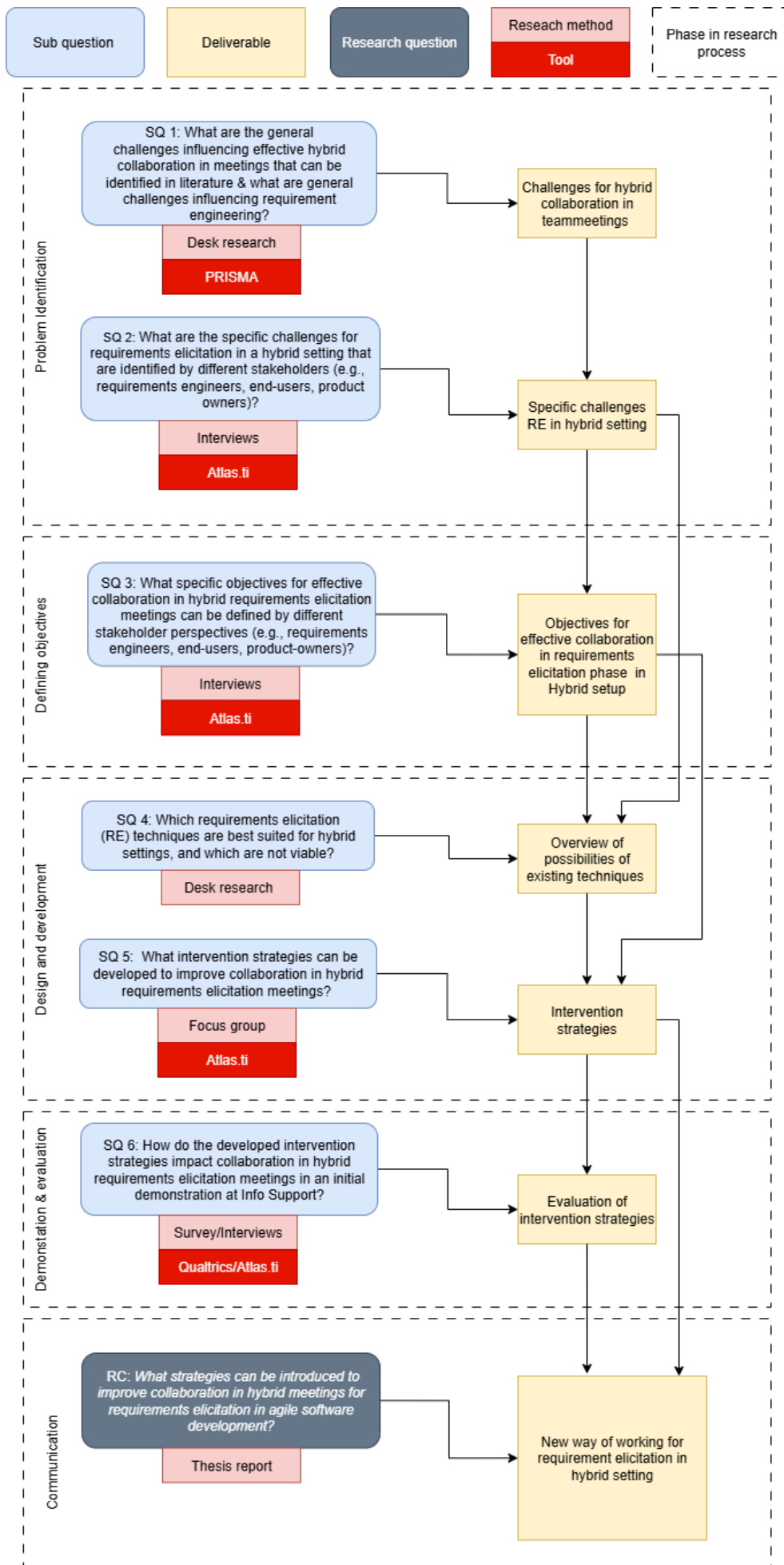
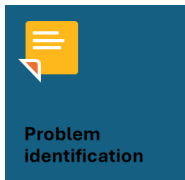


Figure 3.2: Research flow diagram

4 Challenges in hybrid meetings for requirement elicitation



This chapter aims to uncover the specific challenges of conducting requirements elicitation in hybrid meetings. To do so, it is first necessary to understand the broader context in which these challenges occur. The chapter starts with a literature review of known difficulties in hybrid collaboration. This is followed by another literature review of challenges more specific to the field of requirements engineering. Based on these insights, interviews are conducted with practitioners to reflect on and refine the relevance of the findings in practice. This process makes it possible to translate general insights into specific challenges for hybrid requirements elicitation. The outcomes of this chapter form the foundation for the next steps of the design approach and provide answers to sub-questions 1 and 2 of this research.

4.1 Challenges in effective (hybrid) collaboration

This section aims to give an overview of the challenges that are found in literature about hybrid collaboration. During the literature review a framework was found specially built to categorize different collaboration challenges that are present when dealing with hybrid and online collaboration. This framework therefore is used to have a clear way to categorize challenges. First the framework is introduced, whereafter the challenges in the full literature review are presented.

4.1.1 Distance Matters framework

To provide a structured way for analyzing collaboration challenges in hybrid work settings, the *Distance Matters* framework developed by Olson and Olson (2000) is applied. This framework is used in research on remote and distributed collaboration, offering a nuanced understanding of why distance complicates teamwork. It identifies four categories that are typically affected when teams are not co-located: the establishment of *common ground*, *coupling of work*, *collaboration readiness* and *collaboration technology readiness* (Olson & Olson, 2000). Below is each category briefly explained:

- **Common ground:** This refers to the shared knowledge and understanding that participants in a communication process have. It is essential for effective communication because it ensures that everyone shares the same basic information and context, which reduces misunderstandings.
- **Coupling of work:** This concept describes the degree of interdependence between the tasks of team members. Tightly coupled work requires frequent and complex interactions because the tasks are strongly interconnected. Loosely coupled work has fewer dependencies and requires less frequent communication.
- **Collaboration readiness:** This refers to the willingness and motivation of team members to collaborate. It includes the cultural and organizational factors that promote or hinder collaboration. Teams that are accustomed to sharing

information and working together are more likely to embrace new collaboration tools.

- Collaboration technology readiness: This concept concerns the degree to which a team or organization is ready to use collaboration tools. It includes both the technical infrastructure and the habits and skills of team members to effectively use these technologies.

The strength of the *Distance Matters* framework lies in its ability to deconstruct the abstract notion of "distance" into tangible categories of challenges that can be observed, measured, and addressed. This makes it particularly useful for analyzing hybrid collaboration, where some team members may be physically present while others join remotely. In such settings, asymmetries in access to information, technology, and interaction often lead to subtle breakdowns in collaboration. By using this framework, the literature is categorized, enabling a focused exploration of which factors most significantly impact effective collaboration in hybrid requirements engineering (Olson & Olson, 2014). Since requirements engineering is by default a tightly coupled activity, the focus of this research is mainly on the other categories, however the challenges that are found within this category in literature are also presented to be concise with the framework.

4.1.2 General challenges

Common ground in hybrid collaboration

Establishing common ground is essential for effective teamwork, yet it is often undermined. De Andrade et al. (2024) observed communication challenges in online meetings, such as difficulty noticing remote participants' reactions, gestures, and facial expressions, leading to uncertainty and disruptions. This is even more observed by the absence of visual cues, as Bablo et al. (2023) noted, stating no visible body language reduces communication quality. Canedo et al. (2024) further highlighted virtual meetings reduce non-verbal cues like eye contact and body language, especially when participants turn off their cameras. Moreover, Fanguy et al. (2021) pointed out that minority groups may face more difficulties in engaging in the discussion within these virtual settings.

Information management also poses a significant challenge. De Andrade et al. (2024) found that different expectations for chat use make it hard to find relevant information when using a chat. Wang et al. (2024) takes this even further saying that notes often lack key details, making it hard to understand the discussion's context, needing to search through raw meeting data, which can be time-consuming and frustrating. Additionally, participants may hesitate to share notes due to their personal format, while sharing recordings can be difficult due to privacy concerns, as Wang et al. (2024) explained. Bablo et al. (2023) reported that frequent information loss occurs despite meetings, and that there is a decline in meetings both the amount and quality of interaction. Blalock et al. (2024) confirmed this, stating the interview data revealed that attendees perceived poorer team communication in the virtual environment.

Furthermore, reaching consensus and sharing knowledge prove difficult in online settings. Zakrzewski et al. (2019) indicated that due to online meetings, the inability to obtain consensus becomes a challenge, and that in online meetings, lack of effective knowledge sharing is a challenge. Matthews et al. (2018) stressed the importance of achieving specified outcomes and balancing time pressure, while Robertson (2005) emphasized the need for effective information exchange and a clear understanding.

However, Beers et al. (2006) noted that this can be hard to achieve when participants have difficulty keeping up with all the information. Chen et al. (2023) added that participants cannot fully observe other participants' physical environment, hindering intervention. Matthews et al. (2018) also highlighted the necessity of opportunities for learning through challenging tasks and regular team debriefing and mentoring.

Coupling of work challenges in hybrid collaboration

The nature of work interdependence significantly influences collaborative dynamics. De Andrade et al. (2024) and Canedo et al. (2024) found that excessive meetings are a common problem, particularly when tasks are tightly coupled. Matthews et al. (2018) also noted that project challenges included the problem-solving nature of the work, highlighting the difficulty of addressing complex problems remotely.

Collaboration readiness in hybrid collaboration

Team members' willingness and ability to collaborate are crucial for success. De Andrade et al. (2024) observed that distractions also happen in online meetings from chat activity and multitasking, which hinder engagement and meeting effectiveness. They also pointed out that multitasking in remote meetings can lead to fatigue and is seen as disrespectful. Wang et al. (2024) noted that taking notes can be demanding and may distract participants. Canedo et al. (2024) found that remote meetings often lack the dynamic flow of in-person discussions and that meeting participants that are doing meetings online are more distracted. They also suggested that remote settings made it harder for quieter team members to speak up. Additionally, in hybrid meetings, remote participants often felt excluded, as Canedo et al. (2024) reported. Yasuoka et al. (2023) stressed that inclusion is a challenge, and that collaboration is a challenge, requiring efforts to ensure remote participants feel engaged. Bablo et al. (2023) highlighted participation and communication issues, including silence. They also noted that meetings become less relaxed, impacting morale and creativity, and that reduced team cohesion and trust occur as remote work hinders creativity. Zakrzewski et al. (2019) pointed out that inadequate stakeholder participation presents a challenge, and Matthews et al. (2018) stressed the importance of managerial behaviors and psychological safety.

Collaboration technology readiness in hybrid collaboration

The tools used for collaboration significantly impact team performance. De Andrade et al. (2024) found that the use of technology during a meeting cause distraction due to technical issues. Wang et al. (2024) noted that lack of tools makes it hard for meeting participants to capture detailed information. Canedo et al. (2024) observed that office spaces are not always equipped for hybrid meetings and that tool limitations included missing collaborative features. Kirshenbaum et al. (2021) highlighted the lack of channels to contribute without interrupting. Chen et al. (2023) noted that people in videoconferences are more likely to miss parts of the meeting, and Cho et al. (2021) pointed out that misunderstandings may arise due to fewer communication channels. Chen et al. (2023) also found that participants struggle with active participation in group video meetings. Bablo et al. (2023) noted that delayed responses due to muted microphones can hinder communication, and that the lack of meeting summaries leads to poor retention.

4.2 Specific requirements engineering challenges

Another literature review is conducted for this research to uncover specific challenges. By examining these challenges, it becomes possible to gain a deeper understanding of the existing issues in current elicitation practices without the hybrid component. The found challenges are again categorized using the *Distance Matters* framework.

Common ground challenges in requirement elicitation

Establishing common ground between stakeholders remains a well-known challenge in requirements elicitation in general, especially within distributed or large-scale software projects (Pernstål et al., 2015; Hafeez et al., 2020). Differences in language, culture, and domain knowledge often cause misunderstandings or ambiguities, which can hinder the development of a shared understanding of project goals and user needs (Hafeez et al., 2020; Salmani et al., 2022). This challenge becomes even more complex when stakeholders are not always available or struggle to express their needs clearly (Inayat et al., 2014; Basri et al., 2023). As a result, requirements may be incomplete, inconsistent, or even conflicting, which can ultimately impact the success of the project (Basri et al., 2023; Elghariani & Kama, 2016).

Coupling of work challenges in requirement elicitation

The coupling of work adds complexity to requirements elicitation. Rapid development cycles, integration with software architecture, and coordination among distributed teams require careful management to ensure that requirements are accurately captured and traced throughout the development process (Inayat et al., 2014; da Silva et al., 2013). Misaligned workflows and dependencies can result in overlooked requirements, rework, and increased project risk, highlighting the need for robust processes and frameworks to manage these interdependencies effectively (Salmani et al., 2022; Pernstål et al., 2015).

Collaboration readiness challenges in requirement elicitation

To find specific requirement elicitation collaboration readiness challenges found in literature the terms willingness and ability of stakeholders to actively participate in the elicitation process are used. When stakeholders are disengaged, lack motivation, or have limited availability, it becomes difficult to establish effective communication and gather accurate requirements (Inayat et al., 2014). In addition, Parsa et al (2024) notes requirements engineers rely on effective communication and collaboration. Although agile and creative approaches such as design thinking are often introduced to improve stakeholder involvement, their success largely depends on the context and the extent to which stakeholders are willing to engage (Ghosh, 2023). In large-scale projects, this challenge is amplified by reduced customer involvement, which further complicates the elicitation process and limits the ability to collect complete and reliable input (Inayat et al., 2014; Pernstål et al., 2015).

Collaboration technology readiness in requirement elicitation

The *Distance Matters* framework fourth focus is on effective remote collaboration depends in part on the technological infrastructure available to support it. In this context, the challenges identified for general collaboration challenges under the category of Collaboration technology readiness are also applicable to specific requirements elicitation meetings. Therefore, no new challenges are introduced in this paragraph.

4.3 Requirement elicitation challenges identified by experts

In sections 4.1 and 4.2, challenges found in literature are identified for both general meetings context and the specific requirement elicitation process. However, challenges specifically for hybrid requirement elicitation still need to be determined. This section delves deeper into the challenges, specifically for requirements engineering based on the interviews that are held at Info Support.

4.3.1 Approach for this phase: Interviews

To explore the challenges of hybrid requirements elicitation, a series of semi-structured interviews are conducted. The primary objective of these interviews was to gain insight into collaboration barriers and the applicability of elicitation techniques within hybrid meetings. The interview guide was structured around the categories of the *Distance Matters* framework, namely: common ground, collaboration readiness, and technology readiness. The category "coupling of work" was deliberately excluded, as requirements elicitation is by nature a highly interdependent activity and would not yield differentiating insights in this context. The full interview guide can be found in *Appendix B: Interview question list protocol*.

In total, eight interviews are conducted with requirements engineers or professionals in comparable roles at Info Support and four interviews are conducted with clients to complement the internal viewpoint. These participants represented the other side of hybrid elicitation meetings and contributed valuable insights into how hybrid collaboration is experienced by external stakeholders. For this group, a separate interview guide was developed. This version was reformulated to avoid technical jargon and to explore perceptions of both the hybrid meeting context and the role of the facilitator/requirements engineer within it. The adapted client questionnaire is also included *Appendix B: Interview question list protocol*. In table 4.1 below the total list of interviewees can be viewed, which provides the role of each participant.

Table 4.1: Overview of interviewees

Interview abbreviation	Role	Facilitator or client viewpoint
Interview A1	Requirements engineer	Facilitator
Interview A2	Product Owner	Facilitator
Interview A3	Product Owner	Facilitator
Interview A4	Requirements engineer	Facilitator
Interview A5	Requirements engineer	Facilitator
Interview A6	Requirements engineer	Facilitator
Interview A7	Requirements engineer	Facilitator
Interview A8	Requirements engineer	Facilitator
Interview B1	QA Engineer/Scrum master	Client
Interview B2	Solution architect	Client
Interview B3	Project manager	Client
Interview B4	Customer service specialist	Client

Interviews are conducted until theoretical saturation is reached. Meaning, the point at which additional interviews no longer revealed new themes or insights. This approach ensured that the findings are both rich and representative of the internal perspective on hybrid requirements elicitation. The summaries of all the interviews are included in *Appendix H: Summaries interviews*.

4.3.2 Perspectives on elicitation techniques in hybrid setup

To investigate how requirements elicitation techniques are affected by hybrid meeting formats, the interviews included a discussion of commonly used techniques, as outlined in section 2.3. The goal was to understand whether specific methods are better suited for hybrid contexts and to identify potential adaptations required in practice.

No clear consensus emerged among the interviewees regarding the feasibility or desirability of specific elicitation techniques in hybrid form. None of the techniques are explicitly identified as unsuitable for hybrid settings, nor are any techniques highlighted as being particularly well-suited to hybrid use. Instead, the general view is that most techniques remain applicable, provided that the meeting is carefully adapted to the hybrid context. In this regard, preparation was consistently mentioned as a critical success factor.

Several engineers explained that hybrid meetings demand a different operational approach. For example, while a physical whiteboard is often a core element in in-person workshops, it cannot be used effectively when not all participants are physically present. However, participants noted that there are sufficient digital alternatives available to support these traditional methods. Tools such as virtual whiteboards or shared documents can serve as functional substitutes if integrated properly into the session design. This reinforces the point that technique feasibility in hybrid settings depends more on contextual adaptation than on the inherent nature of the technique itself.

The importance of preparation extends beyond selecting the right tools. Interviewees pointed out that facilitating a hybrid session requires anticipating how interaction and engagement take place across different locations. Planning for such sessions typically takes more time than for co-located meetings, as facilitators must ensure clarity, equal access to materials, and balanced participation.

4.3.3 Identified challenges in hybrid requirement elicitation meetings

The interviews provided a set of insights into the challenges experienced during hybrid requirement elicitation meetings. These challenges are categorized using the *Distance Matters* framework, specifically focusing on *Common Ground*, *Collaboration Readiness*, and *Collaboration Technology Readiness*. The category *Coupling of Work* was not explored, as requirement elicitation is inherently a tightly integrated activity.

An analysis of the coded interview data shows how the distribution of challenges differs across these categories and between interviewees. Table 4.2 below presents the number of quotes where challenges are identified within each category per interview. Overall, Collaboration Readiness emerges as the most frequently observed category, followed by Collaboration Technology Readiness, and finally Common Ground.

Table 4.2: Number of quotes categorized by Distance Matters framework in the interviews

	A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4
Collaboration Readiness	9	13	16	7	9	8	5	7	4	5	7	5
Collaboration technology readiness	10	6	2	8	10	8	7	9	1	2	3	1
Common ground	7	2	2	2	4	4	3	1	4	2	2	0

In the following sections, each of the identified categories are further elaborated to provide a deeper understanding of the specific challenges that are identified in the interviews.

Collaboration Readiness

A recurring theme in the interviews was the reduced engagement of remote participants in hybrid meetings. Several requirements engineers observed that hybrid settings tend to limit interaction and discussion when compared to fully in-person meetings. In particular, participants joining remotely often contribute less, partly because the primary focus of the meeting tends to remain on those who are physically present in the room. Interviewee A4 notes: *'The discussion mainly takes place in the physical room, so if you're physically present, it's much easier to join in by interrupting someone'*. This effect is reinforced by the fact that the facilitator, often the requirements engineer, is usually also on-site, which further shifts attention toward in-room participants. Interviewee A5 admits: *'When I'm working as a facilitator in the room, I get so involved in the discussion that I end up forgetting to include online participants'*.

Interviewees noted that this imbalance in participation is less prominent in fully online meetings, where everyone is equally constrained by the same tools and communication channels. In contrast, hybrid meetings introduce uneven conditions that affect involvement. One frequently mentioned example is the limited visibility of non-verbal cues from remote attendees, which reduces both their ability to contribute and their feeling of being included in the session, as elaborated on by interviewee A1: *'You really miss the non-verbal communication part, because usually you can tell from someone that they don't fully agree, but in hybrid meetings that's much harder to see'*.

Several engineers mentioned the impression that online participants are more easily distracted, as Interviewee A2 noted: *'The biggest problem and sometimes you literally just see it happen: when people at home are distracted and are not focused on in the meeting'*. Notifications, multitasking, or simply being overlooked during the session contribute to reduced focus, interviewee A3 for instance experienced: *'Sometimes, remote participants are simply overlooked. And when it becomes difficult to actively join the conversation, it's only natural that people start focusing on other things'*. In many cases, when a participant is not actively involved by the people in the physical space, their attention quickly drifts elsewhere.

Collaboration Technology Readiness

From a technological perspective, interviewees highlighted several recurring issues. Despite the availability of tools such as Miro and Mural, which offer digital alternatives for facilitating classical elicitation techniques, technical challenges persist. The most frequently mentioned issue was audio and video delay. Participants explained that tools like Microsoft Teams introduce a slight lag in the audio stream. This delay, although small, disrupts the natural flow of conversation. Remote participants often struggle to interject or respond quickly, which causes them to miss their opportunity to contribute. As a result, the discussion continues in the room while the online participant falls behind, making it harder to engage in collaborative dialogue. Interviewee A7 recognizes this: *'Because of the delay, it becomes difficult for someone online to take the floor in a discussion, which often causes them to step into the background'*.

Another factor that contributes to lower collaboration is the way content is typically shared in hybrid settings. When a screen is shared, participants' video feeds often become minimized. This makes it harder to maintain visual contact, which weakens the connection between participants and limits spontaneous interaction. Interviewee A5: *'You only see a face, if you're lucky up to the collar [...] but if content is being shared, that person becomes so small it's completely impossible to pick up signs'*. Typical technical difficulties include malfunctioning microphones and cameras, Interviewee A6 noted: *'There are always struggles with a microphone not working or a video that is frozen'*. Even minor issues with these basic tools can significantly hinder the effectiveness of a hybrid meeting. For instance, when a laptop microphone is used to capture multiple people in a meeting room, remote participants struggle to follow the conversation due to inconsistent sound quality. The physical setup of the meeting space also plays a crucial role. Interviewees emphasized the importance of high-quality microphones and cameras that can capture the entire room and ensure everyone is both visible and audible. Inadequate setups, such as relying on a single laptop in the middle of the room, are barriers to effective hybrid collaboration. Interviewee A8 highlighted: *'If audio or video quality is insufficient, you are by definition creating a division within the group you are trying to collaborate with'*.

Common Ground

Challenges related to establishing common ground are also identified. Some engineers reflected on the value of informal moments, such as coffee breaks or casual conversations before a meeting. These moments help participants align expectations, context, or priorities before the formal discussion begins. When some participants are working remotely, these informal interactions are either reduced or entirely absent. Interviewee A4 states: *'I do think that people who are physically present tend to be a bit better aligned or have a clearer idea of what to expect, because just by walking to the meeting and setting up your laptop, you already start talking about it. Online participants usually join later, and by then the conversation has already begun'*.

Related to this is the way hybrid meetings typically begin. Physical participants often engage in small talk before shifting to the agenda, while remote attendees are usually greeted with a direct transition into formal discussion. This difference in experience may lead to diverging mental states or expectations at the start of the session, potentially

impacting shared understanding and meeting dynamics. Interviewee A6 noted: *'I think it was difficult to reach a point where we were all on the same page. That doesn't necessarily mean the online participants had a completely different perspective, but rather that there was uncertainty'*.

4.3.4 Additional Insights

In addition to the challenges identified through the *Distance Matters* framework, several additional observations emerged from the interviews. An important insight is that requirements engineers do not always prepare hybrid meetings with the hybrid nature of the meeting in mind. Instead, preparation often follows the approach of a fully physical or fully online meeting, Interviewee A1 reflected: *'I always prepare it more like an online meeting, so that the risk is reduced that the online participant cannot participate'*. This appears contradictory, as the same interviewees acknowledge that different tools and facilitation methods are required for a hybrid setting to be effective, as also Interviewee A7 noted: *'If you choose to make it more like a fully online meeting, you actually undo some of the advantages of people being physically in the same room'*. This misalignment in preparation may contribute to some of the collaboration and technology-related issues described earlier. Although engineers indicate that they approach the preparation of online and physical meetings differently, hybrid sessions seem to fall between the two, without a distinct, tailored preparation strategy. For instance, while the need for digital alternatives to whiteboards and better microphone setups is recognized, these are not always proactively integrated into the preparation phase.

Another important theme concerns the perceived quality of the requirements that result from hybrid elicitation meetings. There are concerns that hybrid setups may negatively impact the clarity and accuracy of requirements. Specifically, they worry that the translation of business needs into precise, actionable requirements becomes more challenging when discussion is fragmented or participation is uneven. Interviewee A6 noted: *'You are more focused on facilitating the meeting in a hybrid setting.'* *The fact that collaboration is hindered makes my work more difficult and, likely, that also reduces the quality'*.

4.3.5 Insights client interviews

In addition to the requirements engineers, four clients of Info Support are interviewed to gain an external perspective on hybrid requirements elicitation. Their responses largely confirmed the concerns raised by the engineers. All four clients described themselves as feeling less engaged when attending hybrid meetings compared to fully in-person sessions. They mentioned that it is easier to become distracted when joining remotely, especially when interaction and involvement are not actively facilitated. Interviewee B1 noted: *'When you're in a meeting room, you're fully focused on the meeting. But when you're at home behind your laptop and someone starts a chat or something else happens in parallel, you're juggling multiple things at once and end up being less focused on what you're supposed to be doing'*. This reinforces the previously identified importance of preparation and inclusive facilitation to ensure equal participation.

While technical issues such as poor microphone quality or limited camera coverage are mentioned, clients primarily emphasized how these issues affected their sense of

presence and involvement. Rather than the technology itself, it was the lack of awareness and attentiveness to the hybrid setup that seemed to contribute most to these challenges. Interviewee B3: *'I notice that the facilitator pays less attention to me when I am attending online compared to when I am physically in the room'*. Overall, the clients' perspectives validate the earlier findings and underline the importance of conscious facilitation and clear structuring in hybrid meetings to maintain engagement and clarity throughout the elicitation process

4.4 Synthesis of the identified challenges

The challenges identified in existing literature are also reflected in the specific context of hybrid requirements elicitation meetings. Many of these challenges are interrelated. For instance, the limited availability of non-verbal communication in hybrid settings was frequently mentioned as a factor that negatively affects the engagement of remote participants. The inability to observe body language or informal cues appears to reduce the sense of presence and active involvement for those joining remotely. While some challenges specific to requirements engineering are identified in the literature, these are not explicitly mentioned by the interviewees. Showing that hybrid requirement elicitation meetings have challenges of their own rather than requirement elicitation. However, participants did note that when motivation and engagement are lacking, it becomes more difficult to establish high-quality requirements. This suggests that collaboration issues in hybrid settings indirectly impact the effectiveness of requirements elicitation.

Based on the problem analysis, three core challenges can be identified that characterize hybrid requirements elicitation meetings:

- Unequal participation between remote and on-site participants: Interviewees consistently reported that remote participants find it more difficult to contribute and feel less included in discussions. The physical separation between the office space and the virtual space leads to a division in experience and two separate worlds. Audio delays and limited turn-taking opportunities further hinder equal participation.
- Insufficient engagement and focus during meetings: Maintaining attention and active involvement is particularly challenging for remote participants who are not fully embedded in the group dynamic. Limited opportunities for meaningful interaction and difficulties in hearing or following conversations contribute to this issue.
- Difficulties in facilitating hybrid meetings: A significant challenge lies in the dual role of the facilitator, often fulfilled by the requirements engineer. In hybrid settings, the facilitator is expected to manage both the meeting content and the hybrid interaction. This dual responsibility is demanding and can detract from their ability to guide the meeting effectively. As a result, it becomes more difficult to ensure participant engagement and maintain the quality of the elicitation process.

These findings confirm that hybrid requirements elicitation meetings introduce a distinct set of collaboration challenges that are both consistent with, and complementary to, the broader issues found in hybrid collaboration literature. The three identified challenges form the basis for the design objectives and functional requirements presented in the following chapter.

5 Objectives for hybrid requirement elicitation



This chapter aims to determine the solution objectives for the intervention strategies, consisting with step 2 Solution objectives of the design science approach. The problems identified in the previous chapter form the basis for determining these objectives of a potential intervention. Defining these objectives is a necessary step before designing possible solutions, as it provides direction and outlines what such an intervention should achieve. Without a clear understanding of the intended goals, it is not possible to meaningfully develop or assess improvement strategies. The outcomes of this chapter provide answers to sub-questions 3 of this research.

5.1 Approach for this phase: Interviews

To establish the objectives, the same expert interviews used for identifying the challenges are further elaborated on. In the second part of each interview, participants are asked to reflect on potential improvements to the current meeting setup. Their input on desired changes, priorities, and perceived gaps was used to shape a set of preliminary design objectives. These are further refined by drawing direct links to the problems identified in Chapter 4. The complete interview guide can be found in *Appendix B: Interview question list protocol*. A distinction is made between functional objectives, which describe what the solution should enable in practice, and additional objectives, which address more general considerations or desirable side effects. These two categories are presented separately in the sections that follow.

5.2 Functional objectives

The three key challenges discussed in the previous chapter serve as the foundation for the functional requirements in this study. This is also visible in the system requirements structure on the next page in figure 5.1.

Based on the challenges identified in the interviews, three overarching objectives are formulated to guide the development of functional requirements for hybrid requirements elicitation meetings. These objectives reflect recurring issues reported in section 4.4 and form the starting point for the design-oriented phase of this research.

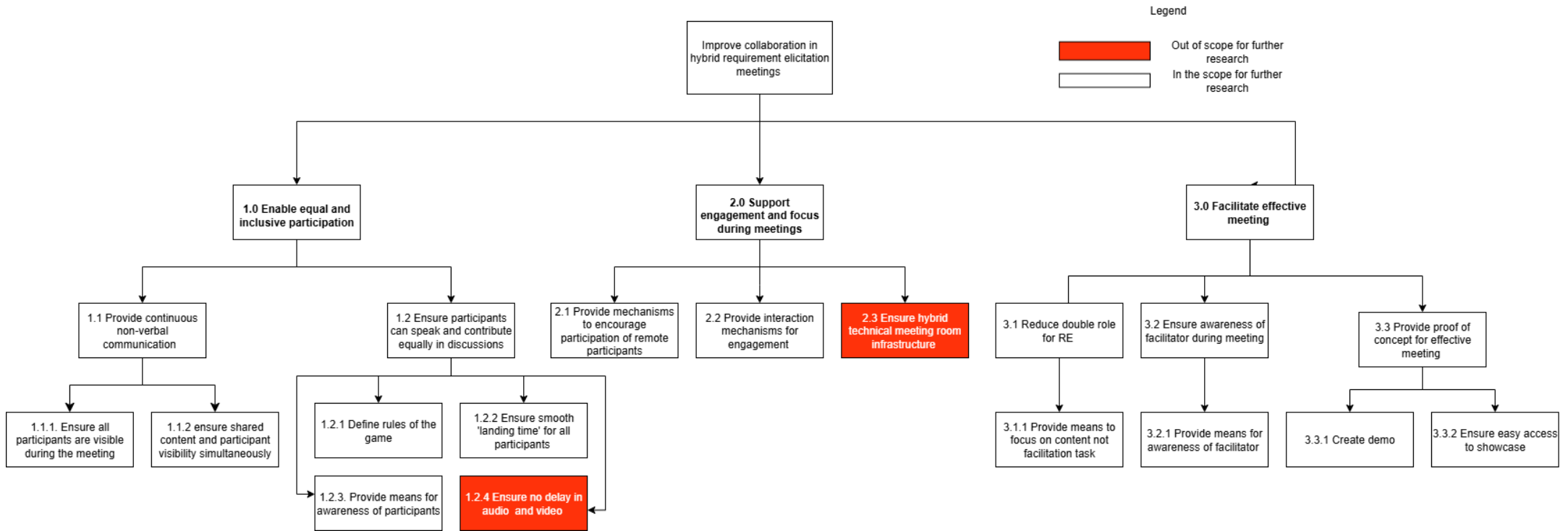


Figure 5.1: System requirements structure for objectives intervention strategy

The first objective is to enable equal and inclusive participation. Interviewees explained that remote participants are often less visible, less vocal, and less involved than those attending on-site. Contributing spontaneously or participating in group discussions was perceived as more difficult for remote participants, resulting in unequal levels of engagement. Addressing this imbalance is considered essential for creating a more inclusive and effective collaborative process. Interviewee A7 strongly felt this: *‘Everyone should be able to participate wherever that person might be. The most important thing is that everyone is aware of everything, so that everyone knows what is going on’.*

The second objective is to support engagement and focus throughout the meeting. A frequently mentioned issue concerns the divide between the physical and virtual settings. Interviewee A3 wishes: *‘What I would want to change is the problem we experience where people are quickly excluded from a meeting, not on purpose of course, but that’s the most frustrating effect of hybrid working to me, and that’s what I’d want to improve.’* This disconnect can lead to reduced involvement from remote participants and a fragmented meeting dynamic. Several interviewees described hybrid meetings as consisting of two parallel conversations rather than a shared experience. Enhancing mutual visibility, interaction, and awareness is considered necessary to create a more cohesive form of collaboration.

The third objective is to facilitate effective meetings, with specific attention to the role of the facilitator. Facilitators in hybrid settings are required to simultaneously manage the meeting content and the hybrid dynamics, including the use of tools and the coordination between remote and on-site participants. This dual responsibility was described as cognitively demanding and as a potential barrier to maintaining focus on the meeting goals. Reducing this cognitive load is considered important for improving the quality and efficiency of facilitation. Interviewee A1 highlighted: *‘What I find difficult is having to facilitate and participate at the same time. Especially in hybrid meetings, you need to involve everyone actively, which adds extra tasks. You want to focus on the content, but you constantly need to step back to keep things running.’*

Some issues mentioned during the interviews fall outside the scope of this research. These include suggestions for improving the technical setup, such as less delays or better audio-conferencing investments. While relevant, these aspects are excluded from the next phases in this study, which focuses on improvements that can be made using existing tools and resources, such as Microsoft Teams.

5.3 Non-functional objectives

In addition to the functional objectives, the interviews also revealed several non-functional objectives that should be considered when designing interventions for hybrid requirements elicitation meetings. Across the interviews, there was broad agreement on the additional conditions that should be met to ensure successful implementation and adoption:

- Flexibility;
- Ease of use;
- User friendliness;

- Location independence;
- Feasibility.

The first objective concerns flexibility. Requirements elicitation meetings can take different forms depending on the context, objective, and composition of the group. It is therefore important that the intervention strategies can accommodate a variety of meeting formats and techniques, like also stated by Interviewee A7: *'I think that's what makes it most useful: try to keep it a bit context-independent, so that it can actually be used in most hybrid sessions'*. This flexibility increases the likelihood that the interventions can be used in different project settings. The second objective is ease of use. Several interviewees emphasized that the interventions should be simple to apply and not time-consuming. If too much time or effort is required, the perceived added value may diminish, which could reduce the likelihood of actual use. A straightforward application is therefore seen as an important condition. The third objective relates to user friendliness. New methods should be easy to learn, especially since external stakeholders often join requirements elicitation meetings. In such cases, there is little opportunity to provide training or extensive instruction. The strategy should therefore be intuitive enough for participants to understand and apply it without additional preparation, for example Interviewee A2 stated: *'I might meet with 40 to 50 different people in a week, and if I have to teach all of them, that becomes quite a challenge'*. The fourth objective is location independence. Requirements elicitation sessions often take place at the client's site rather than at the development team's office. This makes it necessary for interventions to be usable regardless of physical setting or location. Interviewees noted that the approach should not be dependent on a specific room layout or technical setup, Interviewee A4 shared: *'I can take some stuff with me, but a full setup is not feasible to take everywhere'*. Finally, feasibility within the current technical and organizational context was highlighted. For any intervention to be adopted in practice, it must fit within the tools and infrastructure already in place, such as Microsoft Teams and the standard meeting equipment used by Info Support and its clients. The strategies should therefore be realistic in terms of both the effort and resources required.

These five non-functional objectives, next to the with the functional objectives provide as criteria for the next phase: design and development. They help ensure that the interventions are not only useful in theory, but also applicable in day-to-day practice and to evaluate the ideas afterwards.

6 Design and develop intervention strategies



This chapter aims to present the design of intervention strategies to improve hybrid requirements elicitation meetings, consisting with step 3 Design and Development of the design science approach. These strategies are developed based on the objectives formulated in the previous chapter and are created in collaboration with field experts through a focus group. This section outlines the setup, design space, and working method of the focus group. The resulting intervention strategies are presented in the following section. The outcomes of this chapter answer sub-question 4 and 5 of this research.

6.1 Approach for this phase: Focus group

To gain insights, a focus group was held. In total, five participants took part in the focus group. Table 6.1 below provides an overview of the group’s composition. The focus group was conducted in a hybrid setting, with three participants attending on-site and two joining remotely via Microsoft Teams. An online whiteboard (Mural) was used to support the session and document the outcomes.

Table 6.1: Overview participants in focus group

Participant abbreviation	Role	Facilitator or client viewpoint
F1	Requirements engineer (Junior)	Facilitator
F2	Requirements engineer (Midlevel)	Facilitator
F3	Requirements engineer (Midlevel)	Facilitator
F4	Requirements engineer (Senior)	Facilitator
F5	SCRUM-Master / Team Lead	Client

To guide the process of generating solutions, the challenges identified during the problem analysis are broken down into smaller functional building blocks. This was done using the structure of a morphological chart, which helped to translate the broader objectives into more concrete sub-functions. These sub-functions formed the basis for developing potential solutions, or “means.” An example of the whiteboard layout used during the session is included in *Appendix I: Focus group setup mural*.

In preparation for the session, participants received an overview of the sub-functions by email, allowing them to reflect on potential ideas in advance. This email is included in *Appendix J: Focus group preparation for participants*. Additionally, the design space for the interventions was explicitly communicated beforehand. This design space focused on

improvements that could be implemented using existing tools and resources and excluding solutions that required new technological infrastructure.

The session itself was structured into three parts. In the first part, participants individually brainstormed ideas for each sub-function of the morphological chart. This step was conducted anonymously to avoid group thinking and encourage independent input. In the second part, the group jointly reviewed and discussed the ideas that had been generated to encourage group thinking. Similar means are grouped together, and new ideas that emerged during the discussion are added to the board. In the third part, the group was split into smaller subgroups to develop coherent intervention strategies. These strategies are created by combining feasible sets of means into practical solutions. In total, three intervention strategies are developed during the session. These are discussed in detail in section 6.3. These resulting interventions represent combinations of solutions that are both technically feasible all together and aligned with the identified functional needs.

6.2 Design space

To ensure a clear and realistic scope for the intervention strategies, several design constraints are communicated to the participants prior to the focus group. These constraints define the boundaries within which solutions could be proposed and are intended to keep the interventions practically feasible and aligned with the tools currently in use. The design space is framed by the sub-functions derived from the system requirements structure. These sub-functions reflect the objectives formulated in the previous section 5.2 and served as the foundation for generating targeted means.

Participants are instructed to stay within the following constraints:

- Microsoft Teams remains the primary collaboration tool. All proposed interventions must be compatible with this platform, without requiring the introduction of new software tools or major system changes.
- Only currently available technologies can be used. Ideas that depend on technologies such as virtual reality or holographic projection are considered out of scope.
- The hybrid meeting format is retained. This means that some participants are physically present in the meeting room while others join remotely, which is a fixed condition rather than a variable to be redesigned.

By clearly defining these constraints, participants are encouraged to focus on practical, short-term improvements that could be implemented within the existing Microsoft Teams environment. Cost considerations also played a role in this framing. The design space explicitly excluded solutions that would require significant new investments or resources. Instead, the aim was to explore what can be achieved with tools and technologies that are already available within the organization. This approach increases the likelihood that the proposed intervention strategies can be adopted in practice to improve hybrid requirements elicitation meetings.

In addition to these constraints, the design space does not include any selection of or adjustment to the elicitation techniques. During the problem identification phase of this study, it became clear that there is not one elicitation technique that works better or worse in a hybrid setting. The interview participants agreed that, in principle, any technique can

work if the hybrid meeting is well-facilitated, and everyone is able to participate. The choice of technique is therefore not the main issue. What matters is the way the session is prepared and guided, and how well participants are supported in joining the conversation, both online and in the room. This insight is important because it shows that the challenges of hybrid elicitation do not lie in the techniques themselves but in how they are used. For that reason, the focus within this phase is to design intervention strategies aimed at improving the conditions around these techniques.

6.3 Developed intervention strategies

Based on the focus group outcomes, three distinct intervention strategies are developed to address the challenges identified in hybrid requirements elicitation meetings. Each strategy reflects a different approach to improving collaboration, based on a combination of means generated during the session. The interventions can be categorized as follows:

6.3.1 Hybrid equality by design

This strategy focuses on creating a meeting environment in which all participants, regardless of location, experience equal opportunities to contribute. The emphasis lies on the setup and the tools used during the session. Several practical means are proposed, such as using additional screens to increase the visibility of remote participants and placing visual cues in the meeting room to raise awareness of the hybrid setting. Participants also suggested structuring the meeting more explicitly, with a clear opening and closing, and making more frequent use of breakout rooms to support inclusive group discussions.

6.3.2 Hybrid discipline and structure

This strategy focuses on improving meetings through clear rules, preparation, and role assignment. The emphasis lies on defining processes that support engagement and interaction. Suggestions included implementing guidelines for turn-taking, protocols for requesting attention, and agreements such as always keeping the camera on. These rules aim to reduce ambiguity during meetings and ensure that all participants are actively involved throughout the session.

6.3.3 Hybrid conscious culture

This strategy addresses the behavioral and cultural aspects of hybrid collaboration. The focus is on raising awareness among both facilitators and participants about the unique dynamics of hybrid meetings. The group discussed the need to make participants more conscious of how hybrid meetings differ from fully physical or online sessions, and how this affects their own behavior. This includes recognizing the facilitator's dual role and encouraging an attitude shift towards active inclusion and engagement from all attendees.

Each of these strategies consists of a feasible combination of means identified in the morphological chart. The morphological chart is shown on the next two pages in table 6.2. Here the overview of the means and their grouping into the intervention strategies is included. The concept version as a result at the end of the focus group is shown in *Appendix K: Focus group outcomes*.

Table 6.2: Morphological charts with the means gathered in the focus group

Hybrid equality by design			Hybrid discipline and structure			Hybrid conscious culture		
ID	Parent-Requirement	ID	Requirement	Means 1	Means 2	Means 3	Means 4	Means 5
1.1	Ensure participants are visible during the meeting	1.1.1	Provide means for continuous nonverbal communication	Extra screen on table (both at home and in the office)	Multiple cameras in the room	Let physical participants dial in via laptop	Agree to keep camera's on	Uniform background (Corporate branding)
		1.1.2	Ensure shared content and participant visibility simultaneously	Extra screen on table	Use embedded apps in Teams	Split screen	Presenter ensures content is shown at the right time on the screens	
1.2	Ensure participants can speak and contribute equally in discussions	1.2.1	Define the rules of the game	Online = camera on	Good introduction by facilitator	Clear agenda	Display meeting rules upon entry	Everyone uses the same method to request speaking time
		1.2.2	Ensure smooth landing time for all participants	Right selection of participant for a meeting	Send pre-read materials	Start meeting 5 minutes earlier as buffer	Greeting each participant as they enter the meeting	Check-in and check-out at every meeting
		1.2.3	Ensure awareness of participants	Tag near the screen	Explicit asking for awareness start meeting	Encourage teams to go hybrid on purpose	Share knowledge in training session	Share knowledge in blog/framework
2.0	Support engagement and focus during meetings	2.1	Provide mechanisms to encourage participation of remote participants	Use work forms that are democratic (e.g., everyone brainstorms individually, then share results)	Give everyone a set amount of speaking time	Mute other apps and reduce pop-ups when in meeting	In check questions for both remote and in-room participants	State goals for each role at start of the meeting

Hybrid equality by design		Hybrid discipline and structure			Hybrid conscious culture			
ID	Parent-Requirement	ID	Requirement	Means 1	Means 2	Means 3	Means 4	Means 5
		2.2	Provide interaction mechanisms for engagement	Break-out rooms	Use tools that require participant input (e.g., Mural, Menti, polls)	Equal rules for using chat/emojis to raise issues	Actively ask for agreement	In recurring meetings: make sure people who are often in the office also attend remotely sometimes
3.1	Reduce double role for RE	3.1.1	Provide means to focus on content not facilitation task	External facilitator	Reduce RE role (note taker/ record meeting)	Good preparation beforehand (Mural/setup)	Work form with structured blocks that are introduced and executed one at a time	
3.2	Ensure awareness of facilitator during meeting	3.2.1	Provide means for awareness of remote participants	Facilitation training with explanation about hybrid meetings	Assign a specific support role to assist the facilitator in monitoring (lack of) interaction	Post reminder in meeting rooms	Sticker in the room	
3.3	Provide proof of concept for effective meeting	3.3.1	Create showcase	Best practices explained in a "sample meeting" video	Clear list with tips, ideas, do's and don'ts	Something similar to liberating structures		
		3.3.2	Ensure easy access to showcase	YouTube	Training online	Mail / newsletter	Slack	

6.4 Selecting an intervention strategy

In a typical design process, a multi-criteria analysis would be used to evaluate and compare the developed intervention strategies against the functional and additional objectives defined in the previous chapter (Enserink et al., 2022). Such an approach would aim to identify the strategy that scores highest overall and is therefore most suitable for implementation.

However, the three strategies developed in this study each represent a distinct perspective on the hybrid collaboration problem. Rather than offering mutually exclusive alternatives, they complement one another. For instance, increasing awareness and fostering a hybrid-conscious culture strengthens the effectiveness of process-based improvements such as structured facilitation and clear meeting rules. Similarly, technical and environmental changes that support equal visibility and participation reinforce both awareness and engagement.

Because of these interdependencies, selecting a single strategy would be counterproductive. Each strategy addresses a different aspect of the hybrid collaboration challenge, and their combined implementation might offer a more effective approach. Therefore, the three strategies are not seen as competing options, but as mutually reinforcing components of a broader intervention framework to improve hybrid requirements elicitation meetings.

6.5 Combined intervention strategy

Each strategy addresses a distinct aspect of hybrid collaboration. The first strategy focuses on the physical and digital setup to ensure a more balanced meeting environment. In addition, the second strategy introduces clear rules and structure to guide participant behavior and increase inclusiveness. Lastly, the third strategy targets participant awareness and aims to foster a more conscious approach to hybrid collaboration. The combination of these strategies is therefore not only feasible, but also desirable. Together, they form a comprehensive intervention strategy in which the individual components reinforce one another, leading to a combined intervention strategy as depicted in figure 6.1

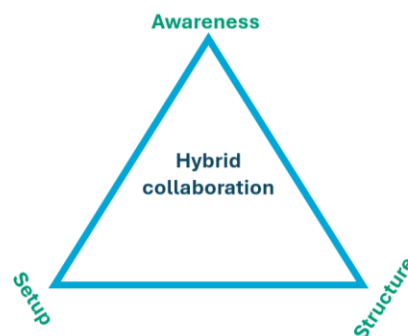


Figure 6.1: The three components for hybrid collaboration

The resulting combined intervention strategy integrates improvements on three levels: setup, structure, and awareness. All suggested interventions fall within the defined design space and rely on existing technologies and processes already used within the organization. The combination makes it possible to implement targeted improvements without introducing entirely new systems, keeping the intervention both feasible and cost-effective.

6.5.1 Setup: Creating an inclusive and functional hybrid environment

A thoughtfully designed hybrid setup is essential for creating a level playing field between online and in-person participants. The strategy proposes three key improvements to the meeting environment. First, in addition to the central shared screen, a second screen should be placed on the table in the physical meeting room. This screen continuously displays the online participants, ensuring they remain visible and integrated into the meeting. This helps prevent the common issue of online participants being forgotten or sidelined during discussions. Second, all participants are encouraged to join the meeting individually from their laptops, even when physically present in the same room. This allows online participants to view facial expressions and reactions up close, instead of relying on a single room camera with limited visibility. Third, the use of breakout rooms is explicitly encouraged when meetings include small group discussions. This functionality was widely used during fully remote collaboration but has become less common in hybrid settings. Nevertheless, it remains a valuable way to facilitate focused discussion and collaboration across different locations. These improvements are supported by small visual cues, such as placing stickers in the physical room to remind participants to remain aware of their remote colleagues.

6.5.2 Structure: Introducing rules and methods that support equal participation

To support hybrid collaboration, clear structure and a guided meeting process are essential. The strategy introduces several process-oriented elements that help foster equal participation and shared understanding. Each meeting should begin with a clear introduction that explains the objective and structure of the session. Participants are explicitly welcomed by name to establish presence and awareness. This is especially important for remote participants, who otherwise risk being overlooked. Structured working methods are encouraged, such as individual brainstorming followed by group discussion. This helps ensure that all participants can contribute equally, regardless of their physical presence or personality traits. It also reduces the risk that discussions are dominated by those who are more outspoken or physically present in the room. To further support equal participation, participants are invited to signal their intention to speak using a shared method. This could include physical cards, hand signals, emojis, or the chat function in Microsoft Teams. By applying consistent rules and mechanisms, turn-taking becomes more balanced, and interruptions are minimized. Finally, the strategy recommends appointing a facilitator or dedicated advocate for online participants. This person ensures that remote voices are consistently included and that any technical or participation-related issues are addressed in real time.



6.5.3 Awareness: Strengthening engagement and mindset around hybrid collaboration

The final part of the combined strategy targets awareness and the mindset of both participants and facilitators. The goal is to foster a more deliberate and reflective approach to hybrid collaboration, acknowledging that hybrid meetings are not simply a mix of online and in-person practices, but require their own way of working. Awareness is raised through both subtle cues and deliberate reflection. For example, visual prompts in the room can serve as gentle reminders to involve online participants. Facilitators are encouraged to ask check-in questions that specifically address the online group, reinforcing their presence and involvement. In addition, the organization can offer lightweight training sessions or guidance materials to help participants understand the unique demands of hybrid meetings. These sessions emphasize that effective hybrid collaboration requires different preparation, facilitation, and behavior than traditional meetings. Finally, it is recommended that each hybrid meeting begin with a short statement that explicitly frames it as a hybrid session. This signals to all participants that they are entering a space that requires attentiveness to both digital and physical dynamics. By combining adjustments to the physical and digital environment with clear structure and increased awareness, this strategy provides a multi-layered response to the challenges identified in earlier chapters. Rather than selecting a single solution, this approach embraces the complexity of hybrid collaboration and leverages the strengths of multiple perspectives to support more effective requirements elicitation in practice.

7 Demonstrate & evaluate intervention strategies



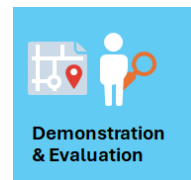
This chapter aims to present the demonstration and evaluation of the intervention strategies, consisting of step 4 Demonstration and step 5 Evaluation of the design science approach. Following the design of the intervention strategy, it is crucial to assess its initial effectiveness in improving hybrid requirements elicitation meetings. To achieve this, a series of demonstrations are conducted aimed at testing specific functionalities and evaluating their impact on collaboration quality and meeting dynamics. These evaluations provide insight into whether the proposed intervention strategy contributes meaningfully to a smoother and more productive hybrid working process. The outcomes of this chapter answer sub-question 6 of this research.

7.1 Initial roadmap of intervention strategy

Given that many components of the intervention strategy require substantial time for full implementation and adoption, immediate integration for demonstration purposes is not feasible. Consequently, the intervention strategy was restructured according to the expected timeframes necessary for implementation, rather than the initial thematic categories of setup, awareness, and structure. This classification, shown in table 7.1, enables a pragmatic approach to evaluation, distinguishing between short-term actions and longer-term changes, and supports a realistic assessment of the strategy’s potential benefits.

Table 7.1: Overview of roadmap categories

Category	Description
Facilitator Quick Wins	Interventions that can be implemented immediately without requiring extra explanation or training. These focus on simple adjustments that improve meeting dynamics with minimal effort from the facilitator.
Facilitator Behavioral Adjustment Strategies	Interventions that require more preparation and deliberate behavior change by the facilitator. These involve structuring and adapting meetings to increase engagement and efficiency, participants are not yet expected to change their own behavior..
Collective Behavioral Adjustment Strategies	Interventions that require behavioral changes from all participants. These strategies involve reflection, establishing shared norms, and require time and commitment to foster a supportive hybrid collaboration culture.



7.2 Scope of the demonstration & evaluation

The interventions from category 1 are exclusively selected for the demonstration & evaluation phase. These measures which consist of facilitator quick win strategies are used due to their low implementation threshold and immediate applicability. They allowed for rapid deployment and evaluation within a realistic project setting, without requiring extensive behavioral change from participants.

Strategies from category 2 (facilitator behavioral adjustment) and category 3 (collective behavioral change) are not included in the demonstration phase. Both phases involve dedicating time during meetings to awareness-building, reflection, and establishing new agreements or norms, fostering a collaborative hybrid meeting culture. Due to time constraints and limited availability of suitable respondents, it was not feasible to set up and evaluate interventions that required more preparation, facilitation training, or participant reflection. However, the insights gained from evaluating category 1 strategies provide a useful first step in assessing the practical value of the overall intervention strategy. Below the included measures within the scope of the demonstration are discussed.

7.2.1. Category 1: Facilitator quick wins strategies

These strategies consist of measures that can be implemented immediately, requiring minimal preparation and no additional explanation to participants during the meeting. They can be quickly communicated to the facilitator and put into practice with little effort. This includes:

- Before the meeting:
 - o Encourage all participants to bring their laptops to ensure visibility of in-room participants for remote attendees.
 - o Place an additional screen on the table to increase visibility of online participants.
 - o Place stickers in meetings room for awareness reminders.
 - o Ensure everyone keeps their camera on throughout the meeting.
 - o Ensure you have your hybrid meeting in an office space with hybrid meetup set.
- At the start of the meeting:
 - o The facilitator provides a clear introduction outlining the meeting's purpose and agenda.
 - o Greet all participants individually, both in-person and online.
 - o Ensure everyone keeps their camera on throughout the meeting
 - o Explicitly mention that the meeting is hybrid, emphasizing the need for extra attention to engagement.
 - o Explain the reason for the additional screen to enhance awareness of remote participants.
- During the meeting:
 - o Use clear control questions, such as "Is this clear for everyone?" instead of more open-ended "Are there any questions?"
 - o Actively ask for verbal confirmation on decisions, as silence should not be interpreted as agreement.

7.3 Approach for demonstration & evaluation of strategy

To examine whether the proposed intervention strategy contributes to more effective hybrid requirements elicitation meetings, a demonstration was conducted focusing exclusively on category 1 strategies as noted in the previous section. These measures can be applied immediately by the facilitator without requiring behavioral changes from participants.

Several requirements engineers are approached to identify meetings that involved collaborative discussion. Ultimately, three meetings were selected in which category 1 strategies could be tested. Prior to each meeting, the researcher held a preparatory conversation with the facilitator, who in each case was also the requirements engineer. During this conversation, the selected strategies were explained and discussed to ensure proper understanding and alignment.

The physical setup of the meeting room was also standardized. Each demonstration took place in a room with an integrated Microsoft Teams setup. An additional screen was introduced to improve the visibility of remote participants for those attending in person. Importantly, this screen was placed directly on the meeting table rather than mounted on the wall. It was positioned as part of the participants around the table, ensuring that online participants remained visible and within the natural line of sight during discussions. Figure 7.1 illustrates this setup. In *Appendix L: Demonstration setup* there are pictures of a real room setup visible. In addition, several stickers for the table and the extra screen were made, also included in *Appendix L*.

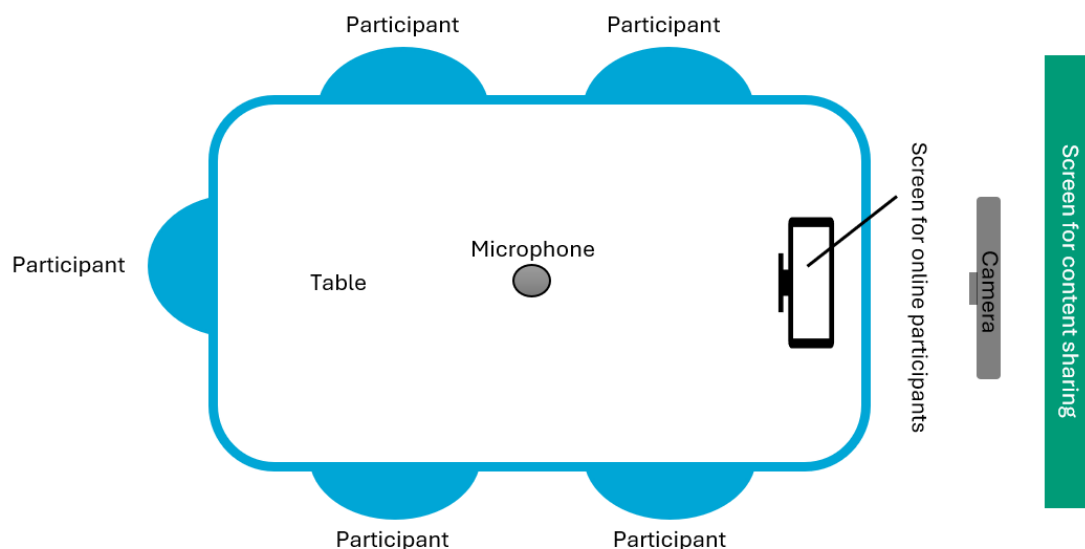
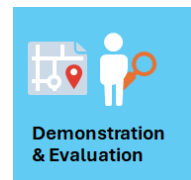


Figure 7.1: Example of demonstration setup (top view)

To limit the influence of the researcher on the meeting dynamics, the researcher did not attend the sessions. Instead, to gather insights into the experience, a short interview was conducted with each facilitator after the meeting. In addition, all participants received a brief questionnaire to evaluate the perceived impact of the interventions on collaboration



during the session. This questionnaire was based on the non-functional and functional objectives that are set in chapter 5.

7.4 Evaluation of the demonstration

Following the implementation of the selected category 1 strategies during three hybrid requirements elicitation meetings, participants generally responded positively. Based on the responses to the post-meeting questionnaire and the follow-up interviews with facilitators, several benefits are identified.

First, participants indicated that the adaptations contributed to improved collaboration between remote and in-person attendees. Online participants reported feeling more included and on equal footing with those physically present. This sense of equality was mainly attributed to improved visibility of non-verbal communication and clearer audio-visual cues, such as identifying who was speaking at any given time. Facilitators also noted a positive shift in their experience. They reported it became easier to identify when online participants wanted to contribute, which reduced the perceived distance and enabled more balanced facilitation. The presence of an extra screen placed on the meeting table was seen as particularly valuable. This setup made remote participants continuously visible and accessible, which in turn encouraged more conscious engagement with the hybrid nature of the meeting. From the online perspective it helped that participants in the room are dialing-in individually as they are more visible this way than when only one camera is used in the room. Some measures, however, are perceived as less effective. For instance, the use of stickers to increase hybrid awareness was generally regarded as redundant, since the visibility of remote participants on the screen already served as a constant reminder. In one of the three sessions, a laptop was used instead of an external screen to represent remote attendees. Participants found this setup less effective, citing lower visibility and a weaker sense of presence. Another recurring theme in participant feedback was cognitive overload. While the setup improved awareness, several participants noted that the abundance of screens in the room made it harder to focus or determine where to direct their attention. This issue underscores the importance of carefully balancing visibility with simplicity in hybrid meeting environments.

Importantly, participants felt that the interventions could be applied across different types of meetings and in multiple physical locations. However, they also emphasized that the interventions mainly focused on enhancing the physical meeting space. To fully support hybrid collaboration, attention must also be paid to the remote experience, such as ensuring remote participants have proper camera framing and clear views of the meeting room.

7.4.1 System usability scale (SUS)

In this study, the SUS statements are slightly adapted to reflect the experience of participating in a hybrid requirements elicitation session. The calculation method followed the standard SUS scoring procedure (see Section 4.2.4). A SUS score of 68 is typically considered the threshold for acceptable usability, with scores above this level indicating above-average user experience (Bangor et al., 2009). From each participant the SUS score is determined, shown in table 7.2 below.

Table 7.2: SUS scores of each participant in the evaluation of intervention strategy

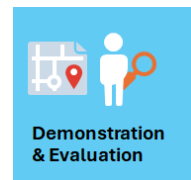
Demo	Participant abbreviation	SUS Score
1	D1	95
	D1	82,5
	D3	82,5
	D4	80
	D5	92,5
2	D6	75
	D7	85
	D8	75
	D9	75
	D10	80
3	D11	47.5
	D12	92,5
	D13	82,5
	D14	82,5
	D15	80

The resulting overall average SUS score for the evaluated sessions was 80.5 which is above the threshold, suggesting that participants found the category 1 interventions usable and supportive of their meeting experience. The complete calculation is included in Appendix M: *Calculation of system usability scale (SUS)*. This supports the earlier qualitative findings, indicating that the selected strategies are not only feasible to implement but also well received by both facilitators and participants. The high usability rating implies that these interventions are likely to be adopted more easily in future sessions, particularly because they require minimal behavioral change from participants and can be introduced by the facilitator with little preparation.

7.5 Take aways demonstration & evaluation for next phase

The demonstration results indicate that the category 1 intervention strategies contribute effectively to improving collaboration during hybrid requirements elicitation meetings. In particular, the introduction of an additional screen in the meeting room proved to be especially valuable in increasing awareness of online participants and fostering their active involvement. Additionally, the requirement for all participants to keep their cameras on further enhanced visibility and engagement across both physical and remote attendees.

In contrast, the use of stickers as visual reminders to raise awareness of the hybrid meeting context showed limited effectiveness based on participant feedback. This suggests that more integrated and tangible interventions, such as the additional screen, are better suited to promoting participant attentiveness in hybrid settings. It is important to note that these strategies predominantly focus on optimizing the physical meeting environment, with less emphasis placed on the setup and experience of remote participants working from home. This highlights an area for future improvement to ensure



equitable participation regardless of location. Some participants also reported a degree of distraction caused by the increased number of screens in the room, indicating that careful consideration must be given to the spatial arrangement and placement of devices to avoid cognitive overload.

The insights gained from the demonstration are incorporated into the final design of the intervention strategy, aiming to enhance its overall effectiveness and support a more seamless and inclusive hybrid requirements elicitation process.

8 Final intervention strategy



Communication

This chapter aims to communicate the final strategy, in line with the last step of the design science approach. After the design and evaluation phases have been completed, this chapter brings together the findings into one. The goal is to present the practical outcome of the research: a structured set of interventions that can support collaboration in hybrid requirements elicitation meetings. The chapter starts by introducing the three core elements that form the foundation of the intervention strategy: setup, structure, and awareness. These elements are translated into a step-by-step roadmap, which supports gradual implementation in practice. Based on this roadmap, practical measures are proposed and explained. Finally, the chapter reflects on how these interventions can be communicated in a clear and actionable way to facilitators, ensuring that the strategy can be applied effectively in real hybrid meetings.

8.1 Base structure of intervention strategy

As outlined in section 7.5, the intervention strategy is built on three interconnected elements: *setup*, *structure*, and *awareness*. When combined, these three elements provide the foundation for effective and inclusive hybrid collaboration during requirements elicitation sessions. All three are equally important to make hybrid collaboration work in practice, as visualized in figure 8.1. The pillars can be explained as follows:

- **Setup** refers to the physical and digital meeting environment. This includes things like screen setup, audio quality, camera positioning, and whether online participants are visible in the room. A proper setup helps everyone to be present in a comparable way, which is a basic condition for equal participation.
- **The structure** is about how the meeting is organized: how time is managed, how people take turns, and what kind of working methods are used. In hybrid settings, structure is extra important to make sure that interaction stays fair and clear, no matter where participants are located.
- **Awareness** relates to behavior and mindset. This means being aware of the hybrid nature of the meeting, actively involving remote participants, and noticing signs of disengagement or exclusion. Awareness is harder to influence directly but tends to grow naturally when the setup and structure are already supporting inclusive behavior.

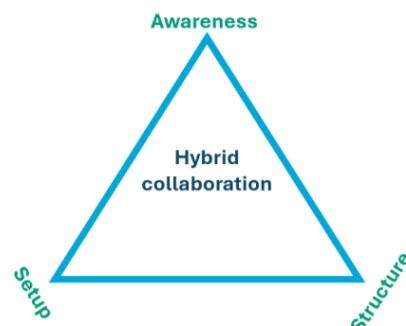
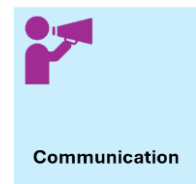


Figure 8.1: The three pillars for hybrid collaboration



These elements are not steps to follow in a fixed order. They are iterative and teams can revisit and adjust them over time depending on their current situation and level of experience. Improvements in one area work best when they are supported by progress in the others.

8.2 Roadmap for practical implementation

The three elements described earlier (setup, structure, and awareness) provide useful direction, but in practice, they are abstract. It is not always clear what they mean in a concrete meeting situation, let alone how to act on them. To make these pillars more practical, a step-by-step roadmap was developed, presented below in figure 8.2.

This roadmap helps to gradually move from basic hybrid readiness towards more mature forms of collaboration. It gives structure to the process and helps teams decide where to start and how to continue. The steps are ordered based on how much effort or behavioral change they require. Starting with simple improvements that can be applied immediately, the roadmap builds up towards deeper behavioral change that takes more time and team involvement. Each step of the roadmap helps towards better hybrid collaboration.

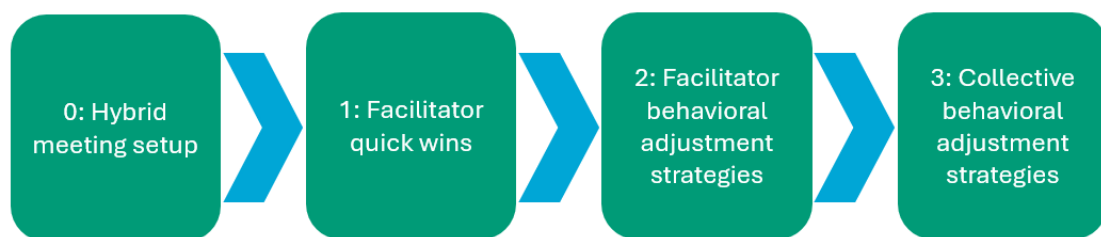


Figure 8.2: Roadmap for practical implementation

Step 0: Hybrid meeting setup

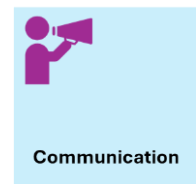
This step is seen as a given. Most offices already have a hybrid meeting set in place with at least one shared screen, a central microphone, and often a device like a Jabra speaker. These tools allow online and in-room participants to connect in the same conversation. This technical base is essential and assumed to be available in the next steps.

Step 1: Facilitator quick wins

These are simple improvements that a facilitator can apply right away, without much preparation. They require no behavioral change from participants, but they already make a difference in visibility, engagement and clarity.

Step 2: Facilitator behavioral adjustments

In this step, the facilitator changes the way they run the meeting. This could mean adding more structure, using breakout rooms, or switching to embedded tools to keep everyone in the same digital space. These changes need some preparation, but participants themselves don't need to behave differently (yet). The goal here is to be smoother, more equal collaboration.



Step 3: Collective behavioral adjustments

This last step requires effort from everyone. It's about actively shaping the way the team collaborates in hybrid settings. For example, making team agreements, assigning someone to keep track of online participation, or taking time to reflect on how the meeting went. These changes take more time and commitment but are key for long-term improvement.

8.3 Practical interventions for implementation

The previous section outlined the stepwise structure of the intervention roadmap. In this section, the proposed interventions are aligned with each of the four roadmap steps. The aim is not to prescribe a fixed order of implementation, but to offer a flexible set of practices that can be applied incrementally. Depending on the facilitator's experience and the specific team context, certain interventions may be introduced earlier or later.

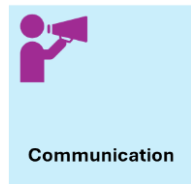
The tables below provide an overview of the interventions per step, including backward traceability to the objectives formulated in section 5.2. This traceability clarifies the intended effect of each intervention in relation to the challenges and goals identified earlier. Following the table, each intervention is briefly explained to provide practical context for implementation.

8.3.1 Practical measures step 1: Quick wins for facilitator

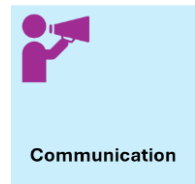
In table 8.1 below, a set of practical interventions is presented that fall under step 1 of the roadmap. These measures require minimal effort but can have a noticeable impact on creating a more inclusive and effective hybrid meeting environment.

Table 8.1: Practical measure step 1

	Intervention measure	Backward traceability of objectives	Underlying rationale/ explanation
Before the meeting	Encourage all participants to bring their laptops to the meeting room when in the office	1.1.1 Provide means for continuous nonverbal communication	<i>Bringing individual laptops allows participants to later dial in separately, ensuring that facial expressions and reactions remain visible to remote colleagues throughout the session.</i>
	Place an additional screen on the table (in the office or at home) to display online participants.	1.1.1 Provide means for continuous nonverbal communication 1.1.2 Ensure shared content and participant visibility simultaneously	<i>A dedicated screen showing online participants increases their perceived presence and inclusion in the office and at home. In office settings, it makes remote participants more visible to those physically present. For remote participants, a second screen helps maintain simultaneous visibility of both content and people.</i>



	Intervention measure	Backward traceability of objectives	Underlying rationale/ explanation
Start of the meeting	Greet all participants individually, both in-person and online.	1.2.2. Ensure smooth landing time for all participants	<i>Greeting each participant individually at the start creates a sense of equal treatment and inclusion. It prevents online participants from feeling overlooked and gives them time to settle into the meeting, improving their ability to engage from the beginning.</i>
	Ensure everyone keeps their camera on throughout the meeting.	1.1.1. Provide means for continuous nonverbal communication	<i>Keeping cameras on ensures that remote participants can see the faces and reactions of in-room colleagues, supporting social presence. Although it may require brief adjustment (e.g. managing echo), participants quickly adapt by muting sound and microphones on their laptops.</i>
	The facilitator provides a clear introduction outlining the meeting's purpose and agenda.	1.2.1 Define the rules of the game	<i>A clear and shared starting point helps all participants understand the meeting's purpose and structure. This prevents disengagement and avoids situations where participants must search through emails or context themselves mid-meeting.</i>
	Explicitly mention that the meeting is hybrid, emphasizing the need for extra attention to engagement.	1.2.3 Ensure awareness of participants	<i>Hybrid meetings have become normalized, which can lead to participants overlooking the hybrid context. Explicitly mentioning it at the start helps raise awareness and encourages inclusive behavior. It also reinforces the presence of remote participants, especially if shown on a dedicated screen.</i>
During meeting	Actively ask for agreement instead of assuming silence equals consent.	2.2 Provide interaction mechanisms for engagement	<i>Asking participants to explicitly agree to decisions or conclusions increases active engagement. It prevents passive silence from being interpreted as consent and creates space for remote voices to be heard.</i>
	Use clear control questions.	2.1 Provide mechanisms to encourage participation of remote participants	<i>Using targeted questions encourages responses, especially from remote participants. It helps facilitators check for understanding and ensures everyone remains engaged in the discussion.</i>



8.3.2 Practical measures step 2: Facilitator behavioral adjustment strategies

Table 8.2 below outlines practical interventions that require the facilitator to adjust their behavior and preparation methods. These measures go beyond quick fixes and aim to improve structure, interaction, and inclusion during hybrid requirements elicitation meetings.

Table 8.2: Practical measures step 2

	Intervention measure	Backward traceability of objectives	Underlying rationale/ explanation
Preparation for the meeting	Prepare the meeting using an online setup beforehand.	3.1.1 Provide means to focus on content not facilitation task	Preparing content and structure in advance using an online tool allows the facilitator to focus on the discussion rather than logistical aspects during the meeting. It also supports equality by giving all participants the same access to materials regardless of location.
	Use a work form with structured blocks, introduced and executed one at a time, that support equal contribution.	3.1.1 Provide means to focus on content not facilitation task 2.1 Provide mechanisms to encourage participation of remote participants	A predefined structure with phased, democratic steps (e.g. individual brainstorming before group discussion) helps focus attention on content and ensures that all participants regardless of presence or personality have equal opportunities to contribute.
	Use embedded apps in Microsoft Teams for interactive activities.	1.1.2 Ensure shared content and participant visibility simultaneously	Embedded apps (e.g. whiteboards, polls, but also Mural) reduce the need to switch between tools, which helps participants maintain focus. These tools also support side-by-side visibility of both content and participants, improving hybrid collaboration.
	Use Microsoft Teams breakout rooms to facilitate discussion.	2.2 Provide interaction mechanisms for engagement	Breakout rooms, used a lot during fully remote work, can still support focused small-group discussion in hybrid meetings. They enable more balanced participation and reduce dominance by in-room attendees.



8.3.3 Practical measures step 3: Collective behavioral adjustment strategies

The interventions in table 8.3 below require effort from the entire team rather than just the facilitator. These collective behavioral adjustments aim to create a shared sense of responsibility for inclusive collaboration and help establish sustainable habits that improve hybrid meetings over time.

Table 8.3: Practical measures step 3

	Intervention measure	Backward traceability of objectives	Underlying rationale/ explanation
During the meeting	Everyone uses the same method to request speaking time (e.g. emoji, hand gesture, chat message).	1.2.1 Define the rules of the game 2.2 Provide interaction mechanisms for engagement	<i>In physical meetings, it is generally easier to signal the desire to speak than in online settings. By introducing a shared method for turn-taking, the interaction becomes more balanced and inclusive, especially for remote participants.</i>
	Display meeting rules upon entry (e.g. in chat or on slides).	1.2.1 Define the rules of the game	<i>Once rules have been defined, showing them at the start of the meeting helps participants recall and apply them consistently, reinforcing inclusive practices</i>
	Assign a support role to assist the facilitator in monitoring interaction.	3.2 Ensure awareness of facilitator during meeting	<i>Delegating responsibility for monitoring engagement, especially for remote participants, helps the facilitator focus on guiding the content. This “ambassador role” ensures that online attendees remain visible and included.</i>
	Reduce the responsibilities of the Requirements engineer (e.g. assign notetaking or recording the meeting).	3.1.1 Provide means to focus on content not facilitation task	<i>When someone else is responsible for documentation, the Requirements engineer can focus fully on facilitating discussion and managing group dynamics, which is especially important in hybrid settings.</i>

8.4 Communicating the intervention strategies: from interventions to facilitator guidance

In addition to structuring and implementing the interventions themselves, objective 3.3: *Provide proof of concept of effective meeting* also addresses how these strategies are communicated to facilitators. To support practical adoption, a separate guide has been developed that translates the proposed interventions into an accessible format for everyday use.

This guide takes the form of a tips-and-tricks manual aimed at facilitators of hybrid meetings. It summarizes the key interventions per roadmap step and includes visual examples to clarify specific measures. For instance, the revised hybrid meeting setup, shown below in figure 8.3, demonstrates how physical layout changes can improve visibility and enable continuous nonverbal communication between remote and in-person participants.

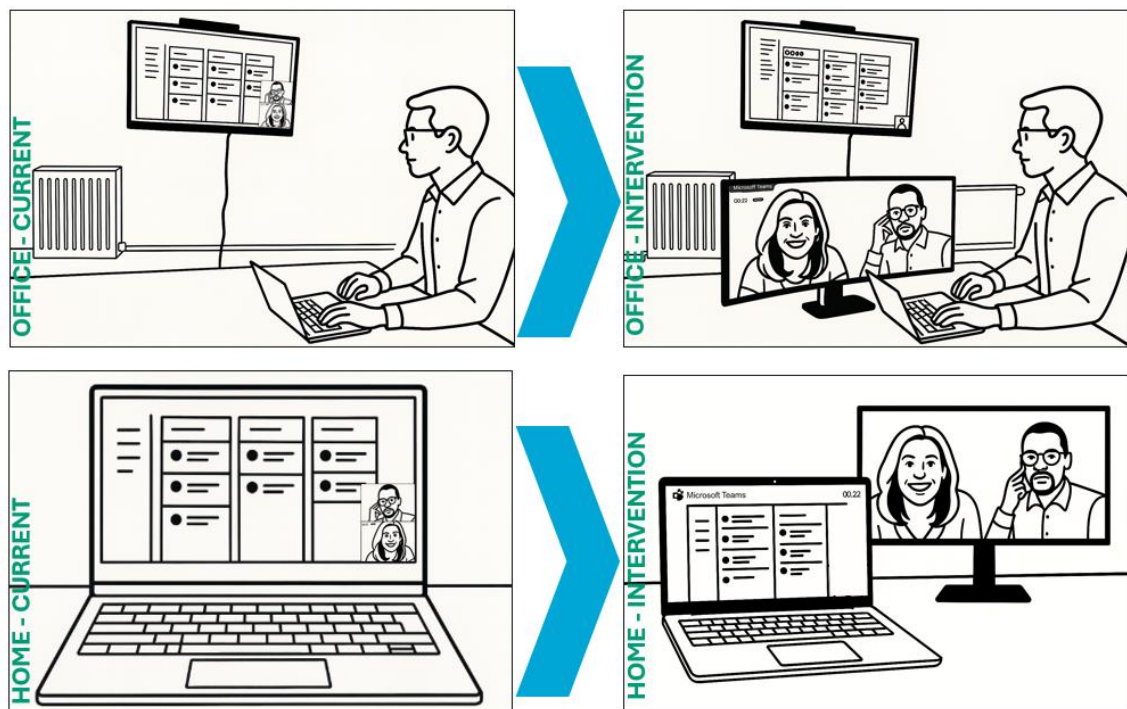


Figure 8.3: Example visualization measure in manual

The creation of this handbook ensures that the outcomes of this research are made accessible and usable for practitioners in the field. It translates the insights and strategies into concrete, applicable steps that can directly support more effective hybrid requirements meetings. Beyond that, it aims to raise awareness and provide clarity on what can be done differently to improve collaboration. The full handbook is included as *Appendix N: Manual for implementation*.

9 Discussion

This chapter reflects the findings of the study and positioning them in relation to existing literature and the research objectives. It begins by interpreting the results and examining what they reveal about collaboration in hybrid requirements elicitation. The implications of these findings are then discussed, including their boundaries, dependencies, and potential for generalization. Strengths and limitations of the study are evaluated, followed by a consideration of its academic and societal contributions. Together these reflections provide a comprehensive understanding of what this research has achieved and how it can contribute to both theory and practice.

9.1 Interpretation of results

The results of this research show that the challenges in hybrid requirements elicitation are not inherent to the process but are strongly shaped by how meetings are set up and facilitated. The demonstrations have shown that small and targeted adjustments to the meeting environment can have an immediate and measurable effect. Measures such as adding an additional screen to show remote participants and having each participant join individually from their laptop reduced disparities between in-room and remote participants. It is found that what was perceived as a “participation problem” in hybrid meetings is in many cases a visibility and audibility problem. The impact of an improved setup extended beyond technical performance. When remote participants were consistently visible, facilitators and in-room attendees were more inclined to involve them and less likely to overlook their contributions. This indicates that setup changes can catalyse behavioural changes by lowering the cognitive effort required to engage remote colleagues. Furthermore, the study showed that awareness of hybrid dynamics does not develop in isolation; it is fostered by awareness from team members and when meetings are structured to encourage inclusive interaction. This suggests that effective facilitation is not solely dependent on individual skill but can be actively supported through deliberate adjustments to the meeting environment.

The findings of this study indicate as well that improving collaboration in hybrid requirements elicitation is less about replacing elicitation techniques but more about creating the conditions for these techniques to operate effectively. A well-designed setup forms the foundation, enabling facilitators to maintain balanced participation, which in turn supports more effective collaboration and potentially higher-quality requirements. Implementation trade-offs must also be acknowledged. In teams with a strong autonomy culture, highly structured facilitation may initially be perceived as restrictive, potentially lowering willingness to adopt new approaches. Management support may therefore be essential to legitimize the change, reinforce its importance, and approve the initial investment of time. The initial investment depends on the maturity of the teams and the number of meetings. As an estimate, the first two categories of the roadmap, which focus on facilitation and meeting structure, require about one hour of preparation per facilitator and minimal extra time during meetings. The third category, which targets collective

behavioral change, requires sustained team commitment, amounting to roughly one additional hour per week over several weeks for all participants. These costs are modest by design, as efficiency was an explicit constraint in the design phase, and are likely outweighed by the long-term benefits of reduced rework from higher-quality requirements. Temporary decreases in efficiency should be expected during the adaptation period, as observed in the demonstrations. Some participants initially experienced uncertainty about where to direct their attention due to the presence of multiple screens but reported increased collaboration using the new setup after the meeting.

9.2 Validation

The validity of the findings is subject to several limitations. The methodological design followed a design science approach. Objectives trees and morphological charts were used to explore the solution space, and interview themes were informed by literature and the Distance Matters framework (Olson & Olson, 2000) to maintain focus on relevant collaboration issues. The study was conducted within a single organization, with twelve interviews. Although theoretical saturation was claimed, divergent perspectives, particularly from less vocal or more junior team members, may not have been fully captured. All interviews were analyzed by a single researcher, which introduces the risk of confirmation bias in coding and interpretation. To mitigate this, open neutral questioning was applied, and the thematic coding was supported by illustrative quotations. The intervention strategies were tested in three demonstrations in real hybrid meetings, which confirmed their applicability in the context of hybrid requirements engineering. However, the demonstrations covered only the quick win strategies in Category 1. Behavioral and team-wide interventions in Categories 2 and 3 were not tested, so their long-term effects remain to be established.

Reliability was supported through several design choices that aimed to ensure procedural consistency and reproducibility. All interviews followed the same thematic structure to ensure comparability while allowing natural follow-up questions. Both the interviews and focus groups were recorded and replayed multiple times to reduce interpretation differences. The focus group used a predefined process and identical preparation materials for all participants. Each demonstration used uniform facilitator instructions and the same post-meeting questionnaire, which included the standardised System Usability Scale. To reduce bias during the demonstrations and maintain consistency in conditions, the researcher did not attend the meetings and facilitators were instructed to behave as they normally would. These measures collectively increase transparency and make the study easier to replicate or to extend in future research.

9.3 Generalization of findings

The context of conducting this study within Info Support shaped both the intervention design and its generalizability. The organization's maturity in agile practices and hybrid collaboration provided a favourable environment for testing, including teams that were already familiar with iterative work, remote tools, and self-organising practices. While the hybrid working model and agile development practices present at Info Support are common in the sector, the study context was limited to Info Support and their clients. This

constrains generalizability, which is a known characteristic of the design science approach (Johannesson & Perjons, 2014).

The strategy is most likely to be effective in teams that already have a baseline level of hybrid readiness, such as stable digital infrastructure, facilitators with basic meeting management skills, and a culture that supports reflective improvement. In such environments, the interventions can be adopted with minimal resistance and generate visible benefits quickly. By contrast, in low-maturity contexts, where digital tools are unreliable, facilitation skills are limited, or there is little openness to changing meeting routines, implementation may face barriers. In these cases, preliminary investment in infrastructure, facilitator training, or change management may be necessary before the strategy can be applied effectively. Cultural readiness, openness to behavioural change, and the quality of digital infrastructure remain decisive factors for the success of the approach.

9.4 Contribution

From an academic perspective, the study advances understanding of hybrid collaboration in agile environments by connecting abstract barriers, such as reduced spontaneity and weakened shared understanding, to concrete mechanisms in elicitation work. The contribution provides a detailed description of how hybrid dynamics can hamper equal participation and sustained engagement. Furthermore, it offers a structured intervention strategy that others can replicate, adapt and study further. In this way the work goes beyond listing challenges and moves towards implementable solutions.

The novelty of this research lies in three main aspects. First, it demonstrates that the core issue in hybrid high-interaction meetings is not the choice of tool or elicitation technique, but the meeting conditions under which these techniques are applied. While prior work has shown that requirements engineering is affected by hybrid meeting setup (Nguyen-Duc et al., 2023), this study specifies how these challenges become manifest in elicitation tasks, in line with literature on hybrid work in other contexts (Canedo et al., 2024; Obal et al., 2024). Second, it integrates challenges that earlier studies treated as separate into a single system requirements structure, revealing relationships between them. For example, limitations in non-verbal communication and visibility can lead to unequal participation, which in turn reduces willingness to collaborate. Third, it delivers an operational design artefact: a roadmap that translates theory into concrete actions across setup, structure, and behavior, providing a phased pathway from quick wins to team-wide behavioral change, together with indicative effort and cost estimates. This level of actionable strategy is absent from earlier literature, which has called for practical interventions to sustain effective teamwork (Williams & Shaw, 2024). Finally, it provides empirical demonstrations. Three pilot sessions, evaluated using a standardized process, showed that the roadmap is both feasible and well received, moving the contribution from conceptual analysis toward partial validation.

Beyond academic relevance, the study has societal value. The demonstration phase also confirmed practical applicability: facilitators and participants consistently reported improved effectiveness and clearer collaboration dynamics. As hybrid working becomes

a stable mode of collaboration, organizations need to adapt critical processes such as requirements elicitation. The issues addressed here, unequal participation, loss of engagement, and facilitator difficulties, occur in many forms of hybrid knowledge work. The roadmap offers low-cost, adaptable interventions that do not require new tools or infrastructure, making them accessible to teams with varying levels of hybrid readiness. Improved hybrid meeting quality can lead to clearer decision-making, better alignment, and reduced costs from rework and miscommunication.

This work aligns with the MSc Complex Systems Engineering and Management programme, particularly the Information and Communication track. It combines system design with stakeholder engagement and behavioural insight, balancing public values such as inclusiveness and accessibility with private values such as efficiency and delivery quality. By applying systems thinking to a socio-technical problem and producing a reusable, partially validated design artefact, the study reflects the programme's emphasis on integrative, value-sensitive engineering. This strengthens the academic positioning and practical relevance of the research and highlights its contribution in translating hybrid collaboration theory into a concrete intervention roadmap for requirements engineering.

10 Conclusion

Requirements elicitation plays a central role in agile software development, where clear and complete requirements depend on effective collaboration between team members and clients. In recent years, hybrid meetings, with some participants on-site and others joining remotely, have become common in this process. While this format offers flexibility, it also introduces new barriers to effective collaboration. This research set out to answer the question: *What strategies can be introduced to improve collaboration in hybrid meetings for requirements elicitation in agile software development?*

Initially, the focus of this study was on how specific elicitation techniques perform in hybrid settings. As the study progressed, it became evident that the techniques themselves were not the problem. The main challenge is found to be in the meeting conditions: imbalances in visibility, audibility, and participation between remote and in-person participants. These imbalances were found to be the cause of disrupting discussion flow, reduce engagement, and can lower the quality of the requirements captured. This insight shifted the research focus from adapting elicitation techniques to improving the hybrid collaboration environment in which they are applied.

Based on literature, expert interviews, and a focus group, a three-pillar strategy was developed: setup (physical and technical environment), structure (session organisation and facilitation), and awareness (participant and facilitator behaviour). These elements reinforce each other: an improved setup enables better structure, clear structure promotes inclusive behaviour, and increased awareness enhances both setup and structure. This interdependency reflects the complexity of hybrid collaboration and demonstrates that effective solutions address multiple, connected aspects rather than isolated problems.

The strategy was operationalised in a roadmap with three levels of intervention: quick wins for immediate improvement, behavioural adjustments in facilitation, and collective behavioural change across the team. This phased design allows teams to start small and scale up as habits and awareness develop. Initial demonstrations of the quick wins showed positive effects, with participants reporting improved engagement and facilitators noting more balanced interaction. The interventions scored an average of 80.5 on the System Usability Scale, indicating high perceived usability.

By applying a design science research approach, the study translated abstract collaboration challenges into actionable and partially validated solutions. The findings suggest that improving hybrid requirements elicitation requires alignment between the physical environment, meeting structure, and behavioural norms. The proposed roadmap supports a shift from ad hoc facilitation towards intentional, structured navigation of hybrid collaboration, positioning the requirements engineer as both a technical expert and a coordinator of effective team interaction.

11 Recommendations

11.1 Recommendations for future research

This research provides a first step in exploring how hybrid requirements elicitation meetings can be improved through targeted intervention strategies. Two priorities for future research stand out. The first is a longitudinal follow-up to study how the interventions perform over time, whether they lead to sustained improvements in collaboration, and whether certain measures become standard practice or require ongoing reinforcement. The second is a comparative study across multiple companies with varying levels of hybrid maturity. This would make it possible to investigate how differences in organisational culture, digital infrastructure and agile maturity influence both the adoption and the effectiveness of the strategy. Such a study would help establish to what extent the challenges and solutions identified in this research are transferable beyond the case organisation.

Building on these priorities, future work could also focus on implementing and testing the full strategy, including the interventions in Categories 2 and 3 that require behavioural change and broader team awareness. These measures are expected to be more challenging to introduce but could deliver greater long-term impact on collaboration quality. Expanding the scope to include additional influencing factors, such as time zone differences, team dynamics or leadership styles, could provide a more complete understanding of the variables affecting hybrid requirements elicitation.

Additionally, future studies might assess the potential of emerging technologies, such as virtual reality or holographic conferencing, to reduce perceived distance between remote and in-person participants. These were excluded from the current research due to practical constraints but may offer fundamentally new ways to enhance hybrid collaboration. Their adoption would need to be assessed in relation to their financial cost and compared to the benefits of relatively low-cost solutions such as those examined in this study. Finally, combining qualitative insights with quantitative measurements, for example by tracking participation patterns or analysing non-verbal interaction from video data, could strengthen the evidence base and enable a more objective evaluation of collaboration dynamics.

11.2 Recommendations for practice at Info Support

This research shows that improving hybrid requirements elicitation meetings requires both small practical steps and long-term behavioral change. To ensure that the results of this research are adopted in practice, several concrete recommendations can be made for Info Support.

The first step is to expand the number of meeting rooms that support hybrid collaboration properly. Now, only a limited number of rooms are equipped with a setup that allows for equal visibility and audibility of all participants. As a result, teams often end up in rooms

where remote participants are barely visible or audible, making it difficult to ensure equal participation. Next, it is recommended to actively support facilitators in applying the quick wins from this research. These are low-effort improvements, such as greeting all participants individually, using a second screen to show remote participants, or explicitly mentioning the hybrid nature of the meeting. These interventions are easy to apply and already improve visibility, engagement, and meeting structure. Facilitators should be made aware of these measures, and ideally, they should be included in the onboarding or training of engineers who frequently lead meetings. Third, it is advised to further professionalize hybrid facilitation by creating more awareness about the extra effort and preparation it requires. The behavioral strategies outlined in the roadmap such as using embedded tools, breakout rooms, or clear structures require deliberate action. Facilitators should get time and space to prepare meetings properly, especially when they involve more complex elicitation. Additionally, Info Support could explore the idea of setting up a small internal learning group where engineers share hybrid facilitation experiences and tools. Moreover, collective responsibility should become part of the way teams approach hybrid collaboration. Many of the deeper issues in hybrid settings, such as unequal participation or unclear turn-taking, cannot be solved by the facilitator alone. It helps if teams make shared agreements about behavior in hybrid sessions. Examples include using the same method to request speaking time, showing meeting rules at the start, or assigning someone to monitor online engagement. These agreements should not be imposed top-down, but rather discussed and chosen by the teams themselves, depending on their way of working.

By implementing these recommendations, Info Support can take a structured next step towards more effective hybrid collaboration. These recommendations may also be applicable to other organizations working with requirement engineering, ultimately supporting both the quality of requirements elicitation and the overall efficiency of hybrid software development work.

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13 Appendices

Appendix A: PRISMA diagrams

PRISMA diagram for research proposal literature review

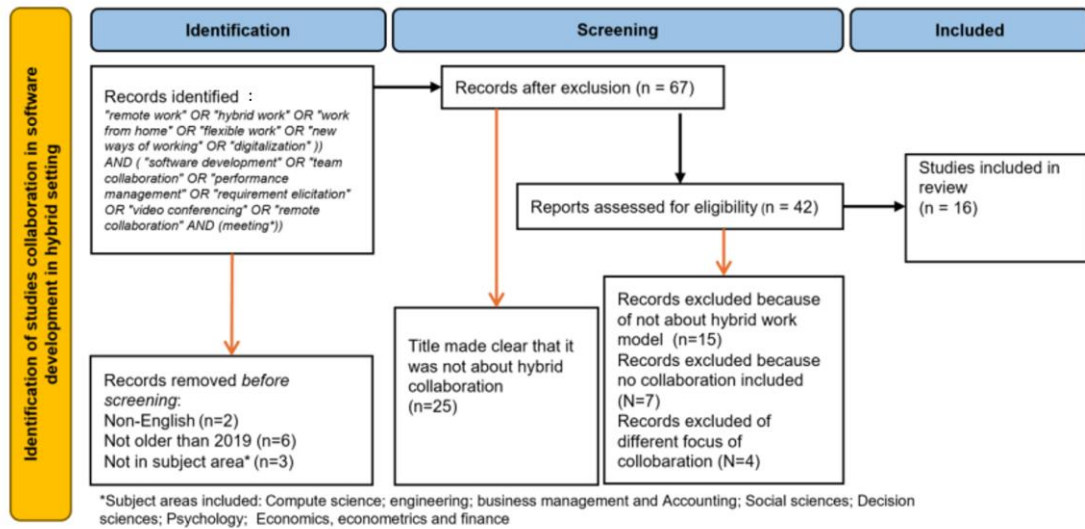


Figure 13.1: PRISMA Research proposal

PRISMA diagram requirement engineering challenges

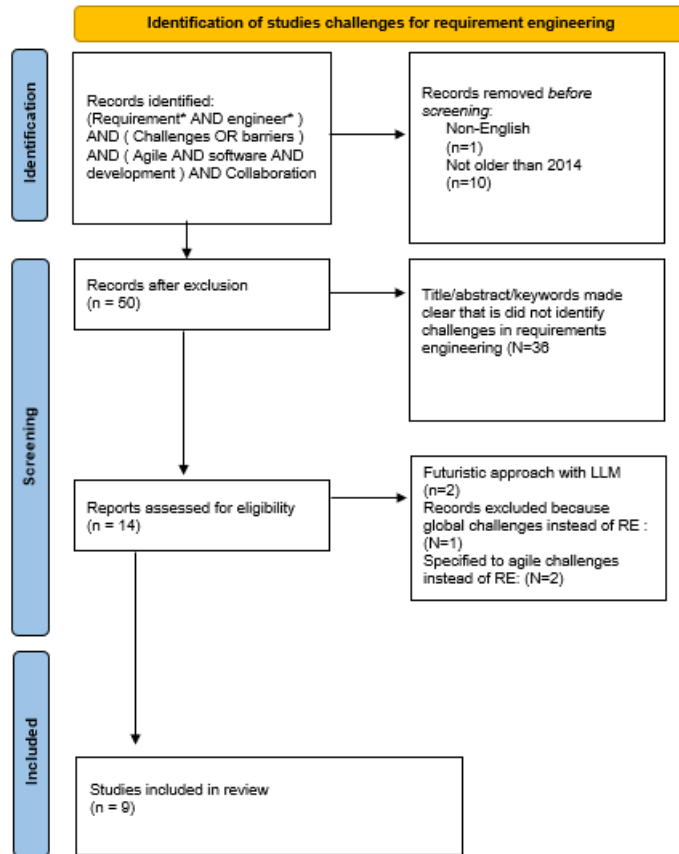


Figure 13.2: PRISMA Requirements engineering challenges

PRISMA diagram challenges for collaboration

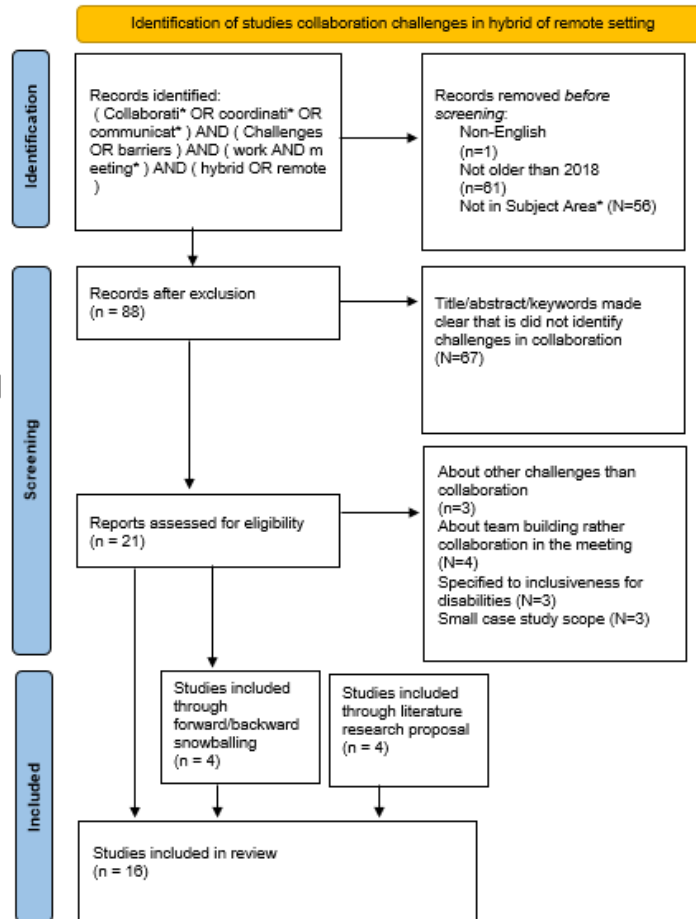


Figure 13.3: PRISMA Challenges for collaboration

Appendix B: Interview question list protocols

Expert question list protocol

Introduction (5 min)

Part 1: Problem Identification (30 min)

Background and Experience

Are you familiar with the term *requirements engineering*?

1. Can you briefly describe your role and relation to requirements engineering sessions?
2. How often do you participate in hybrid meetings for gathering or defining requirements? What type of hybrid meetings do you participate in?
3. Do you usually attend these meetings online or in person?

Challenges in Hybrid Requirements Elicitation

4. Can you describe a recent hybrid session you were involved in for gathering requirements?

- What went well?
 - What challenges did you face?
5. What are the biggest challenges you encounter during hybrid requirements elicitation?
 6. Do you experience differences in shared understanding (*common ground*) between remote participants and those on-site?
 - How do you notice this?
 7. Do people participate equally in hybrid meetings compared to fully online or fully in-person ones?
 - If not, what influences their level of involvement (*collaboration readiness*)?
 - Do you adjust your behavior in a hybrid meeting compared to online or in-person? If yes, in what way? What triggers this adjustment?
 8. Are there technical limitations or difficulties during hybrid sessions?
 - Think of tools, connectivity, whiteboarding, screen sharing, etc. (*collaboration technology readiness*)
 9. Do you feel that your information is conveyed as effectively to the requirements engineer during a hybrid session compared to fully remote or fully in-person meetings?
 - Do you feel you receive the same amount of attention?

10. Do you feel that hybrid sessions are equally effective in achieving concrete outcomes, such as documenting good requirements?
11. Do you feel comfortable expressing your ideas and concerns during hybrid sessions? Does this change when you're remote?
12. In addition to a content role, the requirements engineer also has a facilitating role (e.g., providing structure, involving people, managing pace). Do you notice a difference in this role during hybrid sessions compared to fully remote or fully in-person ones?
 - What goes well, and what doesn't?

Part 2: Desired Improvements (20 min)

13. If you could change one thing about hybrid requirements elicitation, what would it be? What criteria would we need?
14. What should a better way of working in hybrid settings enable?
 - For example: more equal participation, smoother documentation, better understanding
15. What kind of support would you like in hybrid meetings?
 - (e.g., facilitation methods, tool features, guidelines)
16. What criteria are important to you when deciding whether to adopt a new method or tool?
 - For example: ease of use, stakeholder inclusivity, integration with current practices

Conclusion (5 min)

Client question list protocol

Introduction (5 min)

Part 1: Problem Identification (30 min)

Background and Experience

Are you familiar with the term *requirements engineering*?

4. Can you briefly describe your role and relation to requirements engineering sessions?
5. How often do you participate in hybrid meetings for gathering or defining requirements? What type of hybrid meetings do you participate in?
6. Do you usually attend these meetings online or in person?

Challenges in Hybrid Requirements Elicitation

4. Can you describe a recent hybrid session you were involved in for gathering requirements?

- What went well?
 - What challenges did you face?
13. What are the biggest challenges you encounter during hybrid requirements elicitation?
 14. Do you experience differences in shared understanding (*common ground*) between remote participants and those on-site?
 - How do you notice this?
 15. Do people participate equally in hybrid meetings compared to fully online or fully in-person ones?
 - If not, what influences their level of involvement (*collaboration readiness*)?
 - Do you adjust your behavior in a hybrid meeting compared to online or in-person? If yes, in what way? What triggers this adjustment?
 16. Are there technical limitations or difficulties during hybrid sessions?
 - Think of tools, connectivity, whiteboarding, screen sharing, etc. (*collaboration technology readiness*)
 17. Do you feel that your information is conveyed as effectively to the requirements engineer during a hybrid session compared to fully remote or fully in-person meetings?
 - Do you feel you receive the same amount of attention?
 18. Do you feel that hybrid sessions are equally effective in achieving concrete outcomes, such as documenting good requirements?

19. Do you feel comfortable expressing your ideas and concerns during hybrid sessions? Does this change when you're remote?
20. In addition to a content role, the requirements engineer also has a facilitating role (e.g., providing structure, involving people, managing pace). Do you notice a difference in this role during hybrid sessions compared to fully remote or fully in-person ones?
 - What goes well, and what doesn't?

Part 2: Desired Improvements (20 min)

13. If you could change one thing about hybrid requirements elicitation, what would it be? What criteria would we need?
14. What should a better way of working in hybrid settings enable?
 - For example: more equal participation, smoother documentation, better understanding
16. What kind of support would you like in hybrid meetings?
 - (e.g., facilitation methods, tool features, guidelines)
17. What criteria are important to you when deciding whether to adopt a new method or tool?
 - For example: ease of use, stakeholder inclusivity, integration with current practices

Conclusion (5 min)

Appendix C: Codebook

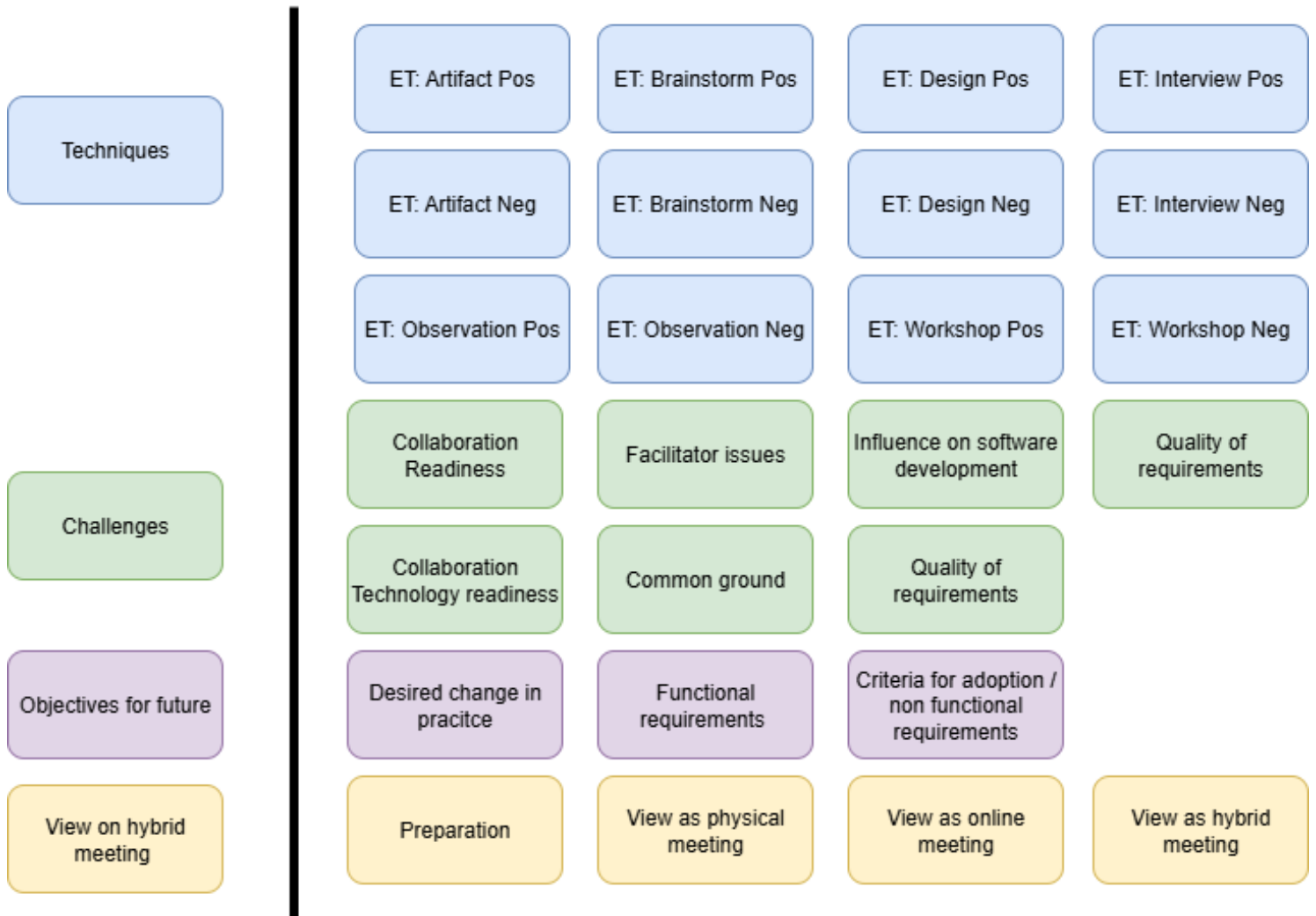


Figure 13.4: Codebook for coding interviews

Appendix D: Demonstration interview protocol

1. Algemene indruk en voorbereiding

Hoe heb je de voorbereiding op deze hybride meeting ervaren?

Wat vond je van de gebruikte setup? Was deze volgens jou geschikt voor hybride samenwerking?

2. Waarnemingen tijdens de meeting

Welke verschillen merkte je op tussen online en fysieke deelnemers in hun participatie?

Wat ging volgens jou goed tijdens de meeting? Wat juist minder?

3. Samenwerking en interactie

Hoe verliep de interactie tussen online en fysieke deelnemers?

Was het voor jou als facilitator makkelijk om alle deelnemers (zowel fysiek als online) erbij te betrekken?

4. Zichtbaarheid en communicatie

Kon je goed zien en horen wie er iets wilde zeggen, zowel online als fysiek?

Waren non-verbale signalen voldoende zichtbaar en bruikbaar tijdens de meeting?

5. Gebruiksgemak en ondersteuning

Zou je deze setup opnieuw willen gebruiken? Waarom wel of niet?

Appendix E: Demonstration question list survey

Evaluatievragen Hybride Meeting Setup

Beoordeel de volgende stellingen met behulp van de onderstaande schaal:

1 = Totaal oneens | 2 = Oneens | 3 = Neutraal | 4 = Eens | 5 = Totaal eens

Let op: Bij het beantwoorden van onderstaande vragen, vragen we je om terug te denken aan een andere hybride meeting waaraan je recent hebt deelgenomen met dit team. Gebruik deze meeting als referentiepunt voor het geven van je antwoorden.

Ik geef toestemming voor het gebruik van mijn antwoorden in deze vragenlijst voor het onderzoek 'RE in Hybrid setting'

Ja

Nee

Was je een online of een on-premise deelnemer aan de meeting?

Online/Teams

In de ruimte

Vraag

Totaal oneens	Oneens	Neutraal	Eens	Totaal eens
---------------	--------	----------	------	-------------

A. Gebruiksgemak en leerbaarheid

- Ik vond de setup gemakkelijk te gebruiken.
- Ik vond de setup onnodig complex.
- Ik denk dat ik technische ondersteuning nodig zou hebben om deze setup te kunnen gebruiken.
- Ik voelde me zelfverzekerd bij het gebruik van de setup.
- Ik moest veel leren voordat ik met deze setup aan de slag kon.
- Ik kan me voorstellen dat de meeste mensen deze setup snel leren gebruiken.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

B. Functionaliteit en integratie

- Ik vond dat de verschillende functies in de setup goed geïntegreerd waren.
- Ik vond de setup onhandig in gebruik.
- Ik vond dat er te veel inconsistentie zat in de setup.
- Ik zou deze setup in de toekomst graag vaker gebruiken.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

C. Toepasbaarheid en schaalbaarheid

11. Ik kan me voorstellen dat deze setup helpt in verschillende soorten meetings.

12. De setup kan gemakkelijk worden geïmplementeerd op andere locaties.

Totaal oneens	Oneens	Neutraal	Eens	Totaal eens
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

D. Samenwerking en gelijkwaardigheid

13. De setup verbeterde de samenwerking tussen fysieke en online deelnemers.

14. De setup zorgde ervoor dat ik me gelijk voelde aan de andere deelnemers.

15. De setup hielp me beter begrijpen wat andere deelnemers bedoelden.

16. Ik voelde me betrokken, ongeacht of ik fysiek of online deelnam.

17. Ik voelde me minder afgeleid tijdens de meeting.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

E. Zichtbaarheid en communicatie

18. Ik kon de andere deelnemers goed zien en horen, ongeacht hun locatie.

19. De setup hielp om non-verbale communicatie zichtbaar te maken.

20. Ik wist wie er aan het woord was en wie iets wilde zeggen.

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Eventueel: Opmerking/toelichtingen

Appendix F: Data management plan

Plan Overview

A Data Management Plan created using DMPOnline

Title: MSc Thesis : Requirement elicitation in Hybrid Setting

Creator: T. Swuste

Affiliation: Delft University of Technology

Template: TU Delft Data Management Plan template (2025)

Project abstract:

My research explores hybrid collaboration in agile software development, specifically focusing on requirements elicitation in hybrid meetings. The goal is to identify collaboration challenges and develop strategies to improve teamwork in these settings. The study involves software developers, product owners, and other stakeholders engaged in agile development at Info Support, a software development and AI consulting company, which is my Thesis company.

ID: 173917

Start date: 17-02-2025

End date: 18-07-2025

Last modified: 01-04-2025

MSc Thesis : Requirement elicitation in Hybrid Setting

0. Administrative questions

1. Provide the name of the data management support staff consulted during the preparation of this plan and the date of consultation. Please also mention if you consulted any other support staff.

My faculty data steward, Nicolas Dintzner, has reviewed this DMP on 01/04/2025.

2. Is TU Delft the lead institution for this project?

Yes, the only institution involved

I. Data/code description and collection or re-use

3. Provide a general description of the types of data/code you will be working with, including any re-used data/code.

Type of data/code	File format(s)	How will data/code be collected/generated? <i>For re-used data/code: what are the sources and terms of use?</i>	Purpose of processing	Storage location	Who will have access to the data/code?
Interview recordings (multiple)	.mp3	Interviews	Capturing experts opinion for problem identification, objectives and review the innovation	TU Delft OneDrive, Teams	Sepinoud Azimi Rashti (first supervisor TU), Jan Anne Annema (second supervisor TU)
Interview transcripts (multiple)	.doc or .pdf	Interviews	Capturing experts opinion for problem identification, objectives and review the innovation	TU Delft OneDrive, Teams	Sepinoud Azimi Rashti (first supervisor TU), Jan Anne Annema (second supervisor TU)
Anonymous interview summary (multiple)	.doc or .pdf	Interviews	Capturing experts opinion for problem identification, objectives and review the innovation	TU Delft OneDrive	Sepinoud Azimi Rashti (first supervisor TU), Jan Anne Annema (second supervisor TU), Marc Valkenier (External supervisor Info Support)
Focus group recording	.mp3	Focus group	Capturing opinion about possible innovation strategies that can be used	TU Delft OneDrive, Teams	Sepinoud Azimi Rashti (first supervisor TU), Jan Anne Annema (second supervisor TU)
Focus group transcript	.doc .pdf	Focus group	Capturing opinion about possible innovation strategies that can be used	TU Delft OneDrive, Teams	Sepinoud Azimi Rashti (first supervisor TU), Jan Anne Annema (second supervisor TU)
Focus group synthesis	.doc. .pdf	Focus group	Capturing opinion about possible innovation strategies that can be used	TU Delft OneDrive	Sepinoud Azimi Rashti (first supervisor TU), Jan Anne Annema (second supervisor TU), Marc Valkenier (External supervisor Info Support)

II. Storage and backup during the research process

4. How much data/code storage will you require during the project lifetime?

< 250 GB

5. Where will the data/code be stored and backed-up during the project lifetime? (Select all that apply.)

Another storage system – please explain below, including provided security measures
 TU Delft OneDrive
 MS Teams by TU Delft infrastructure

III. Data/code documentation

6. What documentation will accompany data/code? (Select all that apply.)

Data – Methodology of data collection

IV. Legal and ethical requirements, code of conducts

7. Does your research involve human subjects or third-party datasets collected from human participants?

Yes – please provide details in the additional information box below

the Human Research Ethics Committee has approved the application 5446.

8. Will you work with personal data? (This is information about an identified or identifiable natural person, either for research or project administration purposes.)

Yes

9. Will you work with any other types of confidential or classified data or code as listed below? (Select all that apply and provide additional details below.)

Yes, confidential data received from commercial, or other external partners

10. How will ownership of the data and intellectual property rights to the data be managed?

According to the signed graduation agreement by the Dean and Company (Info Support) and me.

11. Which personal data or data from human participants do you work with? (Select all that apply.)

Other types of personal data or other data from human participants – please provide details below Video materials

Telephone number, email addresses and/or other addresses as contact details for administrative purposes Proof of consent (such as signed consent materials which contain name and signature)

Audio recordings

Names as contact details for administrative purposes Job description

12. Please list the categories of data subjects and their geographical location.

Requirement engineers at Info Support Clients of Info Support
Info Support is based in the Netherlands

13. Will you be receiving personal data from or transferring personal data to third parties (groups of individuals or organisations)?

No

16. What are the legal grounds for personal data processing?

Informed consent

17. Please describe the informed consent procedure you will follow below.

All study participants will be asked for their written consent for taking part in the study and for data processing before the start of the interview.

18. Where will you store the physical/digital signed consent forms or other types of proof of consent (such as recording of verbal consent)?

One Drive TU Delft

19. Does the processing of the personal data result in a high risk to the data subjects? (Select all that apply.)

If the processing of the personal data results in a high risk to the data subjects, it is required to perform Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data in your research project.

If any category applies, please provide additional information in the box below. Likewise, if you collect other type of potentially sensitive data, or if you have any additional comments, include these in the box below.

If one or more options listed below apply, your project might need a DPIA. Please get in touch with the Privacy team (privacy-tud@tudelft.nl) to get advice as to whether DPIA is necessary.

None of the above apply

23. What will happen with the personal data used in the research after the end of the research project?

Anonymised or aggregated data will be shared with others Other – please explain below

All recordings and transcripts will be deleted

24. For how long will personal research data (including pseudonymised data) be stored?

Other – please state the duration and explain the rationale below

Personal data will be deleted at the latest 1 month after the end of the research project (Thesis defense)

25. How will your study participants be asked for their consent for data sharing?

In the informed consent form: participants are informed that their personal data will be anonymised and that the anonymised dataset is shared publicly

V. Data sharing and long term preservation

27. Apart from personal data mentioned in question 23, will any other data be publicly shared?

Please provide a list of data/code you are going to share under 'Additional Information'.

All other non-personal data/code underlying published articles/reports/theses Summaries;

Interview questions;

Template informed consent forms; Synthesis of the focus groups.

29. How will you share research data/code, including those mentioned in question 23?

I am a Bachelor's/Master's student at TU Delft and I will share the data/code in the body and/or appendices of my thesis/report in the Education Repository

31. When will the data/code be shared?

At the end of the research project

VI. Data management responsibilities and resources

33. If you leave TU Delft (or are unavailable), who is going to be responsible for the data/code resulting from this project?

My supervisor Sepinoud Azimi Rashti

34. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

-

35. Which faculty do you belong to?

Faculty of Technology, Policy and Management (TPM)

Appendix G: Informed consent forms

Participant information – Interview criteria

You are being invited to participate in a research study titled *Requirement Elicitation in Hybrid setting*. This study is being done by T. Swuste from the TU Delft in collaboration with Info Support.

The purpose of this research study is to create intervention strategies in order to enhance requirement elicitation sessions when they are held in Hybrid setting. The interview will be divided in two different sessions (problem & objectives) and will in total take approximately 60 minutes to participate. The data will be used to gain insight into the challenges you find in hybrid meetings and to determine criteria for intervention strategies. We will be asking you questions like:

- Can you describe your experience with hybrid requirements elicitation meetings?
- What criteria should be taken into account when we want to achieve better collaboration in hybrid setting?
- What are the most important criteria and what are the least important criteria?

Your participation will be audio recorded, with a textual transcript produced afterwards. You will be provided with a summary of the interview, which we will send to you for review before publication. The summary will be anonymous, besides your function (as provided in the summary). The summary will be included as supplementary material to the thesis, which will be publicly available.

As with any online activity the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by storing the information at an institutional storage solution at TU Delft (the Netherlands, governed by GDPR), accessible by the researcher only. All personal data (the transcript and the audio recording) will be deleted at the latest 1 month after the completion of the project.

Your participation in this study is entirely voluntary and you can withdraw at any time. You are free to omit any questions. The data provided can later also be removed and/or not included into the research if you would like to retract your information, as long as the result has not been published.

Signatures		
I have read and understood the study information above, and I consent to participate to the experiment and to the data processing described above.		
_____	_____	_____
Name of participant	Signature	Date
<u>Study contact details for further information:</u>		
Researcher: T Swuste [REDACTED]		
Supervisor: Sepinoud Azimi Rashti, [REDACTED]		

Participant information – Focus group Intervention strategies

You are being invited to participate in a research study titled *Requirement Elicitation in Hybrid setting*. This study is being done by T. Swuste from the TU Delft in collaboration with Info Support.

The purpose of this research study is to create intervention strategies in order to enhance requirement elicitation sessions when they are held in Hybrid setting. The focus group will be take approximately 90 minutes to participate. The sessions' goal is to come up with intervention strategies for the challenges that were previously identified in the research. We will be asking you to participate in rounds to come up with ideas, for example :

- Round-robin: each participant shares 1 idea.
- Cluster ideas as they come up (themes, goals, feasibility).
- Participants are encouraged building on others' ideas.

Your participation will be audio recorded, with a textual transcript produced afterwards & any form of documentation during the focusgroup for instance (post its) will be held on to. You will be provided with a summary of the focus group, which we will send to you for review before publication. The summary will be anonymous, besides your function (as provided in the summary). The summary will be included as supplementary material to the thesis, which will be publicly available.

As with any online activity, the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by storing the information at an institutional storage solution at TU Delft (the Netherlands, governed by GDPR), accessible by the researcher only. All personal data (the transcript and the audio recording) will be deleted at the latest 1 month after the completion of the project.

Your participation in this study is entirely voluntary and you can withdraw at any time. You are free to omit any questions. The data provided can later also be removed and/or not included into the research if you would like to retract your information, as long as the result has not been published.

Signatures

I have read and understood the study information above, and I consent to participate to the experiment and to the data processing described above.

Name of participant

Signature

Date

Study contact details for further information:

Researcher: T Swuste, [REDACTED]

Supervisor: Sepinoud Azimi Rashti [REDACTED]

Appendix H: Summaries interviews

Summary Interview A1

This interview was conducted with a requirements engineer who has worked in various roles, including business analyst, product owner, scrum master, and project manager. In these positions, the interviewee has worked across multiple locations and in diverse project contexts, with hybrid meetings being a regular part of the job. These often occur because team members or stakeholders are spread across different locations and can only participate remotely at times.

According to the interviewee, all requirements elicitation techniques are, in principle, applicable in a hybrid setting with proper preparation and facilitation, although some are more challenging than others. Interviews are considered effective, especially when one person provides most of the input; screen sharing and visual support work well in such cases. Workshops are more difficult, particularly when using physical tools such as sticky notes or breakout groups, as online participants only see part of the room and information must be constantly translated. In such cases, the interviewee often opts to run the session fully online so all participants can contribute equally. Scenario storyboarding and document analysis work well as long as everything is visible on one screen. Brainstorming can be effective if structured, for example by having participants develop ideas individually first and then discuss them together. Formats involving a lot of simultaneous input tend to exclude online participants.

The main challenges in hybrid collaboration relate to communication and technology. Misunderstandings often arise from differences in language, context, and working methods, especially when participants come from different organizations. The likelihood of confusion is greater in hybrid sessions, as online participants pick up fewer non-verbal cues and may feel a higher barrier to joining discussions, particularly in larger groups. Informal side conversations or follow-up discussions after in-person meetings are not accessible to remote participants, leading to uneven knowledge sharing. Technical limitations are another challenge: many meeting rooms have poor audio and video quality, limited camera angles, and no automatic speaker tracking. Integration of collaboration tools such as Miro or Mural into platforms like Teams is often missing, making them cumbersome to use and sometimes requiring extra accounts.

The facilitator role is more demanding in hybrid settings than in fully online or in-person meetings. The interviewee prepares hybrid sessions as if they were online sessions to avoid disadvantaging remote participants. Beforehand, the purpose, structure, and approach are communicated, and the technology is tested. During the meeting, a strong focus is kept on structure: all content is made visible to everyone, activities that give in-person participants an advantage are avoided, and online participants are explicitly engaged through direct questions. Formats that give everyone the chance to contribute or that involve working from a single shared source are considered effective. Combining facilitation with content contribution is experienced as demanding, particularly in hybrid settings, because the facilitator must constantly switch between content, process, and technical management.

Proposed solutions and improvements include providing more hybrid meeting rooms with integrated cameras, microphones, screens, and Teams integration, so technology works without extra setup. Better integration of tools like Miro into meeting platforms and providing licenses to all participants would further support hybrid collaboration. The ability

to assign a separate facilitator for complex sessions would help separate the content role from the process role. New methods for hybrid requirements elicitation should be clearly described, applicable across contexts, and not dependent on specific tools that may not be available. The ultimate goal is for remote participants to be able to join without barriers and for all participants to have equal access to information, speaking time, and interaction.

Summary Interview A2

This interview was conducted with an IT consultant with a technical background. In the current role, product ownership is combined with project management for multiple clients. Gathering requirements is regularly part of the work, especially in situations without a dedicated requirements engineer. Due to nearshoring arrangements, many meetings have a hybrid component by default, meaning hybrid sessions take place almost daily and make up a substantial part of the working week.

According to the interviewee, all requirements elicitation techniques are, in principle, applicable in a hybrid setting if the session is well facilitated. Some techniques work more smoothly in person due to greater dynamism and better non-verbal cues, but no method is excluded. Artifact-based collaboration tools such as Miro, Mural, and Fig Jam are considered highly valuable for visualizing ideas and creating shared artefacts that remain available immediately after the session. Co-creation is found to be more efficient and less error-prone than documenting afterwards. Hybrid sessions are therefore often approached as if they were fully online, to maintain equal standing for remote participants. Challenges in hybrid collaboration are both technical and behavioural. Technical issues include meeting rooms without good cameras or microphones, connection problems, and the lack of dedicated hybrid tools. Behavioural issues include distraction among remote participants, failure to use cameras, and a higher threshold for joining discussions. Conversations among in-person participants make it harder for remote attendees to contribute due to audio delays and the absence of non-verbal cues, which can lead to passivity and reduced input. The interviewee sees hybrid as a compromise: it is better than not participating at all, but still suboptimal compared to fully in-person.

The facilitator role is more demanding in hybrid sessions, as it requires simultaneous attention to content, technology, and equal participation. Remote-first principles are applied, giving remote participants speaking priority, actively checking their engagement, and regularly confirming that the connection is working and everyone is following. Ideally, a separate facilitator would focus solely on process, engagement, and technical conditions, but in practice this role is often combined with content participation, which can limit effectiveness.

To mitigate challenges, hybrid sessions are carefully prepared, including selecting tools in advance, setting up templates, and instructing participants on expectations and technical arrangements. In-person participants are encouraged to use their laptops so that their interactions are visible to remote colleagues, although this can cause extra distraction. The organization supports hybrid work with Office 365, Copilot, ChatGPT, Miro, and Mural, and offers the ability to record and transcribe sessions. This improves documentation and traceability, but transcripts still lack automatic speaker recognition. Suggested improvements include equipping meeting rooms with high-quality hybrid technology as standard and adding automatic speaker recognition to transcription functions. In the longer term, VR technology is seen as a potential way to make

collaboration more natural. The main goal is to ensure that remote participants are fully engaged, leading to more equal participation. When adopting new methods or tools, attention is given to expected benefits, ease of use, costs, preparation time, and whether participants can join without extensive instructions.

Summary Interview A3

This interview was conducted with a product owner who has experience with in-person, fully online, and hybrid meetings. Often, everyone is either fully online or fully in person. When hybrid meetings occur, they present clear challenges. In-person participants tend to communicate mainly with each other, which leads to less involvement from remote participants. This happens especially during less structured conversations or intense, heated discussions where people dive deep into topics. For remote participants, it is difficult to break in at such moments, particularly if they are introverted. Extroverted participants sometimes succeed more easily in joining the conversation, but the threshold is always higher. As a result, valuable input can be lost and frustration can arise.

Within the scrum team, this risk is mitigated by a rule that if even one person is remote, everyone participates online, even if several people are in the same location. Using a shared speaker-microphone (such as a Jabra) prevents echo, and everyone looks at their own screen, which helps ensure more equal interaction. Still, in-person meetings are perceived as better, mainly because of the importance of non-verbal communication. This is largely absent in online and hybrid formats, yet it carries a lot of information and nuance.

Tools such as Miro make it possible to run physical activities like brainstorming and whiteboarding online. The advantage is that results are immediately available in digital form. However, activities involving significant physical movement or interaction in the room, such as certain training formats, require adaptation. The technical side plays a major role: stable internet connections, familiarity with the tools used, and compatibility between platforms such as Teams and Zoom are important prerequisites. Although much has improved since the COVID-19 period, disruptions, dead batteries, and unfamiliarity with tools among participants from other organizations can still be a problem.

The facilitator role is considered more complex in a hybrid context. Staying constantly aware of remote participants is challenging, and there is a real risk that they “fall out of sight.” This is a key reason why the interviewee sometimes avoids hybrid formats and opts for fully online meetings instead, ensuring a level playing field. When hybrid is unavoidable, process measures can help, such as starting the meeting with a reminder about the presence of remote participants, planning check-in moments, and ending with a summary and explicit confirmation that everyone agrees on the discussed points.

The main improvement point is preventing remote participants from disengaging. Possible solutions include increasing their visibility, for example through large screens or holographic projections, so that their non-verbal signals remain visible. Structural awareness can also help, such as agreeing at the start of every meeting on how remote participants will be actively engaged. In addition to traditional elicitation techniques, the interviewee mentioned Acceptance Test Driven Development and Gherkin, which describe requirements in natural language and allow for direct validation. This enables short feedback cycles even without physical proximity.

For new methods and strategies, the criteria are clear: they must require little extra preparation time, have a limited learning curve, and avoid unnecessary complexity. If a

method takes too much time, it is unlikely to be adopted. The ultimate goal is always to ensure equal participation, where all participants, whether in person or online, have the same access to information, interaction, and decision-making.

Summary Interview A4

The interviewee is a requirements engineer and functional tester. Her work mainly focuses on translating functional needs from the business into technical solutions, frequently switching between technical and non-technical stakeholders.

Regarding her experience with hybrid requirements elicitation, she noted that most of her sessions take place in a hybrid format, and sometimes entirely online, depending on stakeholder availability. In many cases, she is physically present with a colleague, such as a lead developer or product owner, while the stakeholder joins remotely. The main reason for working in a hybrid or online format is practical flexibility, as busy schedules often make it difficult to meet in person.

She explained that most elicitation techniques are technically feasible in a hybrid setting, but some work less effectively without strong facilitation. Brainstorming, for example, is something she prefers to do in person, as it allows ideas to be shared and built upon more spontaneously. In hybrid sessions, participants who are physically present tend to contribute more, as remote participants find it harder to pick the right moment to speak. This is partly due to the lack of non-verbal cues and slight audio delays, which increase the barrier to joining the conversation. Other techniques, such as design and prototyping activities in Figma, work well in hybrid form because they are easy to share on screen and the opportunities for input are more clearly defined. She also uses tools like Miro or Jam board, mainly for directly documenting input, although she observed that in-person participants often engage less with the board if they do not have a laptop with them.

The main challenges in hybrid collaboration relate to communication and engagement. The lack of informal moments before and after the meeting means that small but often valuable additions are lost more easily. Remote participants generally take a smaller role in discussions unless the facilitator actively manages their involvement. She therefore makes an effort to check whether remote participants are still engaged and to ask them questions to involve them, especially when the physical space is busy. She stressed that good audio and camera equipment are essential, and that without conference microphones it is almost impossible for remote participants to follow along.

She experiences the facilitator role in hybrid meetings as more complex than in fully in-person or fully online meetings. It requires greater attention to ensure equal participation, structure the interaction, and simultaneously guide the content of the discussion. While she does not make major differences in preparation between hybrid, online, or in-person meetings, she believes that hybrid sessions benefit from a more deliberate preparation of interaction opportunities, for example by ensuring that all participants have access to the same tools beforehand.

Her main improvement suggestion for hybrid requirements elicitation is to make it easier for remote participants to join the discussion. This requires both technical support, such as high-quality audio, cameras, and stable connections, and process support, such as active engagement and clear discussion structure. For her, solutions should be easy to use, without complex instructions or steep learning curves, and should fit directly into existing ways of working. The added value should be clear so that any extra time investment is justified. She also considers it important that new practices or tools enable

equal participation and foster interaction, for example by giving all participants access to shared boards or other visual aids.

Summary Interview A5

This interview was conducted with an experienced requirements engineer, business analyst, and product owner with more than twenty years of professional experience. The interviewee regularly works on long-term projects and has experience with a variety of clients in fully in-person, fully online, and hybrid working environments.

The discussion showed that almost all requirements elicitation techniques can also be applied in a hybrid format, provided the session is well facilitated. One-on-one interviews, refinement sessions, reviews, and workshops are all possible, but their success strongly depends on strict facilitation, reliable technology, and clear agreements on discussion discipline. For workshops, it often works better to facilitate them entirely online using tools such as Miro or Mural, with in-person participants also joining via their laptops. This prevents remote participants from losing track of the session. In in-person meetings, flip charts, sticky notes, and physical materials are often preferred. Using a physical board in combination with remote participants can be cumbersome, especially when visual and audio alignment is missing.

Hybrid meetings present structural challenges. The most frequently mentioned issue is that simultaneous talking among in-person participants is difficult for remote attendees to follow. As a result, remote participants struggle to break into the discussion and often ask their questions late or not at all. This reduces their engagement and increases the risk of them being forgotten as the “people at home.” Sharing screens during the session can cause the faces of remote participants to disappear from view, removing important non-verbal cues. In larger physical spaces, participants sitting farther from the microphone are harder for remote participants to hear.

The facilitator role in a hybrid context is both crucial and more demanding. A good facilitator prevents participants from talking over each other, actively involves the remote group, ensures equal speaking time, and encourages interaction, for example by explicitly asking remote participants for questions or comments. Ideally, the facilitator is not involved in the content so they can fully focus on the process. When the requirements engineer also acts as the facilitator, there is a high risk that attention shifts to the content, which can reduce the involvement of remote participants. Awareness of this dynamic and the ability to switch to a “helicopter view” can help, but the interviewee prefers having a separate facilitator, such as a scrum master who is not directly involved in the project content.

The main improvement goal is to ensure equal participation and engagement regardless of location. This requires technical conditions such as reliable audio with good microphones, high-quality cameras, and a suitable room setup (not too large for small groups and equipped with the necessary tools). In terms of working methods, it helps to facilitate hybrid sessions entirely online whenever possible so that all participants contribute in the same way and see the same information. Good preparation also increases effectiveness by sharing context and materials in advance and ensuring that all participants have the same baseline knowledge.

For implementing improvement strategies, the interviewee finds it important that they are not overly dependent on specific technology or locations so they can be applied in a variety of environments. Knowledge sharing, good examples, and showcases of working

solutions can help introduce new ways of working. Ultimately, success depends on gaining practical experience, setting clear team agreements, and having intrinsic motivation to improve hybrid sessions.

Summary Interview A6

This interview was conducted with a requirements engineer who has also gained experience as a product owner. His current work takes place at a relatively small client organization with a limited number of stakeholders, where hybrid requirements elicitation sessions are only occasionally held. In most cases, these involve small groups of up to four participants, sometimes with one or two people joining online. Fully hybrid sessions with multiple remote participants are rare. During the COVID-19 period, all sessions were held fully online. In the current context, hybrid is mainly used when specific stakeholders cannot attend in person.

Regarding techniques, he indicated that interviews and brainstorming sessions in small groups with similar levels of knowledge work well in a hybrid format. A pre-existing shared understanding or only small knowledge gaps between participants is an important condition for success. Group interviews sometimes flow into brainstorming sessions and vice versa, depending on the course of the conversation. Techniques he avoids or finds difficult in a hybrid format include observation and workshops. These methods often lead to unequal engagement: remote participants may mentally disengage or miss in-person conversations, while in-room participants interact in ways that remain invisible to remote attendees. The same applies to prototyping or demonstrations, where attention can become unevenly distributed. Artefact-based and storyboarding techniques play little role in his current context.

The biggest challenge in hybrid sessions is dividing attention between in-person and remote participants while simultaneously facilitating, gathering information, and documenting. Non-verbal cues are essential for assessing whether participants understand the discussion. For remote participants, especially those without cameras on, these cues are limited, which requires extra effort to keep everyone actively involved. He mitigates this by consciously addressing remote participants more often, asking questions to check their attention, and explicitly drawing them back into the conversation when necessary. In his experience, disengagement happens more quickly for remote participants in hybrid sessions than in fully online or fully in-person meetings, partly because they (consciously or unconsciously) perceive that they receive less attention.

Technical challenges are mainly related to audio: ceiling microphones do not always pick up sound well, causing remote participants to miss parts of the conversation. This is less of an issue in fully online meetings, where each participant uses their own microphone. Tools such as Miro are used, but in hybrid settings the dynamics change: using digital boards makes the interaction more online-oriented, which partly negates the advantages of physical collaboration. In contrast, physical boards in a meeting room create more visible group pressure to contribute actively.

There is no dedicated organizational support for hybrid elicitation sessions. The client does provide a meeting room equipped with the necessary hardware, including a screen, microphone, and camera. In his view, an optimal setup always includes high-quality audio and video in both directions. Without this, he sees reason to hold the session fully online or fully in person instead. In preparing for hybrid sessions, he treats them like online

sessions in terms of materials and approach. In-person sessions, however, more often occur ad hoc without prior shared documentation.

According to him, the quality of requirements suffers in hybrid settings compared to both fully in-person and fully online formats, due to divided attention, reduced focus, and less available non-verbal communication. Improving participation and ensuring shared understanding are, in his view, the most important conditions for effective hybrid elicitation sessions. Documentation and decision-making follow similar processes to other modalities but require more conscious attention to inclusive alignment in hybrid settings.

If he could improve one aspect, it would be to ensure that all participants remain visible at all times, without shared screen use limiting this visibility. He believes this would improve both participation and awareness of non-verbal communication. He is willing to adopt new methods or tools only if they clearly provide benefits, but is open to experimentation in specific meetings. There does not need to be a one-size-fits-all solution; techniques that work for certain situations are still valuable. Finally, he sees potential in guidelines, aids, and best practices for hybrid facilitation, provided that the advantages and conditions for use are clearly stated.

Summary Interview A7

This interview was conducted with a requirements engineer, scrum master, and managing consultant who has extensive experience working in international teams, both during and after the COVID-19 pandemic, in hybrid and online collaboration settings.

The interviewee indicated that, in principle, all requirements elicitation techniques can be applied in hybrid meetings. However, the experience is often less optimal compared to fully online or fully in-person settings. Techniques such as one-on-one interviews and surveys rarely cause issues, as they require little simultaneous interaction and can also be carried out asynchronously. Brainstorming sessions can still work reasonably well in a hybrid format, provided they are well facilitated. More complex forms of collaboration, such as story mapping or workshops with a high degree of physical interaction, were described as more challenging. Working with both a physical board and a digital board was seen as cumbersome, and remote participants often lacked an overview and contextual understanding.

According to the interviewee, hybrid collaboration faces structural challenges. Participants tend to form two separate groups, the in-room group and the remote group, where facilitators and in-person participants often give more attention to those who are physically present. This can lead to lower participation from remote attendees, reduced engagement, and the risk that their contributions are overlooked. The shared understanding of the discussion is also affected. In-room participants often have a better grasp of the topics discussed, while remote participants may miss important context due to technical limitations such as poor microphone pickup of multiple speakers, limited camera angles, or poor visibility of physical materials. As a result, sessions often require follow-up communication to confirm and clarify points.

The facilitator's role in hybrid settings becomes more complex. They need to actively balance interaction and speaking time between in-person and remote participants, monitor who has not yet contributed, and explicitly invite them to do so. They must also safeguard the technical conditions and compensate for visibility and audio limitations, which increases cognitive load.

The main goal for improvements is to ensure that all participants, regardless of location, have equal opportunities to participate, provide input, and keep an overview of what is being discussed and recorded. Important prerequisites include:

- High-quality audio solutions that clearly capture all speakers
- Cameras that show both the entire room and individual speakers clearly
- Shared visual workspaces where physical and online contributions are processed equally, for example through smartboards synchronized with online tools
- A room layout that supports collaboration and visibility

A structured working method with clear phases, such as first collecting ideas individually and then discussing them in plenary, also helps to ensure participation. Preparation is crucial, as creating a shared knowledge base in advance increases the effectiveness of the session, especially in groups with diverse backgrounds. The interviewee also advised developing guidelines or practical pointers for hybrid meetings so that teams can make improvements independent of specific tools or circumstances.

Summary Interview A8

This interview was conducted with an experienced professional who has worked in various roles, including Scrum Master, Product Owner, and Requirements Engineer. Over the course of his career, he has worked with a range of clients. Hybrid requirements elicitation sessions make up roughly half of his work in this domain, depending on the topic and context.

In his experience, it is possible to reach consensus in hybrid sessions, but it requires more words and explicit confirmation compared to fully in-person meetings. The use of digital tools often creates practical barriers, as working on a laptop or external screen is less intuitive and less effective than using a whiteboard or paper. He described hybrid sessions as often resulting in “two worlds”: in-person participants interact more with each other, build on each other’s points more quickly, and sometimes talk over each other, which makes it harder for online participants to contribute or encourages them to take a step back. This gap is reinforced by technical limitations such as audio delays, poor image quality, or the absence of a second screen to display shared content alongside participant video feeds.

Not all elicitation methods work equally well in a hybrid context. Interviews are usually one-on-one and rarely hybrid, except in cases where, for example, a colleague is physically present and the client joins remotely. Questionnaires are rarely used in a hybrid form. Brainstorming and scenario elicitation can work in hybrid sessions if they are well facilitated and supported by appropriate technology. Workshops, however, were described as “completely unworkable” in a hybrid format due to the need for group work and the difficulty of enabling equal collaboration between in-person and remote groups. The biggest challenges in hybrid requirements elicitation are maintaining engagement among remote participants, ensuring adequate technical conditions (audio quality, video quality, readability of whiteboards), and structuring interaction so that everyone can contribute effectively. Remote participants are more easily distracted, are less visible if they do not actively contribute, and can sometimes be overlooked by in-person

participants. Facilitators also find it harder to detect emotions or non-verbal cues from remote participants. This places greater demands on the facilitation role, requiring constant checks to ensure remote participants are following, actively inviting them to contribute, and steering discussions when necessary to prevent in-person dominance. Combining this process role with the content-focused role of requirements engineer is challenging, as it can lead to shallower conversations and a loss of depth.

Hybrid sessions require different preparation than fully in-person or fully online meetings. He assesses the physical space in advance, checks equipment (video, audio, room setup), chooses formats that work in both contexts, and simplifies them so they can be easily followed digitally. He clearly communicates the meeting format to participants beforehand (in-person, online, or hybrid), what is expected of them (such as access to tools like Miro or reading documents in advance), and practical arrangements like bringing laptops or turning on webcams for in-person participants. During sessions, he uses tools such as Jabra speakers, placing them strategically depending on who is speaking, and asks in-person participants to also open their laptops so remote participants can better see faces and reactions.

For solutions, he advocates structural investment in technology: high-quality cameras that can make whiteboard notes legible, large screens with split-screen functionality to display both participants and shared content, good microphones and speakers, and standard agreements that participants bring their own devices. He also sees strong value in assigning a dedicated facilitator who is separate from the content role and focuses entirely on the process, engagement, and maintaining equality between in-person and remote participants.

For him, an effective hybrid meeting is one where in-person and remote participants can participate equally, with equal access to information, discussion, and decision-making. This means being able to follow what is said just as well, clearly see visual material, and be actively engaged in the interaction. Regarding new methods or tools, he believes they should be concrete and practically applicable, with clear instructions, inspiring examples, and well-defined do's and don'ts. It should also be clear in which situations a method is and is not suitable. He considers full universality unrealistic, and believes hybrid sessions will always require tailoring, with preparation, technology, and facilitation determining success.

Summary Interview B1

This interview was conducted with a QA engineer working at a client organization. She began as a data engineer, has experience as a scrum master, and now holds a role focused on safeguarding the quality of delivered products. Hybrid work is well established, with fixed remote workdays when many people are absent, although the interviewee is usually on-site. Hybrid meetings occur almost daily, particularly when not everyone is in the office. Simple and structured meetings, such as daily stand-ups, usually run smoothly in a hybrid format. Creative sessions or meetings involving sketching or brainstorming are preferably held in person, as it is harder to create a shared understanding remotely. People tend to form their own interpretations, and aligning these through a screen is more challenging.

Technical challenges arise especially when several people in the same room speak at once, making it difficult for remote participants to follow. Individual contributions are usually audible, but group discussions are almost impossible to track remotely. Not all

rooms have high-quality cameras or microphones that capture both participants and interaction well, which can quickly create a sense of distance for remote attendees. They also often miss informal exchanges before or after the meeting, such as coffee machine conversations. A facilitator can partly compensate by explicitly stating important points, but full equality in information sharing is not achievable.

The interviewee noted that all requirements elicitation techniques are, in principle, possible in a hybrid format, provided there is good preparation and active facilitation. Digital tools such as online whiteboards and templates make it possible to adapt many physical activities to an online context, with the advantage that results are immediately available digitally. However, working with digital versions often feels more limited than working physically with, for example, post-its in an empty room. Movement and spatial interaction, such as in breakout sessions, are difficult to reproduce online. During the COVID-19 period, online breakout rooms were used more frequently, but they are now often avoided as they are seen as cumbersome and in-person meetings are considered more efficient.

The facilitator role in hybrid sessions is experienced as more challenging than in fully in-person or fully online settings. It requires more preparation and conscious attention to ensuring equal participation. Starting the meeting with a thorough introduction helps ensure that everyone has the same starting point, and participants who are less likely to contribute spontaneously should be explicitly invited to speak. Remote participants can disengage more quickly or become distracted, so the facilitator must actively work to maintain focus. It is possible to reach the same level of effectiveness in hybrid as in physical meetings, but it takes more effort and time.

As a participant, the interviewee finds it harder to stay focused online, as distractions are more present. In-person participants tend to talk mostly among themselves, which reduces remote engagement. The ratio of online to in-person participants affects the group dynamic. If the facilitator or presenter is remote, the difference is somewhat reduced, but the advantage of being in the room remains.

For improvements, she sees potential in technology that better simulates the feeling of physical presence, such as holographic projections or solutions that make non-verbal communication and spatial interaction visible. For new methods and practices, she finds it important that they are intuitive and quick to learn, especially when clients are expected to use them. Long training sessions form a barrier to adoption. The ultimate goal remains to ensure that all participants, whether in person or remote, have equal opportunities to contribute, equal access to information, and an equal sense of belonging to the process.

Summary Interview B2

This interview was conducted with a manager at a client organization. Hybrid sessions for requirements elicitation were extensively tested during the COVID-19 period, but according to him they “do not actually work very well.” Functional requirements can usually be identified, but subtle hints and non-verbal cues, especially from quiet or reserved participants, are lost. This creates a risk of developing software that does not align with what decision-makers truly want. He finds that hybrid sessions, where part of the group is in person and part is online, work less well than fully online sessions. At a physical table, many short side conversations occur that online participants miss, creating inequality in knowledge sharing.

Engagement depends heavily on the individual. Some participants actively ask clarifying questions, while others lean back and disengage, particularly in hybrid settings where in-person attendees naturally receive more attention and remote participants are more easily forgotten. He finds himself more inclined to engage and steer discussions when physically present, but more likely to let small points slide when online.

Technical limitations remain an issue. The absence of a physical whiteboard makes visual collaboration less efficient. Online whiteboard tools exist but are slower and less intuitive, especially for participants used to physically “passing the pen” and drawing together. Standard problems with audio and microphones occur in nearly every meeting, causing frustration and misunderstandings. Seeing and hearing participants on the other side of a group setup is often difficult, making it hard to follow who is speaking.

In terms of knowledge transfer, he considers hybrid sessions less effective than fully in-person or fully online meetings. Messages are more often misinterpreted because participants miss important non-verbal cues. Remote participants must explicitly request to speak to gain attention. The effectiveness of achieving concrete outcomes is inconsistent, and he often feels the need to check afterward whether everything has been correctly recorded and will be carried out, regardless of whether he is the facilitator.

Regarding facilitation, he notes that in hybrid sessions the focus is often on the physical table, especially if the facilitator is there. Experienced facilitators know how to involve remote participants by addressing them directly, but less experienced facilitators do this less, making it easier for online participants to be left out of the discussion.

As an improvement point, he emphasizes better integration of the two groups, physical and online. Ideally, participants at each location should sit together at one table, enabling interaction similar to a fully in-person setting. This avoids the “fragmented” feeling where participants on the online side rarely collaborate with each other. However, the technical setup does not always support this well: audiovisual tools are often inadequate, it is difficult to see who is speaking, and group conversations can become messy.

He believes a better way of working should primarily ensure smoother communication. Documentation is often better safeguarded when a skilled note-taker writes remotely in real time, but interaction and knowledge transfer remain challenging. Support should focus mainly on improving technology so participants can clearly see and hear each other. Regarding criteria for adopting new methods or tools, he says it is difficult to define, but technical quality and clear added value are key factors.

Summary Interview B3

This interview was conducted with a manager at a client organization that operates a platform connecting parties across an entire chain. Hybrid meetings make up a significant part of his work. He is usually the remote participant while others meet in person. His preference for working digitally is often driven by efficiency, as for smaller clients the travel time is not proportionate to the contract value.

According to him, much informal interaction is missing in hybrid meetings, such as short conversations before or after the session, non-verbal cues, body language, and subtle remarks. He specifically mentioned the moments at the coffee machine or right after an in-person meeting, where decisions are often finalized or details aligned. Digital meetings remain strictly focused on the topic, with at most a single brief social question, and thus miss the extra attentiveness and customer orientation often present in physical encounters.

He observed that remote participants are often less engaged, sometimes less prepared, and frequently switch directly from one meeting to another without time to reflect or record action points. Travel time to a physical meeting, by contrast, is often used to mentally prepare. The larger the in-person group, the stronger the tendency for remote participants to disengage. In his own behaviour, he tries to pay extra attention to important online participants, especially when their contributions are essential.

There are clear technical limitations. Poorly functioning microphones and speakers are a common issue, especially when a large group meets in person and the sound comes from a single laptop microphone. This reduces intelligibility for remote participants. Body language and identifying who is speaking are often difficult to follow. Group conversations, with rapid exchanges between participants, are challenging to transmit through current technology. Although connections are now fairly stable, delays and dropouts still occur.

From a content perspective, he finds hybrid sessions less suitable for brainstorming and creative stages of requirements elicitation, where drawing, whiteboards, and physical interaction play a role. Being in the same room makes it easier to get up, sketch something on a board, or collaborate quickly on an idea. For later-stage sessions, when requirements are largely defined and details need to be refined, digital meetings are effective because focus is high and informal distractions are absent.

The facilitator's role changes in hybrid meetings. In addition to guiding content, the facilitator must actively involve remote participants, ask questions, and check that they can contribute. This is easier when the facilitator is also remote, as they share the same perspective and tend to divide attention more consciously. In physical settings, facilitators often act more like chairs, leading discussions and noting points, whereas in hybrid settings, actively managing speaking time is more important.

As improvements, he advocates for better meeting room technology, such as cameras that show all participants and microphones that clearly capture everyone in the room. He supports facilities that ensure all in-person attendees can be seen and heard clearly. He also sees opportunities for digital whiteboards that allow multiple participants to draw simultaneously, which could enrich hybrid brainstorming sessions. In practice, he often uses PowerPoint as a substitute drawing board, with one person visualizing the input from others.

When adopting new methods or tools, he values technical reliability but accepts that solutions aimed at improving hybrid collaboration do not need to be perfect. If they help meetings run more smoothly, he is willing to experiment with them, even if there are still some initial shortcomings.

Summary Interview B4

This interview was conducted with a front office employee at a client organization, part of the customer service team, who has frequent direct contact with customers. He brings this customer perspective into meetings and improvement projects. Both in-person and hybrid sessions are held, with the choice depending on the purpose and content of the meeting. Hybrid meetings occur on average twice a month and are mainly used for presentations, progress updates, or demonstrating examples. These sessions are usually held via Microsoft Teams, which allows for effective visual explanations. However, when joint testing or intensive collaboration is required, in-person meetings are strongly preferred. Physical testing makes it possible to show issues immediately and process

feedback on the spot, whereas in a hybrid format people are more likely to talk over each other and discussions flow less smoothly.

There is a clear difference between small and large hybrid groups. In small groups, hybrid sessions generally run without significant issues and there is little difference in knowledge transfer between in-person and remote participants. In larger groups, especially in cross-department sessions, the dynamic becomes more complex. With more than ten participants, conversations slow down, participants lose track more easily, and chat activity increases. The chat is used not only for relevant questions but also for comments, compliments, and non-essential messages, which can push important information out of view. This makes it harder to filter during the meeting, both for participants and facilitators. The interviewee noted that remote participants are more easily distracted, for example by their home environment, phones, or other open applications. As a result, their engagement is less consistent than in in-person meetings, where focus is generally higher. Still, when the group is small and the content is clear, hybrid sessions can be just as effective as in-person ones.

Regarding requirements elicitation techniques, he sees no technical limitations for hybrid use. Presentations, brainstorming, and plenary discussions work well online if they are well facilitated. Activities that require physical demonstration, joint sketching, or direct iteration, such as design sessions or live testing, are more effective on-site.

He does not consider the facilitator role to be fundamentally different in hybrid compared to in-person contexts, as long as there is a clear agenda, clear communication of agreements, and a tightly managed flow. However, hybrid meetings with larger groups require extra attention to actively monitoring the chat, structuring contributions, and ensuring that all participants, including remote ones, have adequate speaking time. A key risk is that without deliberate effort, relevant input can be lost, especially when the chat is very active. Within the organization, it has been agreed that meetings without a clear agenda will not take place to safeguard effectiveness.

As an improvement point, he suggested better filtering and structuring of information during large hybrid sessions so participants can maintain an overview and important points are not lost. The goals for possible solutions are to ensure equal participation, clearly and promptly record agreements and results, and make relevant information accessible to all participants.

For new methods or tools to improve hybrid sessions, he identified several important criteria: they must offer clear added value, be intuitive to use, and not require lengthy training. Methods should be directly applicable in practice so participants can quickly understand and work with them. Complex or cumbersome solutions without clear benefits are unlikely to be used in practice.

Appendix I: Focus group setup mural

Brainstorming means		
Invalshoek	Subeis	OPLOSSINGEN / MEANS
Gelijkheid	Voorzie in mechanisme om alle deelnemers zichtbaar te laten zijn tijdens de meeting	
Gelijkheid	Gedeeld materiaal en deelnemers zijn zichtbaar tegelijkertijd	
Gelijkheid	Duidelijke spelregels voor de meeting	
Gelijkheid	Voor zie in mechanisme voor soepele landing van alle deelnemers	
Gelijkheid	Voorzie in mechanisme voor bewustzijn van teruggankelijkheid bij deelnemers	
Participatie	Voorzie in mechanisme om participatie van online deelnemers te stimuleren	
Participatie	Voorzie in mechanisme om interactie tussen participanten te bevorderen	
Facilitair	Voorzie in middelen om de focus op de inhoud te houden in plaats van op facilitering	
Facilitair	Voorzie in manieren om bewustzijn te creëren als facilitator (van alle deelnemers)	
Proof of concept	Creëer een demo voor concept	
Proof of concept	Voorzie in mechanisme voor een eenvoudige toegang tot deze demo	

Figure 13.5: Setup mural for focus group

Appendix J: Focus group preparation for participants

Beste allen,

Super fijn dat jullie mee willen doen aan de focusgroep over het verbeteren van hybride meetings voor requirements elicitation (en hopelijk ook breder dan dat in de toekomst). Deze mail is bedoeld als korte voorbereiding op onze sessie aanstaande woensdag.

Wat is het idee?

Om gericht tot oplossingen te komen, heb ik geprobeerd het centrale eisen op te delen in kleinere subeisen. Tijdens de focusgroep zal ik jullie vragen om per subeis na te denken over mogelijke oplossingsrichtingen. Dit doen we eerst individueel, waarna we in gesprek gaan over elkaars ideeën.

De subproblemen waar we mee aan de slag gaan, zijn:

Invalshoek	Subeis
Gelijkheid	Voorzie in mechanisme om alle deelnemers zichtbaar te laten zijn tijdens de meeting
Gelijkheid	Gedeeld materiaal en deelnemers zijn zichtbaar tegelijkertijd
Gelijkheid	Duidelijke spelregels voor de meeting
Gelijkheid	Voorzie in mechanisme voor soepele landing van alle deelnemers
Gelijkheid	Voorzie in mechanisme voor bewustzijn van (on)gelijkheid bij deelnemers
Participatie	Voorzie in mechanisme om deelname van online deelnemers te stimuleren
Participatie	Voorzie in interactie mechanisme die betrokkenheid bevorderen
Facilitair	Voorzie in middelen om de focus op de inhoud te houden in plaats van op facilitering
Facilitair	Voorzie in manieren om bewustzijn te creëren van online deelnemers als facilitator
Facilitair	Creëer een demo voor concept
Facilitair	Voorzie in mechanisme voor een eenvoudige toegang tot deze demo

Een voorbeeld van een mogelijke oplossing bij het subprobleem *zichtbaarheid van deelnemers* is bijvoorbeeld het gebruik van een splitscreen of een extra scherm. Uiteraard wordt out-of-the-box denken aangemoedigd, **maar wel binnen de volgende scope:**

- We blijven Microsoft Teams gebruiken;
- We blijven binnen de technologieën die momenteel beschikbaar zijn (dus geen VR, hologrammen, etc.);
- We blijven hybride meetings houden waar een deel van de mensen fysiek aanwezig is en een deel online aansluit.

Hoe gaan we te werk?

We werken via een Mural-bord. Zou je voorafgaand aan de meeting kunnen controleren of je toegang hebt tot het bord via de volgende link:



Ik zal jullie via mural ook uitnodigen via jullie werk email adres. Mocht je nog geen account hebben, maak er dan even een aan. Zouden jullie tijdens de sessie **je laptop mee kunnen nemen?**

Consentformulier & opname

Voorafgaand aan de focusgroep ben ik verplicht om je te vragen een consent formulier in te vullen. Dit is onderdeel van de ethische richtlijnen van de TU Delft en zorgt ervoor dat je goed geïnformeerd bent over het doel van het onderzoek, wat er met je gegevens gebeurt, en dat deelname geheel vrijwillig is. Ik ben van plan om de meeting op te nemen zodat ik deze later goed kan documenteren. In de bijlage heb ik het formulier bijgevoegd, zou je deze voorafgaand aan het focusgroep alvast kunnen doornemen? Dan hoeven we hier tijdens het gesprek zo min mogelijk tijd aan te besteden. Ik zal een geprinte versie meenemen zodat iedereen deze makkelijk kan ondertekenen.

Alvast dank! Ik kijk ernaar uit om woensdag met jullie aan de slag te gaan. Vanaf 15:50 is er (digitale) inloop voor een koffietje en even bij te praten, zodat we om 16:00 direct kunnen beginnen.

Met vriendelijke groet,
Thomas

Appendix L: Demonstration setup



Figure 13.7: Pictures of demonstration setup

Appendix M: Calculation of system usability scale (SUS)

Calculation steps: The scoring procedure followed the standard approach described by Lewis (2018):

1. Recode responses

For positive phrased items, the score contribution was obtained by subtracting 1 from the participant's rating:

$$\text{score_postive} = \text{response} - 1$$

For negative phrased items, the score contribution was calculated by subtracting the participant's rating from 5:

$$\text{score_negative} = 5 - \text{response}$$

Resulting in the following conversion per question number:

Table 13.1: Conversion SUS table

Question number	Conversion for SUS
1	X-1
2	5-X
3	5-X
4	X-1
5	5-X
6	X-1
7	X-1
8	5-X
9	5-X
10	X-1

2. Sum subscores

The ten item scores, each ranging from 0 to 4, were summed to obtain a raw total between 0 and 40.

3. Convert to SUS score

The raw total was multiplied by 2.5 to scale the results to a range from 0 to 100:

$$\text{SUS score} = (\text{sum of item scores}) \times 2.5$$

The following page shows the calculation per participant in the demonstration.

Demonstration 1

Table 13.2: SUS scores demonstration 1

	D1		D2		D3		D4		D5	
Question number	Initial answers	Conversion	Initial answers	Conversion	Initial answers	Conversion	Initial answers	Conversion	Initial answers	Conversion
1	5	4	5	4	4	3	5	4	5	4
2	1	4	1	4	2	3	2	3	2	3
3	1	4	1	4	1	4	4	1	1	4
4	5	4	3	2	5	4	5	4	5	4
5	1	4	1	4	1	4	3	2	1	4
6	5	4	2	1	5	4	5	4	4	3
7	3	2	3	2	4	3	5	4	5	4
8	1	4	1	4	5	0	2	3	1	4
9	1	4	1	4	1	4	2	3	2	3
10	5	4	5	4	5	4	5	4	5	4
SUM OF ABOVE		38		33		33		32		37
SUS SCORE INDIVIDUAL	SUM x2.5	95		82,5		82,5		80		92,5

Demonstration 2

Table 13.3: SUS scores demonstration 2

	D6		D7		D8		D9		D10	
Question number	Initial answers	Conversion	Initial answers	Conversion	Initial answers	Conversion	Initial answers	Conversion	Initial answers	Conversion
1	4	3	5	4	4	3	4	3	4	3
2	2	3	1	4	2	3	2	3	2	3
3	2	3	1	4	1	4	3	2	2	3
4	4	3	5	4	4	3	4	3	4	3
5	2	3	1	4	2	3	2	3	2	3
6	4	3	4	3	4	3	4	3	5	4
7	4	3	4	3	4	3	4	3	3	2
8	2	3	2	3	3	2	2	3	2	3
9	2	3	2	3	2	3	1	4	1	4
10	4	3	3	2	4	3	4	3	5	4
SUM OF ABOVE		30		34		30		30		32
SUS SCORE INDIVIDUAL	SUM X2.5	75		85		75		75		80

Demonstration 3

Table 13.4: SUS scores demonstration 4

Question number	D11		D12		D13		D14		D15	
	Initial answers	Conversion	Initial answers	Conversion	Initial answers	Conversion	Initial answers	Conversion	Initial answers	Conversion
1	2	1	4	3	4	3	4	3	4	3
2	4	1	1	4	1	4	1	4	1	4
3	1	4	1	4	1	4	1	4	1	4
4	3	2	4	3	4	3	4	3	4	3
5	2	3	1	4	1	4	1	4	1	4
6	4	3	5	4	5	4	4	3	4	3
7	2	1	4	3	4	3	4	3	4	3
8	4	1	1	4	3	2	2	3	2	3
9	3	2	1	4	2	3	2	3	2	3
10	2	1	5	4	4	3	4	3	3	2
SUM OF ABOVE		19		37		33		33		32
SUS SCORE INDIVIDUAL	SUM X2.5	47,5		92,5		82,5		82,5		80

Appendix N: Manual for implementation

This Manual is not included in the public version of this document. Please contact the researcher if interested in this manual.

