

Could ChatGPT be Your New Project Management Assistant?

Using AI Chatbots to Support Project Management Tasks

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Abstract—Over the past few years, people became accustomed to using a variety of digital tools in their work environment, e.g., for collaboration, knowledge management and task management. Recently, people have become aware of a new type of digital tool: Artificial Intelligence (AI) chatbots, such as ChatGPT, which are based on large-scale language models. These tools are expected to have a huge impact on the way we work. New application scenarios are constantly being explored and AI chatbots are being used in fields such as marketing, medicine, and education. This paper discusses another use case in the field of project management. It analyzes how AI chatbots could support project management tasks performed by project managers and project management assistants. It also discusses the new skills that these persons must acquire in order to interact with the tool in an efficient way and to use the results provided responsibly. A case study shows how selected project management tasks, i.e., stakeholder management, can benefit from the assistance of an AI chatbot. Special attention is given to the aspects of trust and control in such settings.

Keywords-Large Language Model (LLM); project management; stakeholder management; prompt engineering.

I. INTRODUCTION

Project managers and project management assistants are familiar with using various digital tools in their daily work, ranging from project planning, and monitoring to stakeholder and risk management [1]. Some of these tools are highly specialized, such as project management software, while others are not limited to project management, such as video conferencing software, instant messaging applications, cloud-based document sharing, or digital whiteboards. These digital tools have fundamentally changed the way people work. Recently, a new type of tool has emerged that has the potential to have a profound impact on modern work culture, including project management: Artificial Intelligence (AI) chatbots [2]. They simulate human-like conversations and provide meaningful responses to user queries [3]. This is possible because they are based on Large Language Models (LLMs) that have been trained on vast amounts of text data from the Internet. Due to recent advances in AI, these AI chatbots are becoming increasingly powerful. Since their release to the public, people have explored their capabilities in a variety of application areas and shown how they can improve their productivity [3].

As the use of digital tools is already widespread in project management, it can be assumed that a new digital tool such as an AI chatbot will easily and quickly be adapted by many project managers. Sometimes, they are already considered as digital assistants [2]. AI chatbots can assist project managers in their daily tasks. Ideas can be found in blog posts, and first “cheat sheets” showcase examples of queries [4]. However, there are many differences in the way of interacting and interpreting the results obtained by an AI chatbot in comparison with classical tools in project management. The project manager and the project team should be aware of them and possess certain skills to use them in a productive way. Moreover, despite all the new and exciting possibilities that AI chatbots offer, there are risks involved that need to be mitigated, such as ethical challenges like discrimination, information hazards, misinformation harms and human-computer interaction harms [5][6].

To this end, the paper is structured as follows. Section II provides the required theoretical foundation on LLMs and the new skill “prompt engineering”. Section III discusses how persons responsible for project management tasks can benefit from AI chatbots in their daily work. Therefore, it structures AI-assisted project management tasks in six categories and analyzes the required skills. As a concrete case study, Section IV demonstrates how an AI chatbot can support the activities around stakeholder management. Useful prompts will be introduced. Based on the experiences with the case study, Section V discusses potential and risks of the use of AI chatbots in project management. Section VI concludes the paper.

II. LARGE LANGUAGE MODELS AND AI CHATBOTS

A. AI Chatbots

Since OpenAI released ChatGPT to the public in November 2022, AI chatbots gained much attention. Via their user-friendly interface users can benefit from the capabilities of LLMs. These systems use advanced Natural Language Processing (NLP) techniques to understand users’ questions, generate coherent answers and thereby simulate a conversation between human beings [3]. Their development has been made possible by the recent advances in AI, especially deep learning and transformer architectures, the rapid growth in computational power and the large amount

of data available on the Internet that could be used as training data [7]. LLMs have learnt based on this extensive training set to generate text sequences that most likely continue a given text [8]. Nowadays, the quality of the text produced by these systems is so high that it is difficult to distinguish whether a text was written by an AI or by a human [9].

It is important to know the differences between LLMs and search engines. They are distinct technologies, as they are characterized by different capabilities. LLMs generate context-sensitive text based on a given input, formulated in natural language [3]. In contrast, search engines take a keyword-based query as input and retrieve information from indexed web pages or databases. They do not generate new content but provide access to existing information. This is not the case with LLMs which might “hallucinate” facts and references [3]. Moreover, current LLMs cannot provide information on recent events without being integrated into other tools that have access to up-to-date information (such as search engines) [3]. Users must be aware of these limitations.

B. Prompt Engineering

The instructions given to a LLM are called prompts. In the prompt, the user provides the LLM with the context of the conversation and defines how the intended output should look like in terms of content and format [10]. For instance, a user might specify the desired output as an essay with approximately 1500 words. The process of constructing these prompts is referred to as *prompt engineering*, i.e., “the art of fine-tuning the questions or commands provided to AI models in order to optimize their performance and guarantee that they produce the desired results” [11]. In consequence, to collaborate efficiently with LLMs, users need to have a good knowledge of prompt engineering [3].

III. AI CHATBOTS IN PROJECT MANAGEMENT

A. Patterns of AI-Assisted Project Management Tasks

AI chatbots can be applied to the discipline of project management in a variety of ways. In the following, AI-assisted project management tasks are organized into six patterns. Tasks as assisting in coding or creating images are not included because they are typically performed by team members, not the project manager. Given the rapid advances in LLMs, the following overview is not meant to be exhaustive. Rather, it aims to provide a structured framework for practical tasks.

1) *Generate Ideas and Insights*: An AI chatbot can support idea generation and brainstorming by suggesting topics or themes based on user input or some predefined categories. Combined with search engines, they can retrieve information from a variety of sources, such as articles, research papers, or databases. However, users need to check the output generated by the AI chatbot for their correctness [3], as a high likelihood of the generated content is no

guarantee that it is correct [5]. A project manager could, for example, ask an AI chatbot to generate a list of risks or ideas for risk mitigation strategies.

2) *“How to Do”- Assistance*: Users can ask an AI chatbot for guidance on a certain task, for instance, how to write a project proposal or how to plan and estimate the project. The AI chatbot typically provides a list of steps for the user to follow, often like a recipe, e.g., certain aspects that need to be clarified for the project proposal. It should be noted that, if the prompt is too general, the result will also be unclear or inaccurate [12].

3) *Text Summarization*: AI chatbots are able to summarize or extract key aspects of large texts. This ability could save time for a project manager who needs to compile and summarize project data for a status update. Instead of reviewing numerous documents and reports, they could focus on interpreting the results. However, this task requires a significant level of trust in the AI chatbot.

4) *Content Creation*: AI chatbots can assist in generating content for various purposes, such as articles, blog posts, social media updates, or product descriptions [3]. Based on a given topic, they can, for example, offer relevant keywords, suggest headlines, or write complete articles. In project management, different types of content are relevant, such as official documentation like project proposals, one-pagers, reports, internal working documents, as well as any communication with stakeholders. In addition to content creation, AI chatbots can improve written text. On the one hand, a chatbot can correct a text in terms of spelling, punctuation, and grammar. This is especially helpful for non-native speakers. On the other hand, it can rewrite a text and change its writing style based on the desired tone and target audience. For instance, it could turn a formal and technical text into a conversational and engaging one. This could be useful when preparing two communications about a milestone achieved in the project, one for the project steering committee, and the other for future users.

5) *Pretend to be Someone Else*: An AI chatbot can help users explore different perspectives by simulating to be someone else. By pretending to be a particular persona (“role prompting”) with certain opinions, experiences, or expertise, the chatbot can provide responses from that particular perspective. This allows users to gain insights that they might not have considered otherwise. In project management, this could be useful in stakeholder management. A variation would be a flipped interaction, where the AI chatbot asks questions and the user has to answer. This could be used to train difficult situations.

6) *Sentiment Analysis*: AI chatbots can identify sentiments or emotional tones expressed in a given text [13]. They can assist users in gaining insights into the overall sentiment or mood of the content. This capability could be used in stakeholder management, for instance, to analyze

comments posted by stakeholders on social media or other online communications.

B. Required Skills

To interact successfully and effectively with AI chatbots, humans need certain skills. With the previously described tasks in mind, these skills are explored below.

1) Ability to Write Concise Prompts

When writing prompts, users should ask specific questions and be concise in their wording, as this helps chatbots to better understand user queries. In addition to the use of simple language, the questions, as well as the provided content should be clearly structured [11][12]. Various guidelines on prompt engineering can be found online. It should be noted, however, that these were compiled for a certain tool in a certain version, e.g., GPT-4. Because of rapid development, prompts that worked very well when these guidelines were written may not give good results today. Or prompts could be written in a much simpler way. This is also the case for all prompts discussed in the following. However, some prompting techniques that will be applied within the case study are presented.

First, users should think about whether they want to integrate several tasks into a single prompt or to split them into multiple prompts. For instance, an AI chatbot could be asked in a single prompt to generate four ideas about a certain topic and to discuss them in a short blog post. Alternatively, a first prompt could ask for four ideas, and a second one to write a blog post based on idea 1, idea 2, and so on. The advantage of using multiple prompts is that the output can be reviewed, and if necessary, adjusted or extended. A second important technique is to incorporate background knowledge into the prompt. These knowledge-augmented queries specify additional context that the LLM uses to generate more informed and accurate responses [12].

2) Understand AI Chatbots' Capabilities and Limitations

It is important that users are aware of the actual capabilities of AI chatbots, i.e., to know what tasks they can perform, what knowledge they use to answer queries, and how they differ from search engines. This will help users to frame their questions and expectations accordingly. Awareness of limitations and potential difficulties, such as bias in the underlying data, is also extremely important, as it is a prerequisite for users to write appropriate prompts and interpret the results provided by AI chatbots in a responsible manner. For instance, users should be careful to write prompts that are free of pre-existing biases or assumptions about gender, race, or other sensitive factors to avoid reinforcing bias [12]. Users should think critically, verify the results with their own expertise and conduct further research in trusted sources [12].

3) Adopt an Iterative Approach

Users should be prepared to take an iterative approach when interacting with an AI chatbot [3]. It may be necessary to phrase the prompt in a different style or add information.

Being flexible and adapting to the AI chatbot's conversation flow will ensure a smoother conversation. Sometimes users need to be patient and try different approaches. While this can be considered a form of learning, users need to be aware of the chatbot's limitations and should consider whether not using the chatbot might be more efficient in specific situations.

4) Awareness of Privacy and Security Issues

When interacting with AI chatbots, users should critically evaluate what information they are willing to share. They need to be aware of whether the question or contextual information provided in a prompt reveals sensitive data. This applies to both personal and business-related data. For example, users should be careful about writing project-specific details, financial information, or proprietary data. They should always formulate such information in a generalized and anonymized manner, and consider the need to disclose sensitive information.

5) Being Aware That You are Talking to an AI

Users need to be aware that they are communicating with an AI, not a human. Because of the conversational interface, users tend to think of a chatbot as a human, or at least attribute some human-like characteristics to it. This can be observed in users' prompts where they use phrases like "please", "thank you", even though they know that they are talking to a bot. Anthropomorphizing the AI chatbot poses several dangers, such as shifting accountability to the chatbot or overestimating its capabilities [5]. Project managers using AI chatbots should be aware that AI chatbots may not be able to handle complex or nuanced situations that require human judgment and decision-making. They operate based on data and patterns, which may not always account for a specific situation or in unforeseen circumstances. Users should think critically and consider the limitations of chatbots when relying on their advice or recommendations. Project managers should also understand that not only can they be misled by an AI chatbot's response, but so can their team members.

IV. CASE STUDY ON INCORPORATING AI CHATBOTS IN PROJECT MANAGEMENT

The following case study demonstrates how AI chatbots can increase the efficiency and effectiveness of project management. It considers a digitalization project at a European manufacturing company which aims to introduce a new software for recording the working time. This system should simplify and automate current processes. The project encompasses the vendor selection, the customization of the selected solution, the process redesign, and the training of the future users. Note that scope and objectives of the project considered in the project management case study are already defined as it would be the case in any project in an enterprise context. A conversational AI could have been used in this preliminary step, too. For instance, it could support the project initiators to better formulate the objectives or assist other tasks in project definition.

Within the case study, concrete activities in project management should be performed with the help of an AI chatbot, namely one of the project performance domains described in the PMBOK Guide published by the Project Management Institute (PMI) [14]. A project performance domain is defined as “a group of related activities that are crucial for the effective delivery of project outcomes” [14]. The PMBOK Guide outlines eight performance domains that should be considered during the implementation of a project. These domains play a crucial role in driving the project towards its intended outcome. In the case study, the focus will be on the stakeholder performance domain.

This performance domain emphasizes that it is important to maintain alignment with the stakeholders of a project and to engage with them a positive relationship [14]. Stakeholders are persons or groups of people who affect the project and its outcomes, or who are affected by the project and its outcomes. They all bring their own ideas, values, qualifications, and prior experience [15]. The PMBOK Guide identifies several activities in the context of the stakeholder management as shown in Figure 1.

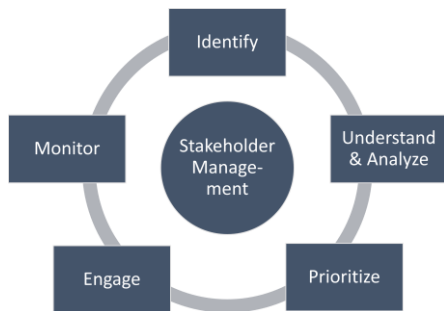


Figure 1. Activities to ensure stakeholder engagement based on [14].

A first try could be to write a single prompt that asks the AI chatbot to perform the stakeholder management, such as “Do the stakeholder management for a digitalization project in a German manufacturing company that aims to introduce a new digital system for recording the working time.”. The result is, according to ChatGPT, a “comprehensive stakeholder management plan for your project”. It contains eight steps that can be mapped to the activities named in the PMBOK Guide. For each step, a type of deliverable is presented, such as a list of stakeholders, or a communication plan. However, a closer look at the results reveals that they are rather general. For instance, one recommendation for managing stakeholders’ expectations is to highlight the benefits of the new system, such as accurate time tracking, improved efficiency, and reduced paperwork. This is true, but too superficial to be useful in day-to-day work. This example highlights the need for more sophisticated prompts. For instance, each of the eight different steps could be refined with the help of individual prompts, each focusing on specific aspects of stakeholder management. Such prompts are shown below for each stakeholder management activity.

A. Identify Stakeholders

First, it is necessary to identify all potential internal and external stakeholders of a project. While certain stakeholders can readily be identified, there might also be stakeholders that are only indirectly affected by the project [14]. They are more difficult to identify. In practice, the activity of identifying stakeholder is often performed by the project manager and some team members in a brainstorming session. An AI chatbot can support this task. To enable the AI chatbot to generate a list of stakeholders that is specific to the project at hand, some context about the project must be provided. It is recommended to describe the project in a short but precise way. By doing this, it has to be taken care that no confidential information is passed to the AI-based system. Table I shows such a prompt.

TABLE I. EXAMPLE PROMPT TO IDENTIFY STAKEHOLDERS

Intent	Identify the stakeholders of a project
Type of prompt	Brainstorming
Required input	Context information about the project
Prompt	Consider the following project and identify the different stakeholders involved in this project: The digitalization project in a German manufacturing company aims to introduce a new digital system for recording the working time. This new system should simplify and automate the process of recording working time. This project encompasses the vendor selection, the customization of the selected solution but also the process redesign and the training of the future users.
Result	List of stakeholders including a brief description of how they are connected with the project

Before further using the results within the project, it is necessary to carefully check the plausibility in the specific context of the project. As the AI chatbot generates the answer based on the information seen during the training of the LLM, relationships could be created that are not relevant in the current project. However, it may also be the case that the AI chatbot identifies stakeholders that one has not thought about oneself. So, one should carefully think about them before excluding them from the list of stakeholders. In addition, the list of stakeholders might be incomplete and might need to be extended “manually”.

B. Understand and Analyze Stakeholders

To be able to effectively engage and communicate with stakeholders, it is important to understand their “feelings, emotions, beliefs and values” [14]. An AI chatbot can help to analyze the stakeholders’ perspectives. In a first step, it could be asked in a rather general way to gain additional information about the stakeholders, their connection to the new system and to the project. Such a prompt could be “Provide more information about the stakeholder ‘work council’.”. Note that AI chatbots remember the information given within one conversation. So, the prompts can build upon each other.

Including good practices from project management in the prompt can improve the output. The PMBOK Guide, for instance, recommends considering different aspects in stakeholder analysis, especially their power, impact, attitude, beliefs, expectations, degree of influence, proximity to the project and their interest in the project [14]. These aspects can be added as desired output to the prompt as Table II shows. The project team should review the results as it might be necessary to refine them based on project specific information.

TABLE II. EXAMPLE PROMPT TO ANALYZE STAKEHOLDERS

Intent	Understand the stakeholders of a project
Type of prompt	Generate insights
Required input	The stakeholder to be analyzed. If available, context information about the stakeholder or past experiences with this stakeholder should be added.
Prompt	Discuss for the stakeholder "work council" its power, impact, attitude, beliefs, expectations, degree of influence, proximity to the project and its interest in the project.
Result	Information about each of the key aspects required in the prompt. Note that without providing the key aspects in the prompt, the result would be more general.

To deepen the understanding of the stakeholders' perspectives, the AI chatbot can be asked to describe typical personas, i.e., fictional representations who have a name, a profession and who can describe the impacts that the new system would have on them. For instance, several personas could be created that represent the stakeholder "employees". Then, the chatbot could be asked in a follow-up prompt what a certain persona would say about the project.

In our case study, it was necessary to ask explicitly for critical perspectives. The answers to our first prompts rather sounded coming from a marketing brochures of time tracking systems and every persona was said to be happy with the system. Table III shows a prompt that provides us with a more critical perspective.

TABLE III. EXAMPLE PROMPT WITH PERSONAS

Intent	Explore different perspectives
Type of prompt	Generate insights
Required input	Additional information about the personas, such as their current way of working and potential concerns
Prompt	What would persona <A> say about the time tracking system when she was formerly used to start and stop working whenever she wished, only being judged by her results, not her time spent on them?
Result	Differentiated opinion from the persona's perspective

C. Prioritize Stakeholders

Due to limited resources, projects normally need to focus on the most important stakeholders [14]. Therefore, it is usual to evaluate all stakeholders with respect to their attitude to the project, i.e., whether it is positive or negative, and whether they have a high or low influence on the

project's progression [14][15]. A so-called stakeholder matrix or stakeholder map can serve as a tool to provide a visual overview of all stakeholders with their interests and their influence [16]. It can be used as a basis when planning measures for engaging and communicating with stakeholders. Note that in the prompt showing in Table IV, the AI chatbot is already familiar with the concept of a stakeholder matrix.

TABLE IV. EXAMPLE PROMPT TO PRIORITIZE STAKEHOLDERS

Intent	Create a stakeholder matrix
Type of prompt	Create project documentation
Required input	List of stakeholders and their concerns
Prompt	Classify the stakeholders identified for this digitalization project in the different quadrants of a stakeholder matrix.
Result	List of stakeholders per quadrant (High Power, High Interest; High Power, Low Interest; Low Power, High Interest; Low Power, Low Interest)

The result generated by the AI chatbot is a list of stakeholders which could be used as the basis for creating a visual representation in the form of a stakeholder matrix. Current text-based AI chatbots are not yet able to generate such visualizations. They can only walk you through the process.

It is important to address any concerns that stakeholders with high power and high interest have. A prompt to generate ideas on how to address potential concerns might be "What incentives could be used to raise acceptance?".

The list of stakeholders and the stakeholder matrix are important artefacts created within project management. They should be reviewed throughout the course of the project, and, if necessary, be updated because on the one hand, stakeholders might change their opinions and, on the other hand, influencing factors might change [14]. In addition, misevaluations can be corrected.

D. Engage Stakeholders

Successful stakeholder engagement requires different communication approaches [14]. Depending on the audience and the type of information, a verbal or written communication should be preferred. Moreover, the communication might be formal or informal. An example for a formal written communication is a progress report, while a social media post or an instant message is an example for a written informal communication. An AI chatbot can support project managers in preparing an appropriate communication artefact. This might include several steps in which the content of the communication is elaborated, the type of communication is determined, and the actual text is written. By doing this, users need to take care that the communication does not remain superficial and that it does not appear to be artificially generated. The time saved by utilizing an AI chatbot can be used to create customized communications for each stakeholder, which can also be supported by the AI chatbot. Table V shows such a series of prompts.

TABLE V. EXAMPLE PROMPTS TO GENERATE CONTENT

Intent	Engage stakeholders by a targeted communication
Type of prompt	Step 1: Get advice Step 2: Create communication materials.
Required input	Additional information about the stakeholder and the topic to be communicated
Prompt	Step 1: How should the rationale behind the new system be communicated to stakeholder <A>? How should the communication be realized? Who should communicate in which way to these three personas? How often? Etc. Step 2: Write a formal e-mail with about 200 words about <topic>.
Result	Step 1: Step-by-step guidelines Step 2: Text

A further application scenario in stakeholder engagement is the training and simulation of difficult situations. For example, an AI chatbot can help the project manager to prepare a project presentation with stakeholders that express many concerns about the project. Table VI demonstrates such a prompt.

TABLE VI. EXAMPLE PROMPT FOR TRAINING AND SIMULATION

Intent	Train the conversation with a difficult stakeholder
Type of prompt	Training and simulation
Required input	Information about the situation
Prompt	I'm the project lead of the following project: [...] I have identified the work council as an important stakeholder in this project. Act as the stakeholder work council. I want you to do a dialogue with me. Start with asking a question about your first concern and wait for my answers.
Result	Flipped interaction with questions asked by the AI chatbot and answers given by the user

E. Monitor Stakeholders

During a project, stakeholders might change their opinions, new stakeholders might become relevant while the importance of others may decline. Therefore, it is important to monitor the stakeholders and their satisfaction with the project [14]. AI chatbots can support by analyzing the sentiments that stakeholders express in their communication. E-mails or any other communication in internal groups or communication platforms about the project could be analyzed by an AI chatbot with the help of a prompt such as "Given this text, what is the sentiment conveyed? Is it positive or negative?". However, it has to be noted that no confidential information is handed to a public AI chatbot.

V. POTENTIALS AND RISKS OF USING AI CHATBOTS IN PROJECT MANAGEMENT

The pattern of AI-assisted project management activities, as well as the examples within the case study have demonstrated that AI chatbots can indeed be a useful digital tool in project management. However, there are several issues that lead us to conclude that they are "just" a tool and not yet a digital assistant that is a full member of the project

team. First, project managers need to trust that the chatbot has a solid knowledge of project management methods and good practices, for instance, when asking for guidance. To build up this trust, it would be helpful if the chatbot added a reference to established project management standards, such as published by PMI, ISO or PRINCE2 to the answer. As long as this is not the case, it is recommended to provide this guidance to the chatbot in the prompt, such as shown in the prompt in Table II, which explicitly mentions the different aspects to be considered in the stakeholder analysis.

Second, the project manager must be able to review any generated content. For instance, if the AI chatbot extracts a project status from various documents, traceability is required. In other words, it must be clear what information was used to set the status. To a certain extent, this can be achieved by explicitly asking the AI chatbot to provide its reasoning in addition to the answer. This can be achieved, for instance, by adding a specific response format that guides the AI chatbot such as shown in Table VII.

TABLE VII. EXAMPLE PROMPT FOR PROVIDING REASONING

Intent	Obtain the chatbot's reasoning in addition to the answer
Type of prompt	Transparency
Required input	Information about the situation
Prompt	[Prompt] Response format: # Reasoning < provide a detailed reasoning here > # Response < Provide your response here >
Result	Answer splitted into two parts, the reasoning behind the response and the response itself

Third, as the example prompts have shown, the more specific details about the project, its environment, and stakeholders are provided, the better the AI chatbot's responses will be. However, this is likely to conflict with data protection and privacy. Users should be extremely careful about the disclosure of any sensitive information. Not only is there the problem of the AI chatbot adding this information to its knowledge base and using it to generate answers, but it also provides the chatbot with information to infer ("to guess") further sensitive information. A solution might be to further develop AI chatbots as business-internal solutions which are separated from the outside world. In this case, the underlying LLMs could be trained with company-internal data, e.g., on past projects. This would provide the AI chatbot with company-specific knowledge and push it a step further to a digital assistant.

VI. CONCLUSION

The paper explored the possibilities of using an AI chatbot, such as ChatGPT, to support project managers in their daily work. Patterns of AI-assisted project management tasks were identified, showing the wide range of possible collaborations between project managers and AI chatbots. Examples include using the AI chatbot to generate ideas and

insights, or to act as a sparring partner. The skills required for successful collaboration were also presented. Special emphasis was placed on prompt engineering. The ability to write concise prompts is crucial to achieving results that are useful and not superficial. A case study demonstrated how an AI chatbot could be used. Examples of prompts were shown for stakeholder management activities. Finally, potentials, risks and solutions were discussed.

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