

Facilitating Urban Participation Project with Generative AI to Support Citizen Engagement and Interaction

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Abstract

This paper investigates how AI-based chatbots can enhance citizens' engagement and interaction on urban participation platforms. Using a design science research approach, we identified twelve issues, formulated eleven meta-requirements, and derived five design principles. These were instantiated with a web prototype designed in Flutter, utilizing a large language model, including interaction and expressing guidelines. Our evaluation revealed increased engagement, lower participation barriers, and improved citizen contributions compared to non-AI-based participation. However, the evaluation also led to the addition of two new ones, highlighting document access and interactive urban maps. Together, they specify information presentation and interaction with participants. Despite promising findings, challenges persist regarding the perception and explainability of large language models. Our findings provide a practical blueprint for future AI-enabled citizen participation in urban planning, suggesting directions for further research on the retrieval-augmented generation architecture, which can incorporate additional domain knowledge and behavioral guidelines.

Keywords: Citizen Participation, Artificial Intelligence, Chatbot, Engagement, Design Science Research.

1. Introduction

Urbanization is an ongoing trend, leading to economic growth but also creating numerous challenges (Butt, 2021), which, nowadays, is truer than ever, as inequalities create conflicts that are enhanced by a lack

of resources and limited access to living space (Caragliu & Del Bo, 2022). In response, many governments and city districts are involving citizens in the development of urban areas (Bono Rossello et al., 2023). Citizen participation in urban planning encompasses a broad array of mechanisms and activities designed to incorporate diverse perspectives into the planning process, supporting projects that better reflect the needs of the population (Vagena & Sneiders, 2022). This process enables individuals to share their experiences, opinions, concerns, and suggestions from which decision-makers and urban planners are benefiting (Borchers et al., 2024). A significant challenge associated with citizen participation is the logistics of communication. Electronic participation (e-participation) lowers barriers to participation by using modern technologies (Adnan et al., 2022). However, as moderation is hardly scalable, participant often submit their ideas but do not receive any (immediate) feedback or response, which then corresponds to one-directional communication, even if participant-to-participant communication is possible. This limits interaction and citizens' engagement (Arana-Catania et al., 2021).

Artificial intelligence (AI) offers a potential solution by facilitating information about urban projects, allowing citizens and chatbots to ask and answer questions actively (Von Brackel-Schmidt et al., 2025). However, this would require the AI site to be aware of the current project in which citizens participate. On the other side, the use of AI could also constitute a barrier for some citizens, given a widespread skepticism and lack of trust (Adnan et al., 2022) These challenges emphasize that in this domain, AI-based chatbots have not yet been properly examined (He & Chen, 2024), which is why we state and answer the following research question (RQ).

RQ: How should AI-based chatbots be designed to support citizens' engagement and interaction on urban participation platforms?

To answer the **RQ**, we conduct a design science research (DSR) project. In Section 2, the foundations are described. Subsequently, we described the method (cf. section 3), and the identified issues are summarized (cf. section 4). In Section 5, we present the meta-requirements and design principles, which we implement in Section 6 with a prototype. The evaluation is described in Section 7, and the findings (cf. Section 8) are presented and discussed afterward (cf. Section 9). Finally, we summarize our work in Section 10.

2. Related Work

Citizen participation refers to the active engagement of individuals in political and societal decision-making processes, empowering citizens to express their opinions and articulate their needs, particularly regarding projects that directly affect them (Cooney, 2021; Milutzki & Borchers, 2025). E-participation defines the use of digital technologies to facilitate more efficient, inclusive, and transparent citizen involvement within decision-making processes (Adnan et al., 2022).

2.1. Urban Participation Platforms

In the domain of urban planning, e-participation plays a vital role in creating and shaping cities to create public value (Vagena & Sneiders, 2022). Urban participation platforms simplify information dissemination, provide access to relevant data, and lower participation barriers, thereby often increasing the number of participants per project (Royo et al., 2024). Urban platforms usually include digital forums and discussion areas, which enable citizens to communicate time- and location-independently by submitting their comments and requirements, which are crucial for value creation (Becker et al., 2022). Nevertheless, these platforms face challenges, including a lack of interactions, as most communications are asynchronous, and real-time discussion is scarce. Typically, requirements and information are only sent in but rarely out and are not comparable to on-site, face-to-face discussions (Borchers et al., 2024).

2.2. AI in E-Participation

Conversational agents like chatbots are AI-driven applications that can simulate human conversation using advanced technologies (Nicolas et al., 2021). Early implementations relied primarily on predefined rules,

while contemporary chatbots leverage deep learning and are capable of nuanced understanding and adaptive language generation (Cortés-Cediel et al., 2023). Past public and governmental chatbots have often been informal and focused on increasing access to information, websites, and public services via text-based web interfaces with limited personalization (van Noordt & Misuraca, 2022). By contrast, AI-based chatbots promise a distinct change in urban participation, as dialogic flexibility and exchange enable participants to articulate claims, evidence, and counterarguments dynamically, as described by Bono Rossello et al. (2024). Within the context of citizen participation, chatbots could serve as automated moderators between citizens and participatory platforms, thus supporting real-time interaction and reducing barriers. This is also described in the literature, for example, in public ideation processes, where large language models (LLMs) have supported finding ideas of how to increase sustainability, adapt to climate change, and increase mobility (Pinto & Macadar, 2024). Furthermore, it is also highlighted that simple scale-based feedback can lead to richer and more coherent citizens' contributions (Borchers et al., 2024). In addition, Bono Rossello et al. (2025) describe an overall architecture of how to use AI in digital citizen participation, naming the demand for domain knowledge and a cognitive and information balance for participants. Therefore, reliability is important, and chatbots should be aware of the specific urban project and its objective, which they are currently discussing, to provide detailed data and ask relevant questions (Nicolas et al., 2021), and be aware of the target audience (Bono Rossello et al., 2023).

3. Research Methodology

To answer the **RQ**, we apply the DSR paradigm. DSR is a well-known approach in information systems, which can be used to create design theories and gain knowledge by developing and elaborating on IT artifacts (Tuunanen et al., 2024). In doing so, issues, meta-requirements, and design principles are identified and derived. The latter lays the foundation for the theoretical contributions, while the development addresses real-world problems (Kuechler & Vaishnavi, 2012). For this work, we implemented the DSR activities as described by Hevner et al. (2004), as shown in Figure 1. In the first step, we identify issues regarding the **RQ** with a literature review. In step 2, we formulate meta-requirements based on the issues and derive design principles from these, as well as the existing knowledge base, as described in Section 2. Afterward, we instantiated the design principles and evaluated them with the target group by providing a fictive urban project

and hosting both prototypes on web servers. The collected data were analyzed, and the initial design principles were discussed, adjusted, and extended.

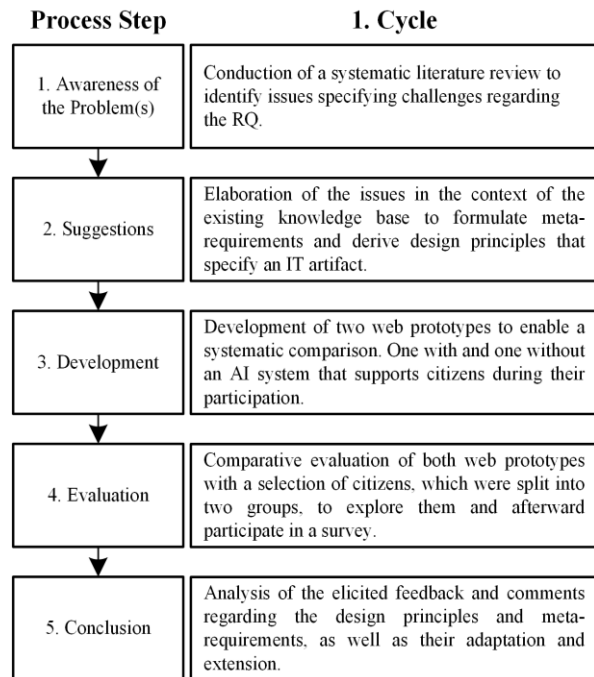


Figure 1. Overview of the applied DSR Approach according to Hevner et al. (2004)

4. Awareness of the Problem

The identification of issues was conducted through a literature review utilizing the databases of AIS and ScienceDirect, and the research was limited to findings since 2022, when OpenAI published the first GPT model. For the search, we used the search string “citizen participation” AND (“AI” OR “artificial intelligence” AND “chatbot”).” We received 23 hits in the AIS and 72 hits in ScienceDirect, leading to a total of 95 hits. After excluding unavailable publications, reading all abstracts, and reviewing the results, twelve relevant papers remained. As a result of our literature review, we identified twelve issues and eleven meta-requirements for AI-based conversational systems for citizen participation. The identified issues and meta-requirements relate to three overarching dimensions, namely, “Information Presentation,” “Citizen Impacts,” and “Citizen Interactions.”

Information overload is a core issue in solutions for citizen participation (ISS1), as urban citizen participation projects are often part of a complex, multifaceted discourse, and navigating this complexity is a significant challenge (Bono Rosselló et al., 2024; Cortés-Cediel et al., 2023). In addition, a lack of visualization (ISS2) further exacerbates this problem

(Cortés-Cediel et al., 2023; Shin et al., 2024). Especially in urban planning initiatives, visualizations benefit citizens by supporting their understanding and imagination to better grasp potential developments and scenarios. Furthermore, a lack of transparency regarding the impact and consequences of citizens' participation (ISS3) hampers engagement (Bono Rosselló et al., 2024; Borchers et al., 2023). Citizen participation solutions often suffer from insufficient feedback during the participation process (ISS4). As these solutions frequently serve as support tools for citizens to form their opinions, understand different perspectives, and engage with various arguments related to new urban planning initiatives, timely and relevant feedback on citizens' input and ideas is essential (Bono Rossello et al., 2024; Borchers et al., 2023; Cvetkovic et al., 2023). Maintaining the long-term engagement of participating citizens (ISS5) is particularly difficult, as various factors often hamper ongoing engagement (Bono Rosselló et al., 2024; Moghayedi, 2025; Mohamed & Han, 2022). This opacity can discourage otherwise motivated citizens from actively engaging, as they may feel that their contributions are not recognized or have no impact. Overall, these issues undermine the credibility and effectiveness of citizen participation initiatives, making it crucial to address them to foster more meaningful and sustained citizen involvement. Additionally, tailoring such feedback to the specific participation context first and to the individual user's context second presents a significant challenge (ISS6) (Bono Rossello et al., 2025; Borchers et al., 2023; Pini et al., 2025). Regarding the conversation and interaction design of AI-based citizen participation systems, many face the issue of insufficient conversation flow management (ISS7) (Azzahro et al., 2025; Borchers et al., 2022; Cortés-Cediel et al., 2023). Such solutions often serve as platforms for citizen ideation, posing closed questions, and a lack of proactive communication further hampers the usability of the system. Additionally, the absence of social cues, empathy, and non-motivational tone (ISS8) can negatively impact user engagement (Al-Ansi et al., 2024; Cortés-Cediel et al., 2023; Shin et al., 2024). As citizens should also express themselves in their natural way to reduce barriers, the system's ability to adapt to diverse communication needs becomes even more critical. Another issue related to users' system interaction is the lack of flexibility in user input (ISS9), which impedes usability (Borchers et al., 2022; Moghayedi, 2025). This is particularly critical in citizen participation contexts, as a diverse range of citizens from various backgrounds, education levels, and language proficiencies interact with these systems. Lastly, one issue that remains is system defaulting and consequently providing mismatched answers in

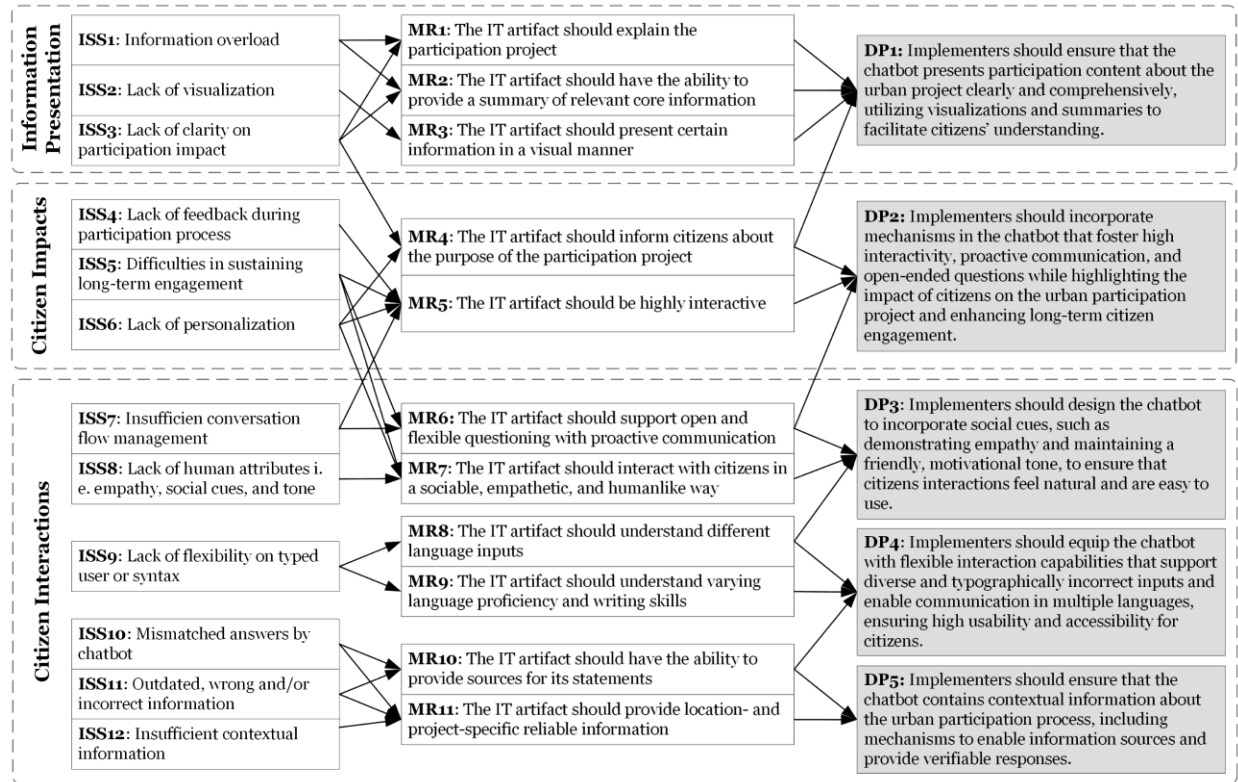


Figure 2. Overview of the identified Issues (ISS), formulated Meta-Requirements (MR) and derived Design Principles (DP)

conversations (ISS10) (Cortés-Cediel et al., 2023; Moghayedi, 2025). This further hinders usability but might have long-term effects on citizens' willingness to use participation systems in the long term. AI-based solutions that provide incorrect, inaccurate, or outdated information represent another central issue (ISS11) (Azzahro et al., 2025; Bono Rossello et al., 2025; David et al., 2025). Such systems may deliver incorrect data due to technical failures, outdated databases, or limited domain expertise. This challenge is closely related to the need to provide contextual information (ISS12) (Abed, 2024; Bono Rossello et al., 2023, 2024, 2025). Particularly in citizen participation solutions that serve as ideation tools, sufficient scenario- and location-specific information is crucial for productive citizen facilitation and meaningful contributions.

5. Suggestions

Building upon the identified challenges, we formulate meta-requirements and condense them into design principles, as illustrated in Figure 3. Information overload (ISS1) justifies MR1 and MR2, which describe the IT artifact's ability to provide a description and explanation of the participation project (MR1) and the ability to provide summaries of relevant information (MR2), which can be achieved with an AI-based chatbot

(cf. section 2.2). Building on ISS2, MR3 calls for visual elements, and ISS3 concretizes MR2 and MR3 by emphasizing the influence of citizens. This is crucial so that citizens, as described in the literature, perceive themselves as co-authors and are convinced that their contribution provides real, tangible added value, thereby increasing acceptance and engagement. Together, MR1 to MR3 lead to DP1, which, as shown in Figure 3, specifies the type of information and its representation and identifies specific functions and objectives.

The lack of feedback (ISS4), the challenge of long-term engagement (ISS5), and the absence of personalization (ISS6) necessitate a highly interactive solution to achieve a pleasant and meaningful interaction flow (MR5). ISS6 also leads to MR4 with ISS3, which specifies that the project purpose must be clearly communicated, thereby supporting DP1. However, MR4 and MR5 lead to DP2, which requires a high degree of interactivity and proactive communication by an AI-based chatbot (Borchers et al., 2024). DP2 thus focuses on clearly communicating the influence of citizens on the project, creating genuine added value by supporting citizens in submitting meaningful and understandable information.

MR6 requires open communication, and MR7 specifies the type of interaction, particularly about the formulation of questions, which should be empathetic.

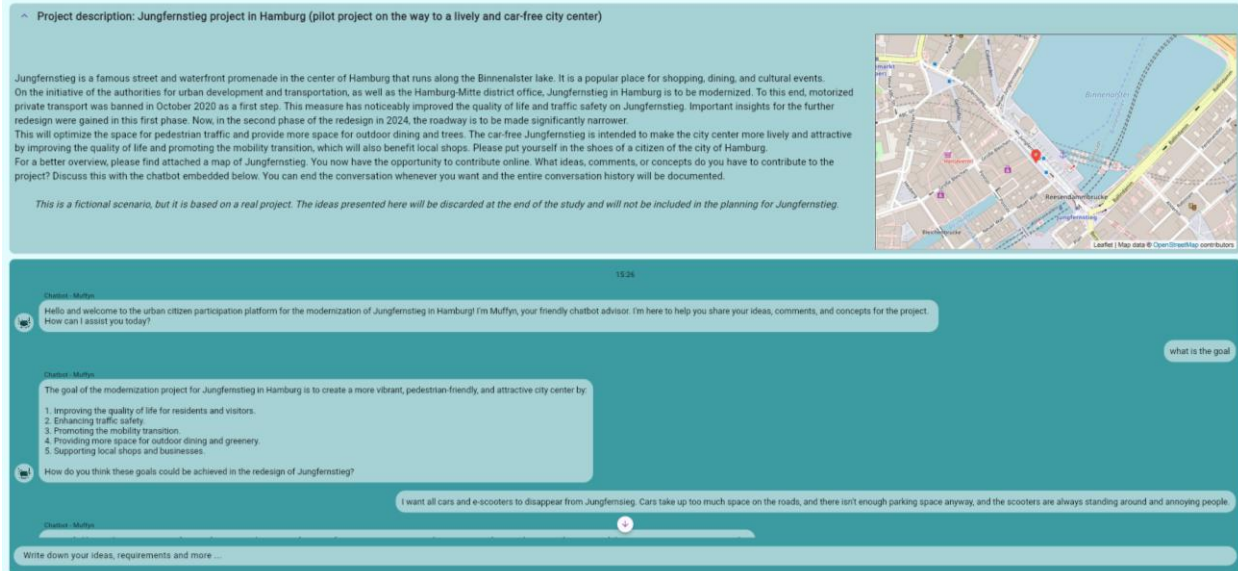


Figure 3. Overview of the AI-Based Chatbot

Both lead to **DP3**, which refers to natural language interaction and emphasizes the need for empathy.

ISS9 refers to a lack of linguistic flexibility, which **MR8** demands about different languages, and **MR9** about linguistic expression and syntax. **DP4** consolidates this and emphasizes usability and flexible interaction with citizens. Thus, an AI-based chatbot should understand a wide range of expressions, terms, and languages. **ISS10** to **ISS12** addresses the accuracy of responses leading to **MR10**, which requires that the IT artifact provide sources for its statements to enable citizens to validate them if required. **MR11** extends this with project-specific information, ensuring the AI-based chatbot has reliable information about the project and is aware of the local characteristics. Both lead to **DP5**, which highlights the accuracy and verifiability of responses (Freitas et al., 2023).

6. Design and Development

Based on the five design principles, we have developed a web prototype that provides two participation variants for the same participation project. The web prototype enables participation with and without the use of AI. In both approaches, the interface is designed to resemble a chatbot. In addition, both options provide a description of the urban project and a map of the surrounding area where the property is located, allowing for further visual representation of local information as required by **DP1**. In addition, in both variants, participants can use text to ask questions, express requirements, wishes, and visions, or describe solutions in detail and submit them. The variant without AI represents an existing urban participation platform, as inputs are recorded as comments. The prototype with

AI is structured in the same way, except that an AI process each input to generate a response. The development of the web prototype was conducted in Flutter with the programming language Dart. As an AI system for text analysis, we utilized GPT4 from OpenAI, as it can be easily integrated via an API key and is one of the most widely used and powerful LLMs (Gao et al., 2024), but could also be replaced with a similar solution.

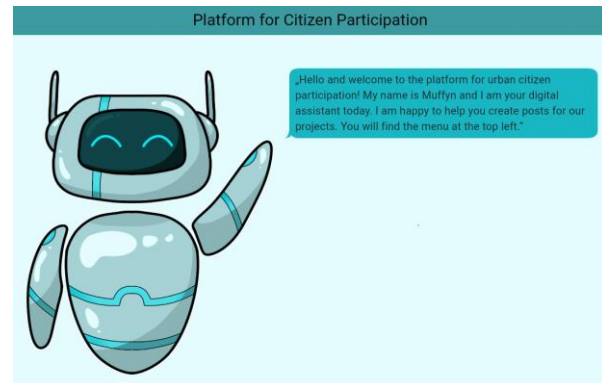


Figure 4. Prototype Welcome Screen

The web prototype considers **DP1** with the design as a chatbot. To also include the requirements regarding the expression of AI responses, we predefined a prompt that ensures the AI-based chatbot is aware of the participation projects and their objectives and always provides information clearly and understandably. To achieve that, we formulated a static prompt which contains specification regarding the (a) role of the chatbot, e.g. platform, (b) a knowledge base about e.g. a textual description of the urban participation project, (c) guideline which define the behaviors of the chatbot and expression style, and (d) a description of the target

audience as initial proposed by Bono Rossello et al. (2023). This also aligns with the idea of reducing the cognitive load to make participation as easy and enjoyable as possible. Furthermore, the chatbot always receives the entire interaction with the participant, allowing it to refer to early submissions and summarize past interactions and the project participation from different viewpoints. Lastly, it also contributes to **DP2** and the overall AI-based approach, as high interactivity requires fast responses to prevent discussions or exchanges from stalling. In addition, the predefined prompt specifies that questions are asked openly and underlines the citizens' impact on the outcome of the participation, which is also considered in the project description. **DP3** is also reflected in the predefined prompt, which points this out. This, along with the requirements of **DP4**, is also supported using an LLM because it understands semantic relationships and can express itself according to the requirements (**MR6** and **MR7**). In addition, it enables natural language interaction in many different languages and is not confused by spelling or grammar errors, nor by long or short sentences. **DP5** was implemented by adding explicit project descriptions to the prompt, along with sources for those descriptions.

7. Evaluation

To evaluate the developed prototype, participants were asked to provide feedback through a questionnaire-based user study. Each participant completed both versions of the prototype, thereby enabling an active comparison of approaches with and without the AI-based response. The order was randomized to minimize sequence effects, but we ensured that the distribution among the projects was even (cf. Figure 5). Most questions in the questionnaire passively or directly addressed the design principles if their instantiation could not be proven or fulfilled with the implementation or usage of the LLM system, as was the case with **DP4**.

In addition to the open questions, nine items were rated using a 6-point Likert scale, where 1 indicated strong disagreement and 6 indicated strong agreement. Both were analyzed, with a special interest in identifying initial significant differences between the two groups (chatbot vs. without chatbot), using the non-parametric Mann–Whitney U test, as a normal distribution could not be assumed. Since separate tests were conducted for each of the nine items, the risk of a Type I error (family-wise error rate) was addressed by additionally applying a Bonferroni correction.

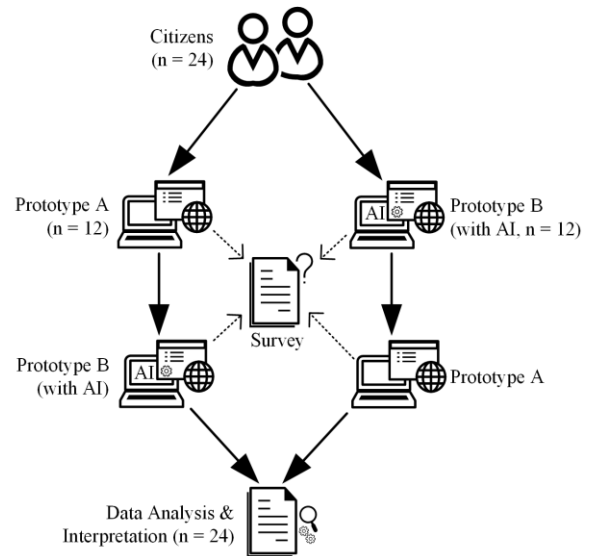


Figure 5. Overview of the Evaluation Approach

The study was conducted with a total of 24 participants, including 13 men and 11 women. The average (AV) age of participants was 34.25 years, with a standard deviation (SD) of 17.38 years. The participants have different backgrounds. Five were students, four were trainees, six worked in IT or IT-related areas, four worked in social areas, and five worked in other areas. In addition, none of the participants worked directly with AI, but many reported that they have tried out tools like ChatGPT or Gemini. Furthermore, eleven (45.8%) participants reported knowing the project location (cf. Figure 3), nine (37.5%) knew it partially, and four (16.7%) did not know it (cf. section 7).

8. Findings

DP1 demands that all information about the urban project is stated clearly and comprehensively, including visualizations. This analysis shows an average of 5.38 (SD = 1.06) for the rating regarding the clarity of the AI responses. Most participants (75%) considered the explanations of the AI-based chatbot to be adequate. A few requested photos or images for a better project overview (8%). Three participants (12.5%) criticized the navigation, with two mentioning unclear workflow and one suggesting clearer icons and a more intuitive website instead of lengthy texts. The integration of the map was seen as helpful for providing a better overview while working on the projects (AV = 4.88 and SD = 0.80). **DP1** was overall approved with high validation that was particularly notable for its intuitive aspects. However, multiple participants also criticized the provision of just one map and the absence of further visual elements. They stated that more figures from the

project location and, if available, an initial plan regarding possible changes to the roads or trees should be provided. This information should also be made available through the chatbot to enable a request-based exploration based on the participants' interests. As a response to that, we reduced **DP1** and created **DP6** to consider visual elements in detail.

DP1 (adjusted): Implementers should ensure that the chatbot presents participation content clearly and comprehensively, utilizing summarizations to support citizens' understanding.

DP6: Implementers should provide interactive maps and additional visual content in the interface and through the chatbot to enable open and request-based exploration of the project area by citizens.

Regarding **DP2**, a total of 11 participants (45.8%) appreciated the constructive nature of the conversation. They noted that the chatbot responded quickly, engaged well with their input, and encouraged further reflection. One participant stated: "... the follow-up questions were a bit exhausting. They led me to provide more detailed information than I would have otherwise. The real idea only emerged through the interaction with the bot." In response to the open-ended question about what users disliked about the chatbot, 8 (33%) participants expressed no criticism. However, 7 (29%) participants noted that the chatbot tended to repeat user input and did not contribute enough to idea development, often following a fixed response pattern. As one participant put it: "The chatbot's response pattern is somewhat repetitive. The suggestion is rephrased and evaluated as constructive, followed by a request for another idea. I don't find that inefficient. It just takes away a bit of the natural flow of the 'conversation.'" Nonetheless, **DP2** is approved, but it should be ensured that the chatbot does not unnecessarily repeat content and does not repeat questions.

DP3 addresses the intuitiveness of the usage, which was rated high for both prototypes (AV = 5.33, SD = 0.92). However, there was no significant difference between the two groups, as indicated by the Mann-Whitney U test ($p = 0.652$). Besides that, participants generally perceived the chatbot's responses as meaningful and coherent (AV = 5.54, SD = 0.51) and felt motivated to interact and develop ideas (AV = 5.08, SD = 0.97). Further, the participants praised the chatbot's empathetic and friendly tone, its clear and human-like language, quick and well-structured responses, intuitive handling, and appealing appearance. The question regarding its human-like and empathetic behavior was rated high, with an AV of 5.0 (SD = 0.98), but without significant differences between the two groups. However, the chatbot encouraged deeper thinking and motivated more idea sharing compared to

the non-chatbot project. One participant said: "The format of a conversation makes the interaction with the project much livelier and stimulating, which is why I thought longer and better about suggestions than with the project without a chatbot."

Considering **DP4**, the flexible interaction and support of diverse and typographically incorrect input in different languages is supported by the LLM. This was not explicitly validated by a survey question but approved, as LLM can handle that, and the interactions in the evaluations have also shown this, supporting **DP4**.

Table 1. Overview of Likert-Scale Items with Average (AV) and Standard Deviation (SD)

DP	Shortened Statements (1 to 6)	AV & SD
DP1	Map integration was helpful.	4.88 ± 0.80
DP2	Chatbot responses made sense.	5.54 ± 0.51
DP2	Chatbot encouraged interaction.	5.08 ± 0.97
DP3	Chatbot felt human/empathic.	5.00 ± 0.98
DP3	The platform is easy to use.	5.38 ± 1.06
DP3	Chatbot is easy to use.	5.33 ± 0.92
DP5	Contributions improved by the chatbot.	4.96 ± 0.75
-	Data storage was a concern.	2.29 ± 1.20

DP5 affects contextual data, which we provided with the prompt, such as information about the participation process. Participants generally felt that the chatbot improved the quality of their contributions (AV = 4.96, SD = 0.75), and the explanations were supportive. However, further information would be helpful, and the transparency of responses should be improved. Considering the feedback regarding **DP1**, we condensed this and derived **DP7**, focusing on further visual elements. **DP7** primarily addresses a technical requirement that goes beyond the use of a simple LLM. This involves retrieving images and other data sources from information or documents, as well as giving the chatbot an idea of the content to be queried.

DP7: Implementers should enable the chatbot to access documents, visual elements, and online sources to provide in-depth knowledge about the participation project and its environments while being aware of the sources to support in-depth citizen exchange.

The implementation of **DP7** would extend the usage of the LLM approach, which could be achieved by following the RAG architecture, but could also limit the reproducibility of responses by the LLM (Nikishina et al., 2025). This extends LLM with predefined data corpora, which are typically stored in vector databases. Additionally, algorithms that detect requests and decide whether to utilize the knowledge base, visual data, or online and real-time data, depending on the use case, can also extend this (Gao et al., 2024).

On a more general topic, participants showed low concern about the chatbot storing all their input (AV =

2.29, SD = 1.20), suggesting this was not perceived as a major issue. However, it is worth noting that the mean was higher in the group that started with the chatbot (AV = 2.83) compared to the group that began without it (AV = 1.75). While this difference was initially significant ($p \approx 0.023$), it did not hold after the Bonferroni correction (adjusted $p = 0.21$). When asked which project they would have preferred if only one had been available, 23 (96%) of participants chose the project with the chatbot. Furthermore, 83% of participants expressed interest in participating in digital citizen engagement in the future.

9. Discussion

In this paper, we examined the **RQ** "How should AI-based chatbots be designed to support citizens' engagement and interaction on urban participation platforms?" by conducting a DSR project. We identified issues, formulated meta-requirements, and derived design principles, which we instantiated with a web prototype. This was evaluated in comparison to a baseline prototype, representing existing urban participation platforms.

Our study demonstrates that carefully designed AI-based chatbots can significantly enhance citizen participation in urban planning by bridging interaction gaps and encouraging participant engagement. The evaluation showed that participants generally preferred the interactive chatbot-based approach over a static, non-interactive alternative, reporting higher levels of engagement, satisfaction, and willingness to participate in future projects. This research advances the existing body of knowledge by deriving design principles (**DP1** to **DP7**) and support the technical requirements and principles proposed by Bono Rossello et al. (2025) for the holistic collective intelligence architecture, as well as the overall impact of interactive digital tools (Becker et al., 2022), by highlighting the chatbot's ability to provide content-specific immediate responses and facilitate more intense interactions (Borchers et al., 2023).

Participants appreciated concise summaries and relevant visualizations yet expressed a need for richer, more interactive materials (Cortés-Cediel et al., 2023), highlighting the importance of multimodal support (**DP6**). The chatbot encouraged reflective contributions, but limitations such as repetitive replies point to the need for more advanced, adaptive dialogue management using LLM prompts. While most users were unconcerned about data privacy, some requested clearer information on data usage and system logic, underlining the importance of explainability and trust (Hao et al., 2024; Moghayedi, 2025). Robust language capabilities in the chatbot lowered participation barriers, supporting findings in the literature (Cortés-Cediel et al., 2023).

Participants also felt better informed with the provided urban projects information. However, greater transparency of information sources remains desirable. Several implications emerge from these insights. Our design principles, particularly the newly introduced **DP6** and **DP7**, which concern multimodal data and access to supplementary project materials, offer value for the development of future urban participation platforms in terms of specific functions. To address the demand for contextual depth and enhanced visual information, we recommend the exploration of RAG architectures, coupling LLMs with curated knowledge bases and multimedia assets (Gao et al., 2024; Nikishina et al., 2025). Further, as AI-chatbots become increasingly central to participatory processes, it is essential to conduct human-centered evaluations focusing on trust, inclusivity, and deliberative quality (Becker et al., 2022).

Our results reinforce the importance of intuitive, empathetic interaction, suggesting that design strategies should prioritize natural discourse and adaptive support. Also, promoting transparency and explainability in AI systems, such as enabling citizens to query information sources and understand automated decision-making processes, will be decisive in ensuring legitimacy and acceptance (Freitas et al., 2023). Finally, while our study demonstrated feasibility and potential with a small, diverse group, broader investigations across different demographic groups and urban settings are needed to generalize and optimize design principles.

Regarding the limitations, our participant pool ($n=24$) was sufficient for the first DSR cycle but not large enough to reflect the complexity and heterogeneity of urban populations and ensure the design principles were comprehensible. The scope of our prototype was also limited, and we did not integrate real-time data or more advanced visual or multimedia capabilities in our chatbot (Nikishina et al., 2025).

To build upon our results, future DSR cycles should focus on expanding technical capabilities by implementing a knowledge base according to the RAG architecture, as further information about the current project, but also general knowledge about citizen participation in urban planning and the interaction with citizens, could further increase engagement and interaction (Nikishina et al., 2025). Furthermore, in the second DSR cycle, as the focus and complexity of the IT artifact is increasing, to consider the AI-based chatbot as part of a whole urban participation platform, we will plan to specify echelons e.g. subsystems and different technical units, layers for all decision-making areas and strata, to specify dynamic elements, to provide a holistic view (Tuunanen et al., 2024). This also affects cross-disciplinary research to develop standards for AI explainability, to ensure that AI-supported participation

can uphold core democratic values (Arana-Catania et al., 2021).

10. Conclusion

This study demonstrates that AI-based chatbots in urban planning can enhance citizen participation by fostering more interactive, inclusive, and engaging dialogue. Through a design science research approach, we identified key requirements, including clear information, empathetic and adaptive interaction, flexible language input, and transparent sourcing. Our evaluation showed that participants preferred the chatbot-driven system to traditional platforms and felt more encouraged and supported in developing their ideas. However, challenges remain in providing richer visual materials, refining dialogue management, and ensuring transparency in data usage. Future research should focus on integrating advanced AI architectures and evaluating these solutions with larger, more diverse user groups to optimize inclusivity and trust. Overall, our findings provide proper design principles for practitioners and lay the groundwork for future research in AI-supported citizen participation on urban participation platforms.

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