

Investigating Human-AI Configurations: Impacts on the Overall Facilitation and Prototyping Activities in Participatory Design

Christopher Hagen Tolloczko

Department of Informatics, University of Oslo, chrishto@ifi.uio.no

Snorre Wenaas

Department of Informatics, University of Oslo, snorrw@ifi.uio.no

Suhas Govind Joshi

Department of Informatics, University of Oslo, joshi@ifi.uio.no

Abstract

The emergence of AI demonstrates many potential benefits of integrating AI into Participatory Design (PD) processes. This position paper highlights some challenges and opportunities recently reported within the PD and HCI community on how and when to use AI. We contextualize these studies into our empirical work, investigating the accompanying opportunities and challenges of integrating AI into PD activities. Our overarching goal is to examine how the use of generative AI can reconfigure the facilitation and prototyping during PD processes. We briefly present our empirical context and then outline some planned trajectories for our upcoming design activities in an ongoing PD project. We end by connecting our expected results to the current discourse on how different configurations of human-AI collaboration affect both the overall facilitation and the prototyping activities within PD projects.

CCS Concepts

•Human-centered computing~Interaction design~Interaction design theory, concepts and paradigms •Human-centered computing~Interaction design~Interaction design process and methods~Participatory design

Keywords

Participatory Design, Generative AI, Decision-making, Older adults.

1 Introduction

The recent development in AI tools introduces new discussions on how new technology can be leveraged to support participation in Participatory Design (PD) processes. In the intersection between AI and PD [13], and recent work showcases a duality in the potential of AI integration in PD [2, 22]. Recent studies highlight issues related to the participants' agency in decision-making as well as how we facilitate the process to support their ability to participate in collaboration with AI [3, 4]. We share concerns about the implications of AI in PD [2].

In our paper accepted for presentation at NordiCHI2024, titled "Investigating How Generative AI Affects Decision-Making in Participatory Design" [FORTHCOMING], we examine the impact of AI on the participants' space to make choices. We suggest that AI can empower the participants' ability to make choices in three ways: (1) by leveraging the participants' own natural language, (2) by communicating through exemplars, and (3) by leveraging the inherent inconsistency of AI tools. We argue that the capability of novel AI tools can positively impact PD processes, and we remain optimistic that there is a place for AI within the discussion of PD configuration. However, our optimism is not unidirectional: we share the concerns from recent studies about the uncritical use of AI and the several pitfalls to consider when incorporating AI into PD processes [20]. As such, we aim to continue our exploration of when, how, and to what extent, we can leverage AI in PD configuration. More specifically, we ask an overarching research question that frames our ongoing research: how can the use of generative AI reconfigure the facilitation and prototyping during PD processes? In this position paper, we present a brief overview of recent studies from mainly PD and HCI communities that concern themselves with human-AI configuration before introducing our plans for our ongoing PD projects with older adults, where the goal is to introduce generative AI. We elaborate on some of the expected results and position them in the ongoing debate on the use of generative AI in PD and other collaborative design cases.

2 Background

This position paper deals with the question of how the use of AI in PD processes challenges the underlying values of PD. In our ongoing PD projects, we are mainly concerned with participant agency issues. Through a reflective and

systematic examination of AI's role in PD processes, we aim to demonstrate successful AI usage that does not compromise PD's core values.

Recent work on AI and co-design activities is predominantly found in the HCI community (e.g., [1, 8–10]). For instance, several studies have highlighted an expanding potential for creative design work in collaboration with AI [15, 19] or have demonstrated how AI can complement tasks and workflows [9, 10]. Ongoing discussions also include a definition of challenges related to the roles of humans and AI [7, 11, 13] and challenges concerning AI's impact on the flow and structure of processes [9, 23]. At the same time, we also see attempts to meet these new challenges, e.g., with design guidelines that provide necessary frameworks [24].

A crucial aspect that requires further investigation is the extent to which AI, in collaboration with humans, yields new positive forms of participation [7, 11]. Our standpoint is that AI use in PD alters the dynamics in such a way that facilitation necessarily changes, for instance, due to altered task division [6, 9], the introduction of new roles [13, 23], or shifts in design direction or scope that would not be possible without an AI presence. We also argue that the critical use of AI introduces opportunities to enhance participants' agency by offloading, taking over, or replacing tasks and responsibilities that individuals may choose to avoid, as pointed out also by previous studies [9, 17].

PD processes can be challenging to facilitate, and there are several considerations to cover when AI is introduced [2, 25]. We have experienced that introducing AI to older adults can be challenging because of the complex nature of the technology. The series of complicated concepts that underly AI systems can be hard to understand and comprehend. Trusting the system and the "black boxing" of AI is a serious concern for PD's core values [21]. Leaving participants "in the dark" is not desired in any form. Facilitating mutual understanding of a concept is also important, as it might be central to using and practicing tools.

3 Empirical context

Over the last year, we have organized a long-term PD project that explores the role of older adults as co-designers of welfare technology. While the project has primarily focused on addressing the well-documented challenges these individuals face in participation, we have also investigated how AI might mitigate some of these difficulties. We have developed our own AI tool that generates images from the participants' dialogue to help them explore and communicate their design ideas more effectively during PD activities [FORTHCOMING].

The project aims to explore how facilitation and prototyping in PD design processes are affected by the implementation of AI by following a PD project from start to end. We are not interested in solution-oriented results, i.e., centering our attention around the design outcomes of the PD project. Instead, we will focus on evaluating and analyzing the integration of AI in conventional PD activities.

During the summer of 2024, we organized weekly PD activities with older adults at a senior center in Oslo, Norway. The group consisted of 10 participants aged between mid-60s and mid-80s. The participants were recruited from residents at the senior center and local older citizens who regularly met at the center to partake in other social activities. The weekly seminars focused on technology in everyday life, where participants would discuss their experiences with various technologies, from simple smartphones to advanced concepts like AI. This series of summer seminars aimed to establish a solid foundation for the autumn phase, which is planned to include more practical and design-oriented activities. We are currently in the planning stages of the autumn phase, and the following section outlines our plans for the next steps.

4 Research Method

This section describes our current plan for the autumn and the next steps in our project. Together with the participants, we will co-create a solution that addresses a common problem in their everyday lives. With our background in design research and AI, we hope to be able to compare the results of the project with equivalent ones without AI, exploring the consequences of AI integration. Our previous research suggests impacts of both positive and negative nature in certain parts of PD processes, which we will try to investigate further. To answer our overarching question of how the use of generative AI can reconfigure the facilitation and prototyping in PD, we aim to explore two specific concerns: (1) what happens to the facilitation of PD processes when AI is integrated into the process, and (2) how AI may be utilized to mitigate the required skills to build prototypes. These concerns offer some early structures for answering and contributing to the overarching question.

4.1 Facilitation

Our previous research suggests a power shift when implementing AI in PD in the early ideation phases of design [FORTHCOMING]. Enabling the process to rely more on the participants' expertise through communication in a non-technical manner is an interesting topic for exploration. A weakness in our previous research is the lack of actual participants evaluating the implications of using AI as a co-creation tool, which is the first thing we plan to investigate

by incorporating direct feedback from participants. Drawing upon our previous PD processes within the same research context, there is space for a deeper conversation on the facilitation of AI-integrated activities.

Firstly, to further understand the impacts of AI on the facilitation of PD processes and PD activities, we plan on conducting two workshops where we experiment with various configurations. One of the workshops will utilize AI as a tool to help with ideation activities, and the other workshop will not use AI and rely more on traditional tools for ideation. Directly comparing these two workshops, we can find the challenges and positives of integrating AI as a tool or partner in workshops. One possible trajectory to explore with the workshops would be for the participants to collaborate with one AI interface each. This would entail using it as a tool or a collaborative “partner”. Each participant could then participate in more traditional design activities assisted by AI. The AI could potentially help participants with mind-mapping or structuring affinity diagrams. There is also the option to organize the workshops in an experimental setting using control groups, i.e., splitting the participants into two groups where one group would use AI, and the other half would not use AI. This could offer insight into the different experiences with or without AI as a tool or partner in a design workshop context, e.g., by asking each group how they experienced the activity with or without AI. A final possibility would be to include AI as an overarching tool for the entire workshop. We could then use the AI as a collective sparring partner where participants and designers collectively interact with the AI to continuously develop ideas, questions, or other information necessary for the goal of the workshop or design process. Or AI could be assigned the role of structuring the entirety of the workshops. Different configurations for testing and exploring AI integrations could be viable in such a scenario. Still, we argue that it remains essential to understand the entirety of the PD process, including the interplay between different roles and responsibilities. Understanding the participants' perspectives is also important to unpack issues related to trust [14, 18], so interviewing their perspectives on the workshops with and without AI is a definitive interest. Holding design workshops without including AI is also necessary to form grounds for comparisons and reflections on the very presence of AI.

Questions about how AI can help participants participate through discussions and reflections will be key exploration goals for our studies. What parts of the social dynamics in the workshop change when participants also must relate to the AI? Will it be purely ignored and only be approached when strictly needed? Or, will it be more of a collaboration partner [24]? Figuring out the role of AI will be a key part of the empirical goal with these two directions for workshops. Exploring how much control you can give the AI is also interesting. Can we carry out workshops completely set up by AI? We consider this unfeasible with the current state of AI; however, it is not unlikely in the future that such a scenario could be seriously considered as an alternative.

4.2 Prototyping

Prototyping is an essential part of PD projects, and we encourage leveraging prototypes of varying fidelity throughout the design process. Prototypes prove valuable in PD projects [12], enabling the participants to engage in conversations about both desirable and undesirable attributes of design ideas. Related work also points to prototypes being generative in terms of project progress [16]. We find that AI capabilities are currently not at a sufficient level of maturity to create finished designs, e.g., 3D models directly. However, our previous research implies that using AI to develop temporary prototypes may be of value in the early stages of PD, mitigating some of the skills required to create prototypes, which are commonly not found among typical participants.

Our research interest lies in the intersection between PD and prototyping with AI, and we plan to explore different ways of utilizing AI-based tools to enhance the participants' ability to co-create. As such, we ask ourselves if AI could also fit into a broader range of activities in PD. Our research with our self-developed AI tool utilizes AI at a distance from the actual prototypes, and we want to explore the usage of AI capabilities in different degrees of proximity to the creation of these prototypes. As such, leveraging AI capabilities in prototyping could unfold in different ways, and it is important to offer some reflection on some possible directions.

First and foremost, we find ourselves interested in investigating AI as a co-creation partner, i.e., as a direct contributor to the design outcomes. Mackeprang et al. [15] present a framework of how different levels of automation (LoA), expressed as value ranges from 1 to 10 (with 1 being all-human and 10 being all-computer) could describe possible system configurations for Human-AI interaction. Their research aligns with our own interest in balancing Human-AI-contributions during prototyping activities. Furthermore, the level of AI intervention is structured in 4 types of tasks in ideation phases: *Term Extraction*, *Concept Search*, *Concept Ranking*, and *Concept Selection*. While this framework targets the ideation phase, we consider such an exploration fitting in our cases as it expands the possible Human-AI configuration into more concretizing activities in PD [3]. Meanwhile, Delgado et al. [5] provide a framework structuring participation into 4 dimensions: *Consult*, *Include*, *Collaborate*, and *Own*. We aim to utilize these frameworks to investigate how AI may be sufficient in different collaborative configurations. We aim to investigate how far on the LoA scale we can push the current AI capabilities when it comes to prototyping. As such, our investigation will consist of prototyping workshops with different goals, ranging from AI usage for ideation, as described in the first investigation, to trials of fully AI-generated design proposals without human intervention. In between, we find investigations of AI functioning as an extension of, and supplement to, human prototyping capabilities, or where some of the control of prototyping outcome is left to the AI. With such an approach, we plan to

concretize some of the practical concerns of integrating AI, as well as attempt to evaluate how the presence and influence of AI affect human contributions.

5 Expected results and contributions

By following some of the outlined trajectories in the previous section, we expect to gather insights from the participants' perspectives on how well AI can be utilized as a collaborative partner or a tool for ideation in the early stages of design. Understanding the considerations and experiences not only from the designers' and facilitators' perspectives will offer directions for how well AI can be implemented without compromising the integrity of PD values such as agency and trust [2]. Much like Dahl & Sharma's exploration of the role of the facilitator [25], we also aim for the project to investigate further how the presence of AI influences the perception of roles and how the social interplay in the workshops unfolds. One concrete scope could be perceptions and practices connected to generative AI in design activities, similar to the work presented by He et al. [9].

Furthermore, we expect our workshops to yield results describing how AI may be of value at the stages closer to final designs. Investigating the configurations is also critical, and we expect that specific configurations may also allow the AI to contribute at the latter stages. While we approach this with a positive outlook, we also expect to find several trade-offs in AI integration and tensions in the balance of AI vs. human contributions. Our findings will contribute to the ongoing discourse regarding human-AI co-creation and how different configurations could be both desirable and undesirable. We also aim to supplement the discourse regarding challenges concerning AI's impact on the flow and structure of the co-creation process (as seen in, e.g., [9, 23]), including examples of different configurations, potential restructuring needs, and important considerations.

References

- [1] Amershi, S., Weld, D., Vorvoreanu, M., Fourney, A., Nushi, B., Collisson, P., Suh, J., Iqbal, S., Bennett, P.N., Inkpen, K., Teevan, J., Kikin-Gil, R. and Horvitz, E. 2019. Guidelines for Human-AI Interaction. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow Scotland Uk, May 2019), 1–13.
- [2] Bratteteig, T. and Verne, G. 2018. Does AI make PD obsolete? exploring challenges from artificial intelligence to participatory design. *Proceedings of the 15th Participatory Design Conference: Short Papers, Situated Actions, Workshops and Tutorial - Volume 2* (New York, NY, USA, Aug. 2018), 1–5.
- [3] Bratteteig, T. and Wagner, I. 2016. Unpacking the Notion of Participation in Participatory Design. *Computer supported cooperative work*. 6 (2016), 425–475. DOI:<https://doi.org/10.1007/s10606-016-9259-4>.
- [4] Bratteteig, T. and Wagner, I. 2016. What is a participatory design result? (2016), 141–150.
- [5] Delgado, F., Yang, S., Madaio, M. and Yang, Q. 2023. The Participatory Turn in AI Design: Theoretical Foundations and the Current State of Practice. *Proceedings of the 3rd ACM Conference on Equity and Access in Algorithms, Mechanisms, and Optimization* (New York, NY, USA, Oct. 2023), 1–23.
- [6] Fatima, I. 2023. *Designing with AI : A User Study to Explore the Future Role of AI as a Collaborative Tool in Graphics Design*.
- [7] Freese, S. 2023. *AI in Co-Creation : The usability and impact of AI tools for co-creation in participatory design to generate innovative and user-centric design solutions*.
- [8] Grudin, J. 1993. Obstacles to Participatory Design in Large Product Development Organizations. *Participatory Design*. CRC Press.
- [9] He, Q., Zheng, W., Bao, H., Chen, R. and Tong, X. 2024. Exploring Designers' Perceptions and Practices of Collaborating with Generative AI as a Co-creative Agent in a Multi-stakeholder Design Process: Take the Domain of Avatar Design as an Example. *Proceedings of the Eleventh International Symposium of Chinese CHI* (New York, NY, USA, Feb. 2024), 596–613.
- [10] Huang, Y. 2023. The Future of Generative AI: How GenAI Would Change Human-Computer Co-creation in the Next 10 to 15 Years. *Companion Proceedings of the Annual Symposium on Computer-Human Interaction in Play* (New York, NY, USA, Oct. 2023), 322–325.
- [11] Jiang, J.A., Wade, K., Fiesler, C. and Brubaker, J.R. 2021. Supporting Serendipity: Opportunities and Challenges for Human-AI Collaboration in Qualitative Analysis. *Proceedings of the ACM on Human-Computer Interaction*. 5, CSCW1 (Apr. 2021), 94:1-94:23. DOI:<https://doi.org/10.1145/3449168>.
- [12] Joshi, S.G. 2017. *Designing for Capabilities: A Phenomenological Approach to the Design of Enabling Technologies for Older Adults* (Doctoral dissertation). *Series of dissertations submitted to the Faculty of Mathematics and Natural Sciences*. 1881, (2017).
- [13] Koch, J., Lucero, A., Hegemann, L. and Oulasvirta, A. 2019. May AI? Design Ideation with Cooperative Contextual Bandits. *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (New York, NY, USA, May 2019), 1–12.
- [14] Liu, B. 2021. In AI We Trust? Effects of Agency Locus and Transparency on Uncertainty Reduction in Human-AI Interaction. *Journal of Computer-Mediated Communication*. 26, 6 (Nov. 2021), 384–402. DOI:<https://doi.org/10.1093/jcmc/zmab013>.
- [15] Mackeprang, M., Müller-Birn, C. and Stauss, M.T. 2019. Discovering the Sweet Spot of Human-Computer Configurations: A Case Study in Information Extraction. *Proceedings of the ACM on Human-Computer Interaction*. 3, CSCW (Nov. 2019), 195:1-195:30. DOI:<https://doi.org/10.1145/3359297>.
- [16] Page, R. and Heiss, L. 2023. Generative prototypes to promote participation in the collaborative design of wearable health technologies. *The Design Journal*. 26, 1 (Jan. 2023), 121–141. DOI:<https://doi.org/10.1080/14606925.2022.2148437>.
- [17] Podell, D., English, Z., Lacey, K., Blattmann, A., Dockhorn, T., Müller, J., Penna, J. and Rombach, R. 2023. SDXL: Improving Latent Diffusion Models for High-Resolution Image Synthesis. arXiv.
- [18] Ramchurn, S.D., Stein, S. and Jennings, N.R. 2021. Trustworthy human-AI partnerships. *iScience*. 24, 8 (Aug. 2021), 102891. DOI:<https://doi.org/10.1016/j.isci.2021.102891>.
- [19] Sarkar, A., Drosos, I., Deline, R., Gordon, A.D., Negreanu, C., Rintel, S., Williams, J. and Zorn, B. 2023. Participatory prompting: a user-centric research method for eliciting AI assistance opportunities in knowledge workflows. arXiv.
- [20] Sloane, M., Moss, E., Awomolo, O. and Forlano, L. 2022. Participation Is not a Design Fix for Machine Learning. *Equity and Access in Algorithms, Mechanisms, and Optimization* (Arlington VA USA, Oct. 2022), 1–6.
- [21] Steen, M. 2015. Upon Opening the Black Box and Finding It Full: Exploring the Ethics in Design Practices. *Science, Technology, & Human Values*. 40, 3 (2015), 389–420.
- [22] Tholander, J. and Jonsson, M. 2023. Design Ideation with AI - Sketching, Thinking and Talking with Generative Machine Learning Models. *Proceedings of the 2023 ACM Designing Interactive Systems Conference* (New York, NY, USA, Jul. 2023), 1930–1940.
- [23] Verheijden, M.P. and Funk, M. 2023. Collaborative Diffusion: Boosting Designerly Co-Creation with Generative AI. *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg Germany, Apr. 2023), 1–8.
- [24] Wang, D., Churchill, E., Maes, P., Fan, X., Shneiderman, B., Shi, Y. and Wang, Q. 2020. From Human-Human Collaboration to Human-AI Collaboration: Designing AI Systems That Can Work Together with People. *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (New York, NY, USA, Apr. 2020), 1–6.
- [25] Yngve Dahl & Kshitij Sharma 2022. Six Facets of Facilitation: Participatory Design Facilitators' Perspectives on Their Role and Its Realization. (2022).