

Change – The transformative power of citizen science

## Game on: exploring game-based tools for citizen engagement in climate research and policy

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### Abstract

The climate crisis requires far-reaching changes which need to be supported by citizens and policymakers alike. New methods of public engagement are necessary to transform the public's needs into actionable knowledge. Games offer potential for engagement through their central role in contemporary culture, allowing citizens to experience the policy process and voice their concerns. The EU-funded project GREAT involves citizens and policy stakeholders as players and co-researchers to explore new formats of political participation regarding climate change. In a series of workshops, local actors have been engaged in distinct phases of the research process: the exploration of current climate issues and the definition of research questions, transferring these issues into a collaborative serious game, and the analysis and interpretation of the data collected during the execution of the game. An initial review of the methodical approaches implemented with policymakers and citizens reveal potential, but also several limitations and challenges encountered in the engagement process. Our initial analysis confirms the potential of game-based approaches for citizen participation and engagement with climate change and their transferability to other social issues. These experiences demonstrate how the ever-growing cultural role of games could be leveraged for supporting the changes necessary to address societal challenges.

**Keywords:** engagement, citizens, games, participation, climate change, policy.

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Published by NHM, BOKU and ECSA and peer-reviewed under responsibility of ECSA-ÖCSK-2024 (Change – The transformative power of citizen science)

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## Introduction

Successfully addressing societal challenges like the climate crisis requires a facilitated dialogue across all stakeholders and a stronger involvement of citizens in climate policy (Kythreotis et al. 2019). Identifying the main concerns of citizens and their communities should form the basis of this dialogue, in addition to jointly developing new understandings and solutions.

Such a process of co-producing new knowledge is a core part of the methodology of Citizen Science (Kythreotis et al. 2019). Contributory approaches to citizen science often intend an observational role for citizens consisting of data collection (Kythreotis et al. 2019, Albert et al. 2021). In contrast, participatory approaches and citizen social science emphasise the inclusion of non-researchers in all research phases as well as the consideration of social concerns (Albert et al. 2021, Kieslinger et al. 2022). As the climate crisis is one of the most pressing social concerns, public engagement in the research and policy process can play a crucial role for effective action.

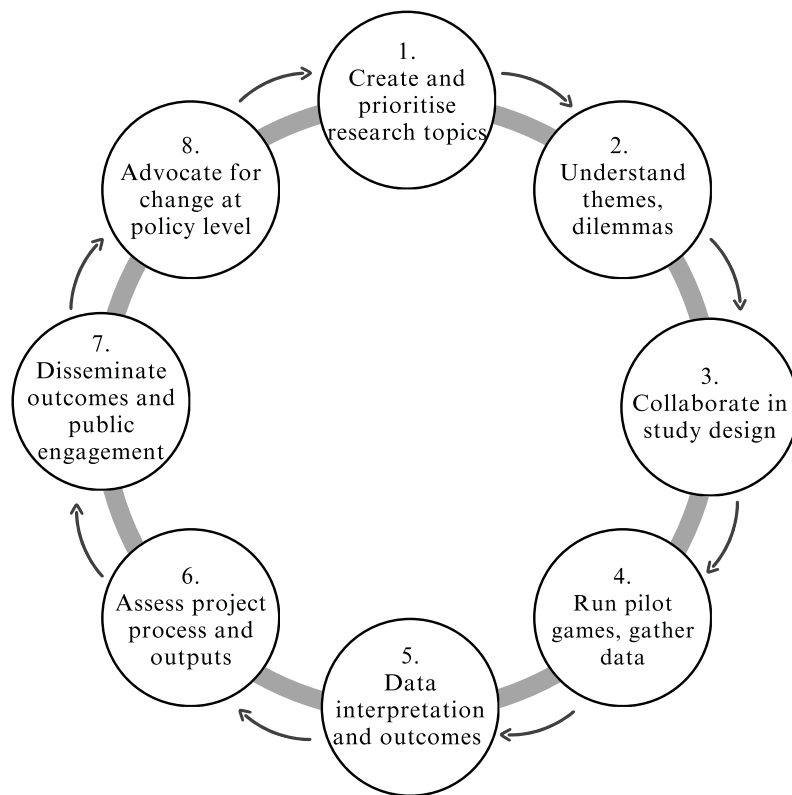
In practice, several barriers stand in the way of citizen engagement in climate research and policy (Ianniello et al. 2019). Public engagement processes often reach only the small portion of already engaged citizens. As these participants do not necessarily represent the wider public or underrepresented groups, engagement processes and their influence on policies may be characterised by power imbalances. Furthermore, public engagement processes are often not evaluated, resulting in an incomplete evidence base to assess their benefits and limitations.

These issues call for further research and new methods for citizen engagement, particularly on complex and multi-layered issues such as climate change (Kythreotis et al. 2019). Game-based approaches offer new avenues by using role-play, points, and narratives for promoting engagement with climate change and policy dialogue (Fernández Galeote et al. 2021).

In the EU-funded research project GREAT (<https://www.greatproject.gg/>), we leverage the central role of games in contemporary culture to promote citizens' reflection and expression regarding climate change. The project involves citizens and policy stakeholders throughout a game-based research process, including co-creation of research topics, co-design of game approaches, and co-analysis of data. We report on participatory activities implemented to collaboratively develop a dilemma-based game (see <https://dibl.eu/> for a description of the platform used). In this contribution, we focus on the implemented activities and reflect on the first experiences from this participatory process. The project tests a dilemma-based game approach for qualitative and a quiz-based approach for reaching large audiences.

## Methods

We have integrated participatory formats along an 8-step cycle for game-based research established as part of the GREAT project. The research cycle represents a logical sequence of steps guiding the implementation of a game-based research tool (see Fig. 1). We implemented 14 participatory workshops with a total of 84 participants along four steps of this research cycle.



**Figure 1.** 8-step research cycle

Three types of participants were involved: firstly, external stakeholders engaged in local climate policies, secondly, participants from within GREAT organisations but not directly involved in the project, and thirdly, researchers involved in the project. Step 4 is not included here as we did not collect participatory data at this stage.

The workshop activities are summarised in Table 1. They were documented through audio recordings or written notes and in standardised templates. The documentation and extensive reflections among workshop facilitators form the basis for results and conclusions.

**Table 1.** Overview of workshops.

Research cycle step (Fig. 1)	Step 1	Step 2	Step 3	Step 5
Participants	5 workshops involving policymakers, (university) students, NGOs	4 workshops involving policymakers, (university) students, NGOs, project partners	3 workshops involving project partners, NGOs	2 workshops with researchers and university students
Activities	Preparatory individual interviews, voting, structured group work, and open group discussion	Group discussion, group work, skills training	Interactive training session for using the game platform and game design	Interactive workshop and group discussion with social science data and climate data

## Results

Step 1 explored local climate issues with stakeholders. We experienced a trade-off between time-intensive open group discussions and short structured formats, e.g. timed discussions and decision-making. While the first allowed in-depth explorations of the topics, the shorter formats were more efficient but lacked depth. Moreover, participants with their own agenda (i.e., the environmental NGO) achieved more focussed outcomes and could be retained for subsequent steps.

Step 2 aimed to translate the most relevant climate issue into themes for a game, define expected results, and identify relevant target groups. Retaining participant engagement was challenging, as policymakers showed limited commitment due to a lack of immediate relevance. Workshops with students who similarly saw no immediate relevance benefited from a more structured and directed approach compared to the open discussion and ideation formats used with policymakers. In turn, participants with their own agenda showed stronger involvement in influencing game themes according to their interests.

Step 3 focussed on the co-design of the game itself. This step was mostly conducted with project team members as only one participant group from the earlier steps was interested in being further involved. Participants contributed to the study design by defining target groups, game scenarios, and evaluation methods, resulting in a clear game and study design strategy.

In step 5, we piloted collaborative data analysis with two participant groups: university students and social scientists. The workshop with university students used graphs depicting climate change data (available at <https://climatedata.imf.org/pages/climatechange-data>), which prompted a discussion on climate issues and policies. The workshop with social scientists introduced an external survey dataset on climate policies. Collaborative data analysis with a statistics software revealed limitations of the survey methodology and the data. This suggests that participants' skills can strongly influence the focus of data analysis and interpretation.

## Discussion

Our pilot activities showcase the potential of participatory engagement in developing game-based tools to address climate change. The game-based research process offered multiple opportunities to involve various stakeholders in discussions about climate change and in the design of the study. However, we also encountered several challenges. Engaging stakeholders beyond the first step proved challenging without a clear need. The participatory formats showed an engagement gap, whereby researchers and policymakers are compensated but citizens volunteer their time. Expectations and time management are thus crucial. Transforming participants' concerns into the logic of our game-based approach was also challenging, especially with limited participant commitment. This may increase the researchers' dominance throughout the participatory process. Relatedly, we could not engage stakeholders further in step 4 of the research cycle which prevented participatory activities or data collection with the game-based tool in this stage. Finally, data sprints may pose difficulties for those unfamiliar with data. To be effective with diverse participant groups, data sprints require thorough preparation, knowledge of the data and participants' needs, and effective visualisations by facilitators.

## Conclusion

Our approach seems promising but requires more experimentation and reflection, especially with participants engaged throughout the whole research cycle. During the GREAT project, we plan to conduct at least 12 case studies across different topics related to climate change and respective policies, offering ample opportunities for citizen and policy engagement. In these future case studies, we plan on conducting further participatory activities for all steps in the research cycle, e.g., data collection. Finally, we see a potential for the transferability to other societal challenges, e.g. related to SDGs.

## Acknowledgements

This work is co-funded by the European Union under Grant Agreement Nr. 101094766.

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