Harnessing the potential of simulation and speculative games for transdisciplinary collaboration: lessons from experience

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Abstract. Addressing societal challenges requires taking a systems perspective, and establishing a shared understanding and mutual learning. This includes not only learning and gaining a systemic understanding about a system's complexity, but also of the perspectives and values involved in challenges to be addressed. In this study, 'speculative games', games that focus on hypothetical scenarios or experiencing the consequences of technological, social, or environmental changes, are proposed as extensions of simulation games as tools to explore perspectives and values. By reflecting on experiences of the design and use of three games, we provide preliminary insights into the benefits of both simulation and speculative games. We discuss how the speculative games, in contrast to the simulation game, use deliberately open-ended objectives and ambiguous in-game objects and materials to contribute to issue formation. We further discuss how, as a result, the speculative games establish mutual learning through collective sense-making of the games' ambiguous materials and reflecting on how these relate to real-world issues. In the simulation game, learning both about the system's complexity and the perspectives of other players originates from experimenting, discussing and reflecting on actions taken in the game. Our experiences suggest that simulation and speculative games can be complementary tools in addressing societal challenges. As these types of games are not mutually exclusive, future research can focus on exploring the use of speculative elements in simulation games that aim to facilitate transdisciplinary collaborations and addressing societal challenges.

Keywords: simulation games, speculative design, transdisciplinarity, game design, societal transformations

1 Introduction

It is widely acknowledged that addressing societal challenges requires transdisciplinary approaches [1-3]. Among the essential principles of transdisciplinarity are taking a systems perspective, and establishing a shared understanding and mutual learning [1, 4]. Simulation games are proven tools to explore complex systems [5]. By experimenting with actions and system responses, players learn about the system and its behavior, including the views and perspectives of others [6].

In addressing societal challenges, we acknowledge the importance of transdisciplinarity, which calls for a holistic understanding of the diverse perspectives and values involved. To effectively tackle such challenges, it is crucial to incorporate both disciplinary and experiential knowledge. As these are situated with stakeholders, how these affect a challenge may not be easily simulated and incorporated in a game. Extending on simulation games, we have therefore started to explore the use of what we define as 'speculative games'. Inspired by speculative design and design fiction [7, 8], speculative games allow exploring alternative futures, by presenting hypothetical scenarios or experiencing the consequences of technological, social, or environmental changes.

While both simulation games and speculative games aim to explore complex systems and potential future scenarios by offering an interactive environment that offers a sense of safety to

experiment, there are some key differences between them. Simulation games often rely on predictive patterns and attempt to accurately model real-world phenomena. Speculative games, on the contrary, focus on imagining and exploring alternative futures by challenging assumptions. To highlight the potential value of each for transdisciplinary collaboration, we compare our experiences in designing and using three simulation and speculative games. By providing preliminary insights into their benefits, we offer guidance on the design choices necessary for leveraging games to facilitate transdisciplinary collaboration to address societal challenges.

2 Games

This section provides an impression (Figure 1) and description of the three games that each focus on transdisciplinary collaboration to explore a societal challenge. The selected games take a systemic perspective, prioritize mutual learning, and integrate stakeholder values. We selected these games based on our experience with using them, given that the games include different degrees of simulation and speculation. The presented descriptions of the games are brief, but illustrative of the simulation and speculative elements they provide.

2.1 Simulation game: Virtual River Game

The Virtual River Game (VRG) facilitates players' learning about the complexity of managing river systems and the perspectives of other players on possible suitable interventions [9]. To increase the scores on three indicators; flood safety, biodiversity, and costs, players implement interventions common in Dutch river management practice by changing tiles on a grid-based physical game board that represents a typical stretch of a Dutch river. Players receive feedback on their actions through spatial visualizations projected on the board and graphs, tables, and scores on the indicators. Besides this feedback, the collective objective and role-specific objectives, representing real-world stakeholders and their interests, guide in-game player choices.

Fig. 1. An impression of the Virtual River Game (a), Future-Frictions (b) and NewEarth (c), including their setting and game materials.

2.2 Speculative game: Future-Frictions

Future-Frictions [10] stimulates players (individually or collaboratively) to discuss and reflect on the impacts of urban technology. As a speculative game, it immerses players in a fictive yet relatable urban context to interact with residents and walk around a neighborhood. On three occasions, the players encounter speculative technologies (i.e. 'guardian angel drone', AI cat to help people in need, and a crew of sensing pigeons for waste management) and decide how these

technologies will use data. The choices are provocative, non-desirable, and cumulative. After making them, the players observe how both the neighborhood and the attitude and perspectives of the neighbors have changed.

2.3 Simulation/Speculative game: NewEarth

NewEarth supports a collaborative process to design a fictional smart city informed by the values and worldviews that players bring into the game [11]. Players adopt roles like policy maker or citizen, and supplement these with their worldviews by reflecting on and choosing from different statements. Collectively, players set a course for another planet to build a city where they want to live and that addresses an earthbound environmental urban challenge. Players discover, give meaning to, and negotiate over resources and technologies in four game phases. The game concludes by building a new smart city and collectively voting whether or not to move to it.

2.4 Results and discussion

We discuss the results regarding the aforementioned principles of transdisciplinarity based on experiences from sessions in educational and project settings.

2.5 Systemic perspective

As speculative games, Future-Frictions and NewEarth contribute to taking a systemic perspective [1] by what we call ‘issue formation’. To do so, they offer open-ended objectives for players to recognize and express their concerns. In-game materials help to attribute meaning to components and events (e.g. the cubes with multi-interpretable icons in NewEarth). Player decisions' outcomes are ambiguous, encouraging reflection and discussion of personal values. The VRG, however, provides clear in-game objectives that match real-world challenges to discuss the interactions between interventions and the system. This encourages taking an integrative view by considering the multiple indicators, and collaboratively experimenting to achieve objectives. Rooted in principles of tangible interaction [12], game materials like the board are designed as explicit representations of the system.

2.6 Shared understanding and mutual learning

Similarities and differences in establishing a shared understanding follow from the games’ approaches towards taking a systemic perspective. By providing explicit representations of reality and future outcomes, the VRG allows observing the direct impacts of player actions on the system being simulated. By experimenting, discussing, and reflecting together, players learn about the system and the perspectives of other players on the challenge. Furthermore, the board and projected visualization support experts in exchanging knowledge with players with less expertise. On the other hand, speculative games, like NewEarth and Future-Frictions, are more open-ended which encourages players to attribute meaning to various components and scenarios based on their individual perspectives. Learning originates from interpreting the games’ ambiguous materials and reflecting on how they relate to real-world issues, facilitating collective sense-making.

3 Conclusion

Our experiences suggest that simulation and speculative games may be complementary in facilitating transdisciplinary collaboration and addressing societal challenges. Simulation games support stakeholders in understanding challenges, taking an integrative perspective and exploring solutions, whereas speculative games enable generating ideas and issues for consideration. Although we present this as a sharp comparison here, simulation and speculative games are not mutually exclusive; the inclusion of speculative elements in simulation games warrants further

research to understand game design considerations. We plan to further elaborate on the insights we can gain from exploring simulation and speculation games for transdisciplinary collaboration to inform the design choices of game designers. Doing so will also contribute to positioning the role of speculative games in relation to simulation games, and other well-established approaches that focus on systemic thinking, shared understanding and mutual learning (e.g. ComMod [13]).

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