UTS UNIVERSITY OF TECHNOLOGY SYDNEY

Gamification of Participatory Modeling: towards creating a more engaging process for stakeholders

by Elena Bakhanova

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under the supervision of Professor Alexey Voinov, Doctor Jaime Garcia, and Doctor William Raffe

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Certificate of Original Authorship

I, *Elena Bakhanova*, declare that this thesis is submitted in fulfilment of the requirements for the award of *Doctor of Philosophy*, in the *School of Computer Science*, *Faculty of Engineering & IT* at the University of Technology Sydney.

This thesis is wholly my own work unless otherwise referenced or acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

This document has not been submitted for qualifications at any other academic institution.

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Date: July 13th, 2022

Abstract

Complex issues such as sustainability-related ones imply the interests of diverse groups of stakeholders. The solutions to these problems and actual changes require comprehensive understanding and consensus among the stakeholders as well as the change in mindsets and behavior patterns. Participatory Modeling (PM), serious games, and gamification are among the approaches that have been broadly used in this context. However, there are only a few cases where one can observe synergy between them. Therefore, this research aims to explore how the PM process can benefit from existing advances in serious games and gamification.

Our in-depth literature review has shown the positive effects that different types of game-like applications bring to social learning and the contribution of gamification to engagement, motivation, and enjoyment of some activities. This created a foundation for suggesting possible extensions for the use of game design at each stage of the PM process, aiming at better learning, communication among stakeholders, and overall engagement. Next, we analyzed existing gamification frameworks, built on their relevant aspects, and proposed a more nuanced gamification framework for PM. To provide empirical evidence for this research, we designed and evaluated three interventions: (1) gamification strategy for conceptual model development as one of the PM stages, (2) gamified learning tool for the preliminary preparation stage of PM aiming at increasing awareness about group communication challenges, (3) gamified features for artificial intelligence-based online platform used as an alternative to traditional PM workshops.

The results of this research positively contribute to our initial claim about the usefulness of game design applications at various PM stages. In addition, this research provides guidance for PM practitioners on how to gamify the PM process and notes caution about the potential challenges and risks of such interventions.

To my parents

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List of Publications

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Abstracts:

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