

SE-Games 2020: 1st International Workshop on Games for Software Engineering Education and Training

Thorsten Haendler

University of Applied Sciences BFI Vienna, Austria
Vienna University of Economics and Business (WU), Austria
thorsten.haendler@fh-vie.ac.at

Gustaf Neumann

Vienna University of Economics and Business (WU), Austria
gustaf.neumann@wu.ac.at

Abstract—This workshop summary refers to the 1st International Workshop on Games for Software Engineering Education and Training (SE-Games 2020), co-located with the 32nd IEEE International Conference on Software Engineering Education & Training (CSEE&T 2020). SE-Games aims to serve as a platform for researchers and practitioners, who share the goal to improve the methods of teaching and training software engineering by designing and applying game-based environments such as serious games, game-based learning and gamification.

Index Terms—Software Engineering, Gamification, Serious Games, Game-based Learning, Software-Engineering Education and Training.

I. INTRODUCTION

Over the last years, software systems have become increasingly complex, which demands of software developers being able to deal with this complexity. Acquiring and improving the required practical and analytical skills in software engineering is a laborious and time-consuming process for learners, since it involves in-depth knowledge and practical experiences. In turn, for educators and trainers it is a challenge as well to motivate learners and to provide the content and activities appropriate to drive this process. Games and gamification are seen to be a promising medium to address these challenges. Thus, in recent years, more and more educators and trainers have been aiming to integrate game-based environments into teaching and training for software engineering. However, there remain challenges regarding the design and use of SE games, such as how to develop games to address certain competency levels, how to combine games with other teaching and training activities, or how to apply video games for teaching SE, etc.

The SE-Games¹ workshop aims to serve as a platform to explore and analyze challenges, ideas and opportunities for designing and applying games for teaching and training software engineering. It addresses researchers, SE practitioners, game designers and developers, lecturers, trainers and educators from industry, university and high school, allied in the endeavor to improve learning and training of software-engineering practices by applying game-based environments.

¹The website of SE-Games 2020 is available at <http://se-games.org>.

II. SCOPE

The workshop called for submissions focused on, but not limited to the following topics:

- Game-based environments, games and game designs (such as serious games, game-based learning, and gamification) for learning, teaching and training software engineering as well as fostering motivation.
- Digital as well as non-digital games to support learning and motivation in SE activities such as *programming, software design and architecture, maintenance and refactoring, conceptual modeling, requirements engineering, debugging, testing*, etc.
- Game-based environments in specific SE application areas (e.g. web/mobile development, machine/deep learning) as well as for specific SE methodologies (e.g. agile development, DevOps).
- Conceptual and methodological aspects of SE games such as game mechanics, dynamics, and aesthetics (e.g. feedback-mechanisms or graphical views), as well as game models, frameworks and ontologies, etc.
- Technical aspects of SE games such as game demos or software prototypes, as well as game architectures and patterns, etc.
- Empirical aspects of SE games such as game-play studies, user studies, surveys, experiments, case studies and experience reports.
- Position statements on challenges, problems, visions, ideas, and designs for games/gamification in SE education and training.

III. PC MEMBERS AND REVIEW PROCESS

For evaluating the paper submissions, a double-blind review process has been applied. Each paper has been reviewed by at least three PC members. To enhance comparability, a structured review template has been prepared. In particular, the submissions have been judged on the basis of its originality, relevance to the workshop topics and clarity as well as regarding the potential for discussion and future research. The international program committee consists of the following

experts from the fields of software engineering, SE education and training as well as gamification and serious gaming:

- Joan Arnedo-Moreno, *Universitat Oberta de Catalunya (UOC), Spain*
- Kay Berkling, *Cooperative State University Karlsruhe, Germany*
- Jeremy Bradbury, *Ontario Tech University (OIT), Canada*
- Kai Erenli, *University of Applied Sciences BFI Vienna, Austria*
- Stefan Göbel, *Technical University Darmstadt, Germany*
- Christiane Gresse von Wangenheim, *Federal University of Santa Catarina (UFSC), Brazil*
- Thorsten Haendler, *University of Applied Sciences BFI Vienna and WU Vienna, Austria*
- Igor Miladinovic, *University of Applied Sciences Campus Vienna, Austria*
- Gustaf Neumann, *Vienna University of Economics and Business (WU), Austria*
- Patrick O'Shea, *Appalachian State University, USA*
- Sigrid Schefer-Wenzl, *University of Applied Sciences Campus Vienna, Austria*

IV. CONTRIBUTIONS

The following papers have been accepted for presentation at SE-Games 2020 and for publication in the joint CSEE&T conference proceedings (in no specific order):

- Eman Sherif, Andy Liu, Brian Nguyen, Sorin Lerner and William Griswold: *Gamification to Aid the Learning of Test Coverage Concepts* [1]
- Joan Arnedo-Moreno and David García-Solórzano: *Programming is fun! A survey of the Steam digital distribution platform* [2]
- Thomas Voit, Alexander Schneider and Mathias Kriegbaum: *Towards an Empirically Based Gamification Pattern Language Using Machine Learning Techniques* [3]
- Barış Ardiç and Eray Tüzün: *ToolStackers: A boardgame for SE education (Extended Abstract)* [4]
- Thomas Auer and Michael Felderer: *Gamified Internet of Things Testing within a Virtual Learning Environment - The interactive simulation game "IoTCityLab"* [5]
- Leonardo Andrade, Marcelo Schots and Vera Maria Werneck: *InspectorX 2.0: Developing a Multi-Device Game for Software Inspection Education* [6]

In particular, Sherif et al. propose a game called COVERBOT to mediate skills in software testing, especially statement coverage [1]. The game combines multiple gamification features such as graphics, sounds, a scoring system and level progression. The player's goal is to defeat enemies by effectively selecting inputs to execute all lines of a given code snippet. In addition, a user study demonstrates the effectiveness of the game. Arnedo-Moreno and García-Solórzano present an analysis of the Steam digital distribution platform to evaluate and classify 70 identified video games and game designs for learning programming [2]. This classification by programming interfaces and SE activities allows assessing the adequacy

of the games as educational tools. Voit et al. present a first step towards a pattern language for gamification [3]. In their study, they report on applying machine-learning techniques to analyze instructions of 4,000 board games in order to identify patterns in game-design elements. Ardiç and Tüzün propose in an extended abstract the design for a card-based board game called TOOLSTACKERS. The multi-player game aims to familiarize students with tools for application lifecycle management [4]. Auer and Felderer propose the design for a multi-player virtual-simulation game entitled IOTCITYLAB for learning IoT testing [5]. The game is planned as a real-world simulation to train how to design and automate IoT tests. Its usability is shown via a case study on autonomous driving. Andrade et al. present a web-based learning environment for code inspection entitled INSPECTORX, which builds upon a previous version [6]. The game combines multiple gamification elements and provides different game modes to simulate the code-inspection process. A small user study evaluates the approach.

In addition, SE-Games 2020 also called for submissions of extended abstracts to be presented at the workshop.

V. WORKSHOP ACTIVITIES

This first edition of SE Games is held as a one-day virtual workshop co-located with CSEE&T 2020. It is planned as a highly-collaborative workshop with multiple forms of interactions. Driven by virtual presentations, the accepted papers and extended abstracts will be discussed. For this, each paper will be assigned a discussant tasked with preparing questions to initiate the plenary discussions. Furthermore, there will be a keynote, a discussion-panel session, and other (more informal) opportunities to exchange ideas and experiences.

VI. CONCLUSION

We look forward to stimulating presentations and lively discussions at the workshop that may yield interesting points for future research and collaborations. Our thanks go especially to the all authors and reviewers for their contribution to the first edition of the SE-Games workshop, particularly in these challenging times. We plan to continue with further editions and invite researchers and practitioners, who aim to improve the methods of SE teaching and training via games and gamification, to contribute and participate.

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