

# ASE4Games 2021 Workshop Summary

Kendra M. L. Cooper  
Independent Scholar  
City, Canada  
kendra.m.cooper@gmail.com

Fabio Petrillo  
Université du Québec à Chicoutimi  
Chicoutimi, Canada  
fabio@petrillo.com

Yann-Gaël Guéhéneuc, Cristiano Politowski  
Concordia University  
Montreal, Canada  
{yann-gael.gueheneuc@,c\_polito@encs.}concordia.ca

## ABSTRACT

The first edition of the workshop on Automated Software Engineering For Games (ASE4Games 2021) was held virtually on November 14th, 2021, co-located with the 36v IEEE/ACM International Conference on Automated Software Engineering (ASE 2021). Five papers from all over the world were submitted, two full-papers and two short-papers were accepted. The program also featured a keynote by Mathieu Nayrolles, researcher at Ubisoft, entitled Automated Software Engineering for AAA Games.

## 1. INTRODUCTION

Computer game development relies on an extensive history of advances in research and development that spans numerous disciplines. The earliest computer games emerged over 70 years ago as creations from research-oriented environments that possessed rare and expensive computing systems. From these early beginnings, computer games have become ubiquitous. They permeate popular cultures to the extent that a new release of a AAA title is a major social event.

In practice, developing today's large-scale entertainment games presents many challenging issues [9, 7]. Such games are complex, can take years to develop, and rely on teams with expertise spanning artistic, computer science, software engineering, and business skills. In part, their complexity stems from their demanding traditional quality of service requirements: availability, backward compatibility (e.g., earlier platforms), multiple platform deployment, performance, reliability, scalability, security, usability, and so on. They also have distinct user experience requirements to provide players with a game that is engaging and fun. Game aesthetics, mechanics, and dynamics are utilized to provide the desired game play experience.

Researchers are actively addressing the numerous and evolving development issues present in today's large scale, complex games. Recently, an interdisciplinary games and software engineering research community has emerged. Issues are investigated from the perspectives of traditional engineering (e.g., requirements engineering, architecture, design, construction, testing) and umbrella (e.g., lifecycle processes, configuration management, project management, traceability) activities; metrics; re-use; data analytics; user experience; and so on. Automating methods for these diverse topics is essential to support the rapid, cost effective development of high quality games. Recently, automation in software engineering for game development has received considerable attention, particularly in the areas of procedural content generation (e.g., [1, 3, 4, 8, 10]), and testing (e.g., [2, 5, 6, 11]). However, a workshop event to gather the community and share results is not currently available.

The theme for the First International Workshop on Automated Software Engineering for Games (ASE4Games 2021)<sup>1</sup> was to share innovative research contributions on automated software engineering methods that address the numerous grand challenges currently facing game development (entertainment games, serious games, and gamified applications).

The main goals of this workshop were to gather the community (academic game researchers and commercial game developers) and interactively share contributions on topics relevant to the emerging grand challenges in Automated Software Engineering for Games.

## 2. KEYNOTE TAKEAWAY

The keynote titled "Automated Software Engineering for AAA Games" was presented by Mathieu Nayrolles, a researcher at Ubisoft. Mathieu shows some of the works done by the research department La Forge.

He shows the difficulties of applying existent cloud software literature into the video game domain. The main challenges are latency, wide domains, video streams, and multiplayer. Also, game servers are not well discussed in the academic literature. Subjects like long-live, state-full, slow boot, and multi-cloud should be given proper attention.

Mathieu also calls attention to how Empirical Software Engineering does not fit well in a fast-paced environment like video game development.

As for the testing, he poses different questions that should be more explored. For example, how to do TDD when the feature under test constantly evolves? Also, how to combine the different test types (unit, system, integration, game exploration, etc)?

Another challenge in big game projects is the work organization. For example, Mathieu said that the game Assassins Creed Valhalla required 5700 contributors from 17 different studios. How to keep a sustainable development in a scenario like this?

## 3. INSIGHTS FROM PAPER SESSIONS

The paper "Automated game testing using computer vision methods" by Ciprian Paduraru, Alin Stefanescu, and Miruna Gabriela Paduraru presents ideas on how computer vision methods can be used to automate the process of game testing. Their contributions are (1) A list of current problems identified with game

<sup>1</sup><https://2021.ase4games.quest>

industry practitioners regarding automated testing. (2) An analysis of computer vision techniques that can be used to mimic the playtester. (3) A reusable prototype framework architecture and implementation that allows users to directly reuse existing open-source code of computer vision libraries. For future works, the authors want to conduct further evaluations with specific game genres. Also extend the functional testing features using graphical blueprints, model-based testing, symbolic execution, and fuzzing.

The paper “Rebuilding games at runtime” by Claudia Werner and Diego Castro aims to create a systematic way of creating video game mods. It uses concepts of the Software Product Line domain. The paper shows an initial prototype of a game created by applying Product Line concepts to generate new mods. For future works, the authors intend to evaluate the game with experts and validate the idea of creating mods from modelled product lines.

The paper “Towards a Framework to Assist Iterative and Adaptive Design in Gameful Systems” by Antonio Bucchiarone, Antonio Cicchetti, Enrica Loria and Annapaola Marconi presents a Gamification Framework structure and how the whole life cycle of the gamified application can be modeled through the components of the framework. The idea allows domain experts to abstract implementation problems and focus on details closer to their expertise. The resulting idea reduces the complexity of defining gameful applications.

The paper “Metrics for Assessing Gamers’ Satisfaction: Exploring the Graphics Factor” by Stylianos Gkikas, Christina Volioti, Nikolaos Nikolaidis, Apostolos Ampatzoglou, Alexander Chatzigeorgiou and Ignatios Deligiannis proposes a process that can be used for enhancing game requirements’ engineering, by specifying non-functional requirements along with metrics, based on user satisfaction factors. For future works, the authors plan to implement the calculation of the metrics as plugins for open-source game engines and as a standalone tool that will parse the code of non-game-engine based games.

## 4. CONCLUSION

The outcomes of this first edition of the workshop encompass the creation of a collaboration network of researchers sharing challenges and future perspectives of automated software engineering for games.

We aim at strengthening the community of researchers working in this area. In a longer perspective, we also consider converting the workshop into a working conference with a well-defined format and organization. We expect it would create a persistent venue with a stable and vivid community of researchers.

## 5. REFERENCES

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