

**Hrvoje Puškarić<sup>1</sup>**  
**Marija Zahar**  
**Dorđević**  
**Aleksandar**  
**Dorđević**

## **GAME DEVELOPMENT AND CONNECTION TO MODERN SOFTWARE ENGINEERING**

***Abstract:** Modern software engineering principles must be thoroughly understood for the complex process of game creation to be successful. This entails integrating cutting-edge software tools and technology to build interesting and enjoyable games while implementing industry-standard techniques, such as Agile development. Building a flexible, maintainable, and scalable foundation of code is essential to creating a successful game. This may be done by using efficient project management, a collaborative team, and industry best practices.*

***Keywords:** game development, software engineering, Agile development, software tools, modern technologies, project management, teamwork, code quality, scalability, maintainability*

### **1. Introduction**

Video games today require a combination of expertise in game production and software engineering. Both professions are rooted in the same fundamental concepts of creating software and applications for computers, but there are some essential differences between them. Game production requires a deeper understanding of the art and narrative side of gaming, while software engineering is all about developing and coding the necessary technical features for an application to work properly.

The field of software engineering is centered on the orderly and effective creation of software. This includes using tried-and-true methods, strategies, and equipment for creating, coding, testing, and maintaining software. Producing high-quality, dependable, and maintainable software that satisfies user needs is the aim of software engineering (Farley, 2021, Sommerville, 2020).

On the other hand, game development refers to the process of making video games. This

covers the creation of video games, as well as their design and programming. To produce games that are both entertaining and technically sound, game creators apply the principles and methods of software engineering. Also, they use specialized platforms and tools to create games, such as level editors and game engines.

Creating a realistic and engaging game world is one of the major problems in game creation. A thorough understanding of computer graphics, physics, and artificial intelligence are necessary for this. These technologies are employed by video game designers to produce dynamic characters, realistic landscapes, and fun gameplay (Flanagan, 2009).

Game creation and software engineering share certain difficulties as well. Developers, artists, and designers must work closely together and communicate effectively in order to succeed in both industries. Both also need for thorough testing and debugging procedures to guarantee that the final output is of the highest caliber and free of errors and flaws.

---

Corresponding author: Hrvoje Puškarić  
Email: [hpuskari@asss.edu.rs](mailto:hpuskari@asss.edu.rs)

## **2. Problems of Game Development in Classic Software Engineering**

The design and implementation of a game is a complicated process that calls for the use of software engineering techniques. There are difficulties in game creation, just as there are in every software development effort. These difficulties may appear at various stages of game development, from game design through implementation, and they may have a big impact on how well the game performs.

Meeting player expectations is a big challenge in game creation. Gamers anticipate an interesting, difficult, and enjoyable game. Game developers must have a thorough awareness of the gaming business, be up to date on trends and advances, and be able to produce original and cutting-edge game mechanics if they are to live up to these expectations.

Project scope and timeline management is a big obstacle in game development. Games development projects sometimes have tight deadlines, and adjustments to the project's scope might affect the budget and schedule. Game developers must be able to prioritize activities, manage resources effectively, and have a clear idea of the project's scope in order to overcome this difficulty.

Technical intricacy is a major obstacle in game creation. To create engaging and convincing environments, game developers need to have advanced programming and design skills. To create realistic worlds, dynamic characters, and fun gameplay, game creators need a thorough understanding of computer graphics, physics, and artificial intelligence.

Game creators must use software engineering development techniques to solve these obstacles. This comprises developing, coding, testing, and maintaining software using tried-and-true procedures, methods, and tools. For instance, game developers can

successfully control project scope and timeframes by using agile development approaches. Agile development places a strong emphasis on iterative development and ongoing feedback, which enables game creators to adjust to shifting requirements and deliver high-quality games on schedule.

Using already-developed game engines and libraries is another strategy for addressing the difficulties associated with game development. By giving game developers a framework, game engines enable them to produce games faster and more affordably. On the other side, libraries offer pre-built elements that can be used to increase the functionality of the game, such as music libraries and physics engines.

Game creation poses particular difficulties that can be resolved by using the concepts of software engineering. In-depth knowledge of the gaming sector, project management expertise, technological know-how, and the capacity to use the appropriate procedures and tools are requirements for game developers. By overcoming these obstacles, game creators may produce captivating and engrossing games that live up to users' expectations.

## **3. Project management practice**

Project management is the practice of planning, organizing, and managing resources in order to achieve specific goals or objectives. A project is a temporary endeavor designed to produce a unique result, product, or service. Project management is used in a variety of industries and fields, including construction, engineering, software development, and business.

The project management process typically involves five stages: initiation, planning, execution, monitoring and control, and closure. During the initiation phase, the project is defined and stakeholders are identified. The planning phase involves

developing a project plan, which outlines the project's scope, objectives, timeline, budget, and resources. The execution phase involves carrying out the project plan and completing the work. The monitoring and control phase involves tracking progress, identifying and addressing issues, and making adjustments as needed. Finally, the closure phase involves wrapping up the project and delivering the final product or service to the client.

One of the key principles of project management is that it is focused on achieving specific goals or objectives. These goals or objectives should be clearly defined at the outset of the project and communicated to all stakeholders. In addition, project management emphasizes the importance of planning and preparation. A well-planned project is more likely to be successful than one that is not.

Another key principle of project management is that it is a collaborative process. Projects typically involve a team of people with different skills and expertise. Project managers must be able to work effectively with their team members and stakeholders in order to achieve the project's goals.

Effective communication is also critical in project management. Project managers must be able to communicate clearly and effectively with their team members, stakeholders, and clients. They must be able to provide regular updates on the project's progress and address any concerns or issues that arise.

Project management also involves risk management. Projects are inherently risky, and project managers must be able to identify potential risks and develop strategies to mitigate them. This may involve developing contingency plans, allocating resources to manage risks, or making adjustments to the project plan as needed.

Finally, project management emphasizes the importance of continuous improvement.

After a project is completed, project managers should evaluate the project's success and identify areas for improvement. This feedback can be used to improve future projects and ensure that the organization continues to improve and grow.

Overall, project management is a complex and dynamic process that requires a range of skills and expertise. Effective project managers must be able to plan and organize effectively, communicate clearly and work collaboratively, manage risk, and continuously improve their processes and practices. By following these principles, organizations can successfully manage their projects and achieve their goals.

#### 4. Modern Principles of Software Engineering Project Management to Proper Game Development

The success of a game development project depends on how well it is managed. Therefore, it is crucial to apply project management principles to ensure that the project is delivered on time, within budget, and with the desired quality. As many authors show (Adams, 2014; Adams and Dormans, 2012; Flanagan, 2009, Cruz and Paiva, 2006) some project management principles that are commonly used in game development practice:

- 1) **Define the project scope and objectives:** Defining the scope and objectives of the project is the first step in project management. This involves identifying the features, functionality, and content of the game, as well as the target audience and business goals. Defining the scope and objectives helps to establish a clear vision of what the project should accomplish and ensures that all team members are on the same page.

- 2) **Develop a project plan:** A project plan is a roadmap that outlines the tasks, activities, and timelines for the project. It includes a schedule, a budget, and a list of resources needed to complete the project. The project plan serves as a guide for the team to follow and helps to identify potential risks and challenges that may arise during the project.
- 3) **Assign roles and responsibilities:** Assigning roles and responsibilities is critical to the success of a game development project. Each team member should have a clear understanding of their role and responsibilities, and how they fit into the overall project plan. This ensures that everyone is working towards the same goal and that there is no duplication of effort.
- 4) **Communicate effectively:** Effective communication is essential in game development projects. Regular team meetings, progress reports, and status updates help to keep everyone informed and aligned with the project goals. Effective communication also helps to identify issues and risks early, so they can be addressed before they become major problems.
- 5) **Manage risks:** Game development projects are often complex and unpredictable, with many potential risks and uncertainties. Effective risk management involves identifying, assessing, and mitigating risks throughout the project lifecycle. This ensures that potential problems are addressed before they become critical and helps to keep the project on track.
- 6) **Use agile methodologies:** Agile methodologies are widely used in game development projects due to their flexibility and adaptability. Agile approaches involve iterative development and continuous feedback, which allow for rapid prototyping and

testing. This enables the team to respond quickly to changing requirements and make adjustments to the project plan as needed.

- 7) **Quality assurance:** Quality assurance is critical to ensure that the final product meets the desired standards. This involves testing the game thoroughly and identifying and fixing any bugs or issues. Quality assurance should be integrated into the project plan from the beginning and should be an ongoing process throughout the project.

Project management principles are critical to the success of game development projects. Defining the project scope and objectives, developing a project plan, assigning roles and responsibilities, communicating effectively, managing risks, using agile methodologies, and ensuring quality assurance are all essential components of effective project management in game development. By following these principles, game development teams can ensure that their projects are delivered on time, within budget, and with the desired quality.

#### 4.1. Agile Technologies in Game Development

Agile project management technologies are becoming increasingly popular in video game development. An agile approach is flexible and can adapt to changing requirements and priorities during the course of a project, making it ideal for the dynamic and creative environment of video games.

One of the most common agile approaches is Scrum, which consists of several phases such as Sprint planning, Daily Scrum, Sprint review and Sprint retrospective. These phases are repeated in cycles until the project goal is achieved. This approach allows for faster decision-making and flexibility in the team, as well as the ability for the client to be involved in the development of the game and provide feedback during the project

(Keith, 2010).

Another agile technology often used in video game development is Kanban. This methodology is focused on visual work management and continuous product delivery. Each task is displayed on the board and goes through several stages until it is completed. This method allows a clear visualization of the progress of the project and facilitates the identification of problems during the work.

Agile project management technologies in video game development also include test-driven development (TDD), which is based on writing tests before developing code. This method enables early identification of problems and reduces the number of errors in the final product. It also enables faster deliveries and adaptation to changes in requirements.

## 5. Conclusion

While software engineering and game development may seem distinct, they are inextricably linked when it comes to video game production. Software engineering provides the underlying structure and architecture for the game, while game development focuses on designing and implementing gameplay mechanics, graphics, and sound. The successful integration of these two disciplines is essential for the creation of a high-quality video game that is engaging and enjoyable for players.

## References:

- Adams, E. (2014). *Fundamentals of game design* (Third edition). New Riders.
- Adams, E., & Dormans, J. (2012). *Game mechanics: Advanced game design*. New Riders.
- Cruz, A. M. R. da, & Paiva, S. (Eds.). (2016). *Modern software engineering methodologies for mobile and cloud environments*. Information Science Reference, an imprint of IGI Global.
- Farley, D. (2021). *Modern software engineering: Doing what really works to build better software faster* (First). Addison-Wesley.

One of the main challenges of game development is the need to balance creativity with technical proficiency. Game developers must be able to think creatively in order to design engaging gameplay mechanics and characters, but they must also have a deep understanding of software engineering principles in order to implement these ideas effectively. Similarly, software engineers must be able to design flexible and scalable systems that can accommodate the ever-changing demands of game development.

Another challenge in video game production is the need to work effectively in a team. Game development typically involves a large team of artists, designers, programmers, and testers, all working together to create a cohesive and engaging experience for players. Effective communication, collaboration, and project management are essential for ensuring that everyone is working towards the same goals and that the project stays on track.

Despite the challenges, the fusion of software engineering and game development has led to some of the most popular and beloved video games of all time. From classics like Super Mario Bros. and The Legend of Zelda to modern hits like Fortnite and Overwatch, video games have become an increasingly important part of our culture and entertainment industry. As these two disciplines continue to evolve and innovate, we can expect to see even more groundbreaking and memorable video games in the future.

Flanagan, M. (2009). *Critical play: Radical game design*. MIT Press.

Keith, C. (2010). *Agile game development with Scrum*. Addison-Wesley.

Sommerville, I. (2020). *Engineering software products: An introduction to modern software engineering* (First edition). Pearson.

---

---

**Hrvoje Puškarić**

Academy Of Professional  
Studies Sumadija,  
Kragujevac,  
Serbia  
[hpuskaric@asss.edu.rs](mailto:hpuskaric@asss.edu.rs)

**Marija Zahar Đorđević**

University of Kragujevac,  
Faculty of Engineering  
Kragujevac,  
Serbia  
[maja\\_199@yahoo.com](mailto:maja_199@yahoo.com)

**Aleksandar Đorđević**

University of Kragujevac,  
Faculty of Engineering  
Kragujevac,  
Serbia  
[adjordjevic@kg.ac.rs](mailto:adjordjevic@kg.ac.rs)

---

---