Developing "EMBER": A Fantasy Puzzle Adventure Game with An Approach to Agile by Applying Game-Scrum Methodology

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Abstract – *Digital games development process is often done using traditional methods. Many digital game developers believe that the game development process cannot be equated and use other software development methods because game development is not only focused on technical processes such as programming and coding but also creative processes such as asset and display design. In this study, the process of developing a fantasy adventure puzzle game was carried out using the Game-Scrum approach, a method modified from the Agile Scrum method. As well as the software development process using the agile method, game development using this method is carried out with an iterative process where each process allows an update of the feedback given to each sprint backlog. At the end of the study it was concluded that although there were still some things that had to be adjusted, basically the Game Scrum method could be adapted for the development of a digital game.*

Keywords: *Game-Scrum; Agile; Game Development; Adventure Game*

I. INTRODUCTION

The game development process is, in essence, an unstructured process. Historically, this process has occurred following an intuitive and organic methods. However, recently, some researchers have observed that the game development process can be managed by following project management methods. It involves planning, scheduling and coordinating, setting deadlines, calculating costs and quality standards.

In general, the digital game development process has two aspects: one is related to software development, such as programming and coding processes, while the other is related to more artistic perspectives, such as graphics and character design, music, etc. So, many researchers argue that digital game development can be considered the main case in software development (Hodgson, 2013). Many researchers consider that game development differs from software development basically because of the creative aspects, which involve game concepts, aesthetics and entertainment (Akta, 2014).

This research will develop a fantasy puzzle adventure genre game using the agile scrum development model. Where, the model covers all stages of the game development process, can be applied to the creative and technical stages of the game development stage, later this method better known as Scrum-Game.

1.1 Literature Review

Most games nowadays have been made in company. The method that they use for achieving their ultimate goal are different. Some of the methods that have been commonly used are as follows:

1.1.1 *Model Driven Development* (MDD)

This methodology was purposed to raise the level of the abstraction of the game development, especially the prototype from the game. Model-driven Development (MDD) is a promising direction, which has shown improvements in software productivity in various software domains (Zhu & Wang, 2019). Game as a software is particularly appropriate for MDD, because:

- MDD makes prototyping of design ideas easier
- MDD reduces the requirement of developers' knowledge and experience
- MDD enables more efficient communication

The methodology used concludes that MDD methods can help the developer build the game faster after defining it into 3 diagrams.

The game that they made was a 2d platform game using a class diagram with UML diagram extensions, divided into three parts of the diagram.

The only concern about it is, we have to define the modelling language that will be used to code the game.

1.1.2 *Game Waterfall Model*

This method was a modification from traditional waterfall model, specified to the game waterfall model in creating a single-player game. The six-phase including Requirement Phase, Specification Phase, Design Phase, Implementation Phase, Integration Phase, Operation Phase. This method believed that works properly with a small team of up to 10 people. Although this method is quite old fashioned and inflexible, it is still effective, because, before the development of the game, the process of reviewing and designing the game to be made has been carried out (Handoko, Nugroho, & Harnadi, 2022). Therefore the game made will have a strong foundation.

1.1.3 *Component Based Game Development*

This methodology at the beginning of its development uses Component based game development to create a 3d game (Folmer, 2007). By using 3d rendering engine like Unreal Engine and Doom Engine. The purpose of using the methodology is to

- Reduce overall system development costs and development time.

- Having a higher quality of components that can be modified to look different.

- Advancing technology that can help to build a game

They define some areas of reusability that can be useful for future game development; there are Network, Graphics GUI, Artificial Intelligence, Physics, and Sound. there are several things that need to be a concern, which is the complexity and integration. Complexity means the architecture of the game that wanted to build. Meanwhile, integration means to integrate all of the selected components successfully took the game.

1.1.4 *Game-Scrum*

As one of Agile methodology, scrum shows many beneficial out-come to the company since it can reduce the time of production. According to Cooper (Cooper, 2014), the Scrum methodology can be understood as an iterative process that makes it possible to demonstrate products to clients or stakeholders by carrying out work packages known as sprints.

Agile methodology is actually often used by company. in-game studios, agile practices adopted more than 10% compared to the waterfall by showing 45% projects using agile practices and 30% project use waterfall, other than that are using other methodologies (C.Politowski, 2016). Some of them prefer the modified one because it can be flexible or suit to their current development. Clinton Keith, the author of "Agile Game Development with Scrum" also mentions

that scrum methodologies bring the project to become more visible and can make a common-sense decision, especially creating fun or unique ideas for the game (Wahyono, 2017).
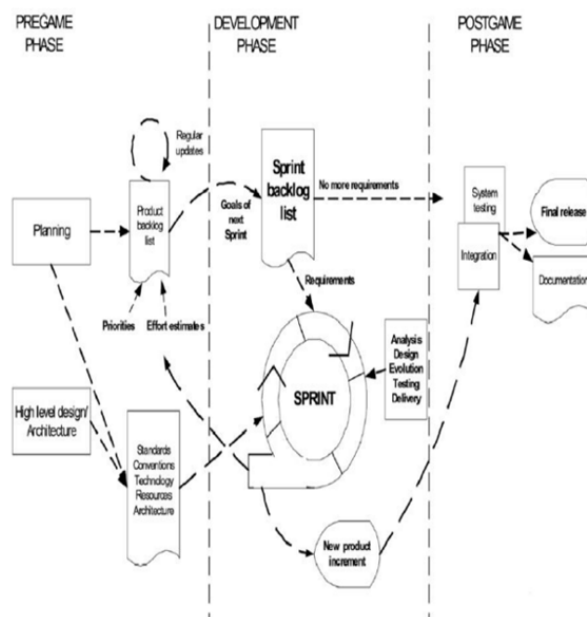

Figure 1. Game-Scrum Development Phase

Scrum has shown good results in game development; there are several developers now prefer scrum to other methodologies due to the effectiveness of the result (Kristiadi, et al., 2020). The classic scrum process modified and involved in Game-Scrum method. It consists of three processes starting from pregame (planning phase), game (development phase), and postgame (C. Mario, 2017) as shown on figure 1.

There are several recent studies that applied Game Scrum to the game project. An educational game developed by nurses on safe medication management for nurse technicians (da Cruz, Gonçalves, & Magalhães , 2019). The Scrum Methodology were demonstrated in an effective way, which led to the achievement of the objectives.

Another study was conducted to developed a serious game about the COVID-19 Pandemic. This study conducted with the interdisciplinary collaboration of specialists in health sciences, computing, and design at the Federal University of Minas Gerais, Brazil (Gaspar, et al., 2020). The agile SCRUM development methodology enabled quick and daily interactions of developers through a webchat and sequential team meetings.

II. METHODS

In this study, a fantasy puzzle adventure game was developed using the scrum method. According to the scrum method, the production process is divided into 3 stages, namely preproduction, production and post-production. The following is a diagram of the game development process.
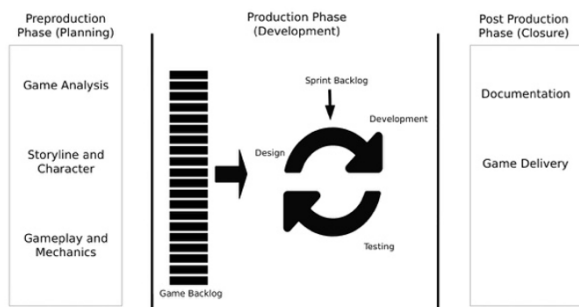
Figure 2. Proposed Game Development

2.1 Preproduction

2.1.1 *Game Analysis*

Ember is a 2D Pixelated Game with Adventure, Fantasy, Action genres. With a Combat mechanic that combines Ranged and Melee combat and the ability to dodge reflexes. With the Yang world slowly being swallowed up by darkness, Ember begins to try to find out the dark secret of imbalance, in a world where darkness continues to swallow light, Ember must survive. The mission statement of this game is "You are Lantern in the dark. Small yet cast away the shadow". This game runs on the PC.

The target audience for this game is non-casual gamers who like challenges and seek for unique and gripping graphic backgrounds in a fantasy world. The target age is for player 12 years and over.
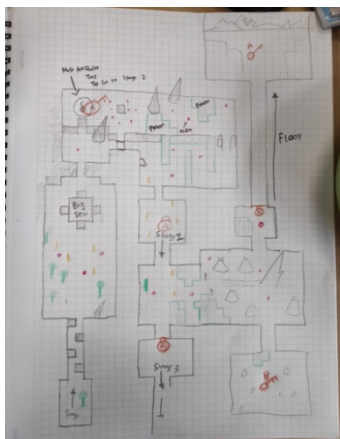

Figure 3. Early Game Stage Design

This game does not provide a literal narration but tells it implicitly to the player by observing the player himself and the environment around him. This game was developed with the hope that it will suit gamers who don't like long narrative games like JRPGs and Persona, where each story is in text form.

2.1.2 *Storyline and Character*

This game tells the story of a fire sentient named "Ember", who was born in a mysterious world shrouded in darkness. Ember is forced to survive through all the darkness of the night of Grayland (world) where all darkness wants to swallow the fire of the bucket's light. Armed with an Elemental Necklace, Ember begins to explore the game world, the darkness of night, and uncover the mystery behind it.

Table 1. Game Character Description

No	Character	Description
1.		Ember is a fire sentient who is in the middle of the dark night, armed with his fire necklace he walks through Grayland
2.		Native is a shadow Sentient who lives in the wilderness of Grayland.
3.		Native Warriors usually have mastered the power of Moonlight and use it as a weapon
4.		Native Brutes is Native who is more Muscular than other Natives, carries a big rock.
5.		A Sentient who carries a Lantern, his job is to guard the fire that is in his lantern
6.		Dark liquid surrounded by crystals, often appears where the darkness begins to creep.

2.1.3 *Gameplay and Mechanics*

The game objective is to beat the Boss in each map segmentation, or stage segmentation. After defeating the boss, the player gets an artifact to upgrade the player's abilities. In addition, there are several additional puzzles to be completed in order to get bonus artifacts to upgrade the hidden features.

Players will move by pressing the WASD button, right-clicking the mouse to attack and several buttons for skill and others similar to the action RPG movement. Players will be provided with several skills that can be unlocked using the skill tree or using Boss Artifacts. The player is limited to Health which when it runs out, the player will die and come back to life at the last checkpoint. Following is the list of mechanics in this game.

Table 3 Game Mechanics

Character Attributes	
Character	Movement Abilities / Actions Available
EMBER	• Walk : W, A, S, D keyboard keys • Attack : Right Mouse Click • Skill : E, R, T Keys • Avoid : Space
Game Modes	
• *Story Mode* Contains the main story, players will have adventures according to the story • *Boss Challenge* Player can choose Boss and try to beat as fast as possible • *Coop* Players can play multiplayer games with friends	
Game Features	
• *Skill Tree* Player can form Build based on 3 Main Perks: Melee, Ranged, Evasion • *Artifact* Players can make weapons and upgrade from found artifacts.	

2.2 Production

At this stage all the designs and ideas that have been obtained in the pre-production stage are continued. At this stage the design of each level is made iteratively. There are additions, subtractions and revisions in each iteration process. This production process divided into 3 sprints.

2.2.1 *Sprint Backlog 1*

In the first Sprint, several parts of the game were made, such as the main gate, road of red ashes (playing arena) and several additional assets. The main gate is where players first start the game. Figure 4 shows the Players as Ember here begin to get to know their new environment, where here there are several natives who are sitting and ready to welcome the arrival of the Light Sentient.

Figure 4. The Main Gate of Game World

The last update added in the first sprint is the addition of several assets. Added Assets such as Thorns, Bones, Pillars, Trees, Crystals, and Sarcophagi. Figure 5. shows assets added to Sprint 1.
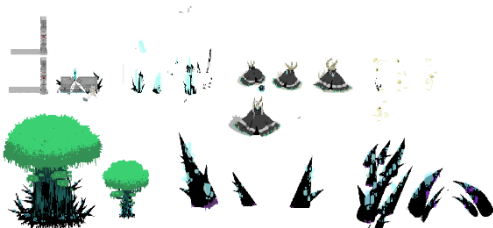

Figure 5. Game Assets

2.2.2 *Sprint Backlog 2*

In this section, several parts or game areas are created, including Native Settlement 2, Four Pillar Arena, and the Shadow Death Forest area.
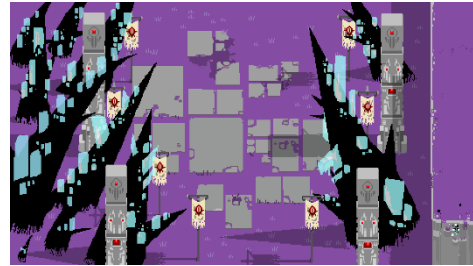

Figure 6. Four Pillar Arena

2.2.3 *Sprint Backlog 3*

In this section the UI element is created. To support the Game interface's suitability and to show game's characteristics, several elements were made. It includes the original typeface that used in ther game.
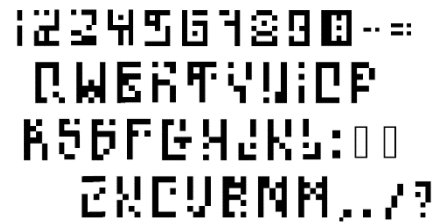

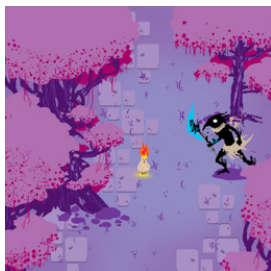Figure 7. Game's Original Typeface

2.3 Post Production

After its done testing and quality assurance, the game will be ready to launch, and during this phase, the game documentations were made for making the game more packaged well. After doing the process, the other would be the marketing, on how the product should be sell and how much to get the ROI or the fund. The game delivered to computer desktop platform through online game's market place.

III. RESULTS AND DISCUSSION

In this study, the game that have been made using the Game-Scrum method produce games with 2 levels. Table 4 shows the details of each level in the game.

Table 4. Level in the Game

Levels
1. Road of Red Ashes
The goal of the game at this level is the introduction of the game and the area. Players are expected to fight the natives and defeat the boss.

2. Valley of Thousand Spears
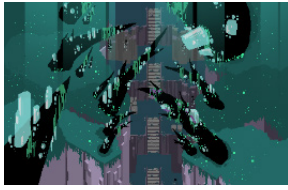
On this level, players are expected to "clean up" the place using such strategies to open a gate to another place that is blocked by the torn of tears while fighting with the natives.

Iterative methodologies make it possible to set up features quickly and developers can tell if the development process has been carried out well and the "fun" factor of the game is found. Agile methods are methods that allow developers to focus on what matters and allow for repeated updates.

Game-Scrum methodology is one of the Agile methods where this methodology brings together a team consisting of multidisciplinary members so that they can collaborate well. In this study, some approaches of Game-Scrum Method are as follows:

• **Asset Provision**

Asset provision is carried out repeatedly during the game production where in each iteration it is possible that the asset has not been fully completed. The completion, updates and revisions can be carried out in the next iteration.

• **Project Scope**

The process of determining the scope of the project is carried out by brainstorming, making storyboards, and game design documentation. This activity is carried out at the pre-production stage.

• **Project Management**

Project management is carried out by following the Scrum method framework where in each phase a sprint backlog is defined and must be completed. With the sprint backlog, it is possible to get constant suggestions that help with improvement.

IV. CONCLUSION

Although in this research the Game-Scrum method can be practiced in the "Bucket" game development process, this methodology does not solve all the problems. There are still some features that are not suitable where some ideas only appear in the final development process. In addition, the existence of brainstorming which was originally intended to get ideas may even lead to other problems. For example, too often brainstorming and discussion causes the desire to eliminate features or even expand the scope of research. This methodology needs to be used as a suggested methodology where modifications and adjustments are expected to be used in further research.

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