

# Will Foot - Assignment 2

*by* William Foot

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# Assignment 2: Practical & Professional Development

## Changemakers: Creativity and Value Creation

*Computing (Games Development)*

William Foot (2405192)

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## Introduction

Creating a new piece of software is not just about coding. There are many steps in the lifecycle of a project that involve market research, development, business planning, and project review. For this project, I have created a game to research how the Unreal Engine Gameplay Ability System can be used to manage attributes, abilities, and scaling damage. To begin, I will gather feedback based on the initial design idea and prototype. Then, I will describe the project's implementation and any issues that occurred during development. I will then present a start-up business idea and PEST analysis to help me secure funding and publish it. Finally, I will gather feedback on the final project implementation and reflect on the skills I developed during this process.

## Task 1: Practical Development and Implementation

### Initial Feedback

Using Microsoft Forms and the questions shown in Appendix A, I created an online questionnaire to gather feedback based on my game idea. The consensus was that the game would be interesting to play, but it lacked story elements to boost interest.

### Implementation

The Gameplay Ability System (GAS) is a framework for creating and managing player attributes, abilities, and interactions in both single-player and multiplayer [1], [2]. It consists of four major areas.

- Gameplay Tags – these identify effects, events, and abilities and can also be used to identify many other areas of the game.
- Gameplay Abilities – these allow the player to do something, like attack or cast a spell
- Gameplay Effects – these are used to manipulate attributes or can serve as events to activate other abilities or functionality
- Attributes and Attribute Sets – these are values for things like a player's health

I used an online Udemy course by Stephen Ulibarri to teach me how to implement this system. The course also provided me with models and textures that I used throughout the project [2].

### Tags

To manage all identifying tags for this project, a singleton file was created to store information about them, enabling their use in the Unreal Engine blueprint editor and C++ files [2].

```

//~ Vital Attributes
FGameplayTag Attributes_Vital_Health;
FGameplayTag Attributes_Vital_Stamina;
FGameplayTag Attributes_Vital_Mana;
//~ End Vital Attributes

//~ Vital Attributes
GameplayTags.Attributes_Vital_Health = UGameplayTagsManager::Get() // UGameplayTagsManager&
.AddNativeGameplayTag(
    FName("Attributes.Vital.Health"),
    TagDevComment: FString(Str: "Amount of damage a player can take before death")
); // FGameplayTag

GameplayTags.Attributes_Vital_Stamina = UGameplayTagsManager::Get() // UGameplayTagsManager&
.AddNativeGameplayTag(
    FName("Attributes.Vital.Stamina"),
    TagDevComment: FString(Str: "Resource used for movement and physical abilities")
); // FGameplayTag

GameplayTags.Attributes_Vital_Mana = UGameplayTagsManager::Get() // UGameplayTagsManager&
.AddNativeGameplayTag(
    FName("Attributes.Vital.Mana"),
    TagDevComment: FString(Str: "Resource used for magical abilities")
); // FGameplayTag
//~ End Vital Attributes

```

Figure 1. Left: Declaring Gameplay tags. Right: Adding Native Gameplay Tags.

## Attributes

For this project, multiple attributes were created and grouped into the following categories: Vital, Primary, Secondary, and Meta.

```

//Health
UPROPERTY(BlueprintReadOnly, ReplicatedUsing = OnRep_Health, Category = "Vital Attributes")
FGameplayAttributeData Health;
ATTRIBUTE_ACCESSORS(UCvcAttributeSet, Health);

```

Figure 2. Creating an Attribute

Vital attributes are values for health, stamina, and mana. Primary attributes, such as intelligence and vigour, contribute to the values of secondary attributes. Meta-attributes are used to control things like incoming damage and XP.

Using a ModMagnitudeCalculation, when a primary attribute like vigour changes, the Max health of a character will also increase according to a predefined formula.

```

//Base + (2.5 * Vigor) + (10 * PlayerLevel)
return 80.f + 2.5f * Vigor + 10.f * PlayerLevel;

```

Figure 3. Formula for MaxHealth

All the player's attributes were then displayed in an attribute menu, where they could see their values and increase them at level up.



Figure 4. Attribute Menu

## Effects

Gameplay Effects were used to change these attribute values. These could be either instant, duration-based, or infinite effects. These were implemented as potions that instantly add to vital attributes, crystals that add over time, and a flame area that damages you when you stand in it.

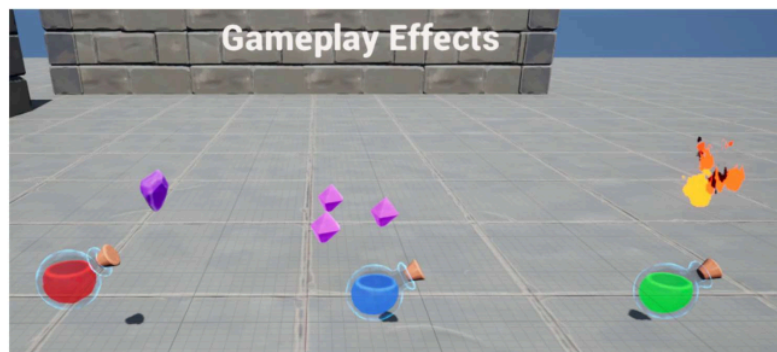


Figure 5. Gameplay Effect Actors.

These effects also use curve tables to modify their value, allowing you to increase the effect magnitude.

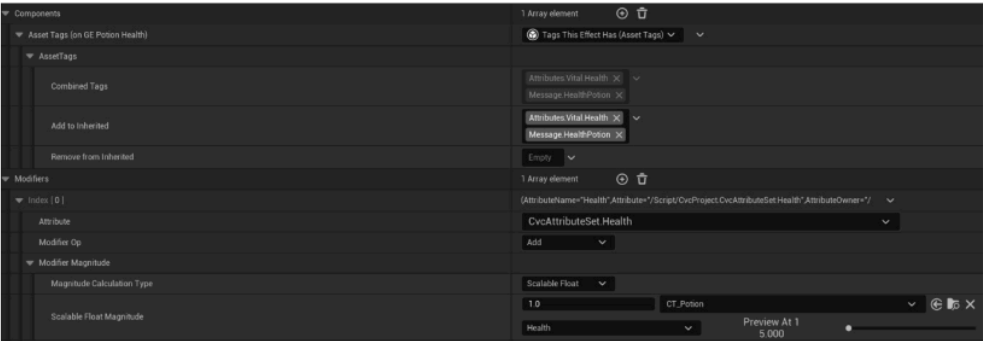


Figure 4. Add health effect.

| Curve   | 1   | 2   | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10    |
|---------|-----|-----|------|------|------|------|------|------|------|-------|
| Stamina | 2.5 | 5.0 | 7.5  | 10.0 | 15.0 | 20.0 | 25.0 | 30.0 | 40.0 | 50.0  |
| Health  | 5.0 | 7.5 | 10.0 | 15.0 | 20.0 | 30.0 | 45.0 | 60.0 | 85.0 | 100.0 |
| Mana    | 2.5 | 5.0 | 7.5  | 10.0 | 15.0 | 20.0 | 25.0 | 30.0 | 40.0 | 50.0  |

Figure 7. Potion Curve Table

These effects could also use custom calculations to determine magnitude. For example, the damage effect needs to use a C++ calculation class to query the target's ability system and check multiple values before it can be applied to health. This class considers the target's armour, resistance, block chance, and the player's crit chance.

Effects are very versatile; they can also be used to add a cost and a cooldown to abilities.

These values can also be set with curve tables like the potion effects, allowing you to scale cost or cooldown with player level.

## Enemies

Three types of enemies were created with their own attribute sets, abilities and behaviours.



Figure 8. The Player being attacked by enemies

The warrior enemies walk up to the player and use melee attacks; the ranger enemies stay at a distance and use ranged attacks. The mage enemies summon additional enemies and then use ranged attacks. What the enemy does is decided by a behaviour tree with pre-defined conditions.

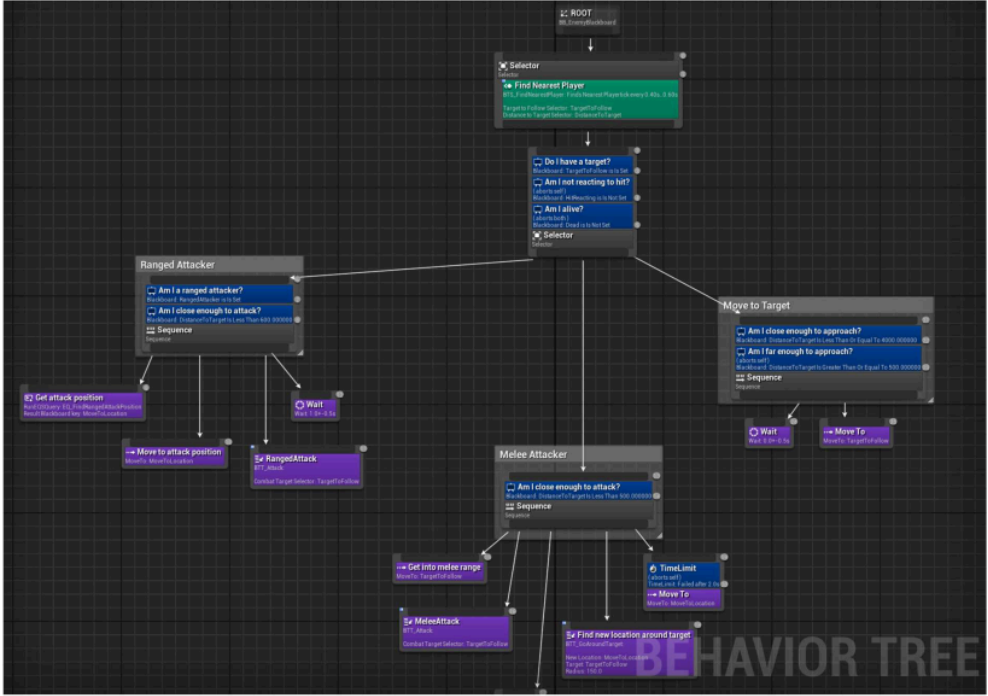


Figure 9. The Warrior and Ranger behaviour tree

All the information for each enemy type is stored within a data asset, allowing you to add new enemy types or additional enemies easily.

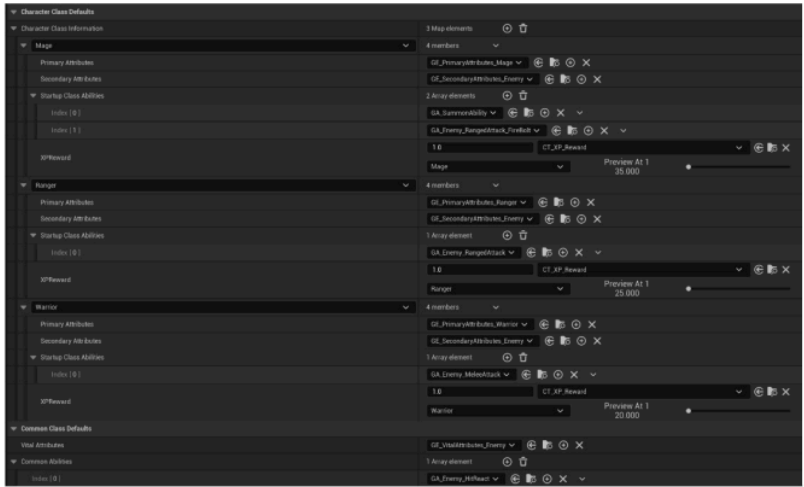


Figure 10. Class Info

## Abilities

Gameplay abilities are asynchronous tasks, allowing you to activate them and wait for certain conditions to be met. This can be used to spawn a projectile at a specific point in an animation.

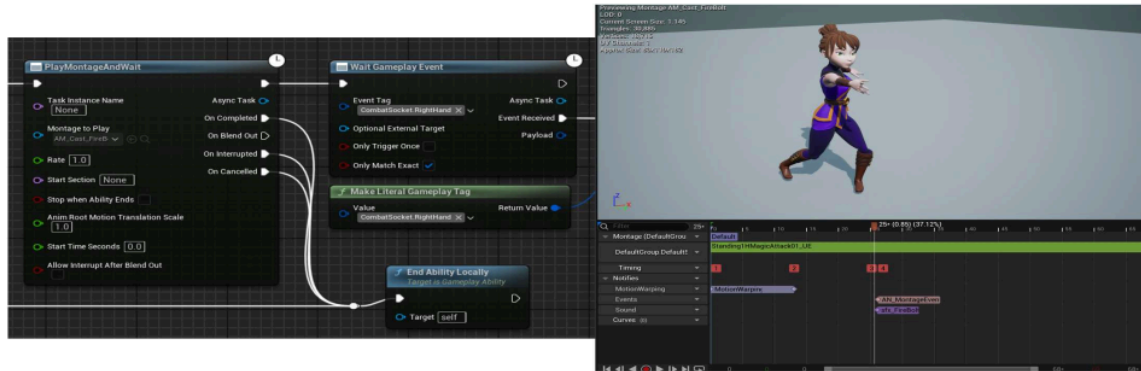


Figure 11. Left: Playing an animation within an ability. Right: The animation montage.

The figures above show the ability blueprint waiting for an event that is set within the animation montage before it spawns the projectile. This allows it to spawn from the character's hand at the right moment.

This method is also used for the enemy's ranged attacks. It is also used to fire an event to check for a player when an enemy melee attack is triggered.

## Animations

While the course did include animations of the character, I wanted to include more. Using a website called Mixamo [3] I downloaded an animation pack and remapped it to the character using the Unreal Engine animation remapper [4]. I could then use the animations with the skeleton for the "Aura" [2] character model.



Figure 12. The projectile spawning from the player.

## UI and Gameplay



Figure 13. Screenshot of gameplay

The figure above shows the game's UI. In the top-left corner are the character portrait and player level. The bottom left corner is a button that opens the attribute menu. At the bottom centre is the experience bar, which increases as the player gains experience. Above that is the player's ability bar, which shows their current abilities and a timer for each ability's cooldown. To the left of the ability bar is the player's health, and on the right of the ability bar is the player's mana and stamina for activating abilities.

## Task 2: Enterprise

### Tech Start-up Information

As part of this project, I have chosen to complete the Enterprise section of task 2. This involves planning a start-up, developing a business strategy, and researching available funding sources. I have chosen to name my company "Celtic Gaming". This name is in reference to my Welsh heritage and my interest in creating and playing computer games.

Figure 14 shows an idea for a logo that combines a Celtic knot pattern with a digital circuit board pattern. However, this design is rather complex and could be simplified.



Figure 14. Logo Idea

The business would likely fall under the "Sole Trader" classification, as it is a small start-up with only me as the founder and sole employee [5]. This would allow me to continue working on the project without losing control or having difficult registration procedures [6]. However, this method makes me personally responsible for all debts the business may incur. This would also make me responsible for any wages I would need to pay contractors or employees I may hire for the project [7].

The business could also be a private limited company, but this would involve more paperwork and may require the services of an accountant, adding to business costs. This would prove difficult to set up as a first-time business owner, even if it does allow easier investment by other companies [5]. Likely the best approach is to start as a personal project, and if no outside investors or publishers can be secured, launch as a sole trader to ensure the project can start generating income.

### Business Strategy

**Mission statement:** To create games that engage with the community and promote value and entertainment for users.

**Objectives:**

- To put a user's entertainment first
- To listen to feedback from users
- To create engaging experiences

**Values:**

The core value of this company is to bring the joy of gaming to life. I want to create games that people enjoy and recommend to their friends. I want to establish a business that listens to community feedback and maintains transparency between the developers' vision and the community's needs.

## Funding

The UK Games Fund is an organisation that aims to support early-stage game developers by offering different funding options to support development [8]. They offer three funding types:

- Prototype – used for early-stage projects that have generated interest from potential audiences.
- Starter – used for solo developers and university graduates looking to create a new studio.
- Content – for existing companies that wish to receive extra funding to expand their business and finish their product.

Among the available funding options from the UK Games Fund, the Starter funding would be most appropriate for this project. It would provide support for the creation of the business as well as the development of the project [8].

## PEST Analysis

A PEST analysis is a method used to assess the Political, Economic, Social, and Technological factors that could impact a business's activities or performance. A variation of this, called PESTLE, also analyses Legal and Environmental factors [9].

### Political

Some governments may ban video games based on their content. For example, China prohibits the use of blood in media, and games that wish to be present in this market must change the colour of the blood shown or remove it entirely [10]. Other political factors may include censorship of some imagery. Such as the German version of Wolfenstein, which censors the use of Nazi imagery [11]. If the game created for this project is to be released globally, cases like this must be considered.

### Economic

The tools and resources used to produce the game for this project are all free. Except for the IDE, Rider requires a licence for commercial use, bringing the total to £135 per year [12]. However, it is free to use for non-commercial and student learning. Unreal Engine only applies royalties after \$1 million USD in gross product revenue [13]. All assets used are free; the hiring of skilled personnel would be required to produce bespoke models and animations.

### Social

The game produced for this project will somewhat resemble the rogue-like dungeon crawler Hades [14]. It focuses on managing resources and fighting waves of enemies. Hades is a very successful indie game with a sequel, so targeting this audience could be difficult. The hope is that this game also includes features like levelling up, a skill tree, and multiplayer, which will be enough to stand out among competitors.

## Technology

As mentioned previously, Unreal Engine and JetBrains Rider will be the main development tools for creating this game. The Steamworks Distribution Program [15] will be used to sell and distribute this game, and can also help with marketing in some respects. However, a more suitable tool, such as Instagram or other social media, should be used to market the game to a wider audience.

## Task 3: Project Feedback and Reflection

### Practical Feedback

I created another questionnaire, shown in Appendix B, using Microsoft Forms to gather feedback after the project had been completed. The feedback was the same as before, as I ran out of time to implement story elements and multiple abilities. This made the game feel rather unfinished, and many progression elements were not completed on time.

### Project Progress Diary

Over the course of the project, I kept track of my progress through weekly progress reports, shown in Appendix C. While the goals were mostly achieved each week, a few tasks were pushed back, including the implementation of gameplay abilities, character experience, and levelling functionality. These features were quite complex and took multiple weeks to complete. I also used a Jira Board to help me track tasks that needed to be completed.

### Skills

Throughout this project, I have developed many skills. My game was built using both C++ and Unreal Engine Blueprints, which has given me a great deal of experience. At the beginning of the project, I had never used Unreal Engine before, and now I know how to do many things, such as creating custom C++ functions and accessing them from within blueprints, broadcasting changes to variables from C++ classes into blueprints, and listening to changes. I have also gained a lot of experience debugging my code, setting up custom logging events to track variables I create, and overriding functions in Unreal Engine to add custom functionality.

## Conclusion

While I managed to implement much of the functionality I wanted in my game, I was unable to finish some areas I would have liked to. Currently, the player and enemies only have one activatable ability. I would've liked to create a skill tree with multiple abilities the player could choose from at each level-up. The enemy AI is also very basic: it moves towards the player and attacks, except for the mage, who summons enemies. I would have liked to give them more variation in abilities and movements

to make gameplay more engaging. I was also unable to create story elements that would help to drive engagement.

However, I have set up a good base from which I can grow this game into something better. Unreal Engine GAS is great for scalability. The classes I have created for managing attributes and abilities can be easily extended to add more. By testing the animation remapping, I know I can swap out models and animations to make this game more bespoke.

## References

- [1] 'Gameplay Ability System for Unreal Engine | Unreal Engine 5.7 Documentation | Epic Developer Community', Epic Games Developer. Accessed: May 13, 2026. [Online]. Available: <https://dev.epicgames.com/documentation/unreal-engine/gameplay-ability-system-for-unreal-engine>
- [2] 'Unreal Engine 5 - Gameplay Ability System - Top Down RPG', Udemey. Accessed: May 13, 2026. [Online]. Available: <https://www.udemy.com/course/unreal-engine-5-gas-top-down-rpg/>
- [3] 'Mixamo'. Accessed: May 13, 2026. [Online]. Available: <https://www.mixamo.com/#/?page=1&query=pro+magic+pack>
- [4] Smart Poly, *Retarget Animations FAST In 5.4 | Unreal Engine 5.4 Tutorial*, (Mar. 22, 2024). Accessed: May 13, 2026. [Online Video]. Available: <https://www.youtube.com/watch?v=EvUGgpSUxPI>
- [5] 'Compare and choose a business structure', Business Growth Service. Accessed: May 04, 2026. [Online]. Available: <https://www.business.gov.uk/support/business-structures-governance-and-ethics/comparing-business-structures/>
- [6] B. Smithson, 'Choosing the right business structure – Companies House'. Accessed: May 04, 2026. [Online]. Available: <https://companieshouse.blog.gov.uk/2018/07/18/choosing-the-right-business-structure/>
- [7] 'Set up a business', GOV.UK. Accessed: May 04, 2026. [Online]. Available: <https://www.gov.uk/set-up-business>
- [8] 'UK Games Fund', UK Games Fund. Accessed: May 04, 2026. [Online]. Available: <https://www.ukgamesfund.com/>
- [9] D. R. F. B. D. is comprehensively experienced in many facets of financial, L. Research, publishing A. an I. fact checker since 2020, H. H. V. Over 1, 100 Articles on a Wide Range of Financial, and investment topics L. about our editorial policies, 'What Is PEST Analysis? Its Applications and Uses in Business', Investopedia. Accessed: May 04, 2026. [Online]. Available: <https://www.investopedia.com/terms/p/pest-analysis.asp>
- [10] P. Reitmeier, P. Reitmeier, D. C. Schmidkonz, and C. Schmidkonz, 'Activision Blizzard, Inc. in China: a PEST analysis'.
- [11] 'Wolfenstein has first German release with the New Order', *BBC News*, May 20, 2014. Accessed: May 04, 2026. [Online]. Available: <https://www.bbc.co.uk/news/technology-27488254>
- [12] 'Buy Rider: Pricing and Licensing, Discounts - JetBrains Toolbox Subscription', JetBrains. Accessed: May 04, 2026. [Online]. Available: <https://www.jetbrains.com/rider/buy/>
- [13] 'Unreal Engine (UE5) licensing options', Unreal Engine. Accessed: May 04, 2026. [Online]. Available: <https://www.unrealengine.com/license>
- [14] 'Supergiant Games'. Accessed: May 04, 2026. [Online]. Available: <https://www.supergiantgames.com/games/hades/>
- [15] 'Steamworks Partner Program'. Accessed: May 04, 2026. [Online]. Available: <https://partner.steamgames.com/steamdirect>

# Appendix

## A. Initial Feedback Form Questions

1. What are your initial thoughts about the project idea?
2. Is this a game you would like to play? (Yes/No)
3. If you answered 'no', why not?
4. Do you think the gameplay would be engaging? (Yes/No)
5. If you answered 'no', why not?
6. What could be added to the game to improve it? (e.g. features, abilities, enemy types)
7. Would you recommend this game to others?
8. If you answered 'no', why not?

## B. Project Feedback Questions

1. What are your thoughts after playing this game?
2. Is this a game you would like to play? (Yes/No)
3. If you answered 'no', why not?
4. Is the gameplay engaging? (Yes/No)
5. If you answered 'no', why not?
6. What could be added to the game to improve it? (e.g. features, abilities, enemy types)
7. Would you recommend this game to others?
8. If you answered 'no', why not?

## C. Project Progress Sheets

Name: William Foot 2405192

Programme: Changemakers: Creativity and Value Creation

Project Aim: Implement the Unreal Engine Gameplay Ability System in a Multiplayer Role-Playing Game.

Project Objectives:

1. Use the Unreal Engine Gameplay Ability System to track player primary attributes and replicate them across multiplayer.
2. Create secondary attributes and effects that scale according to primary attribute values.
3. Use Gameplay Effects and Abilities to alter player and enemy attributes.
4. Create UI components that show player attributes and abilities.

Date: 06/06/2026

Progress:

- Player gains points on level up that can be used to increase attributes
- Player Health/Mana/Stamina increase every level up

Actions:

1. Spell menu that can be used to purchase new abilities
2. Ability levels that can be improved with points

Next review date:

Date: 29/04/2026

Progress:

- Created a basic level with static enemy spawns
- Enemies reward experience points on death
- Player can level up

Actions:

1. Improve attributes with level up
2. Increase ability level/cost/damage with player level
3. Assign attribute points on level up

Next review date: 06/05/2026

Date: 22/04/2026

Progress:

- Created Enemy AI
- Created abilities for enemies that change for each enemy type
- Added cost and cooldown for player abilities

Actions:

1. Handle Experience and Levelling
2. Create basic level

Next review date: 29/04/2026

Date: 15/04/2016

Progress:

- Created three classes for enemy types
- Created enemies that use class types
- Improved handling of damage to enemies
- Added enemy death

Actions:

1. Add Enemy AI
2. Give enemies abilities to use

Next review date: 22/04/2026

Date: 08/04/2016

Progress:

- Created an ability that spawns a projectile
- Applied the ability to the player on game startup
- Mapped input tags to ability activation
- Added test enemy with health bar

Actions:

1. Create enemy classes
2. Create new enemy types
3. Add enemy AI

Next review date: 15/04/2026

Date: 01/04/2026

Progress:

- Added Secondary Attributes that are derived from Primary Attributes
- Added Attribute menu to show all attributes

Actions:

1. Create some abilities for the player to use

Next review date: 08/04/2026

Date: 25/03/2026

Progress:

- Added effect actor class to modify player attributes (hazard area, instant damage, instant heal effect)
- Created a curve table to apply levels to gameplay effects to increase effect magnitude

Actions:

1. Continue to work on gameplay tags
2. Look at gameplay abilities to apply effects

Next review date: 01/04/2026

Date: 18/03/2026

Progress:

- First-person camera added
- Player attribute set created
- Basic UI added

Actions:

1. Add a test actor to manipulate these values
2. Look at gameplay abilities to apply effects

Next review date: 25/03/2026

Date: 11/03/2026

Progress:

- Initial project has been created
- GitHub repository has been created
- The Jira board has been created, and tasks for the first sprint have been planned

Actions:

1. Add a first-person camera to the third-person mannequin
2. Add player attributes to character pawn (health, stamina)
3. Add a test actor to manipulate these values
4. Basic UI to show player attributes

Next review date: 18/03/2026

# Will Foot - Assignment 2

## GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

76/100

Marks

awarded

Total 76

1. Engagement with Literature Skills 10

+ Good use of citations included but literature relies heavily on documentation, tutorials and web sources with limited academic evaluation or critical discussion.

+ Well-formatted reference list.

2. Knowledge and Understanding Skills 5, 10

T2 Q1: 5

+ Tech Start-up name, Logo, Business type (Legal classification) and a

Business Strategy are documented.  
Funding options are considered. Commercial strategy and market positioning could be developed further to strengthen business planning

## T2 Q2:

- **PEST analysis** summary includes some relevant considerations for each category and documents some key professional legal & ethical considerations. Analysis remains mainly descriptive and does not include separate legal or ethical consideration expected within wider enterprise evaluation.

- Some additional professional legal & ethical considerations could be included and 6 each category supported by relevant citations.

## 3. Cognitive and Intellectual Skills 5, 5, 5, 5

### T3 Q1: +

3

**Data collection** method for practical feedback is appropriately designed, and some feedback acquired and considered but feedback analysis is brief and identifies limited evidence of iterative changes or deeper evaluation of user responses

### T3 Q2: + Project

**management reflection** is documented but reflection could provide deeper evaluation of project management decisions and lessons learned.

### T3 Q3: + Skill

**development reflection is** documented but could further explain how these skills support future professional or industry practice.

### T3 Q3: + Project's positive impact on society

4

is not described.

4

0

#### 4. Practical Application Skills 10, 30, 10

8

##### T1 Q1: +

**Data collection** method for initial feedback designed, and some feedback acquired and considered but the analysis is limited.

+ Data collection tool and question set are documented.

**T1 Q2:** + key features of the **implementation** process and practical output have been clearly documented but occasionally lacks depth.

+ Some additional practical implementation work is included but some planned gameplay depth and progression features are not finished. 25

##### **Progress sheets (Appendix): -**

Documentation of weekly progress sheets

not included.

10

**5.**  
**Transferable Skills for Life and**  
**Professional Practice 5**

· + Very good report presentation structure 4  
and  
format

·  
+  
Title page & Table of contents.

·  
+  
Introduction & Conclusion.

·  
+  
Tasks complete.

·  
-  
Appendix: CPD course not reported.

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