COMP4501A Project Proposal

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Disclaimer: Some CRC cards may be split over page breaks.

# Overview

The game shall be titled *affliction*. In the game, the player will control six organs and a host of microorganisms within the human body with the objective of defending against a threatening virus. At the start of a game, two infections will exist somewhere in the body unknown to the player. This infection will begin the production of enemy units which will surge toward the player to destroy organs and spread more infections. Enemy units will consist of pathogens, which are infectious killing virus units which only serve to destroy allied units and organs, and spores, which are virus units with the intention of spreading and creating more infections throughout the body. Infections continuously produce new virus units.

The player will have control over a heart, lungs, brain, stomach, and kidneys, each of which has its own special function and upgrades. All organs need to be constantly supplied with oxygen, otherwise they begin to continuously take damage over time. Organ upgrades need to be paid for with protein, a nutrient which will be discussed shortly. The heart will be responsible for the production of blood cells, taking erythropoietin (‘Eryth’ in game) as payment. The two types of blood cells which can be produced by the heart are red blood cells and white blood cells. Red blood cells will be able to collect nutrients and deliver them to organs (if applicable) while white blood cells will be able to attack viruses and infections. The lungs will be responsible for producing oxygen to be retrieved by red blood cells. The brain will be capable of researching new upgrades for organs, paid for with protein. The stomach will be the location to mine protein. And finally, the kidneys will be the location to mine erythropoietin.

The objective of the game is to destroy every last infection and every last virus within the body. But if the player has all organs destroyed, then it’s game over. In reality the crucial organs to continue the game are the heart and lungs. All the rest are just supplemental.

# Technical Requirements

* The game uses an overhead isometric view camera angled at the terrain at 50 degrees.
* The game has illumination from a directional light and game objects cast dynamic shadows.
* The game is made up of 3d models for all units and a terrain made with unity’s terrain editor.
  + All visual assets are textured.
* Collision detection is implemented between all game objects using unity’s rigid body component for units and just a terrain collider for the terrain.
* When the game starts up, all of the player’s organs exist as well as two red blood cells to get the work started. For the enemies, two infections are created by default.
* Units can interact with each other via mouse input. Clicking (or dragging over) any units selects them. Shift clicking as well as dragging the mouse allow for multi unit selection. With allied units selected, right clicking is the method for interacting. Right clicking the terrain makes the selected unit move to the target destination. For white blood cells right clicking enemy units compels the cell to attack the unit. For red blood cell, right clicking any resource miner organ and then right clicking another organ starts the cell on an endless automated transfer trip delivering resources from the first organ to the second.

# Architecture

The following CRC cards describe the responsibilities in the relevant game classes.

|  |  |
| --- | --- |
| Unit | |
| Responsibilities | Collaborators |
| -Knows health  -On attacked event |  |

|  |  |
| --- | --- |
| Microorganism | |
| Responsibilities | Collaborators |
| -Moves | -Unit |

|  |  |
| --- | --- |
| Blood Cell | |
| Responsibilities | Collaborators |
| -Is allied microorganism | -Microorganism |

|  |  |
| --- | --- |
| Red Blood Cell | |
| Responsibilities | Collaborators |
| -Harvests nutrients from organs  -Carries nutrients | -Blood Cell  -Organ  -Nutrient |

|  |  |
| --- | --- |
| White Blood Cell | |
| Responsibilities | Collaborators |
| -Attacks viruses and tumors | -Blood Cell  -Virus  -Tumor |

|  |  |
| --- | --- |
| Organ | |
| Responsibilities | Collaborators |
| -Requires oxygen to be sustained, otherwise takes damage over time  -Can receive protein to upgrade to enhance function  -Can upgrade defense | -Unit  -Oxygen  -Protein |

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| --- | --- |
| Heart | |
| Responsibilities | Collaborators |
| -Can receive erythropoietin to produces blood cells | -Organ  -Erythropoietin  -Blood Cell |

|  |  |
| --- | --- |
| Lung | |
| Responsibilities | Collaborators |
| -Produces oxygen  -Passes oxygen to red blood cells | -Organ  -Red Blood Cell  -Oxygen |

|  |  |
| --- | --- |
| Brain | |
| Responsibilities | Collaborators |
| -Can research organ upgrades and blood cell buffs | -Organ |

|  |  |
| --- | --- |
| Stomach | |
| Responsibilities | Collaborators |
| -Produces protein  -Passes protein to red blood cells | -Organ  -Red Blood Cell |

|  |  |
| --- | --- |
| Kidney | |
| Responsibilities | Collaborators |
| -Produces erythropoietin  -Passes erythropoietin to red blood cells | -Organ  -Red Blood Cell  -Erythropoietin |

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| --- | --- |
| Virus | |
| Responsibilities | Collaborators |
| -Enemy microorganism | -Microorganism |

|  |  |
| --- | --- |
| Pathogen | |
| Responsibilities | Collaborators |
| -Attacks blood cells and organs | -Virus  -Blood cell  -Organ |

|  |  |
| --- | --- |
| Spore | |
| Responsibilities | Collaborators |
| -Builds tumors | -Virus |

|  |  |
| --- | --- |
| Tumor | |
| Responsibilities | Collaborators |
| -Grows over time  -Produces new viruses | -Unit |

|  |  |
| --- | --- |
| Nutrient | |
| Responsibilities | Collaborators |
| -Can be held by red blood cells  -Can be spent |  |

|  |  |
| --- | --- |
| Oxygen | |
| Responsibilities | Collaborators |
| -Can be delivered to replenish organ oxygen level | -Nutrient |

|  |  |
| --- | --- |
| Protein | |
| Responsibilities | Collaborators |
| -Can be spent to purchase organ upgrades | -Nutrient |

|  |  |
| --- | --- |
| Erythropoietin | |
| Responsibilities | Collaborators |
| -Can be spent to purchase blood cells from heart | -Nutrient |

# Additional features

Should there be extra time for development, some additional features are as follows.

### White blood cells

Having only one type of offensive unit can make a game dull, and is most certainly not realistic in this case where there are actually many types of white blood cells. Dividing the white blood cell offensive units in the game can allow for more strategic play. Here are some ideas for incorporating different types of white blood cells in this game as different unit classes:

* Neutrophil: cheap grunt/swarm units, close ranged attacks, has mid defense and health
* Eosinophil: area of effect, damage per second attacks, has high defense
* Basophil: expensive tank, largest, can attack close ranged, can cause inflammation to buff allies and nerf enemies, has high defense and health
* Lymphocyte: *Natural Killer Cells*, ranged specialty attacking units, low defence and health but high attack, special ability to gain experience for each kill and becomes more proficient against the types of units it has kill (this is an actual thing)
* Monocyte: healer support class, special one time ability to mutate into an expanding foam which deteriorates slowly and ends the lives of all in the vicinity as well as itself

These different units would all have a different cost to produce by the heart and the heart would need to be upgraded in order to produce some of them.

### Organs

Additional organs such as the liver, spleen and appendix will be added to richen the gameplay possibilities. With functions for filtering blood and toxins, regeneration, and the appendix as a ticking time bomb, we think these organs would add a new level of depth to the game.

### Pathogens

Having diverse ally units can only be balanced by having equally diverse opposing units. It time permits, it would be nice to also add an assortment of different pathogen units with different abilities. The more rare ones would only be able to be produced by tumors which have grown to a certain size.