## Sprint 2 – Algorithm Researching 14/02/2019 – 20/02/2019

### Abstract

The main goal of this sprint is researching the best algorithms for procedural terrain generation. Not only this sprint is going to be one of the most important ones but also it will dictate the outcome of the project.

### Research

After researching for a while, the author created a list with the following terrain synthesis algorithms:

#### Perlin Noise

Perlin noise is an algorithm developed by Ken Perlin in 1983. This algorithm is used to create a type of noise that creates natural looking textures [2.3.1 Perlin Noise].

#### Diamond-Square

Diamond-Square is a well know algorithm for procedural terrain generation. It is created by Alain Fournier, Don Fussel and Loren Carpenter. Practically is called inside a recursive function until there are no more vertices to recurse from.

For more information in how this algorithm works check the section in the progress report [2.3.2 Diamond-Square Algorithm].

#### Simplex Noise

Simple Noise is a new version from Perlin Noise made by Ken Perlin in 2001, this version was created to overcome some limitation of the Perlin Noise [2.3.3].

#### Thermal Noise

Thermal Noise is an algorithm responsible for terrain erosion through the breaking down of rocks, soil and minerals and they are moved by the wind to the bottom [2.3.4 Thermal Erosion].

#### Hydraulic Erosion

Hydraulic Erosion is a process that creates erosion through the water flow, practically there is composed by two things, one of them is the sediment capacity that the water can carry and another one is the deposit process. The water starts eroding the surfaces it touches and carries that surface as sediment, when the sediment capacity of the water reaches to its maximum amount it starts to deposit that sediment.

### Sprint Review

This sprint was a success, at the end it is possible to conclude that the author learned the most used algorithms for terrain generation and the two most common used algorithms for terrain erosion. The author then decided to choose the Perlin Noise algorithm for the noise map generation and hydraulic erosion for implementing the terrain erosion.

### WBS

1. Research Terrain Synthesis Algorithms (30%) (9 hours)
2. Perlin Noise (14%) (4.2 hours)
3. Diamond-Square (14%) (4.2 hours)
4. Simplex Noise (14%) (4.2 hours)
5. Thermal Noise (14%) (4.2 hours)
6. Hydraulic Erosion (14%) (4.2 hours)