Executive Summary

# Mechanics

## Introduction

The core mechanics of this demonstration revolve around a harvesting, selling and trading economy, where a player can harvest resources such as wood, stone and iron and buy, sell or trade resources with non-playable character merchants.

## Resource Types

There are 3 harvestable resources in the game wood, stone and iron ore, as well as gold that acts as a currency. In real life these resources have worth based upon supply and demand, I have replicated this by making iron nodes much rare, as well as making them give the player less total resources per node. The price of these items therefore reflect the rarity, with iron being rarer and more expensive than stone, and stone being rarer and more expensive than wood.

## Harvesting

When a player harvests a resource, they will wait for a repeated delay, before receiving a random range of the nodes resources, this delay continues until all the resources are gone. Randomness is used to counteract dominant strategies, but is only used here to limit overuse. As each node per resource type has a different maximum amount of resources, to reflect their rarity, the random range returned per delay is balanced, with wood returning much more than iron ore. Additionally, to further balance price differences and reflect real life, iron ore has a longer harvesting delay than wood, meaning it will take slightly longer to harvest iron. Resources respawn after 5 minutes, acting as a static engine, to prevent continuously mining the same type.

## Levelling

The player has a skill level for logging, mining and smithing, which are relative to each of the three resource types. XP is earnt by harvesting the resource related to the skill, and the level will increase when the XP requirement is met. As a negative feedback loop, XP requirements increase as the level does, opposingly the players harvest delay is reduced, and more resources are returned each delay as skill levels increase. This acts as an arms race design, as players can focus a specific skill to increase their income over others that choose to level skills equally, effectively rewarding specialisation. Reducing the harvesting delay, also acts as a dynamic engine, as the player can invest time into the skill, to increase the level and therefore harvest faster.

## Merchants

Each resource type has a related merchant, carpenter for wood, mason for stone, and blacksmith for iron ore. Only related merchants buy or sell their resource type. The base prices of the materials are all different, to mimic supply and demand, meaning each material is worth harvesting, and there isn’t a clear best. To further mimic supply and demand, merchants will also buy resources at double the base price if they don’t have much, or buy at half the base price if they have too much. This limits the effectiveness of arms race strategies as it produces diminishing returns. Merchants also take a 10% cut from transactions, to prevent buying and selling constantly to generate money, acting as a friction stopping mechanism.

## Trading

Players can trade resources with merchants in return for their respective resource, the conversion rate is based on the respective prices of each resource, to prevent players abusing the system. Merchants also take a 10% cut in trades too, to further prevent trade abuse, again acting as a friction stopping mechanism.

# Annotated Diagrams

These diagrams show annotated information of the machinations diagrams, with a focus on explaining feedback loops within the system, positive loops are green, negative loops are red:

Diagram, timeline

Description automatically generated

The positive feedback loop here shows the decrease in harvesting delay as the player levels up the respective skill, by gaining XP from harvesting the resource. The negative feedback loop shows the XP requirement increase as levels increase, meaning players must harvest more of one resource to each another level.

Timeline

Description automatically generated with medium confidence

Both the positive and negative feedback loops here show the price of a material rising/falling when the player sells to the merchant, the price of a material will decrease if the merchant has too much, due to the player selling them too much, but the price will also increase if the merchant needs more. This encourages players to mine multiple resource types, and not stick to one type. The merchant also takes 10% off of a transaction, introducing a small negative feedback loop for massive sales.

Graphical user interface, diagram

Description automatically generated

As above, the negative and positive feedback loops here also show price alterations of resources based on supply and demand, yet this is when the player is buying resource from a merchant.

Diagram

Description automatically generated

This diagram shows the player trading one of two resources for the merchants resource type. There are no major feedback loops here, other than merchants taking a 10% cut of the resources traded, similar to the previous diagrams.