Game Idea Proposal:

Doomsday: Underground Uprise

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Games Laboratory

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Introduction and Setting

Doomsday is a 2.5D RTS game with a strong focus on base building, set in a post-apocalyptic world where the surface got too toxic to be inhabited by the human kind. After years of being trapped in those bunker units, the inhabitants used up all their resources and are now forced to colonize the surface once again to survive:
Their last desperate attempt is to use the remains of human technology and build armed robots to cope with the now mutated wildlife, corrupted Military Robots and the remanence of upper world humans.

Game Mechanics

The player controls both the surface and the bunker with the classical RTS/City Building approach by constructing buildings and assigning workers to it. The surface and bunker parts share only the resources, Robots are too clunky to be used in the Bunker and humans cannot withstand the still deadly radiation. To survive the player has to gather resources on the surface by defending them appropriately by producing Security Robots and placing Defend Towers.

Main Goal

The main objective is not to starve, the bunker inhabitants are safe in the bunker from outside enemies, even though the discussion is still on about if we should let the bunker entrance be destroyable thus adding another loose condition.

The Game is won when the last wave of enemies is repelled.

Up and Down Theme

Doomsday is a game where players manage a base that's split into an 'up' world on the surface and a 'down' world underground. The challenge is to keep both parts running well. The surface is dangerous, but players need to gather resources there. The underground is safe but has limited supplies. This 'up and down' theme makes the game exciting because players always have to balance the risks above with the needs below.

Technical Focus

Our game will have a strong focus on indulging the player into the world's mood:

We will explore different technologies to convey the anticipated Game Art which is realistic and dark but with a stylized touch to it (basically the look of a Graphic Novel).

To reach this style we will experiment with programming of Custom Shaders, using Unity's potent High Definition Render Pipeline (HDRP) for realistic global lighting and effects, and crafting custom animations, models, and textures.

Further we will incorporate many details into the game map (vegetation, litter, maybe even murder of crows etc.) to build up the visual confidentiality.

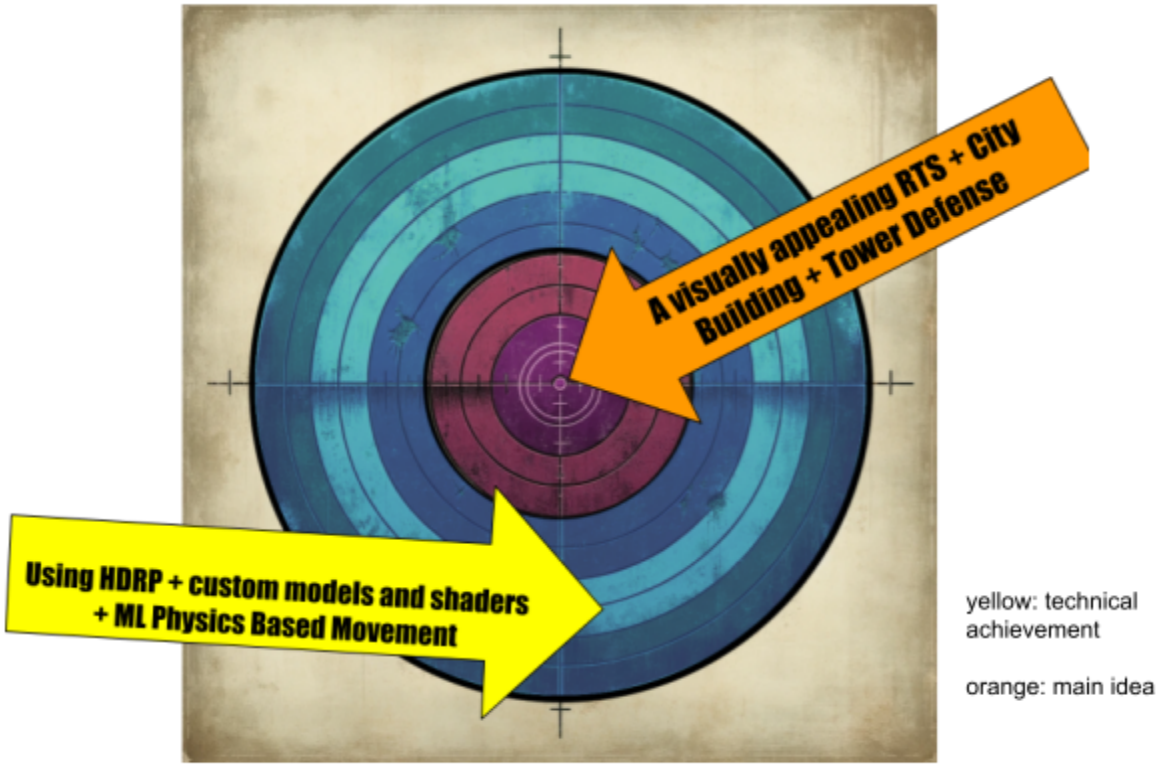
MLAgents

We plan to use Unity's MLAgents (easy to use Reinforcement Learning framework) to generate physically based interactions with the environment for animations and fighting strategies.
The Virtual Robots will learn to balance, move and fight only by applying torque and force to its limbs which will both simplify the animations for custom models and make interesting, unpredictable behavior possible (physics based fighting was e.g. used in TABS with great success/fun).
https://store.steampowered.com/app/508440/Totally_Accurate_Battle_Simulator/),

We have some ideas to incorporate ChatGPT into the game to control certain aspects (maybe in later development stages): E.g. ChatGPT could simulate the enemy war boss which we can convince to not attack us or use DallE-3 to generate items and missions.

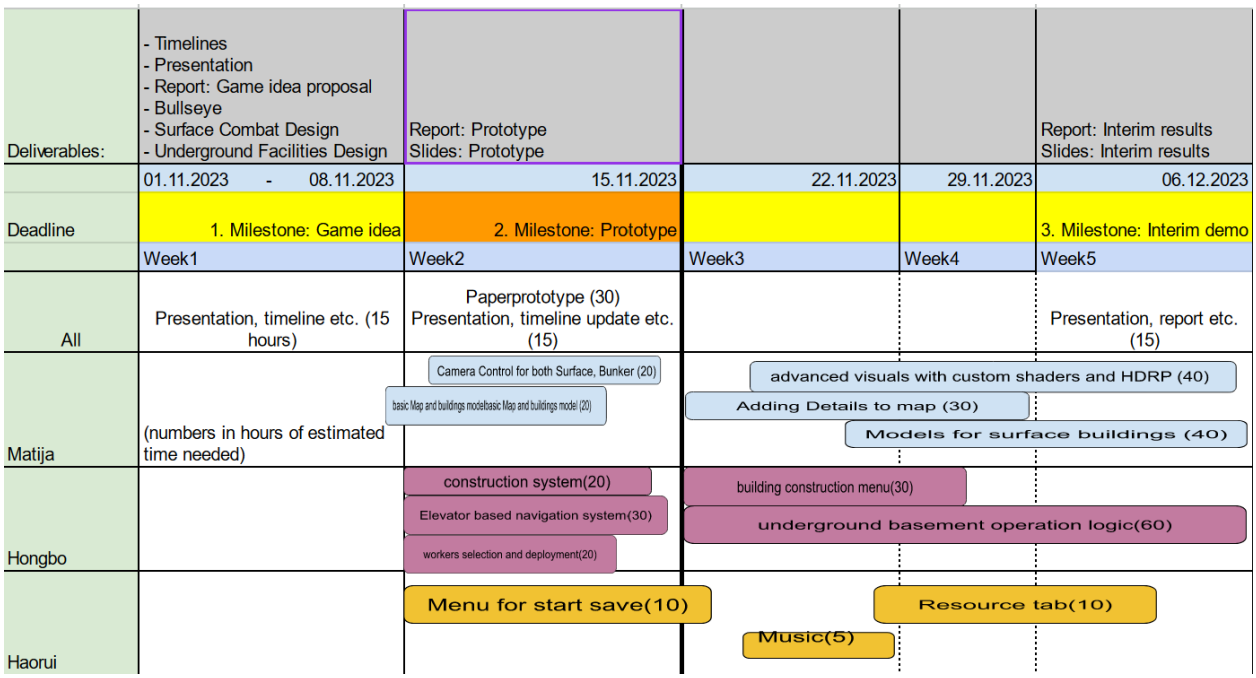
All this adds collectively to a greater replayability, fun and unique gameplay experience.

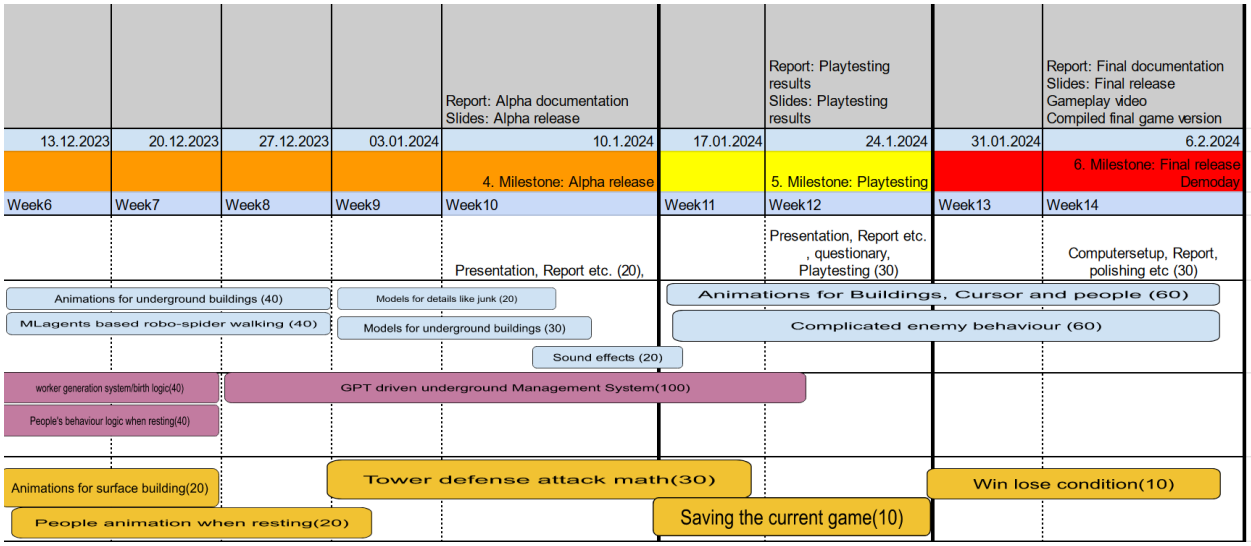
"Big Idea", Bullseye



Development Schedule

We tried to construct our layered schedule in such a way that the base game with all its core Game Mechanics will be enough to get playable and polished game while the layers 3 and 4 will mainly add more animations and visual details. ChatGPT integration and the use of more complicated Enemy and Robot behavior (with POCA) could be another big feature that we will only introduce if we have time left and the prior plan execution went without problems.





Task	Estimated Time in hours	Time took	importance	Developer	comment
basic Map and buildings model	20		1	Matija	
Camera Control for both Surface, Bunker	20		1	Matija	Including Switch button between bunker surface, using Unity's Input system
construction system	20		1	Hongbo	let the player place wanted buildings to certain location
Menu for start save	10		1	Haorui	
workers selection and deployment	20		1	Hongbo	check workers status and send them to the place to work
Elevator based navigation system	30		1	Hongbo	Elevator only connect layers of underground layers
underground basement operation logic	60		2	Hongbo	What buildings produce what resource / need what resource to operate / how many people can be plugged in the buildings etc
Adding Details to map	30		2	Matija	
Models for surface buildings	40		2	Matija	
Resource tab	10		2	Haorui	
advanced Visuals with	40		2	Matija	

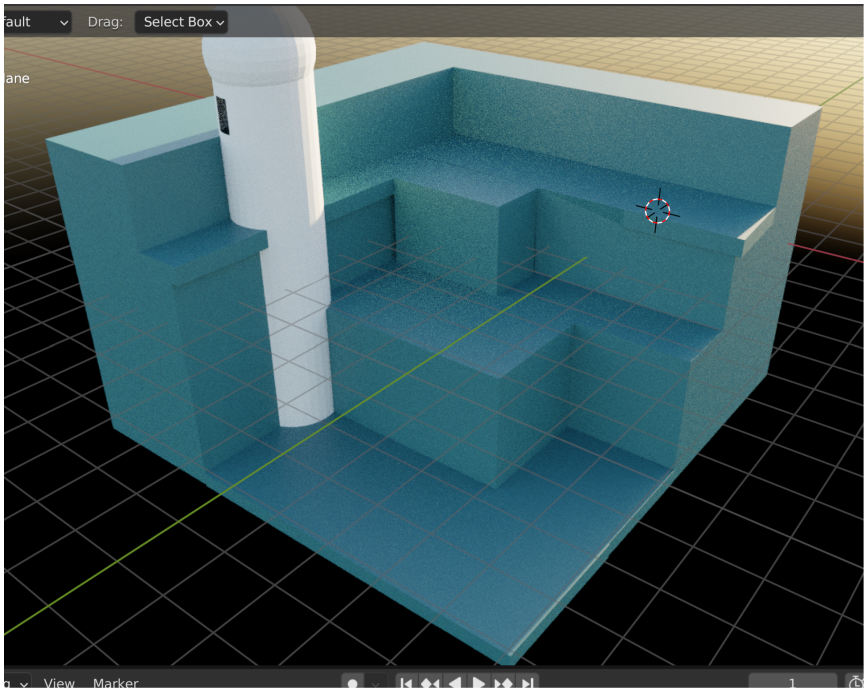
custom shaders					
Win Lose condition	10		2	Haorui	
Animations for surface buildings	20		3	Haorui	
Animations for underground buildings(prefab)	40		3	Matija	Making cool animations with Inverse Kinematics
building construction menu	30		3	Hongbo	make it easier for player to interact
MLagents based robot-spider walking	30		3	Matija	
Models for details like junk	20		3	Matija	
Models for underground buildings	30		3	Matija	
Music	5		3	Haorui	
People's behavior logic when resting	20		3	Hongbo	People go to kitchen & garden & hospital by themselves when released from jobs
Saving the current game	10		3	Haorui	saving whole state of every object, saving it to database or file, load it
Sound effects	20		3	Matija	Sounds of machines when zooming in, Light having buzzing etc.
Tower defense attack math	30		3	Haorui	
worker generation system/birth logic	40		3	Hongbo	child will inherit parents' outlook / maybe some sort of clone device which only needs to put a couple into the container then it can generate a clone kid in a second
Animations for Cursor	5		4	Matija	
Animations for Buildings, Cursor and people	60		4	Matija	work, walk, sit, lie down, get hurt, injured walk, chat | Take from Asset Store
Complicated enemy behavior	60		4	Matija	
People animation when resting(chat, play instrument)	20		4	Haorui	
GPT driven underground Management System	100		4	Hongbo	Only if have time
Dynamic 3D sound			5		
Having Story Modus with			5		

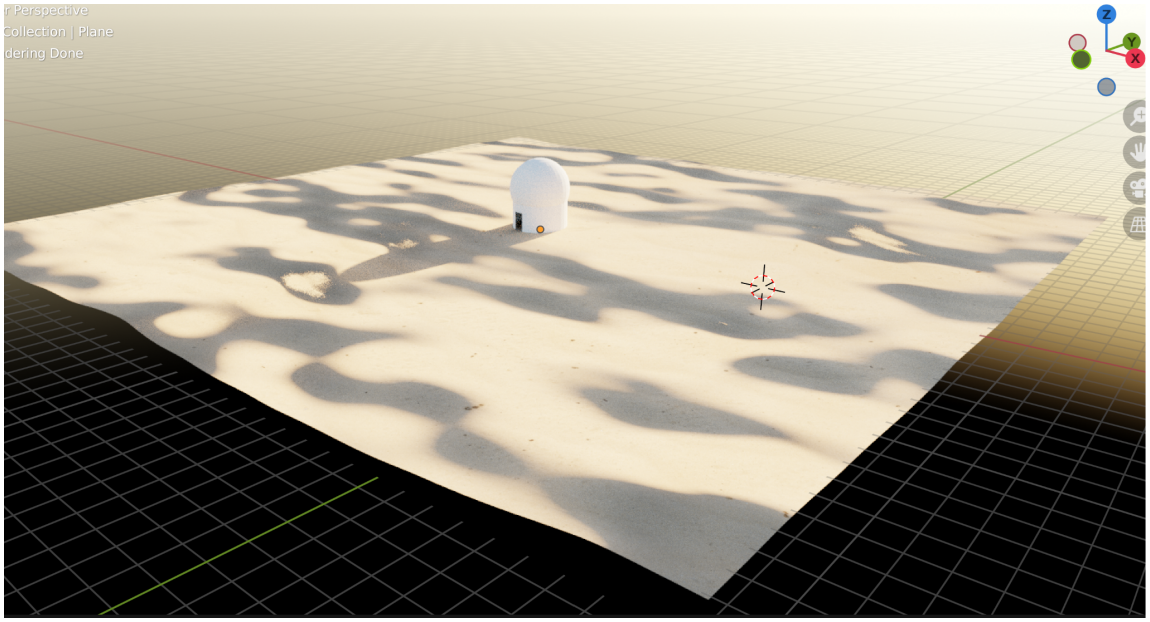
Missions					
More enemies			5		
Multiplayer in some way			5		

Game Art Style

The game's art direction is central to its design, aiming for a unique blend of realism and stylization. The intended aesthetic combines realistic textures and proportions with a graphic novel-inspired shader, resulting in a detailed, vibrant, yet muted visual experience. The environment will be richly detailed, fostering an immersive world. The game, reminiscent of the Fallout series, will merge Cyberpunk and Steampunk elements to create a distinct post-apocalyptic setting.

Concept Art

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Assessment

Our Game "Doomsday: Underground Uprise" offers an innovative blend of 2.5D RTS gameplay, set in a richly detailed post-apocalyptic world that promises to engage players through its strategic depth and base-building elements. The game stands out with its unique art style that combines realistic textures with a graphic novel aesthetic, providing a distinctive visual experience. Advanced AI integration using Unity's MLAgents will ensure dynamic and challenging enemy encounters, enhancing replay value. The potential incorporation of AI-driven content generation through ChatGPT and DALL-E could revolutionize player interactions and game customization, setting "Doomsday" apart by design from other comparable RTS games.
The project's ambitious scope is manageable with our strategic planning, which allows for flexibility in development. Even if time constraints arise, we prioritize core gameplay features to ensure we deliver a full game project, even if some later-stage elements are deferred.

Sources

All pictures are modified generation from OpenAI's Dalle-3

Additional Game Design Details/ Appendix

General purpose worker that can do any task

- hunger and eletricity value
- robots on the surface
    - harvest crops (food)
    - fighting
        - big robots
            - High hp, low speed
        - small robots
            - Low hp, high speed
        - medium robots
            - medium hp, medium speed

- surface weapon systems
    - cannon tower
    - machine gun tower
    - etc

- monsters have attack waves
- more monsters with time goes by / more and more difficult
- first several minutes focus on construction
- builds consume energy
- upper world defense towers build on 2D grid
- down world facilities build on 2.5D grid

Resources:

- energy as electricity, place buffers (batteries, capacitors) to save energy if no energy is available at times, every building consumes energy if produced.
- food has to be stored and cooked by mensas and get distributed by mensas -> Bunker NPCs automatically go there to eat and use the food.
- How to make robots? A Bodypart producer which produces robot parts, a weaponsmith that produces weapons you want him to make; click on the entrance of the Bunker => produce robot type (like a dropdown menu with small Robot -> Energy Weapon Robot), and then a Robot Producer actually assembles the Robot you want and spawns him on the surface.
- Reason for doing it is so complicated? BC you have more freedom to produce, more involvement in the actual building planning, experimenting with different robots and seeing which one is good for what.
- maybe different ML levels of skills for the robots (experience points or explicit upgrades)
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Bunker NPC stats:

- hunger is one (get food and water when hunger is 0)
- action points (walking and work makes people tired) -> go to sleep

  -> could introduce like faster work mode where they work faster but are then burnt out

- health to cope with hunger and accidents

- some appearance randomization (skin color, clothes, gender)

- maybe skills according to job participation (get more science points if worked as scientist).

Robots Stats

- health
- attack damage
- critical damage body parts
- experience points (how much damage dealt)

Enemy Stats

- health
- attack damage
- maybe level to see how strong

Kinds of Resources

- electricity
- food
- people
- robots (max number of robots)

Kinds of Guns for Robots

- canon shooting projectiles
- gun shooting full auto, ray cast
- laser beam
- electric beating stick
- knight shield
- double handed sword

Kinds of Towers

- simple turrets having a rotatable part that can shoot at enemies, maybe canon balls to have it physics based

kinds of Upgrades for towers

- maybe faster shooting rate

Technology tree for buildings?

- maybe just upgrades for more production or more space for people

Music / Sound effects

- some background music, different for surface and bunker
- environment sounds like wind, machines, talking of people
- different music when get attacked
- Win music (upbeat trumpets)

AI for pathfinding (Navmesh), bunker people and robots, towers

- they have to find their house, production place
- use elevator and streets
- very simple AI

Missions?

- send an army to some place, sounds like a lot of work tbh

Winning/loose condition Condition

- Bunker has hitpoints, slowly regenerating, get destroyed=> game over, monsters go into bunker, get some screen with running screaming people
- Win. survive all waves?

UI for building stuff, main menu

- some simple scrollable list

kinds of Buildings bunker

- mushroom farm (food but less food? Maybe 2 foods are needed for mensa)
- facility for robot body parts

- gun smith
- facility for producing robots (you need body parts and weapons to produce robots, build them on the surface)
- sleep rooms (let's say 5 slots per house)
- main lobby where people go without a job
- mensa (storing food)
- Human production (produces new human)
- weapon warehouse to store weapons
- bodypart warehouse

kinds of Buildings surface

- photovoltaics sun collector
- towers
- bunker entrance (not buildable)
- crop with glass dome
- scrap yard (assign robots to search area for scrap/metal)
- Robot Charging station (sleep for robots plus house)
- kinds of waves
- smaller waves, bigger ones some announcement like "soon a big wave will attack"
- subwaves bc the wave won't come all at once, right?

Status

— Hunger value (0% -> game over)

-Each people consumes a certain amount of hunger/10s

— Energy value (0% -> unable to build things, All machines on the ground will stop)

-Each robot and building consumes a certain amount of energy／10s

—Building anything requires a certain amount of energy

— Hp for base(bunker) (0% -> game over)

Story/Setting

- you are in a bunker, surface totally radioactive, send robots to do dirty work on surface
- human very safe in bunker, until entrance get destroyed
- setting in some desert wasteland (maybe like Nevada)

Environment Graphics (clouds, night day)

- some wind effects, clouds
- some nice night stars?

Buffs/Effects on buildings

- building facilities near by houses make the sleep last longer
- facilities nearby energy generators make energy less costly
- mensa stores food so farms nearby are faster to get food

How to Produce people?

- make them mate ;) (Fallout Shelter Implementation)
- build them (Nursery)
- 

(buildings／robots...)
- **Design a sort of building called “gene fusion device” which needs the player to send two underground citizens into the device, then the device can produce them**

Graphics / Animation for the NPCs

- walking
- working
- sleeping
- talking
- taking/carrying something
- idle bc of some problem (no more space, no energy)
- taking exercise
- hurted
- death

Behavior of NPCs

- at idle stand or random walk?
- walking to places (using also elevator)
- when working running around and do stuff
- fake talking with other NPCs?
- sleeping
- get clothes that of what they do
- taking exercise
- hurted
- death

Behavior of Robots

- stand still when idle
- do work
- fight against enemies when in vicinity

Behavior of Enemies

- attack either base or robots or towers or nearest
- die

Wave System

- attack waves 3 minutes to be able to concentrate on building stuff

Enemy Types ideas

- spider with turret on it shooting something
- A dog like monsters / looking like boston dynamics dog
- a flying insect thing shooting
- same robots as payers one but in red

Robot Types

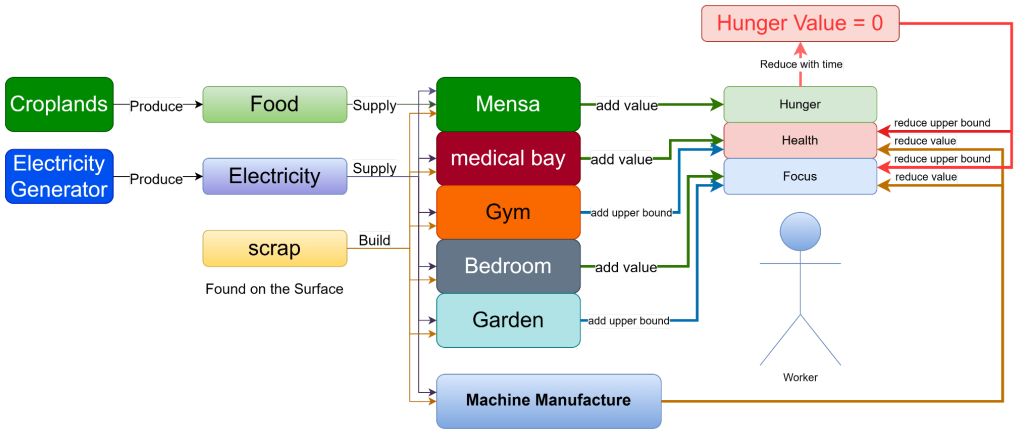
- small robots
- bigger robots looking the same
- fast wheeled robots
- levitating drones

- **Resource**
  - **food:** gained from croplands
  - **scrap:** gathered at the surface by harvest robot
  - **electricity:** supplied by the underground facilities
- **Workers' attributes**
  - **Health**
    - **Effect: Health value** goes zero then workers die
    - **value increase: medical bay**
    - **value decrease:** probability event in **machine manufacture**
    - **upper bound increase: gym** (effect only when Hunger value doesn't equal to zero)
    - **upper bound decrease: BIO electricity generator or Hunger Value goes zero**
  - **Focus**
    - **Effect: Focus upper bound** decides workers' production efficiency and **Focus value** chance of getting hurt during production
    - **value increase: bedroom**

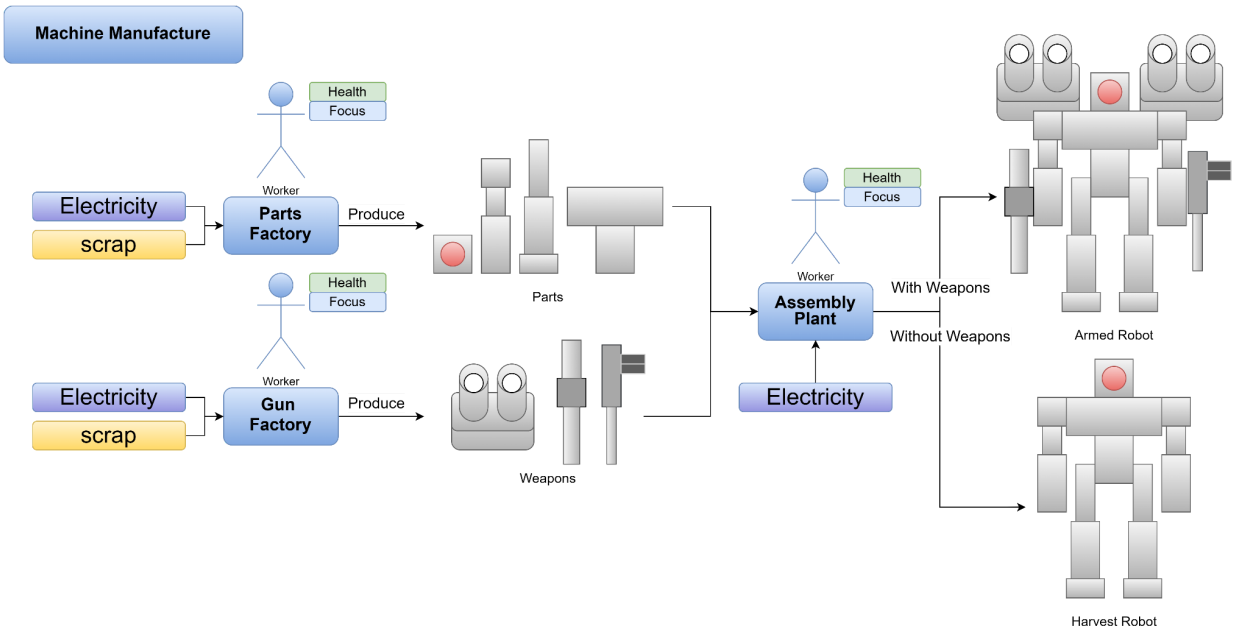
- **value decrease:** with time in **machine manufacture**
- **upper bound increase: garden** (effect only when Hunger value doesn't equal to zero)
- **upper bound decrease: Protein block synthesizer or Hunger Value goes zero**

○ **Hunger**

- **Effect: Hunger value** goes zero then **Focus upper bound** gradually decrease to zero then **Health upper bound** gradually decrease to zero
- **value increase: Mensa**
- **value decrease:** as time goes on



- **Underground facilities**



- **resource generators**
  - **electricity generator**
    - **effect:** produce electricity
    - **construction require:** scrap
    - **operation require:** none
  - **Population generator**
    - **effect:**
      - produce new population
      - the baby will inherit the features of his/her parents
      - the baby will be growing in the container until being mature and becoming a worker ready to deploy; it takes some time to produce a new worker
    - **construction require:** scrap & parts
    - **operation require:**
      - have a male worker and a female worker scanned in the device for a little while
      - producing new population requires considerable amount of electricity and food
  - **BIO electricity generator**
    - **effect:**
      - produce massive electricity when a worker is in position
      - when producing electricity, the worker's maximum health value decreases quickly

        - **construction require:** scrap & parts
        - **operation require:** have a worker in the device
    - **Protein block synthesizer**
        - **effect:**
            - Producing food from indescribable protein sources such as insects and rats
            - decrease a certain amount of workers' **focus upper bound** when **Protein block synthesizers** exist in the underground base
        - **construction require:** scrap
        - **operation require:** electricity

- **survive facilities**
    - **Mensa**
        - **effect:** reduce people's hunger when have food
        - **construction require:** material
        - **operation require:** consume electricity & food when people are eating in the **Mensa**
    - **medical bay**
        - **effect:** recover people's health
        - **construction require:** scrap & parts
        - **operation require:** consume considerable electricity when healing people
    - **gym**
        - **effect:** increase workers' health upper bound
        - **construction require:** material
        - **operation require:** little electricity
    - **bedroom**
        - **effect:** recover workers' energy
        - **construction require:** material
        - **operation require:** little electricity
    - **garden**
        - **effect:** increase workers' energy upper bound
        - **construction require:** material
        - **operation require:** little electricity

- **machine manufacture**

- **parts industry**
  - **parts factory**
    - **effect**:
      - produce parts for assembly robots and upgrade automatic factory
      - small chance to cause worker injure
      - high chance to cause worker injured when increase production speed
    - **construction require:** material
    - **operation require:** consume 1 electricity
  - **automatic parts factory**
    - **effect:**
      - produce parts for assembly robots and upgrade automatic factory
      - Fixed production speed
    - **construction require:** needs **parts** to transfer from **parts factory**
    - **operation require:** consume 2 electricity
- **weapon industry**
  - **normal gun factory**
    - **effect:**
      - produce light guns that can be equipped by small and big robot
      - small chance to cause worker injure
      - high chance to cause worker injured when increase production speed
    - **construction require:** material
    - **operation require:** consume 1 electricity
  - **automatic normal gun factory**
    - **effect:**
      - produce light guns that can be equipped by small and big robot
      - Fixed production speed
    - **construction require:** needs **parts** to transfer from **normal gun factory**
    - **operation require:** consume 2 electricity
  - **advanced gun factory**
    - **effect:**
      - produce heavy guns that can only be equipped by big robot

        - small chance to cause worker injure
        - high chance to cause worker injured when increase production speed
      - **construction require:** upgraded from two neighboring **normal gun factory**
      - **operation require:** consume 2 electricity
    - **automatic advanced gun factory**
      - **effect:**
        - produce heavy guns that can only be equipped by big robot
        - Fixed production speed
      - **construction require:** needs **parts** to transfer from **advanced gun factory**
      - **operation require:** consume 3 electricity

- **robot industry**
  - **light assembly plant**
    - **effect:**
      - produce small robot and harvest robot
      - small chance to cause worker injure
      - high chance to cause worker injured when increase production speed
    - **construction require:** material
    - **operation require:** consume 2 electricity
  - **automatic light assembly plant**
    - **effect:**
      - produce small robot and harvest robot
      - Fixed production speed
    - **construction require:** needs **parts** to transfer from **light assembly plant**
    - **operation require:** consume 3 electricity
  - **heavy assembly plant**
    - **effect:**
      - produce big robot
      - small chance to cause worker injure
      - high chance to cause worker injured when increase production speed
    - **construction require:** upgraded from two neighboring **light assembly plant**

        - **operation require:** consume 3 electricity
- **automatic heavy assembly plant**
    - **effect:**
        - produce big robot
        - Fixed production speed
    - **construction require:** needs **parts** to ****transfer from **heavy assembly plant**
    - **operation require:** consume 4 electricity