Design Document
- OIL -

Table of content

1. Design history

This document covers decisions and goals of the project. The document will be updated by the team members under supervision of the team leader, Hampus Pieslinger.

1.1 Versions

Since this document is being produced continually during the whole process, the team will use *Google Docs* in order to work on it together in an agile fashion. When major changes are to be taken, a version backup will be created. The following section covers details of the changes being made to the document over time.

Name	Comment	Date	Version
Hampus Pieslinger	Created document	2018-09-17	1.0
Martin Mossberg Hampus Pieslinger	Filled out the basic layout	2018-09-21	1.1
Everyone	Filled in -Design history -Goals and vision -Marketing -Gameplay til 4.3	2018-09-21	1.2
Everyone	Filled in -Story & art style -Game world -Technical specifications -Tools -Team	2018-09-24	1.3
Simon	Added: -Morality desc -Building desc -Event desc	2018-09-24	1.4
Simon	Added more events	2018-09-28	1.4.1
Simon	Added more events Added main menu design and explanations	2018-10-3	1.5
David & Anton	Added technology tree structure	2018-10-17	1.6

Martin, David, Hampus, Dennis, Simon & Anton	Cleaning up and revising. Added sections about changes in mechanics, final buildings, the tool, events and the final tech-tree.	2019-01-31	2.0

2. Goals and vision

Our goals for the project are listed below:

- The game we are creating is a “survival real time strategy”-game. In this genre the gameplay is split into sessions and we are aiming for a total game time of 2-4 hours.
- The project will be in a finished state when all functional and non-functional goals are fulfilled.
- Naturally the game is supposed to be considered fun for the target audience.
- We strive to create a challenging game which is user-friendly but hard to master.

2.1 The game

The game takes place in a post-apocalyptic world where you as a leader control a society of people. Because of global warming the Earth is overheated and Europe is a big desert.

2.2 Gameplay

The core mechanic is to control resources and spend them on the most critical needs of the society. The player will be presented with moral choices that will impact the society in the future. As the game progresses the difficulty of the game increases.

2.2.1 Aesthetics

We want the player to really feel the heat of the dystopian world. The desperation of the survivors should be conveyed in order for the player to get invested in the story and the people. This can be shown with the music, visuals, voicing and general style of the game.

3. Marketing

Oil will be developed as a non-commercial game without any official marketing. Thus this section will cover the pitches and the oral presentations.

3.1 Presentations

The game will continually be presented to peers and receive feedback. Initially, the vision was presented in a first pitch.

3.1.1 First pitch

The pitch was presented to a panel of external people from the industry. It went well but there was room for improvement. According to the audience, we did not really convey the general idea of the game. The panel had to ask us about the game concepts in order to get the full picture. We also received criticism about how we structured the pitch. This contradicted what we had learned in the previous exercises.

The panel assumed that we had already written this document prior to the pitch and that we had established all of the gameplay-related mechanics. This resulted in some confusion and inconsistent answers.

In summary we focused on the wrong aspects of the pitch which will be a lesson for further endeavours.

3.2 Target audience

The target audience will be gamers that enjoy a slower pace with focus on immersion, strategy and challenging decisions. We aim for a bit more mature players.

4. Gameplay

4.1 Game description

Oil is inspired by games like *Frostpunk*, *Banished* and *This War of Mine*. The player begins with an oil pump and a smaller population of survivors. Through construction, the distribution of labour and resource-management the player guides the society to either doom or survival.

4.2 Game mechanics

- The player can construct buildings from a list and the workers will build the building on their own.
- After clicking on a building, the player can assign workers to collect resources or interact with the building.
- Some buildings will produce resources. Others will provide other benefits such as shelter from the heat and education.
- The terrain and the resources will be procedurally generated.
- The environment is the big enemy and when the weather gets more and more extreme, the player has to adapt.

- Moral choices will be presented in the form of pop-ups where the player can make a choice.
- Technology tree will be implemented. More on this below.

4.2.1 Buildings

The normal way of upgrading: There is a finite amount of workers which can be assigned to a resource producing building. Upon upgrading such a building, the maximum number of workers assigned to it decreases. While the maximum amount of resources produced stays the same. See section 5 for pictures of models.

- **Bar:** Assign workers to keep the building open. Workers will enter it at random if it is and get a moral boost.
- **Canteen:** Produces cooked food from raw food and clean water from dirty water. Only operates if workers are assigned to it.
- **Knick-knack store:** Assign workers to continually produce trinkets and accessories for the population. This boosts moral.
- **Oil pump:** This building will exist at game start. It produces oil as a resource continuously without any workers. It was initially thought to consume water as a way to cool down but this idea was abandoned.
- **Residence:** This building provides living quarters for the current and future population. It doesn't produce any resource, but provides a boost to the inhabitants moral if they have a place to live in. Population can be viewed as a resource. Upon upgrading this structure more living space will be available, allowing for more people to populate that structure.
- **Resource Depot:** These structures contain the resources the player collects and are required to be upgraded in order to contain more resources. From this building, the player can assign woodcutters and hunters to the forest and miners to the old ruins where steel can be harvested.
- **Sawmill:** This building produces wood by assigning workers (from the population) to this building. Normal upgrade. A truck travels back and forth to the forest. This has no technical use but serves the immersion.
- **School:** Finite capacity to teach pupils at any one time. Requires an assigned, grown-up worker. Normal Upgrade. When pupils are done in school they become skilled workers, able to take on more complex jobs.
- **Spaceship:** Ruins of a spaceship exists at the start of the game. This building can be upgraded five times, requiring resources, time and skilled workers. The more workers the faster each upgrade will progress. The player wins if level five is reached.
- **Steel Refinery:** Produces steel by assigning workers to the building. Normal upgrade. A truck travels back and forth similar to the saw mill.
- **Water well:** At first, workers need to fetch water from the well and deliver it to the Resource Depot. Upgraded version is automated and workers are assigned to it where they work continuously.

4.2.2 Morality

Each individual in the society controlled will have a measure of happiness, called morality. This measure is the result of what we internally reference as the morality system. The morality of the individual is measured using the resource abundance of food, water and if the individual has access to a home of their own. Should the morality of a person decrease past a threshold, the likelihood of negative population based events increase. If the morality of the colony is kept high, the likelihood of positive population based events increase.* Global moral is the average morale of the population. It is mostly used as buffs and debuffs in order to avoid unexpected behaviour in the individuals of the population.

4.2.3 Events System

In game events are GUI based actions which sometimes require decision making by the player, due to some reason or another. These are all text based.To make sense of these choices, they're divided into environmentally based and world based events. The environmental based events the player has some control to affect, mainly through the morality system. The world events are events in which the player has no ability to affect the outcome. World events do not spawn within the first
All events starts off neglectable but their intensitivity and impact increase over time until such a time, the player will not be able to survive anymore and the game becomes unbeatable. Thus the events are indirectly also a limitation as to how long one play session can last.

The events will be handled by a finite state machine as the system incorporates a number of states and steps. Further, the system tries to select events based on the resources of the player. Specifically it looks at the highest and lowest resource, and the highest and lowest rate of income per event. It then checks the prerequisites which vary from resource flags to count down timers and cooldowns. Then discards the ones that won't work and selects a random one from the ones that do.

4.2.3.1 Environmental Events

- Rodents in the larder. Rodents has found an old entrance to a the storage unit and has eaten a percentage of the food supply. The purpose of this event is to provide the player with a challenge. The player chooses between plug the hole or rats are a great source of protein which will give the player raw food, or don't do anything for a morale debuff.
- Add population is an event which adds population to the player. There is only a time restriction before this event can be triggered. The options try to balance an increasing number of population against an increasing initial resource toll of food and water.
- Contaminated water will present the player with three options how to handle a contaminated water reservoir. At the cost of various resources the player can choose to clean and reboil at the cost of wood. This action will cost wood to gain clean water. Option two will have you only clean the reservoir which will leave you with dirty water. And option three will use oil to burn in order to reboil the water.

- Destroy building. When this event is active the player can choose to spend resources at an attempt to save a collapsing building. If the player do not have enough resources a building will be destroyed.
- Feed the poor presents the player with a moral choice to either give food away or keep it at the expense of global morale. The player options are limited to giving the poor some cooked food, or some raw food for a smaller morale debuff- And lastly, give nothing for a big hit to morale
- Harsh Desert winds is another event which simply provides a challenge to the player much like rodents in the larder. The player will have to decide whether to use wood or steel to repair a fictional building. If the player chooses the option of doing nothing, a penalty to the global morale will pursue.
- Low productions is an event where a production building gets damaged. The first choice is to shut down the building completely and repair it as fast as possible. Another choice is to repair as you go along, producing 40% of the normal resource but at a slower pace. The last option is to no repair the building, continuing to produce resources at 40%, but the production building will eventually break down.
- Machine Repairs pits the player to decide how to go about food processing with some malfunctioning machinery. Primarily this event targets the players oil reserves. But as a second option, does allow the player to use a lot of wood for the same purpose. Finally, of course, the player can choose to do nothing at all, resulting in a penalty to the global morale.

4.2.3.2 Population Events

- The draught has destroyed the harvest. Decision: Ration food = small morality penalty during a long period. Do nothing = no immediate penalty, but if the food runs out normal penalties apply.*
- Sabotage. Due to low poor mood a worker has damaged a building. Severe punishment = loses a population and this event has a less chance of happening if low morale. Or mild punishment = temp moral boost for leniency but this event has a higher chance of occuring. *
- Slacking. Due to low moral a worker has taken the day off. Force individuals family to work = moral takes a hit but production increases.*
- Protests. Moral amongst a number of your population is displeased and refuse to work in protest.*
- Riot. Moral is now so low a large number of the population takes to the street to express their anger.*

4.2.3.3 World Events

- Eclipse. When an eclipse is active, the overall temperature is decreased and will lower the moral of the survivors. If the player has upgraded clothes for the survivors this can counteract the effect.
- Fire. Due to a lack of rainfall, a random amount of the players wood storage. Damages an adjacent building until fire has been put out.*
- Storm. Does provide water as rain, but increases chance of buildings and people getting damaged. There is also a small fire hazard.*

- Draught. Due to a draught, wells and water pumps temporarily loses all function. If the player has built and stored water in a reservoir, negative effects can be negated for as long as there is water stored.*
- Sandstorm. When this event is present the sandstorm can both kill workers and destroy buildings. The duration is set to the world difficulty setting.

4.2.4 Final Event System

There were great ambitions about this event system. With more interconnected events and event chains. This could have been possible with better planning. The event system was more complicated to build than previously thought. Finally we had to settle for a much simpler version of what was originally envisioned due to time constraints and differences in vision.

No population events were ever made, instead the workers will stop working as their morale goes down. The original idea was to have actual actions by the population as implicit events. But as the game evolved, other areas of the game had to be prioritised.
Fire and Draught world events were also skipped because they would have required further visual implementations which we did not feel we had the time to invest in.

4.3.4 Technology tree

The technology tree will feature technologies to be researched in order to improve on existing buildings and units.

- A technology will cost resources and will take a certain amount of time before it is researched.
- When researched, the player is able to build/upgrade new mechanics in the game.

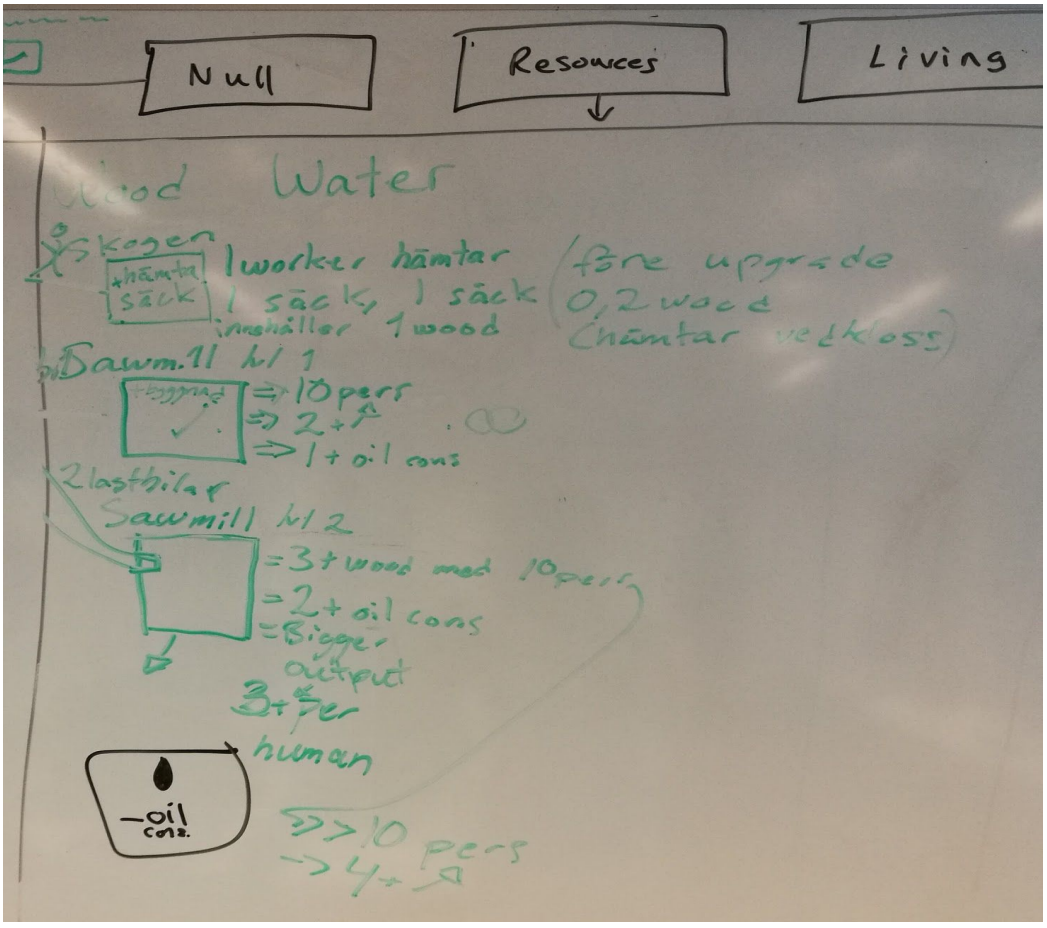
4.3.4.1 Technology tree structure

There are two main technology categories, resources and living.

- Resources
    - Wood/Steel
        - 1. Workers receives a larger bag for carrying.
        - 2. Unlock saw mill building level one.
        - 3. Unlock saw mill building level two.
        - 4. Oil efficiency.
    - Water
        - 1. Workers receives a bucket carrying.
        - 2. Unlock water building level one.
        - 3. Unlock water building level two.
        - 4. Oil efficiency.
    - Food
        - 1. Improve hunting skills.
        - 2. Increase canteen efficiency

        - 3. Add the option to buff up food consuming to temporarily increase moral.
    - Population
        - 1. Better beds.
        - 2. House electricity.
- Living
    - Clothes
        - 1. Better clothes.
        - 2. Shoes to increase walking speed.
        - 3. Unlock accessory/jewelry store.
    - Education
        - 1.Unlock school building.
        - 2a. Increase class size.
        - 2b. Playground for students.
        - 3. Academy.
    - Recreation
        - 1. Unlock bar building.

Technology tree sketch.



4.3.5 Final technology tree

Resources tab in the final technology tree.

Living tab in the final technology tree.

The final version of the technology tree contains the intended technologies listed in the described tree structure. Although there was one change made to the recreation tier under

the living tab. We added the technology “Residence lvl 2” which increases the total amount of humans that can live in a house at the same time to twice as many.

4.4 Mechanics in the final version

Some mechanics had to be scrapped in the final version due to time limitations. For instance, the procedural content generation of the terrain was abandoned during the final part of the production phase. The plan was to let the tool produce this but since the purpose of the tool was changed to QA analysis we decided to use a handcrafted level in the end.

Initially, the game was thought to be endless (until the player simply lost the game because it was too tough) but we added a feature where the player has to restore and develop a spaceship in order to leave the Earth. This feature worked for the final release but could use some polish. For instance, we wanted each stage of this process to be represented by the spaceship in different stages of construction. In the end, the spaceship always uses the same model but the mechanics of its restoration and progress are working.

But everything else concerning building and population management eventually made it to the final release: the player can build buildings, assign workers to tasks, upgrade and repair them. Basic human behaviour was implemented resulting in the need to eat, drink and sleep for the population.

By far the most major issue was that we never had time to develop a proper tutorial. Since the game has a lot of complex features, many players never even understood how to upgrade buildings properly. Had we had the time for it, we would develop one much earlier.

4.5 Rules

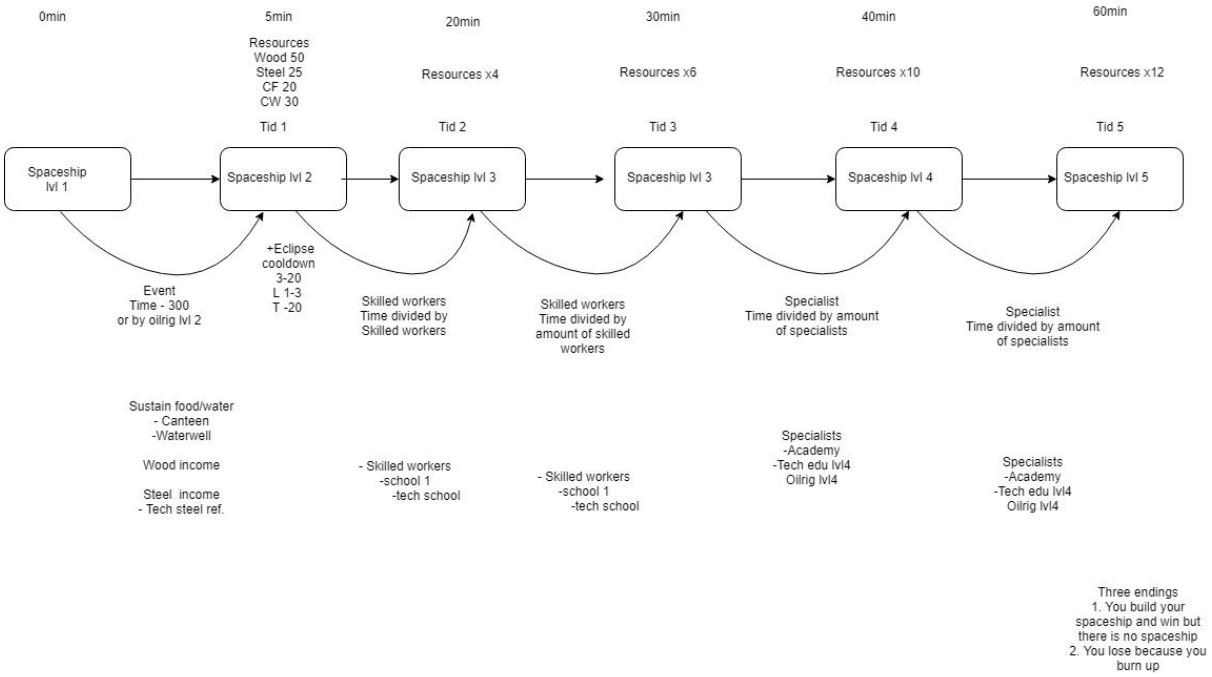
The game will feature two modes: survive as long as possible or build a rocket in order to escape. These basic game rules are listed below:

- A building must be created on a grid and cannot overlap other buildings or resources. The player needs to have the required amount of resources in order to build it.
- Buildings can be upgraded x times and their efficiency scales accordingly. For instance, the player can upgrade a sawmill in order to produce the same amount of wood with less workers.
- More survivors will add to the population through birth or arriving refugees. These refugees will arrive at a variable rate.
- More rules will be added as time progress.

4.6 The path to victory

When the game mode to build a spaceship was added in order to win, we created a path for the player to follow in order to win. The player could deviate from it in order to develop other parts of the community but to win the game before the climate got too harsh, the spaceship would need to be fully upgraded and restored. To do this, the player had to gather resources, develop the Oil Rig and upgrade technologies before the option to advance the spaceship to the next stage was enabled. This had to be done five times and the resource

cost and technology requirement increased. When level five was reached the player won the game.



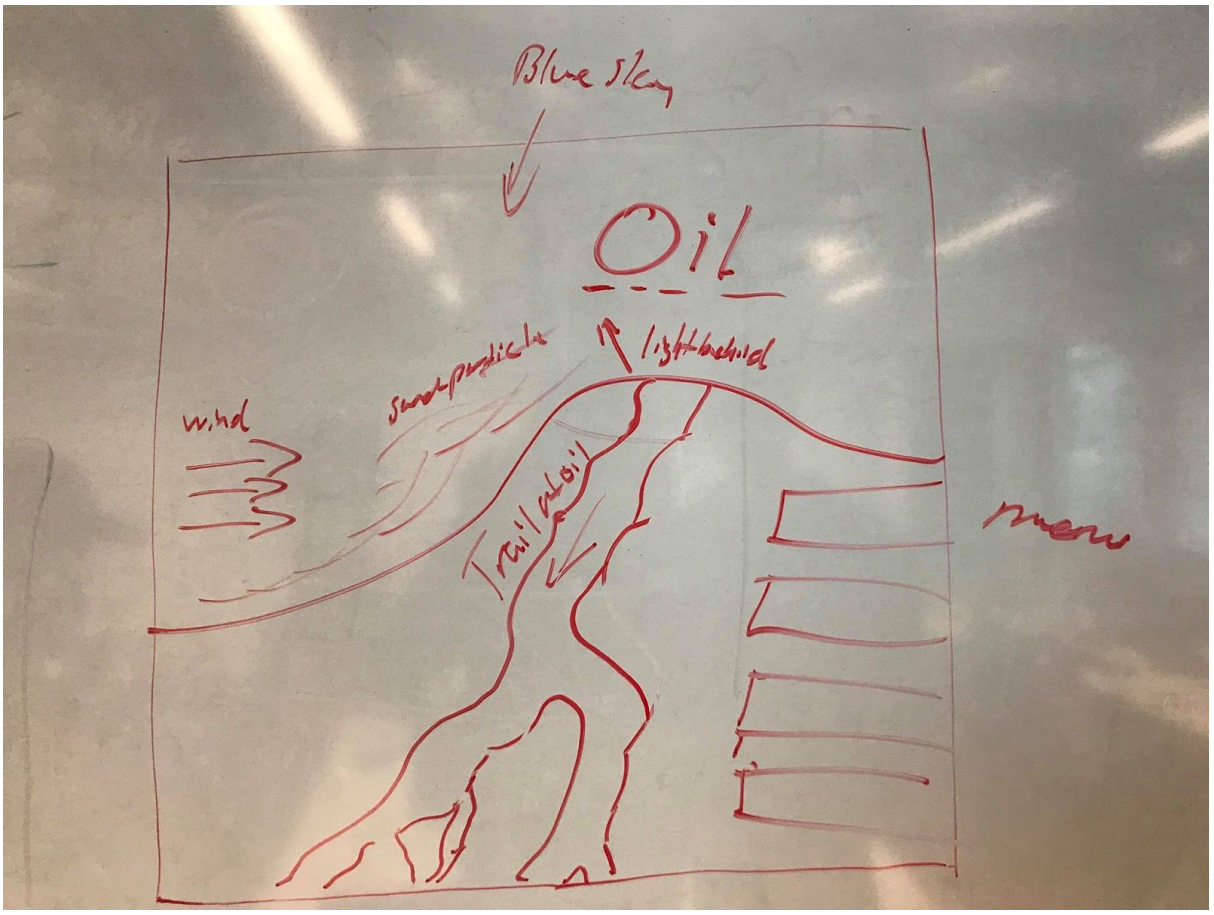
4.7 Level design

The game was initially thought to encompass different, procedurally generated maps, but this idea was scrapped due to time limitations and instead featured one map with a handcrafted terrain. In the centre, the oil rig and the resource depot were located and sites such as a forest (wood), old skyscraper (steel) and other props were placed around it. Enough room to build the entire settlement was also left out for the player to build as he/she wished.

4.8 HUD/UI/Menu

The HUD/UI should be self-explanatory and easy to use. Resources will be displayed and the amount of available survivors. The UI also displays survivors needs such as hunger, thirst and housing. In the the Middle left section is the information box HUD. It displays built buildings, events and death of the population.

Mainmenu sketch.



Mainmenu finished.

Will require a new scene. The main menu will focus on a calm, warm, sunny feeling with a satire aspect pointing towards a trail of oil that is tracing the sand.

The background will consist of a desert sand hill with a blue contrasting sky. On top of this hill there will be a trail of oil, slowly running down towards the player, periodcly reflecting sunshine of the sun which is placed above and behind from the perspective of the menu. Resulting in a lit up, warm scene.

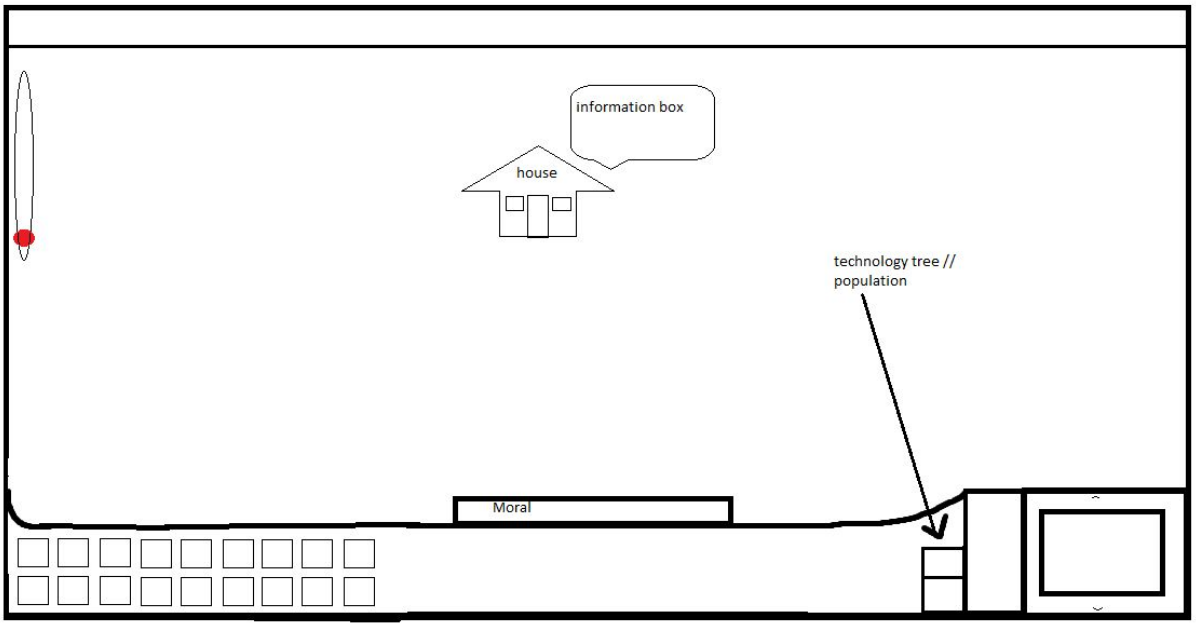
To sprinkle this scene with some further life there will be a particle effect to simulate how the wind blows sand up the sand hill. Behind this hill there will be a second light, which will light up the particles i the effect in order to make these stand out, further adding to the sensation that this place would be a very warm place to be. The actual menu options and the design of these are as of version 1.5 of this document not decided.

The exact music has not been decided upon, but the current consensus suggests either a very calm background music, in the lines of Diablo 2s act 1 music track. Or no background music at all, simply add a wind sound to the wind effect, possible some bubbly sounds from the trailing oil.

4.9 In game GUI

4.9.1 Concept Style

These are pictures used to gain a shared goal for the design of the UI.



4.9.2 Finished gui

The finished GUI in the final product.

5. Story & Models

5.1 Story

“The year is 2250 and global warming has become a huge presence. Europe is now a desert where humans have to fight for their survival”.

5.2 Art style

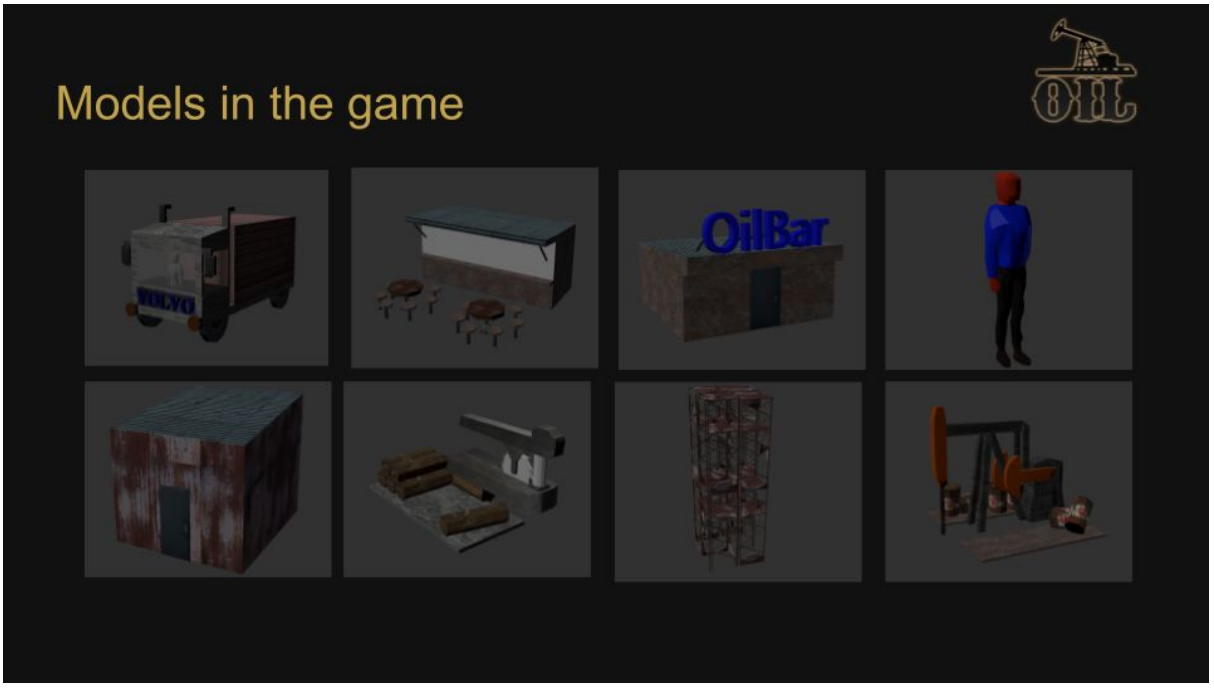
Post-global warming environment with inspiration from the *Mad Max*-universe. Resulting in a hot climate topography consisting of desert and savannah. With some humour included through the *Mad Max*-inspirations. Lighting and post-processing effects will be used to accomplish the feeling of the warm and dusty environment. To ensure 60 fps we’re limiting the models to a low polygon count.

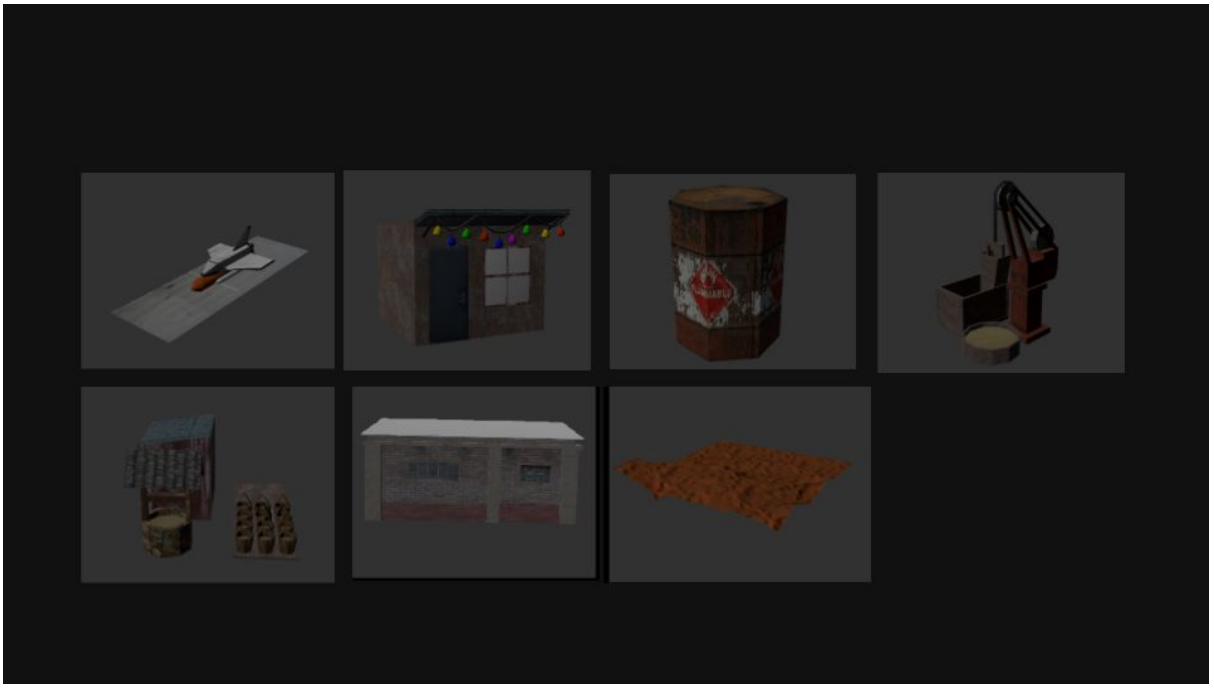
Inspiration for the desired look.

5.4 Models

All the models made.

5.4 Models in the game





6. Game world

The game will be played in a fictional world where it has been exposed to eminent heat for some time.

6.1 World overview

The game will be played in a single game level. This map will contain all the resources and challenges the player will need in order to enjoy the game. The player will always begin with an oil rig in the middle of the map. The resources however will be randomly scattered across the map, which will create diversity with each new game played.

6.2 Printscreen of an early stage in the game, finished product

7. Technical specifications

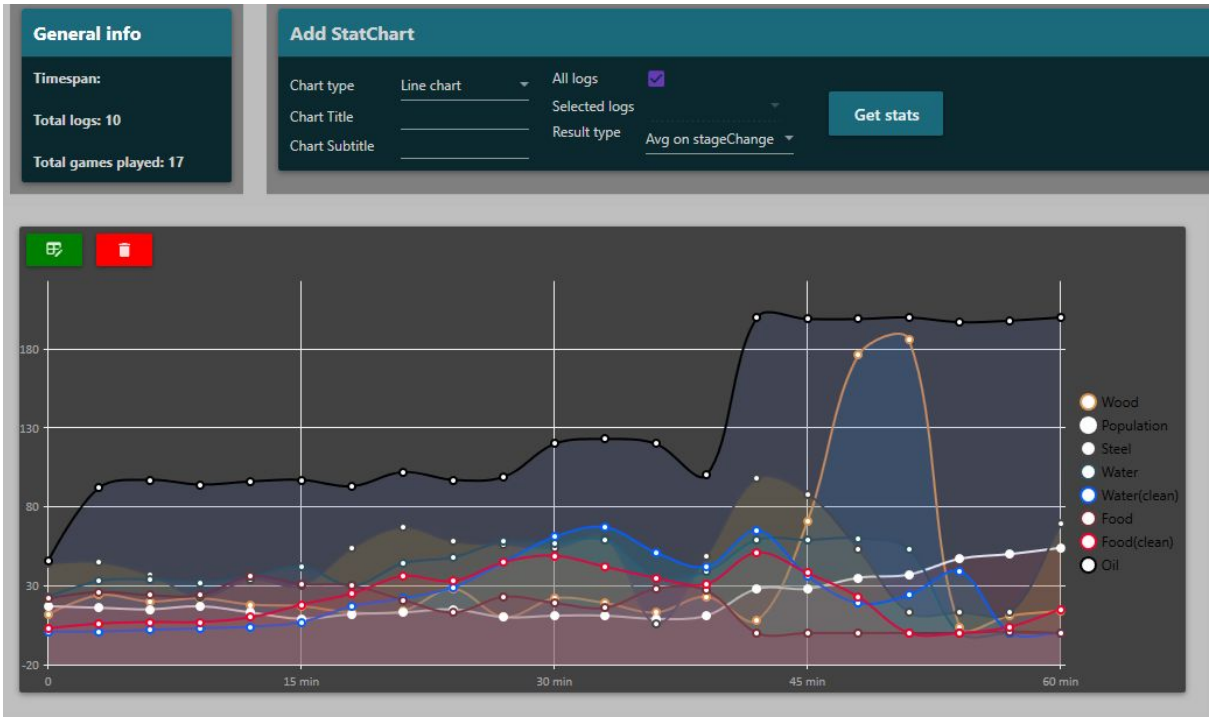
7.1 Platform

Our game will be developed for pc exclusively. The genre requires the player to interact with buildings and other resources in a game view where it makes no sense to use a controller.

8. External tool

Apart from the game itself, an external tool will be developed in order to be used during the QA phase. The purpose of the tool is to record parameters during playtests and compile them into statistics. This will be used to tweak and fine-tune the game to make it challenging enough while not being unplayable.

The tool will be developed externally outside of *Unity* and will collect text files with information on the current playthrough. All parameters are yet to be decided (and will probably need a lot of tweaking) but things such as how much resources the player had, how long the session was etc. will be present.



8.1 Final product

The final version of the tool was used as a data analyser during the testing. During set intervals the game collected data about resources, time played, population and spaceship stage. The game's output was a log file in .xml-format and could be opened in the tool where it was analyzed. Everything was presented in graphs representing the average resources on each timestamp for the selected log files. It turned out to be quite useful since it helped us to see what stages of the game took too long time and needed too much resources.

Since the tool was finished early on in the production phase, it could be used effective during the testing. Because of this we were able to tweak aspects that the tester couldn't identify while playing the game.

9. Team

The team consists of six developers with experience in different areas, apart from common programming skills in multiple languages. Everyone are used to work with *Unity* and C# in order to develop games. Some team members are versed in 3d-modelling tools such as *Maya*, or music production software which will also be used during development. The team consists of the following members:

9.1 Martin Mossberg

Roles:

- Lead programmer.
- Team leader.
- Music composer.

- UI designer.

9.2 Hampus Pieslinger

Roles:

- Documentation lead.
- 2D Artist.
- Tester.

9.3 Anton Björkman

Roles:

- Art lead.
- Music composer.
- Animator.

9.4 Dennis Nilsson

Roles:

- Programmer.
- Lead QA.

9.5 David Terins

Roles:

- Programmer.
- UI designer.
- External tools developer.

9.6 Simon Ohrberg

Roles:

- Gameplay programmer.
- Programmer.