# Requirements and Analysis Document

for


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This version overrides all previous versions.

# 1 Introduction

The purpose of the project is to create an entertaining arcade game in 3D. The game will be taking place in outer space and is therefore called *Not Enough Space*. It is divided into two separate parts, whereas the focus will be on finishing the first part and if there is time also develop a second part. The aim of the game is to collect, and keep, as many cows as possible which will generate points.

## 1.1 General characteristics of the application

The application will be a cross-platform offline game for one player. It is developed for desktop use, standalone, with a graphical user interface and an arcade game concept. Below follows a basic description of the game.

**Part 1: Collect the cows**
The player is in control of a spaceship orbiting the planet. On the planet there is cows walking around. By navigating above a cow and activating the tractor beam the cow starts to hover towards the ship where it will be added to the storage and generate points. To make it more difficult the player can happen to collect junk such as barns or trees which will waste beam energy. It is also possible for the cows to flee from the spaceship and an angry farmer will defend his cows by throwing hay forks towards the ship which will harm the ship by decreasing the health bar. The same goes for satellites that hit the ship while orbiting the planet. If the health bar is emptied the game will be over. There will be power-ups orbiting the planet as well so it is possible to increase both the health and the energy bar.

The player controls the ship with four keys, one for each direction. Two keys for rotation and the blank space is used to activate the tractor beam. It will be a time constraint of 2 minutes for the player on the planet.

***Part 2: Transport the cows (to be implemented)***
*The player is in control of the spaceship and will try to navigate through an asteroid field to reach the home planet without running out of life or losing all the cows. The spaceship can move in four directions and rotate to avoid the asteroids. The same keys as in part one will be used to control the spaceship. When colliding with an asteroid the spaceship will loose some cows, depending on the extent of the crash, and also the life bar will be reduced. If it is a massive crash the ship will explode and the game is over.*

*The weight of the storage will make the navigation of the ship harder by slowing it down. It is possible to lose weight by shooting out the last collected object from the storage towards the asteroids. It will be a visible storage of the last five objects collected at the side of the screen, and the cows will be included in the last collected objects.*

## 1.2 Objectives and success criteria of the project

The following criterias should be fulfilled for the project to be considered successful:

- The spaceship should be able to navigate around the planet.
- The spaceship should be able to collect cows with the tractor beam, which will generate points.

- The spaceship should be able to collide with satellites and power-ups that orbit the planet.
- When the time is up the game is over and a screen with high score will appear and it should be possible to restart or exit the game with the scores saved.
- The application should have a 3D-GUI and 3D navigation.

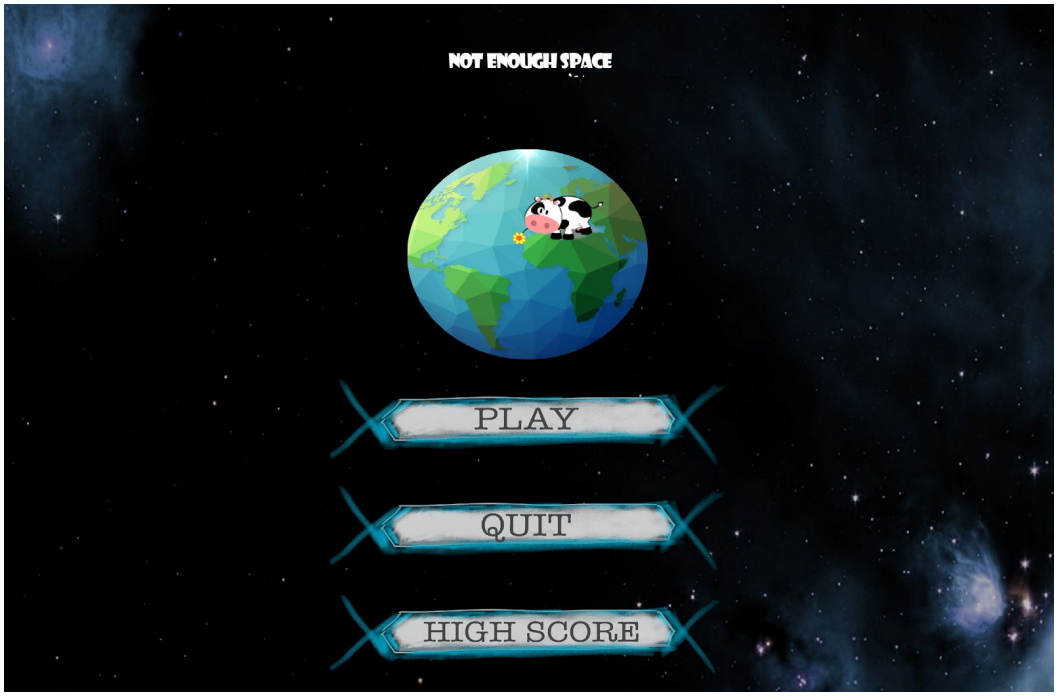
## 1.3 Definitions, acronyms and abbreviations

Round - one round inside the game.
Program - the application itself.
Beam - “Tractor beam”, the classic UFO abduction beam.
Power-up - Collectible item that charges the ship’s energy or restores health.
*Phase/Part - used interchangeably and refer to the two different phases of the game.*

# 2 Requirements

## 2.1 User interface

### 2.1.1 Main Menu




### 2.1.2 Gameplay

### 2.1.3 Pause Menu


### 2.1.4 Highscore View

## 2.2 Functional requirements

The player should be able to:

1. Start a new game
2. Play the game
    a. Navigate the ship around the planet.
    b. Collect cows and barns with the tractor beam.
    c. Get hit by satellites and hay forks from the farmer.
        i. Lose the game by reaching zero health.
    d. Collect powerups that:
        i. Restore health.
        ii. Restore energy.
    e. Open pause menu and choose by following:
        i. Restart
        ii. Return to the main menu.
        iii. Resume game
3. See the high score screen when game is over and choose by following:
        i. Play again
        ii. Return to main menu
        iii. Exit the game

In the main menu, it should be possible to:

1. Start a new round.
2. Exit the program.
3. Go to high score screen.

*In the second phase, it should be possible to:*

1. *Navigate the ship to avoid the incoming asteroids.*
2. *Hit asteroids and take damage or lose the game.*

### List of Use Cases, ordered by priority:

Use cases followed by a number indicates that the use case is for the corresponding phase.

Phase 1 Phase 2 Pause menu Main menu

1. Navigate
2. Activate beam
3. Deactivate beam
4. Beam (continuous)
5. Finish round
6. Collide with satellite
7. Chase cow
8. Start round
9. Show highscore
10. Exit program
11. Pause round

12. Resume round
13. Quit round
14. Restart round
15. Get chased by farmer
16. Get attacked with hayfork
17. Pick up powerup

*18. Navigate 2*
*19. Crash*
*20. Finish round 2*
*21. Phase transition*
*22. Shoot*
*23. Wormhole*
*24. Boost*

## 2.3 Non-functional requirements

### Usability

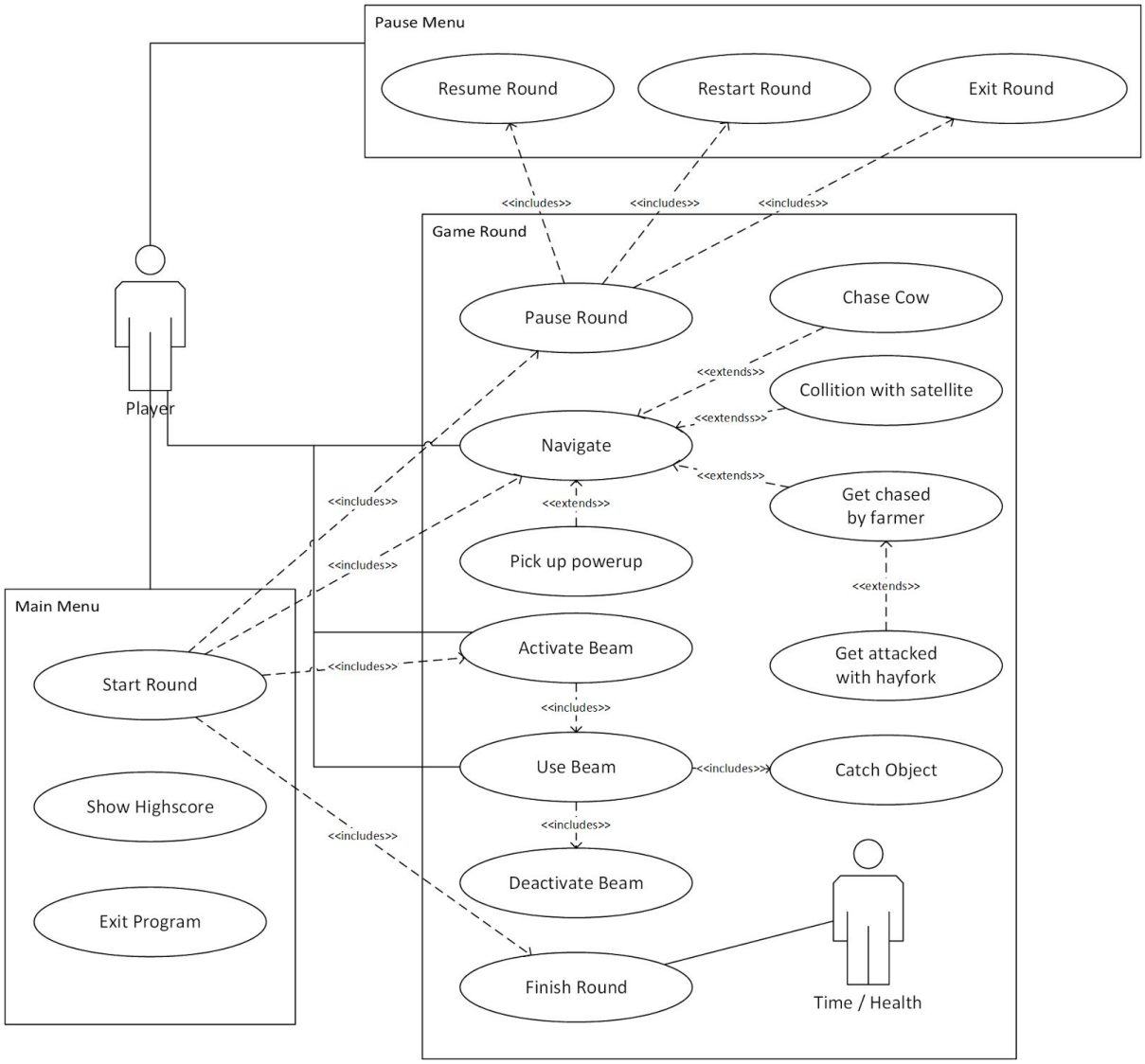
It should be very easy to understand what to do and how to play with just basic computer knowledge. No explicit manual should be necessary , but a non-intrusive instruction display may be considered. The time between running the application and starting a new round should be minimal.

### Technical

To maintain platform independence and to minimize backend programming, the application will be written in Java using the 3D game engine JMonkeyEngine. The final product will be shipped as a .jar containing the class files, resources and necessary .dll-files.

The game mechanics are designed for a 3D view. This means that, while the model should be separate from the view, no effort will be made to keep the model usable in other environments such as 2D or text-based views.

# 3 Use cases




## 3.1 Implemented use case listing

## Use Case: Navigate

**Summary:** The actor is navigating her ship in phase 1.
**Priority:** high
**Extends:** Start Round
**Includes:** -
**Participants:** Actor, System

NOTE: The keys called “the arrow keys” below don’t have to be the actual arrow keys of the keyboard, but will correspond to the usual purpose of these.

**Normal flow of events**

Actor moves the ship sideways/back- and forwards with the arrow keys. (The movement described is relative to the surface of the planet, so each movement is actually along a sphere outside of the planet's surface.)

| | **Actor** | **System** |
|---|---|---|
| **1** | Presses one or more of the arrow keys. | |
| **2** | | Ship object is moved in the (possibly combined) direction of the arrow(s) that is(/are) pressed. It accelerates quickly up to top speed.<br>The ship continues to move as long as the user keeps the key(s) pressed. |

**Normal flow of events 2**

Actor stops moving the ship by releasing the arrow key(s).

| | **Actor** | **System** |
|---|---|---|
| **1** | Releases all the arrow keys. | |
| **2** | | Ship object slows down to a complete halt. |

**Normal flow of events 3**

Actor rotates the ship (around a local y-axis) with the rotation keys.

| | **Actor** | **System** |
|---|---|---|
| **1** | Presses one of the rotation keys (LEFT or RIGHT). | |
| **2** | | Ship object is rotated in the direction corresponding to the users key press. The rotation speed has a very quick acceleration phase until it reaches a constant level. The ship continues to rotate as long as the user keeps the key pressed. |

**Normal flow of events 4**

Actor stops rotation of the ship by releasing the currently pressed rotation key.

| | **Actor** | **System** |
|---|---|---|
| **1** | Releases the rotation key. | |

| | | |
|---|---|---|
| **2** | | The ship object's rotation decelerates quickly until it comes to a complete stop. |

# Use Case: Activate beam

**Priority:** High
**Extends:** Start round
**Includes:** Use beam
**Participants:** Actor, System

**Normal flow of events**

| | **Player** | **System** |
|---|---|---|
| **1** | Presses spacebar | |
| **2** | | Starts playing "sonic" sound and beam becomes visible |
| | | See **Use beam** |

# Use Case: Deactivate beam

**Priority:** High
**Extends:** Start round
**Includes:** Use beam
**Participants:** Actor, System

**Normal flow of events**
Empty beam is deactivated

| | Player | System |
|---|---|---|
| 1 | Releases spacebar | |
| 2 | | Stops playing "sonic" sound and beam turns invisible. |
| 3 | | Checks for any object still hanging in mid-air. |
| | | No objects in mid-air. |
| 4 | | Beam energy level starts to increase with constant speed. The on-screen energy meter is adjusted accordingly. |

**Alternate flow:**
Beam carrying objects is deactivated

| | Player | System |
|---|---|---|
| 1 | Releases spacebar | |
| 2 | | Stops playing "sonic" sound and beam turns invisible. |
| 3 | | Checks for any object still hanging in mid-air. |

| | | |
|---|---|---|
| | | Objects in mid air is released and fall to ground with realistic gravity. As it falls it gradually regains its original size. |
| 4 | | Beam energy level starts to increase with constant speed. The on-screen energy meter is adjusted accordingly. |

# Use Case: Use Beam (continuous)

**Summary:** The user presses spacebar to beam cows below the spaceship
**Priority:** High
**Extends:** Start Round
**Includes:** Activate beam, Deactivate beam
**Participants:** Actor, System

**Normal flow of events:**
The beam is active while no object is in range and beam energy does not run out.

| | Actor | System |
|---|---|---|
| 1 | Activate beam | |
| 2 | | Check for objects below spaceship within reach of beam. |
| 3 | | No object found. Beam still active. |
| 4 | | Beam energy is reduced by an appropriate amount. The on-screen energy meter is adjusted accordingly. Energy is not yet empty. |

**Alternate flow:**
The beam is active while no object is in range and beam energy runs out.

| | Actor | System |
|---|---|---|
| 1 | Activate beam | |
| 2 | | Check for objects below spaceship within reach of beam |
| 3 | | No object found. Beam still active. |
| 4 | | Beam energy is reduced by an appropriate amount and reaches zero. The on-screen energy meter is adjusted accordingly. |
| 5 | | Beam is deactivated regardless of whether player is holding down the spacebar or not. See **Deactivate beam** |

**Alternate flow:**
The beam is active while object is in range, object is picked up. Beam energy does not run out.

| | Actor | System |
|---|---|---|
| 1 | Activate beam | |
| 2 | | Check for objects below spaceship within reach of beam |
| 3 | | Object within range of beam is slowly lifted towards spaceship. Its size lessens relative to its height above the planet's surface. |
| 4 | | Object reaches spaceship and is added to "storage". HUD is updated with new values of items and total weight. Beam still active. |
| 5 | | Beam energy is reduced by an appropriate amount. The on-screen energy meter is adjusted accordingly. Energy is not yet empty. |

**Alternate flow:**
The beam is active while object is in range, object is picked up. Beam energy runs out.

| | Actor | System |
|---|---|---|
| 1 | Activate beam | |
| 2 | | Check for objects below spaceship within reach of beam |
| 3 | | Object within range of beam is slowly lifted towards spaceship. Its size lessens relative to its height above the planet's surface. |
| 4 | | Object reaches spaceship and is added to "storage". HUD is updated with new values of items and total weight. A "ship swallowing animation" is shown and a rewarding sound played. Beam still active. |
| 5 | | Beam energy is reduced by an appropriate amount and reaches zero. The on-screen energy meter is adjusted accordingly. |
| 6 | | Beam is deactivated regardless of whether player is holding down the spacebar or not. See **Deactivate beam** |

# Use Case: Collision with satellite

**Summary:** The user's ship collides with a satellite.
**Priority:** low
**Extends:** Navigate
**Includes:** -
**Participants:** System

**Normal flow of events**

| | Actor | System |
|---|---|---|
| **1** | | The satellite collides with the ship. |
| **2** | | The satellite explodes. It disappears from the world and an explosion animation is played where it previously was. An explosion sound is played as well. |
| **3** | | The ship's health meter is reduced by a certain amount. |

**Alternate flow of events 1**
**(The satellite hits the ship and makes its health reach zero.)**

| | Actor | System |
|---|---|---|
| **1** | | The satellite collides with the ship |
| **2** | | The satellite explodes. It disappears from the world and an explosion animation is played where it previously was. An explosion sound is played as well. |
| **3** | | The ship's health bar is reduced by a certain amount, which makes it reach zero. |
| **4** | | **Finish Round** |

# Use Case: Pick up powerup

**Summary:** The user's ship collides with a powerup.
**Priority:** low
**Extends:** Navigate
**Includes:** -
**Participants:** System

**Normal flow of events**

| | Actor | System |
|---|---|---|
| **1** | | The powerup collides with the ship. |
| **2** | | The powerup disappears from the world and a powerup sound is played. |
| **3** | | The ship's health or energy meter, corresponding to the powerup type, is increased by a certain amount. |

# Use Case: Chase cow

**Summary:** The user's ship get's close to a cow which makes it react in a scared manner.
**Priority:** mid
**Extends:** Navigate
**Includes:** -
**Participants:** Actor, System

**Normal flow of events**
**(The cow's stamina is above a threshold level and the ship chases it until the level reaches zero.)**

| | **Actor** | **System** |
|---|---|---|
| **1** | Steers the ship close to a cow | |
| **2** | | A moo sound is played and the cow speeds up, running in a way that takes it further from the ship. |
| **3** | Continues to steer the ship close to the cow | The cows stamina is constantly going down (this is not visible in the game). |
| **4** | | After a certain amount of time the cow's stamina reaches zero and the cow slows down to normal speed again and walks as it did before, not avoiding the ship. |
| **5** | | The cow's stamina starts rising again. When it gets above the threshold level the use case starts over. |

**Alternate flow of events 1**
**(The cow's stamina is above a threshold level and the ship chases it briefly.)**

| | **Actor** | **System** |
|---|---|---|
| **1** | Steers the ship close to a cow | |
| **2** | | A moo sound is played and the cow speeds up, running in a way that takes it further from the ship. |
| **3** | Continues to steer the ship close to the cow | The cows stamina is constantly going down (this is not visible in the game). |
| **4** | Steers the ship away from the cow or slows down so that the | |

| | | |
|---|---|---|
| | cow is further from the ship again | |
| **5** | | The cow slows down to normal speed again and walks as it did before. |

**Alternate flow of events 2**
**(The cow's stamina is below a threshold level and the ship chases it.)**

| | **Actor** | **System** |
|---|---|---|
| **1** | Steers the ship close to a cow | |
| **2** | | The cow continues just as before (i.e. does not react to the ship getting close). |

# Use Case: Finish round

**Priority:** Mid
**Extends:** Start round
**Includes:** -
**Participants:** System

**Normal flow of events**

| | **Actor** | **System** |
|---|---|---|
| **1** | | Time reaches zero or ship's health bar reaches zero. |
| **2** | | Navigation and beam is deactivated. Music stops playing. |
| **3** | | Score is displayed on High-Score list and endgame GUI is presented. (Play again, main menu) |

# Use Case: Start round

**Summary:** The user clicks the "Start" button in the main menu.
**Priority:** mid
**Extends:** -
**Includes:** -
**Participants:** Actor, System

**Normal flow of events**

| | **Actor** | **System** |
|---|---|---|
| **1** | Clicks "Start" button. | |
| **2** | | Main menu is removed and stage 1 is displayed. |

| | | |
|---|---|---|
| **3** | | Catchy music starts playing. |
| **4** | | Timer starts and actor gains control of the ship. |

## Use Case: Show Highscore

**Summary:** The user clicks the “Highscore” button in the main menu.
**Priority:** mid
**Extends:** -
**Includes:** -
**Participants:** Actor, System

**Normal flow of events**

| | **Actor** | **System** |
|---|---|---|
| **1** | Clicks “Highscore” button. | |
| **2** | | Main menu is removed and highscore view is displayed, containing the highscore list and navigational buttons. (Play again, main menu) |

## Use Case: Quit program

**Summary:** The user clicks the “Quit” button in the main menu.
**Priority:** mid
**Extends:** -
**Includes:** -
**Participants:** Actor, System

**Normal flow of events**

| | **Actor** | **System** |
|---|---|---|
| **1** | Clicks “Quit” button. | |
| **2** | | Program shuts down. |

## Use Case: Pause round

**Summary:** The user is in-game and presses the pause key.
**Priority:** mid
**Extends:** -
**Includes:** -
**Participants:** Actor, System
**Normal flow of events**

| | **Actor** | **System** |
|---|---|---|
| **1** | Presses pause | |

| | | |
|---|---|---|
| | key. | |
| **2** | | Actor loses control, timer pauses and AI/Physics are stopped. |
| **3** | | Pause menu is presented. |

## Use case: Resume round

**Summary:** The player chooses to resume the game from the pause menu
**Priority:** middle
**Extends:** Start round, Pause round
**Includes:** -
**Participants:** Actor, System

**Normal flow of events:**

| | **Actor** | **System** |
|---|---|---|
| **1** | Player presses “resume game” | |
| **2** | | The pause menu disappears. |
| **3** | | The game resumes from where it was paused. |

## Use case: Exit round

**Summary:** The player chooses to exit the game in the middle of a round, from the pause menu
**Priority:** High
**Extends:** Start round, Pause round
**Includes:** -
**Participants:** Actor, System

**Normal flow of events:**

| | **Actor** | **System** |
|---|---|---|
| **3** | Player presses quit button | |
| **4** | | The round is stopped and the high score screen is shown with buttons to Play again, or go to Main menu. |

## Use case: Restart round

**Summary:** The player chooses to restart the game from the pause menu
**Priority:** Middle

**Extends:** Start round, Pause round, Exit round
**Includes:** -
**Participants:** Actor, System

**Normal flow of events:**

| | **Actor** | **System** |
|---|---|---|
| **1** | Player presses “Restart” | |
| **2** | | The game timer is reset, the score is reset, and a new round starts. |

# Use Case: Get chased by farmer

**Summary:** The user’s ship get’s close to the farmer which makes him react by chasing the ship and throwing hayforks at it.
**Priority:** low
**Extends:** Navigate
**Includes:** Get attacked with hayfork
**Participants:** Actor, System

**Normal flow of events**

| | **Actor** | **System** |
|---|---|---|
| **1** | Steers the ship close to the farmer | |
| **2** | | The farmer starts chasing the ship by constantly running towards it. At random intervals he throws a hayfork at the ship (see **Get attacked with hayfork**). A constant muttering sound is played. This sound is stronger the closer the farmer is to the ship. |
| **3** | | When the farmer is very close to the ship he constantly runs in circles below it. This continues as long as the ship is close to the farmer. |
| **4** | The actor manages to steer the ship a certain distance away from the farmer. | |
| **5** | | The farmer stops chasing the ship and goes back to randomly strolling around. |

# Use Case: Get attacked with hayfork

**Summary:** The farmer is throwing a hayfork at the user's ship.
**Priority:** low
**Extends:** Get chased by farmer
**Includes:** -
**Participants:** (Actor), System

**Normal flow of events**
**(The hayfork hits the ship which has enough health left for it not to reach zero.)**

| | **Actor** | **System** |
|---|---|---|
| **1** | | The farmer throws a hayfork in the direction of the ship. A throwing sound is played. |
| **2** | | The hayfork collides with the ship. A collision sound is played. |
| **3** | | The ship's health bar is reduced by a certain amount, but is still above zero. |

**Alternate flow of events 1**
**(The hayfork hits the ship and makes its health reach zero.)**

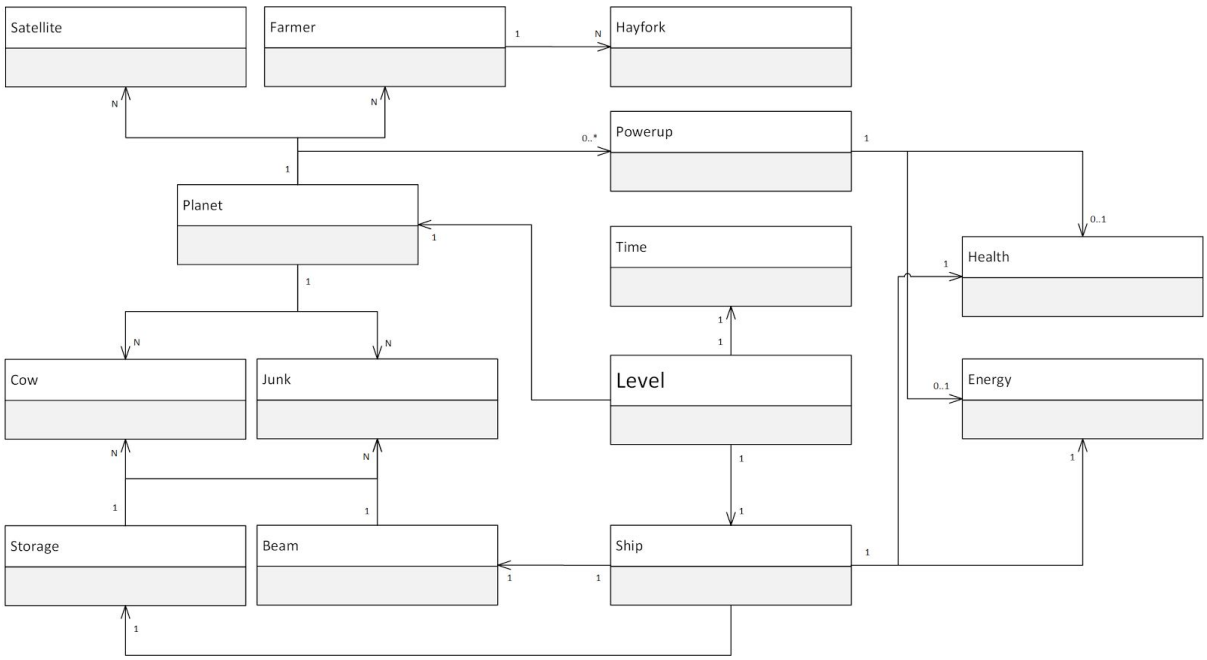
| | **Actor** | **System** |
|---|---|---|
| **1** | | The farmer throws a hayfork in the direction of the ship. A throwing sound is played. |
| **2** | | The hayfork collides with the ship. A collision sound is played. |
| **3** | | The ship's health bar is reduced by a certain amount, which makes it reach zero. |
| **4** | | **Finish Round** |

**Alternate flow of events 2**
**(The hayfork misses the ship.)**

| | **Actor** | **System** |
|---|---|---|
| **1** | | The farmer throws a hayfork in the direction of the ship. A throwing sound is played. |
| **2** | Steers the ship so that it avoids | |

| | | |
|---|---|---|
| | the hayfork. | |
| **3** | | The hayfork continues into outer space. |

# 4 Domain model




## 4.1 Class responsibilities

**Level**: Represents a game round. Responsible for creating the ship and the planet. Keeps track of score and ends the game when the time is up.

**Ship**: The UFO model that the player controls. Responsible for being moved by the player and activating/deactivating the beam. Keeps track of its own health and energy levels, as well as a storage.

**Storage**: The UFOs internal storage. Keeps track of stored objects.

**Beam**: The UFOs tractor beam. Drags cows and junk towards the ship when they’re inside the beam.

**Planet**: The planet that the ship is navigating around. Contains a list of beamables, i.e. cows and junk for the ship to beam up. Responsible for spawning new beamables and satellites continuously. Also keeps track of the farmer enemy.

**Cow**: Cow model responsible for walking randomly around the planet and to some extent try to avoid the ship. Cows can be beamed by the ship.

**Junk**: Like non-moving cows (that don't give points).

**Satellite**: Satellite model that rotates around the planets atmosphere. Can collide with the ship, dealing damage.

**Farmer**: Angry farmer model that runs around the planet looking for the ship. If the ship is within a certain range, the farmer throws hayforks at it.

**Hayfork**: Hayfork model that is thrown by the farmer. Can collide with the ship, dealing damage and sticking to the ship model.

**Powerup**: Powerups are responsible for keeping track of their location and powerup type, each powerup can be of either health or energy type.

**Health**: Represents the fitness of the ship, which drops when hit by hayforks and satellites and rises when a health powerup is picked up.

**Energy**: Represents the resource used to power beam. Is consumed constantly when beam is activated and recharges 2x slower than it is consumed. Energy can also be recharges quickly by picking up a powerup of the energy type.

# 5 References

TVTropes (2017). *Aliens Steal Cattle*. Accessed from http://tvtropes.org/pmwiki/pmwiki.php/Main/AliensStealCattle at 2017-05-26

# APPENDIX

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## Unimplemented Use Case Listing (Phase 2)

### Use Case: Navigate 2

**Summary:** The actor is navigating her ship in phase 2.
**Priority:** low
**Extends:** -
**Includes:** Crash
**Participants:** Actor, System

NOTE: The keys called “the arrow keys” below don’t have to be the actual arrow keys of the keyboard, but will correspond to the usual purpose of these.

**Normal flow of events**

Actor moves the ship sideways/up- and downwards with the arrow keys.

| | **Actor** | **System** |
|---|---|---|
| **1** | Presses one or more of the arrow keys. | |
| **2** | | Ship object is moved in the (possibly combined) direction of the arrow(s) that is(/are) pressed. It accelerates quickly up to top speed.<br>The ship continues to move as long as the user keeps the key(s) pressed.<br>While moving a gentle swoosh sound is constantly played. |

**Normal flow of events 2**

Actor stops moving the ship by releasing the arrow key(s).

| | **Actor** | **System** |
|---|---|---|
| **1** | Releases all the arrow keys. | |
| **2** | | Ship object slows down to a complete halt. |

**Normal flow of events 3**

Actor rotates the ship (around a local z-axis) with the rotation keys.

| | Actor | System |
|---|---|---|
| **1** | Presses one of the rotation keys (LEFT or RIGHT). | |
| **2** | | Ship object is rotated in the direction corresponding to the users key press. It continues to rotate as long as the user keeps the key pressed.<br>While rotating a swoosh sound (different to that playing while moving as described above) plays. |

**Normal flow of events 4**

Actor stops rotation of the ship by releasing the currently pressed rotation key.

| | Actor | System |
|---|---|---|
| **1** | Releases the rotation key. | |
| **2** | | The ship object's rotation decelerates quickly until it comes to a complete stop. |

**Alternate flow of events**

The ship's movement results in it hitting an asteroid.

| | Actor | System |
|---|---|---|
| **1** | Moves the ship so that it hits an asteroid. | |
| **2** | | **Crash** |

**Alternate flow of events**

The ship's movement results in it hitting a powerup.

| | Actor | System |
|---|---|---|
| **1** | Moves the ship so that it hits a powerup. | |
| **2** | | **Activate powerup** |

# Use Case: Crash

**Summary:** The user's ship hits an asteroid in phase 2.
**Priority:** low
**Extends:** Navigate 2
**Includes:** Lose round
**Participants:** System

**Normal flow of events**
Ship collides with the asteroid head-on.

| | **Actor** | **System** |
|---|---|---|
| **1** | | Actor loses control of the ship. |
| **2** | | Ship object  is removed and explosion animation plays. |
| **3** | | **Lose round** |

**Alternate flow of events**
Ship collides with the asteroid from the side, takes damage but doesn't run out of health.

| | **Actor** | **System** |
|---|---|---|
| **1** | | Health bar goes down slightly and becomes red. Fades back to normal color over 1 second. |
| **2** | | Cow counter goes down by a small number, but doesn't go below 0. Number becomes white and fades back to normal color over 1 second. |

**Alternate flow of events 2**
Ship collides with the asteroid from the side, takes damage and runs out of health.

| | **Actor** | **System** |
|---|---|---|
| **1** | | Health bar goes down to 0. |
| **2** | | Actor loses control of ship. |
| **3** | | Ship object is removed and explosion animation plays. |
| **4** | | **Lose round** |

# Use case: Lose round

**Summary:** The player runs out of life and loses the game
**Priority:** low
**Extends:** Start game, Crash?
**Includes:** -

**Participants:** System

**Normal flow of events:**

| | Actor | System |
|---|---|---|
| **1** | | Lifebar turns red and start blinking to signal that the player is about to run out of life |
| **2** | The player touches/ crashes into an asteroid | |
| **3** | | Life bar gets empty |
| **4** | | Dialogue pops up saying: “Game over” |
| | | The exit-screen appears with the high score and the alternatives: “Restart” and “Exit” game” |

## Use case: Activate powerup

**Summary:** Ship collides with a powerup in phase 2.
**Priority:** low
**Extends:** Navigate 2
**Includes:** -
**Participants:** System

**Normal flow of events:**

| | Actor | System |
|---|---|---|
| **1** | | “Powerup” sound plays. |
| **2** | | Specific powerup effect is activated. |
| **3** | | Specific powerup visuals are shown on ship. |

## Use Case: Finish round 2

**Summary:** The user’s ship successfully gets to the end of phase 2 and releases the cows on its home planet.
**Priority:** low
**Extends:** -
**Includes:** High Score list
**Participants:** System

**Normal flow of events**

Ship reaches the end of the asteroid belt with at least one cow and releases it’s goods onto its home planet.

| | Actor | System |
|---|---|---|
| **1** | | Ship reaches the end of the asteroid belt. |
| **2** | | Winning animation is played (something like: new view where the ship hovers over its home planet, opens its hatch and releases all of its cows onto an already huge pile of cows on the surface). |
| **3** | | **Highscore list** |

**Alternate flow of events**

Ship reaches the end of the asteroid belt with no cows left, gets destroyed and loses the game.

| | Actor | System |
|---|---|---|
| **1** | | Ship reaches the end of the asteroid belt. |
| **2** | | Losing animation is played (something like: new view where the ship hovers over its home planet, opens its hatch to release some cows but doesn't have anything to release and then gets destroyed by a destroyer beam from the very angry control tower). |
| **3** | | Losing screen is shown telling the user that she lost and asking her if she wants to try again or go back to the main menu. |

# Use case: Phase Transition

**Summary:** Stage 1 timer reaches 0:00
**Priority:** low
**Extends:** Start round
**Includes:** -
**Participants:** System?

**Normal flow of events:**

| | Actor | System |
|---|---|---|
| **1** | | Actor loses control of ship. |
| **2** | | "Alert" sound plays. |
| **3** | | Ship moves and rotates in an arc and ends up facing the asteroid field. Camera follows normally. |
| **4** | | Actor regains control of ship. |

# Use Case: Shoot

**Summary:** The user's ship shoots some of it's goods out in phase 2.
**Priority:** low
**Extends:** Navigate 2
**Includes:** -
**Participants:** Actor, System

**Normal flow of events**

Ship shoots out it's most recently gathered item and it hits an asteroid..

| | **Actor** | **System** |
|---|---|---|
| **1** | Presses shoot button. | |
| **2** | | The item on top of the UI item stack gets bigger and then shrinks to nothing to signal that it no longer is on the stack. All the other items get moved up one step. |
| **3** | | The item gets shot out from the front of the ship, moving forward with great speed. An appropriate sound (e.g. a "MOOO" if the item is a cow) is played. |
| **4** | | The item hits an asteroid. Both the item and the asteroid get destroyed. (Visualised as the object disappearing in a small explosion while the asteroid gets divided into many small stones scattering in all directions.) |

**Alternate flow of events**

Ship shoots out it's most recently gathered item and it doesn't hit anything..

| | **Actor** | **System** |
|---|---|---|
| **1** | Presses shoot button. | |
| **2** | | The item on top of the UI item stack gets bigger and then shrinks to nothing to signal that it no longer is on the stack. All the other items get moved up one step. |
| **3** | | The item gets shot out from the front of the ship, moving forward with great speed. An appropriate sound (e.g. a "MOOO" if the item is a cow) is played. |
| **4** | | No asteroid is in the path of the item, so it just gradually fades away in the distance. |

**Exceptional flow of events**

Ship tries to shoot out it's most recently gathered item but doesn't have any items stored.

| | **Actor** | **System** |
|---|---|---|
| **1** | Presses shoot button. | |
| **2** | | A sound indicating an empty storage is played. |

# Use Case: Wormhole

**Summary:** The user's ship travels through a wormhole during phase 2.
**Priority:** low
**Extends:** Navigate 2
**Includes:** -
**Participants:** Actor, System

**Normal flow of events**

The ship enters a wormhole and gets teleported to the corresponding "out" wormhole.

| | **Actor** | **System** |
|---|---|---|
| **1** | The actor navigates the ship so that it enters a wormhole. | |
| **2** | | The ship disappears into the wormhole while a teleporting sound is played. |
| **3** | | The whole view very quickly moves to the corresponding "out" wormhole and the ship reappears there (coming out of this wormhole). |
| **4** | | **Navigation** |

# Use Case: Boost

**Priority:** Low
**Extends:** Navigate 2
**Includes:** -
**Participants:** Actor, System

**Normal flow of events**

| | **Player** | **System** |
|---|---|---|
| **1** | Presses boost button | |

| | | |
|---|---|---|
| **2** | | Visually reduces the fuel meter by a certain amount. (The level is seen dropping.) |
| | | Plays swoosh sound and shows fire animation (from the ship's rear) while making the ship move forward at a higher speed than normally for a few seconds. |

**Alternate flow of events (no fuel left)**

| | **Player** | **System** |
|---|---|---|
| **1** | Presses boost button | |
| **2** | | Shows the fuel meter blinking in red, signalling that there is no fuel left. |