Collaborative, cooperative and competitive player behaviour within a real time multiplayer survival game

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Abstract

In this thesis the use of live game design to monitor and influence the aspects of collaboration, cooperation and competition is discussed. Many games include the aspect competition but not so much the aspects of collaboration and cooperation while all three of them are important. This insight gave form to the question of: How can the degree of collaboration, cooperation and competition be monitored and influenced using live game design while playing a multiplayer survival game? To answer this question there was research done on the aspects of collaboration, cooperation and competition. Each of these aspects have their own aspects and types which makes them unique. With these results a game was made in which the players needed to survive on an island and have to make use of the aspects that were made in the form of game mechanics. To influence and monitor the players the role of the game master was created. The game master can use the tools that are available to him to work on his goals.
1. Introduction

The goal of conducting this research came from the Lectorate Play & Civic Media. Inside their live game design department there was an insight that a lot of games contain the aspect of competition and not so much the aspects of collaboration and cooperation while all three of them are important. By creating a live multiplayer game where all three aspects can be explicitly tested, player behaviour could be influenced. This would be beneficial for the department of live game design. Before starting the actual literature research some brainstorming and desk research was done to create a concept and a basic structure for a game that could contain all three aspects.

The reason for writing this thesis is to answer the main question of: How can the degree of collaboration, cooperation and competition be monitored and influenced using live game design while playing a multiplayer survival game? This question consists of three problems that need to be solved namely: what are the three aspects, how can you implement them in a survival game and how can the players be influenced on the three aspects while playing the game.

This thesis consist of the following chapters:

- **Context:** In this chapter the context of the thesis is explained. The company which gave the assignment, a description of the assignment and the research questions.
- **Methods:** In this chapter the methods that were used while conducting research are discussed.
- **Collaboration, cooperation and competition in games:** In this chapter collaboration, cooperation and competition is discussed firstly on the aspects then the different types and lastly examples of games.
- **Designing a multiplayer survival game:** In this chapter the information gathered in the previous chapter is used to design a multiplayer survival game. This chapter also consists of implementation of game mechanics.
- **Using the role as game master to influence player behaviour:** In this chapter the role of game master to influence player behaviour is discussed.
- **Conclusion:** In this chapter all the gathered information is used to answer the main question.
- **Future work:** In this chapter all the missing components or interesting concepts that could be added onto the game is discussed.
- **References:** In this chapter the references used for the research are found.
- **Appendix:** In this chapter all the extra information regarding the methods are found.
2. Context

2.1 Lectorate Play & Civic Media

The Lectorate Play & Civic Media is one of the research groups of the CREATE-IT knowledge center of the HvA. Within the lectorate work roughly ten researchers from whom two with specific expertise in the field of card game design and live game design. The lectorate is not only active on a national level, but also international with publications on international conferences, the lectorate also takes care of the international master study Digital Design. Some of the projects that originated from the lectorate are ‘Didactics-Driven Development’ and ‘A Digital Prototyping Tool for Card Game Design’, within these projects the lectorate researches and develops intelligent tools for game design for educational (card) games. This is embedded in the Live Game Design approach, in which visual and formal languages play a role in modelling, automatic generation and live changing of game aspects.

2.2 Live Game Design

Live Intelligent Visual Environments for Game Design, or in short, LIVE Game Design, is a RAAK-MKB applied research project funded by the Dutch funding body SIA, co-financed by research partners and business project partners. The project started in May 2016 and the goal of the project is to be able to adapt games across several dimensions in real time, in order to speed up the game design process.

2.3 Assignment Description

To create a scenario where the aspects of collaboration, cooperation and competition can be monitored and influenced a game has to be created. In this game players would have complete freedom to make their own choices and actions. In the gameworld their main focus would be survival. While the game progresses the players will have to make decisions or react to scenarios based on the aspects of collaboration, cooperation and competition. To fit the narrative of live game design the players’ progress on the aspects of collaboration, cooperation and competition can be monitored and influenced to bring one of the three aspects to the foreground.
2.4 Research Questions

To answer the main question: How can the degree of collaboration, cooperation and competition be monitored and influenced using live game design while playing a multiplayer survival game? A set of sub questions were set up that needed to be answered. The information gathered from the sub questions will be used to answer the main question. The sub questions that will be answered are:

- What is needed to design a game for collaboration, cooperation and competition?
- How can you design a multiplayer survival game?
- How can live game design be used to influence player behaviour?
3. Methods

3.1 Desk Research
To acquire information that could be used in designing the product desk research was used. The research was mostly focused on studies regarding the three aspects of collaboration, cooperation and competition. There was a lot of information to be found. The publications that were used in this thesis were obtained by using different databases the most prevalent were Google Scholar, Gamasutra, ResearchGate, ACM and ScienceDirect. All the publications that were used can be found in the chapter References.

3.2 Meetings Product Owner
To make sure the product was headed towards the correct destination with the product owners vision in mind we scheduled weekly meetings. These meetings start off with what was accomplished since the last meeting and if there are any problems that hinder progression. When that was done it was time to discuss the next steps. These turn into brainstorm sessions on what would be interesting to have in the game and also fit in the aspects of collaboration, cooperation and competition.

3.3 Tools

Unity
In the creation of the product certain tools were used to support the creation. The first and primary tool was Unity (Valve Corporation, 2009). Unity is a cross-platform engine used in the creation of games. This tool supports the usage of scripts and creation of a game world within the engine. It is also able to create builds which can be used to easily access the game for both releasing the product and testing purposes.

Visual Studio
The second tool that was used in the creation of the product was Visual Studio (Microsoft, 2014). Visual Studio is a development environment used for creating the code scripts in Unity. Visual Studio also supports the use of debugging to find flaws in the code.

GitExtensions
The third tool that was used was GitExtensions (gitextensions, 2019). GitExtensions is a graphical user interface for using GIT. By using GitExtensions an iterative workflow was possible because it allows the user to back up his progress of the product.

Blender
The fourth tool that was used is Blender (Blender, 1998). Blender is an open source 3D creation suite. It was mainly used to make specific 3D models to place in the gameworld or editing models that were acquired elsewhere to fit specific needs.

3.4 Evaluation
To evaluate both the product and thesis outside sources were used. The product was evaluated in a series of tests. Because of the global Covid-19 pandemic the tests had to be
done digitally unfortunately. The people that were testing the game were also students writing their thesis. The tests that were conducted were usability tests with certain goals that needed to be completed. The test persons were asked to think out loud and filled in a short survey afterwards. Both the goals of the tests and results can be found in the appendix.

For the thesis two teachers at the Amsterdam University of Applied Sciences were consulted. In an online meeting my product was shown for context and then the uses and beneficial effects of the aspects collaboration, cooperation and competition in games was discussed. The notes of the meeting can be found in the appendix but are in dutch only.
4. Collaboration, Cooperation and Competition in Games

In this chapter information about collaboration, cooperation and competition is discussed. Each of the aspects is dissected and made clear what defines them.

4.1 Collaboration in Games

The meaning of collaboration is the process of two or more people working together to accomplish a shared outcome. It’s best seen as teamwork where both parties coordinate their effort on a solution to a problem (Wikipedia, n.d.-a).

4.1.2 Aspects of Collaboration

4.1.2.1 Common Goal

An important aspect in collaborative games is a common goal shared by all players. If for example all the players in a team would have a separate goal they would have no real reason to collaborate with each other and go their own way. So the common goal could be seen as the glue that holds the team together for collaboration. An example for a common goal could be reaching the end of a level together while there is a zombie apocalypse. Another important aspect of a common goal in a collaborative setting is that all the players share the end result of the game “if the team wins or loses, everyone wins or loses” (Zagal, Rick, & Hsi, 2006, p. 28). This creates a drive for the team to trust each other and rely on each other because they are all in this together.

4.1.2.2 Team Identity

Another important aspect in a collaborative team setting is team identity. This could be as simple as a color identifying their team like team red. This could boost their motivation as they got something to represent now. Eventually this could lead to pride and confidence as they got achievements under their belt as team red.

But most of all team identity is based on the goals and desires of each member encapsulated according to Tauer and Harackiewicz (Tauer & Harackiewicz, 2004, p. 849). This creates the common goal that was talked about before. But it also defines the way the team works together for example team red prides itself on being the best woodcutting company. So they all have their set of standards for producing the best possible work. This also works for recruiting more members because of their clear team identity. A new member could be interested in joining because it overlaps with their goal of becoming the best woodcutter and wants to be part of team red.
4.1.2.3 Communication

Player interaction in a collaborative setting should be based around positive comments. Because both players work towards a common goal there is no use for negative or derogatory comments because they tend to influence the team spirit in a bad way decreasing productivity according to Jon Gordon (Gordon, 2008, pp. 1–3). Jon Gordon then initiated the no complaining rule.

That no complaining rule can even be forced in games by only giving the option of positive comments.

This is the case for the game Rocket League (Psionic, Panic Buttom Games, 2015). Sam Heckman believes the quick chat in Rocket League allows players to effectively communicate while also reducing toxicity (Heckman, 2018).

The way Rocket League works is by categorizing messages. The categories are information, compliments, reactions and apologies. Then per category players can choose which message they want to enter from a list. As shown in figure 1.
4.1.3 Different Types of Collaboration

4.1.3.1 Combining Forces

One of the biggest strengths of a team based on collaboration is the combining of forces. The combining of forces is a big strength because of its upsides (Spurgeon, Obst, Santamaria, Gough, & Spencer, 2018, p. 16). For example inclusive decision making because they are all working for the better of the team meaning each member's opinion is equal. Another upside is enhanced standardization and mainstreaming. Because of the common goal the team is not likely to split up and will combine their forces to the end. This means that the teamwork between members would only improve over time as they get more experience with each other.

The way a game allocates for combining forces is by making some tasks impossible to do on their own because there would be no need for a team to collaborate if every task could be completed by a single individual (Seif El-Nasr et al., 2010, p. 8).

4.1.3.2 Maximize Rewards as a Team

In a collaborative team setting all the members either win or lose. There are no independent goals as discussed in 4.1.2.1 they all combine forces to complete a single goal. Because of this the team maximizes their efforts because they all want to win. To win as a team they have to maximize their rewards.

This can be for example in the case of World of Warcraft (Blizzard, 2004) where a team starts a raid encounter and their goal is defeating the final boss. Before getting to the final boss other bosses have to be defeated. These other bosses drop items like weapons. In this example the boss drops a sword with an intellect bonus. There are a lot of members that can use a sword but not every member benefits from the intellect bonus. Like a warrior who relies mostly on the strength attribute. So to maximize their rewards as a team they efficiently allocate their resources as a team (Spurgeon, Obst, Santamaria, Gough, & Spencer, 2018, p. 19). Meaning they give the sword to the mage member because his character would benefit the most from it in turn improving the progression to the last boss.
4.1.4 Examples of Collaborative Games

Firstly Portal 2 developed by the Valve Corporation and released in 2011 (Valve Corporation, 2011). The goal in this game is for the players to solve the puzzles in the level, so they can go to the next level. The main way to solve the puzzles is by creating portals (Figure 2). Each player can create two portals which connect together to create a path. But most puzzles need the players to work together by creating four portals to create paths one player could not make on his own. In this way the players must combine forces to complete their common goal.

The second game is Left 4 Dead 2 (Valve Corporation, 2009). Left 4 Dead 2 is a survival zombie shooter. The game was made by Valve and released in 2009. The common goal for the players in the game is reaching the end of the level with as many players as possible without getting killed by the zombies (Figure 3). The player starts the game with three other players and each player can choose which weapons to use. The players also have some healing equipment. Because the player wants to reach the end of the level with the whole party they combine forces. If one person is on his own he easily gets overwhelmed by zombies, so the other players work as a set of extra eyes. Also because they work as a group they can heal each other so that increases their chances of reaching the end.

Lastly Dark Souls 1 an action role playing game. Dark Souls 1 is developed by From Software and released in 2011 (FromSoftware, Inc, 2011). The goal of the game is killing all the bosses in the world and claiming the throne. Dark Souls 1 is notorious for its difficulty but there is a way to make it a lot easier. The player can summon other players to his world that can aid him with the boss battles (Figure 3). The summoned player will get a reward for helping the player and the player itself can progress the game. So a common goal is created in killing the boss of the world and so they combine forces. This makes the game a lot easier because the boss’ attention now goes to both players instead of focussing on one. Which gives the players more time to heal or attack.
4.2 Cooperation in Games

The actual meaning of cooperation is the process of groups or individuals working together for a common, mutual or some underlying benefit as opposed to working in competition for a selfish benefit. While it seems similar to collaboration the main difference is that cooperation is accomplished by the division of labor among participants as an activity where each person is responsible for solving a portion of the problem (Wikipedia, n.d.-c).

4.2.1 Aspects of Cooperation

4.2.1.1 Independent Agents

In a cooperative setting all the players act as independent agents meaning they still have their own objectives and choices to make. This is different then what we talked about earlier in collaboration where they act as one. Because of this most cooperative teams do not have the same sense of trust as a collaborative team so they make use of task allocation where each member can focus on their own work. For John Pearl, design director of Ashen cooperation meant giving the independent players roles. On the cooperation in Ashen he said this on creating meaningful boss fights for a cooperative team: "it means creating roles for players to take in the fight, similar to how MMO bosses function. "It forces players to -- especially in multiplayer games -- to kind of come up with jobs and or a focus "[For example], 'hey I’ll handle these guys, you focus on the boss,'" he said. "It adds a lot of strategy to coordination with your team to be able to say, 'hey I’m going to do this over here, you do this.'"(Francis, 2019, p. 1). An example of these roles mentioned by John Pearl are roles like a healer, tank and damage dealer. Here a tank is responsible for keeping the focus of the monsters so the damage dealer can perform optimally. The healer needs to make sure the tanks survive the focus of the monsters. Lastly the damage dealer needs to eliminate the threats.

4.2.1.2 Goals Not Necessarily Shared

Because a cooperative team is made of independent agents they do not necessarily share the same goals. But there still might be some overlap in their goals. So they still enter the team because it makes it easier to reach that personal goal. Think of the team operating an old steam train. Each member has their own task for example fueling the fire or keeping the engine hydrated for the steam. So they have a common goal of operating the train but their end goal is not necessarily shared. Their personal goals could be the different stops the train makes so one might get off the train earlier than the others.
**4.2.1.3 Terms of Agreement**

A cooperative team is mostly made on terms. Because a cooperative team is made up of members with their own goals they have no reason to trust each other. So to get some sort of sense of safety they make terms so they can get some sort of confirmation that they get what they want while the cooperative team is made. Just like big companies in the economy. For example the latest cooperation between the Unreal Engine 5 from Epic and the Playstation 5 from Sony. The terms were Epic got early access to the specifications of the new Playstation but is not allowed to share that information. Sony gave the Epic team early access to the hardware of the Playstation 5 so they could cater their Unreal Engine towards those hardware specifications (Palumbo, 2020). This is beneficial for Epic because their engine has a head start for developing games on the newer Playstation 5 giving developers more reason to use the Unreal Engine. For Sony the cooperation is beneficial because giving the Epic team access to their system means games can be made faster than letting them wait for the information until the Playstation 5 is officially released. This means the game library of the Playstation 5 could be potentially bigger at the release giving the consumers more reason to buy the Playstation 5.
4.2.1.4 Communication

For collaboration the communication was focused on positivity keeping the team spirit high, but for cooperation the communication is more geared towards task management. Because in a cooperative setting the player wants to perform as well as possible but within his expertise. Zachary O. Toups, Jessica Hammer, William A. Hamilton, Ahmad Jarrah, William Graves and Oliver Garretson think of cooperative communication as: “cooperative communication mechanics enable players to share information and direct action by engaging with game systems. These include both explicitly communicative mechanics, such as built-in pings that direct teammates’ attention to specific locations” (Toups et al., 2014, p. 263).

Meaning a quick chat in a cooperative setting would benefit a lot from direct and clear messages improving every individual’s workflow in the teamsetting.

For example in the game Sea of Thieves each sailor has his tasks and the quick chat in that game helps communicate that along his team.

![Figure 5 Sea of Thieves quick chat](image)

Here you can see the quick chat of Sea of Thieves (Rare Ltd., 2016). In this image (Figure 5) you see the person carrying a chest, because he is carrying a chest he gets specific quick chat options. For example one of them informing the others that he has the chest or that he needs protecting, because he might be attacked or even that he is going to hide to get it later. But all these options are clear and keeps his other teammates informed.
4.2.2 Different Types of Cooperation

4.2.2.1 Complementarity

In a cooperative setting the team is made of members that each work for their own goal but work together to make that goal easier to reach. The way that goal becomes easier to reach is by complementing other team members' weak points according to research (Seif El-Nasr et al., 2010, p. 4). For example in a role playing games the players have different classes like a tank that takes all the blows from the enemy and a healer which is able to heal teammates. The way these two complement each other is very simple. The tank is not able to heal himself so he depends on the healer to heal him, and the healer is unable to take blows from the enemy so depends on the tank for keeping the enemies away.

4.2.2.2 Synergies

Another way cooperation occurs is via synergies (Seif El-Nasr et al., 2010, p. 4). This can be synergy through goals or abilities. Synergy through abilities will be discussed first. In the following example the game Overwatch is used, a game by Blizzard (Blizzard, 2015). In this game the player can play as various characters and some characters synergize really well together. Two characters that synergize well together are Hanzo and Zarya because of their ultimate abilities. It takes time for them to unlock their ultimate abilities so while it is not unlocked there is no direct cooperation happening between the two. But once they have their ultimate abilities they cooperate because of their destructive force combined. Zarya can create a black hole which pulls enemies together in an area (Figure 6) and Hanzo can create a dragon that damages enemies in a certain area, so when Zarya uses her ultimate Hanzo does not have to worry about missing his targets. After that they will go their own way again.

![Overwatch Zarya blackhole ability](image-url)
Synergy between goals occurs when two different players need to cooperate through synchronized goals. For example in World of Warcraft (Blizzard, 2004) there is an achievement for the warlock to burn three enemies while being restored. Restored can only happen when the druid restores him. But the druid has a different achievement which is to restore a warlock while he burns three enemies. In this way they will cooperate to complete their personal goal.

4.2.3 Examples of Cooperative Games

The first game is Sea of Thieves. Sea of Thieves is an online multiplayer RPG developed by Rare Ltd and released in 2016 (Rare Ltd., 2016). In Sea of Thieves the players play as a pirate that is part of a crew aboard a ship. The goal of the game is acquiring gold this can be done by following treasure maps or completing the bounties put upon other pirates' heads. To get this done the player needs to sail to the places with his crew but that is easier said than done. Operating the ship all on his own is virtually impossible that is why most crews in Sea of Thieves cooperate by using task allocation (Figure 7). For example one crew member might be assigned to the sails to make sure they are always catching the optimal wind or get raised when approaching an island. The other might be the navigator watching the compass closely and steering the ship. This way the crew can optimally operate the ship and complete their goals faster.

The second game is a hack and slash dungeon crawler game called Diablo 3. Diablo 3 is a game developed by Blizzard Entertainment and released in 2012 (Blizzard, 2012). The main way the game is played is by choosing a class for example a wizard and using the spells the wizard has to get rid of monsters (Figure 8). The goal of the game is defeating the bosses and clearing levels in a set amount of time. The game can be played by up to 4 players. The way the players have to cooperate is by complementing the other player's weaknesses, for example the healer keeping the tank alive because the tank cannot heal himself.
Lastly Keep Talking and Nobody Explodes a puzzle game developed by Steel Crate Games and released in 2015 (Steel Crate Games, 2015). This game is played by a minimum of two players and the goal is to diffuse a bomb. One player is wearing a virtual reality headset where a bomb is placed in the scene with multiple puzzles on the sides of the bomb (Figure 9). The other player or players have a manual with the solutions to each puzzle. Meaning the player with the virtual reality headset on has to describe what he sees while the other relays the information in the manual so the bomb can be diffused. Just like in Sea of Thieves there is a need for task allocation.
4.3 Competition in Games

The definition of competition is when at least two parties strive for a goal which cannot be shared. In general it is a rivalry between two or more parties (Wikipedia, n.d.-b).

4.3.1 Aspects of Competition

4.3.1.1 Conflicting Goals

An important aspect that is prevalent in competitive games is a conflicting goal. In the case of video games there is a wide range of possible conflicting goals. The way a conflicting goal could arise according to Peter Vorderer, Tilo Hartmann and Christoph Klimmt is by creating two key components to a situation one with the possibility to act and the other with the arising necessity to act (Vorderer, Hartmann, & Klimmt, 2003, p. 8).

What is important is that both components are not the same and overlap in some way. Think of a game where one player has to storm the castle which is the possibility to act and the other has to defend it which is the necessity to act. Both goals have the castle as their main objectives but for different reasons which ends up in a conflict between the two players.

The conflict in the goals also comes from the fact that the goals cannot be shared. Meaning one player or one team wins all while all the others in the game lose. Think of the example stated earlier where a player had to storm the castle while the other had to defend it. There cannot be a scenario where both teams win because the castle either still stands or it has been demolished. Another example where it is very clear that there is only one winner is in battle royale type games. In most cases a battle royale starts off with a fifty to a hundred players and then the players have to eliminate each other and become the last one standing. In this case there is no discussion on who the winner is because there is only one player left at the end more on this in 4.3.2.2.

4.3.1.2 Rivalry

Earlier in this paper team identity was discussed as a collaborative aspect in 4.1.2.3 but what is interesting is that team identity can lead to rivalry where it becomes a competitive aspect. Think of two teams one team could be team red and the other team blue. The blue players have their identity as team blue and they might not think much about it until team red appears in the picture. Because the other team has a different identity but is still striving towards the same goal rivalry occurs. Members of the blue team could be starting to think to themselves “we can't let team red win” or “blue team is the best”.

This is called team based rivalry which is a form of direct rivalry (“Competition in games,” 2013). There is also direct rivalry where it is a one on one situation where the player knows the other player exists and is striving towards the same goal as him. It is important that the players know of each other’s existence otherwise there would be no rivalry to speak of. As the player would just think he is playing a singleplayer game.
There is also indirect rivalry which Max describes as “The calling card of this form of competition is extreme focus on optimizing one’s own performance with little opportunity or desire during gameplay to affect opponents' performance” (“Competition in games,” 2013). This kind of rivalry is most prevalent in games with a high score system. For example old arcade games where the other players have no way to hinder the players performance. The thing that drives the player is the desire to topple the first player on the list.

4.3.2 Different Types of Competition

4.3.2.1 Competition Between Individuals
One of the most common types of competition is competition between individuals. This type of competition is most commonly seen in the fighting and shooter game genre. There is not much needed for this type of competition, just the two players and map. The goals to win could be the first to a set amount of points or when the other dies the other player instantly wins. The maps for competition between individuals should be on the smaller side, because the players want to get into the fun part of the game and not spend much of their time searching for the other.

4.3.2.2 Competition Between Teams
Competition between teams is also a very common type of competition. This type of competition is seen in a lot of genres like shooter, fighting, survival and role playing games. The only thing that is needed is a way to differentiate the two or more teams and the competition will already take place because of the rivalry aspect which was already mentioned in the aspects of competition. Team based competition can take all sorts of forms for example the easiest form is eliminating the other team, but making it centered around points is also possible by creating the scenario of the first team to thirty points wins. This type of competition favors bigger maps where each member of the team has its space to do their own things but not that big where the team members are out of reach from each other.

4.3.2.3 Free For All
Free for all is an uncommon type of competition in most genres but is the main genre in battle royale type of games. Most free for all matches are defined by a set number of players competing for one goal. The goal can be the first to a set amount of kills or be the last man standing. It has much in common with competition between individuals because all the players in a free for all match have their own goal and only one player can win. But the main difference comes from the amount of players participating. Because of this not every individual player has direct competition with each other. For example in battle royale games the game starts with a fifty to a hundred players and the last man standing wins. Some players start at one corner of the map while another player starts at the opposite corner one of them could be eliminated before they would ever have the chance of meeting.
4.3.2.4 Competing for Resources

Competing for resources is a type of competition that is most prevalent in real time strategy games. Competition happens because the game has only limited resources and the player needs the resources to for example create buildings or soldiers to get ahead of the other player or players. So strategies arise where players at the start of the game create lots of resource gatherers and rush towards resources while others immediately spend their resources to create soldiers to eliminate the other players’ resource gatherers. This sets the player back quite a bit and gives the other player complete control over that resource.

4.3.3 Examples of Competitive Games

The first competitive game example is Super Smash Bros. Ultimate (Bandai Namco, Sora Ltd., 2018). The genre of this game is fighting and it was developed by Bandai Namco Studios and released in 2018. In this game the player picks one of his favourite Nintendo characters like Mario and with this character he fights another player (Figure 10). The game can be played in different ways but the main goal is knocking the player off the stage. For example there is a time based setting where the player needs to get as many points by knocking the other player off the stage inside the time limit. The competitive aspect here is based around time and achieving more points than the other. Another setting is stock based stock meaning lives. For example each player has 3 stocks so when the player gets knocked off the stage for a third time he loses. The competitive aspect here is for the player to preserve his stocks while still trying to get rid of the opponents stocks time can also be added to this gamemode.
The second competitive game is Overwatch (Blizzard, 2015). Overwatch is a first person shooter developed by Blizzard Entertainment and released in 2015. This game is played by picking a hero the player wants to play for example Soldier 76 which is able to shoot a rifle or Mercy which can heal teammates (Figure 11). The competitive nature of this game lies in the gamemodes. For example the players have to deliver a payload to the other side of the map. The payload moves when the players are close to it and stops in its tracks when the enemy is close to it. So one team has to keep attacking and push forward the payload while the other has to defend and stop the payload. Another gamemode is capture the flag which speaks for itself. Each team has a flag in its base and the players have to defend it. But the players can only gain points by stealing the other team’s flag and delivering it to his base.

Lastly Player Unknown Battleground a third person battle royale shooter (PUBG Corporation, Bluehole, 2016). The game was developed by PUBG Corporation, Krafton, Tencent Games and Xbox Game Studios and released in 2016. The goal of the game is being the sole survivor on the map. This is easier said than done. There are multiple competitive factors here that play a role in winning the game. For example everybody starts with nothing. It is up to the player to scavenge gear like weapons and armor spread across the map (Figure 12). Having the best gear gives the player a distinct edge over the rest. Another factor is knowledge of the map over time the map shrinks so knowing where to go where the player draws the least attention is a huge advantage. There is also a scoreboard which keeps track of the amount of kills the player and the other players make so generally people want to end up high on the scoreboard.
5. Designing a Survival Multiplayer Game

In this chapter the design of the survival game is discussed starting with the resume then the dramatic elements and lastly the formal elements. In this chapter there will also be implementation shown and explained.

5.1 Resume

5.1.1 High Level Concept

The game is about players that get stranded on an island. The island is in a very raw state and needs work to become habitable for the players. By forcing the players on an island they will need to display some behaviour along the aspects of collaboration, cooperation and competition. The player can choose to work alone or try to come in contact and develop bonds with other players on the island. The island also contains challenges based around the aspects of collaboration, cooperation and competition. This happens on two islands simultaneously. Each island has a team of three players. The game is played in the first person.

One of the players in the game can become the game master. The game master can do all sorts of things the survivalist cannot, for example fly around. The survivalist cannot see the game master. The role of the game master is to influence the aspects of collaboration, cooperation and competition of the survivalist by for example making them work together more to boost collaboration.

More information about what the game master can do is written in chapter six.

The game ends after a set amount of time. The players then get a score presented from their performance on their island. The score is based around points given to specific tasks that involve the aspects collaboration, cooperation and competition. But also the state of their island for example the amount of buildings they have built.

The game can be played up to a maximum of seven players where one of the seven is the game master. The game takes around fifteen to twenty minutes to fully play through one session.
5.1.2 Design Goal

The design goal of the project is to create a sandbox type setting where the game master can influence player behaviour on the aspects of collaboration, cooperation and competition. The goal for this is that for example a teacher could use this to teach his class the importance of certain aspects for example how collaboration accelerates the growth of the island. But also for a psychologist to test certain scenarios on specific player behaviour. For example testing what is needed for a team that is fully collaborating to turn against each other or the opposite.

The game will have some forced challenges on the aspects of collaboration, cooperation and competition on the island. But most of the direction the game goes is in the hands of the game master. The game will act as an empty canvas where the game master can work on his own agenda.

5.2 Dramatic Elements

5.2.1 Challenge

This game is based around the aspects of collaboration, cooperation and competition so the challenges in this game will revolve around those subjects. Some of these challenges are laid out on the island itself for example a collaborative challenge where a big rock needs multiple players to be moved. More challenges on the island itself will be discussed in Game World 5.2.3.

Another challenge in this game comes from the player’s decisions. How can a player convince another player on the same island to trust him and help him with certain objectives. Or convince a player from the other island that he means no harm.

The player also has a hunger bar to manage. Low hunger can lead to unwanted situations, so he will always need to keep track of that and have the resources ready to replenish his hunger.

Lastly the game master also has some challenges that could stem from his own agenda. For example how can he create certain scenarios to happen to get the information he wants. Or to create a scenario where he wants the players to learn certain things.
5.2.2 Play

In this game three kinds of play are distinguished on the aspects of collaboration, cooperation and competition. Collaborative type of play in this game comes from working together as a team with the others on the island. For example working together to build the facilities that benefit all of them like was discussed in 4.1.3.2. Or moving the rock that is blocking the mine. Cooperative type of play is handled by making sure there is enough individual work to be done, but there is still a need for teamwork. For example task allocation that was discussed in 4.2.1.1 where one is in charge of gathering the rocks while the other gathers wood. Competitive type of play comes from rivalry within the team or players from the other island which is a form of direct rivalry that is discussed in 4.3.1.2. It is possible to go to the other island and steal their resources. Their team can then make better buildings for a better end result while the other island has started falling behind.

5.2.3 Game World

The game takes place on two islands. Each island has wood, stone and mushrooms to be collected. Those resources can be used to create facilities on the island in certain areas. The island itself also contains challenges as mentioned earlier. One of these is a mine that is closed off by a huge boulder and needs at least two players to be moved out of the way to access the mines. Another challenge is the lack of resources. This forces cooperation and competition. The two islands do not start with the same amount of resources. One island contains more wood while the other island contains more stone. In order to build every facility on the island they will need to go to the other island either to steal or trade the resources. The islands are also clouded in a thick fog at the start of the game and the fog fades slowly over the course of the game or manually by the game master. When the fog is faded the islands are able to see each other and can create bridges to visit each other.
5.3 Formal Elements

5.3.1 Players and Teams

This game is meant to be played by seven players. Six of these players are survivalists on the island while the last remaining one is the game master. The six players are divided into two teams of three and have the option to work together but at the end the two teams are graded as one even if they did not work together. For the two teams the game starts as players versus the game but could develop to team based competition. The game master could play against the players or could take a more cooperative stance. More information about the game master can be found in chapter six.
5.3.2 Game Mechanics

The game mechanics in this game are separated in the three aspects of collaboration, cooperation and competition.

5.3.2.1 Collaboration

Firstly the collaborative game mechanic in this game is moving objects together. Moving an object is a collaborative game mechanic because some items cannot be carried by one player himself. Meaning two or more players need to work together. By doing this the collaborative message of together you are stronger than alone is conveyed according to research (Buchinger & Da Silva Hounsell, 2017, p. 143).

Implementation

To create this an object is made with a trigger collider (Figure 12). The trigger is used for checking how many players are currently standing in front of the object. The players that enter are added to a temporary list. If the amount of people in the trigger are equal or greater than two a for loop is called that loops through the players in the temporary list and checks if they are pressing the key that is needed for pulling the rock. If that is the case the object is moved to a corresponding axis (Figure 13).

```csharp
if (playerCount >= 2)
{
    for (int i = 0; i < playerActions.Count; i++)
    {
        if (!playerActions[i].isPulling)
        {
            break;
        }
        else
        {
            rockParent.transform.position -= new Vector3(vectors[0], vectors[1], vectors[2]);
        }
    }
}
```
5.3.2.2 Cooperation

The cooperative mechanics in this game are trading and task allocation. Trading is a cooperative mechanic because the player is in a temporary cooperative relationship with the other team to accomplish their own personal goal which is to trade goods he lacks. This game mechanics was created from the information gathered in 4.3.1.3. Task allocation is a cooperative game mechanic because it gives each individual player his own task within the team while still functioning for the greater good for the team. Task allocation in this game is portrayed by getting roles on the island like woodcutter, miner and food gatherer which is inspired by the information in 4.2.1.1.

Implementation

Trading is done by a trading board in this game. The players put their resources in a crate and they get added to a list. The booleans get reset in case there was already an offer so both parties are aware the offer changed (Figure 14).

```csharp
if (other.tag == "Pickup")
{
    if (tradingBoard.itemInCrate < 5)
    {
        for (int i = 0; i < tradingBoard.items.Count; i++)
        {
            if (tradingBoard.items[i] =="")
            {
                tradingBoard.itemInCrate++;
                tradingBoard.items[i] = other.name;
                if (tradingBoard.tradedAccepted == false)
                {
                    tradingBoard.othersBoard.tradedAccepted = false;
                    destroy(other.gameObject);
                    //tradingBoard.UpdateBoardInfo();
                    break;
                }
            }
        }
    }
}
```

If both parties accept the current offer on the board (Figure 16) the items get exchanged. The SpawnItems function gets called based on if it was a trade or not because the player is also able to withdraw his items from the board (Figure 15). The items get spawned on the corresponding location by looping through the list and everything is reset to default.
Task allocation was done by roles. It starts off with assigning a role to a player which happens in the FormChanger class (Figure 17). In that class the player gets his tool that corresponds with the given role and that tool gets added to the inventory. The collider of the tool is also collected because it will be used later for the animation.

Now when the player uses the corresponding input for using the tool an animation gets played. While that animation is active the collider of the tool is set to active to register objects entering its trigger. On the tool a script then checks if the objects entering the trigger is destroyable for example a pickaxe can destroy a rock. If that is the case the script sends a message to that object to call the function RpcTakeDamage.

In this function (Figure 18) the damage gets subtracted from the total health of the object if that health gets below zero a courtine is called for dropping the items. The items are from a list which the designer can fill like a loot table. A big rock would for example drop three smaller rocks that the player can put in his inventory.

![ClientRpc](image)

**Figure 17** Results of becoming miner

**Figure 18** Taking damage and dropping items
5.3.2.3 Competition

Lastly the competitive game mechanics in this game are stealing and destroying. Stealing is a competitive game mechanic because there is only a limited amount of resources per island. So if the players steal the resources from the other island they get ahead for the end result while the other team has no benefit. Destroying is the second competitive game mechanic. The players are able to destroy the facilities that are built upon the islands. Destroying the other teams’ facilities can lead to them getting behind in progression of the island and losing the benefits of the specific facilities. Both these mechanics stem from the information in 4.3.1.1 where there is no scenario both teams win.

Implementation

Stealing in this game is simple. There is an inventory system attached to every player. The player is able to pick up smaller rocks, pieces of wood and mushrooms and add them to his inventory which consist of four slots. So to consider it stealing the player must be on the other island picking up their resources which puts them at a disadvantage.

Items that are able to be picked up have a tag attached to them. When the player inputs the correct key they will be added to their inventory. The AddToInventory takes the name of the object that was picked up and adds them to the list if there is an empty spot (Figure 19).

```csharp
public void AddToInventory(string item)
{
    for (int i = 0; i < items.Count; i++)
    {
        if (items[i] =="")
        {
            items[i] = item;
            itemsInInv++;
            break;
        }
    }
}
```

The player is able to cycle through his items by pressing the one to five keys on his keyboard. If there is an object on that corresponding key press the SetHoldItem function is called (Figure 20). This function loops through a list of possible objects the player could be holding and searches for the one that matches the corresponding inventory slot.

```csharp
void RpcSetHoldItem(string newHoldItem)
{
    foreach (Transform item in holdItems)
    {
        if (item.name == newHoldItem)
        {
            currentHoldItem.gameObject.SetActive(false);
            item.gameObject.SetActive(true);
            currentHoldItem = item.gameObject;
        }
    }
}
```

If it finds the corresponding object for example wood it turns off the previous item the player was holding and sets the piece of wood active in the hand and makes that its current holding item.
Lastly the player should be able to drop the items that he took. To do this the player chooses an item to hold and inputs the drop button which calls the DropItem function (Figure 21). The DropItem function checks the name of the item that the player is currently holding and drops the corresponding object. It has to be done this hardcoded way because otherwise the objects that would be dropped would automatically get the clone name tag behind them which messes up the system.

The current item slot gets set to empty again and the number of items in the inventory is decremented and the player gets his holding item set to the default slot.

```csharp
void RpcDropItem()
{
    if (currentHoldItem.name == "Rock")
    {
        Debug.Log("Rock drop");
        var rockObject = (GameObject)Instantiate(rock, item
        rockObject.name = "Rock");
    }
    else if (currentHoldItem.name == "Wood")
    {
        var woodObject = (GameObject)Instantiate(wood, item
        woodObject.name = "Wood");
    }
    else if (currentHoldItem.name == "Mushroom")
    {
        var mushroomObject = (GameObject)Instantiate(mushroom
        mushroomObject.name = "Mushroom");
    }

    items[currentSlot] = ";
    itemInInv--; 
    currentHoldItem.gameObject.SetActive(false);
    SetHoldItem(items[0]);
    currentSlot = 0;
}```
Destroying facilities is done by hitting the facility repeatedly with a tool. It works just like how roles worked in 5.3.2.2 about task allocation. The main difference here is that the building afterwards needs to be rebuildable.

Before a facility is built the players on the island need to deposit resources in the crate corresponding to the amount given on the sign (Figure 22). When that is completed the facility is built.

The facility is built by checking if the players have enough resources, and if they do the resources in the crate get destroyed and the collider and mesh renderers of the facility are set to active (Figure 23). The facility has to be built this way because just setting the game object active makes the scripts on the building non interactable by the player on the network.
So for example setting the tradingboard active from 5.3.2.2 makes it so that the player can still deposit resources but cannot use the inputs to accept a trade.

Destroying the building once it is built is done with the same script as in 5.3.2.2 under task allocation (Figure 18). The facility has health once it reaches zero it drops items in this case the items that were needed to build it. But because it is a building instead of destroying the object it has to be restored to its original state which is the sign plus the crate for resources. So the deconstruct function is called, which is the ConstructBuilding (Figure 23) function but the other way around now the script sets the facilities mesh renderers and colliders to inactive, and the sign and crate mesh renderers plus colliders to active. Now the players can collect resources again to rebuild the facility.
5.3.3 Objectives

The first objective of this game is getting the player to collaborate. In this game collaboration has huge benefits because it allows the island to grow faster because the team works for the best interest as a team instead of withholding items for themselves. But there are also the collaborative challenges for example the players working together to free the rock of the mine entrance.

The second objective of this game is making the players cooperate. The player can cooperate by trading with the other team via the trading board and making offers or by picking their role as woodcutter, miner or food gatherer and providing the correspondent resources to the team.

The third objective is competition. The players on the island can compete as teams against each other by stealing resources from each other's island and destroying their facilities. But competition between themselves within the team is also possible for example a team member withholding food so he has to work less.

The fourth objective is exploration. When the players are dropped on the island it is in their best interest to explore the island to find the locations of resources like stone or food. But also points of interest like the mine and the places to build facilities.

Lastly the objective gathering. The players have to gather the resources wood and stone to further the progress of the island by making facilities. But they also have to gather food to keep their hunger satisfied. Lastly gathering intel on the other team to make sure their progress is not ahead of theirs.

5.3.4 Communication

The players are able to open a simple menu with some communication options. There is no chat window in this game because it has been decided that it would be more interesting if there was a sense of ambiguity between the players. The communication options they have are in the form of simple icons to indicate what they are after. They can also convey emotion on their face to make certain interactions more clear. The communication options they have currently are pictured in figure 24. At the moment there is a lack of options because a whole redesign is on the table which is discussed in the chapter Future Work.
The game master can communicate to the players on the islands indirectly and directly. The game master is able to broadcast messages on the screen. This can be for giving direction to the teams in the form of hints for unlocking certain things. More on this in chapter 6.2
5.3.5 Outcome

The outcome of the game comes forward from an end screen with statistics from both islands on the aspects of collaboration, cooperation and competition. But also on how the island has flourished in terms of the facilities both teams build and how many island objectives they have completed.
So for both the teams the outcome is based around the state of the island by the end of the game.

The outcome for the game master could be different. It could be possible that the game master started the game in the hope of completing certain scenarios or seeing how players behave in certain scenarios. Both which could happen and the game master gets his information or a more negative outcome where none of his planned scenarios came to pass.
Or the game master might even want to learn a lesson to both the teams by reflecting on the end results. The game master could showcase for example how the team with a lot of collaborative points also was ahead in creating the facilities indicating that collaborative type of teamwork accelerates progress on the island.
6. Using the Role as Game Master to Influence Player Behaviour

In this chapter the role of the game master is discussed. To influence player behaviour while using live game design the role of the game master was created. The game master is able to use tools to steer the players in certain directions. This way the game master is able to work on his agenda in the game.

6.1 Register Aspects

For the game master to operate he needs information about the aspects on the islands. For example are the teams collaborating or are they each working on their own. How many challenges have they completed on the island. To make this happen the aspects needed to be registered. The registering of aspects is done partly by the game master itself and by an automatic system on the islands themselves.

6.1.1 Game Master Registering

The game master is able to fly around and is not limited to staying on one island. Because of this he is able to follow the team closely and make notes about the progress of the teams. The game master can get a first hand experience of how the teams tackle certain aspect scenarios. Or the game master can see why some groups split apart and the reason why they split apart. The game master is able to register certain scenarios and can take a guess for the reasoning behind certain scenarios. The reasoning being human made decisions for example a player thinking the other is not trustworthy because he saw the other doing questionable things. An automatic system is not able to get a grasp of reasoning made by players in the game. But what the game master does lack is eyes. The game master can only follow the situation he is watching. But when he watches one player the two other players might be doing an interesting cooperative challenge. Or the other island is having an all out war between the team members.

6.1.2 Automatic Registering

As stated earlier the game master is not able to watch every player that is where the automatic system comes in to play. The automatic system can track certain mechanics that the players use or the specific aspect island challenges.
6.1.2.1 Movement

The movement that the players make can indicate on what level of the aspects they are operating.
Collaborative movement would be that all the players are almost always in close proximity to each other. That could be moving rocks together or discussing the progression of the island.
Cooperative type of movement in the team would be a split situation where they spend their time doing their individual work and then coming together to contribute to the team goal. This is because the team members each have their role like a woodcutter.
Competitive type of movement would be in the team setting, spending most of the time not near each other. They refuse to collaborate or cooperate with each other so they have no reason for coming together.
There are also possible scenarios where the automatic system cannot detect the sort of aspect being used. For example the two teams being together. The two teams could come together to trade their wares which would be cooperative but it is also possible that they are fighting with each other which is competitive.

6.1.2.2 Communication

The way the communication works in this game could also be categorized in different aspects. The different kinds of communication options could have a score attached to them based on the aspects of collaboration, cooperation and competition.
Collaborative type of communication would be centered around positive messages. For example a thumbs up or a smiley face. But also options like help me would be a collaborative option.
Cooperative type of communication would be more to the point. For example asking how much wood they have. Or directing them to areas. But also requesting to start a trade and then discussing the terms.
Competitive type of communication would be crude and also direct. It could be threats that they make to the other team. For example a simple skull emoji or an angry emoji to indicate that they are going to attack them.
So a team that would use a lot of positive messages and is very busy trading and directing members to objectives to get the best possible island would score very high on the aspects of collaboration and cooperation while competition would have no score added to it.

6.1.2.3 Island Objectives

As mentioned earlier in 4.2.3 the islands consist of objectives that need to be completed. To register these objectives being completed there could be points attached to them which the island keeps track of. For example clearing the rock from the mine that needed more than one player pulling could give fifty points towards collaboration.
But also the creation of facilities could award points for example a facility that would only be used for the creation of weapons or torches to destroy facilities on the other island would reward competitive points.
6.2 Influence Aspects

To influence player behaviour via live game design the game master needs tools to operate. The tools also needed to influence the specific aspects of collaboration, cooperation and competition.

6.2.1 Game Master Goals

The role of game master is accessible to everyone meaning there is not one singular goal the game master has. The game master could be a psychologist interested in specific behaviour or a teacher with a learning goal in mind for his students.

6.2.1.1 Importance of Aspects

One of the goals a game master could have is teaching the importance of the aspects. The best way to teach them would be through the actions the players themselves have taken. This could be done in combination with the end screen that was discussed in 5.3.5. Take for example a class where a teacher is letting the students play this game. He notices how one team collaborates more while the other team is a more cooperative team. The teacher could then at the end of the game reflect on the end screen with the students. A more cooperative team could lead to a lot more resources being collected because of task allocation. But a collaborative team could have built more facilities that benefit the team. In this way the teacher could support his arguments of the importance of the specific aspects being useful in different situations.

6.2.1.2 Insight Player Behaviour

Instead of teaching lessons to the players the game master can also use the players for his own research. For example as mentioned earlier a psychologist can play the role of game master. He could then create certain scenarios in which the aspects he wants to gain insight of are in the foreground. He could use the two islands as two separate test scenarios. One island could be driven to cooperate while the other island is driven to a more competitive atmosphere. He then could use these islands to see what kind developments happen on both islands and document interesting behaviour.
6.2.1.3 Positive and Negative Aspects

It is easy to think that all the aspects only have positives to them, especially collaboration. But that is not the case and it would be an important lesson that the game master could give via the game.

6.2.1.3.1 Collaboration

Most of the positives about collaboration were discussed in chapter 4.1. For example team identity that leads to more motivation, a very open type of communication to make sure everyone benefits from the decisions, maximizing their rewards as a team which leads to better progression and lastly the combining of forces which made tasks that were impossible to do alone suddenly possible.

But there are also negatives in a collaborative type setting according to Merchant (Merchant, 2011). What is prone to happen in most collaborative team settings is that there is too much talking and not enough decision making. This stems from the fact that in a collaborative setting all team members should benefit from the decisions. But in most cases that is very hard to do which could lead to a lot of discussion and not enough action which in a competitive setting could make them fall behind. The open type of communication which is a positive aspect could also lead to a negative. Especially in the case of bigger teams. This open type of communication where almost all information is shared could lead to information overload. If all members keep continuously reporting their findings it would take no time before members cannot keep up with the information and in turn forget findings which then could be reported again out of a mistake.

6.2.1.3.2 Cooperation

The positives of cooperation stem from the fact that it makes work easier which was discussed in chapter 4.2. For example the task allocation where everyone could do their own job at their own tempo and does not have to worry about the other job that someone else took. But most importantly complementing the weaknesses of the other members and synergizing their skills.

But there are also negatives to cooperative team setting (Tauer & Harackiewicz, 2004, p. 849).

The first one comes from the positive of the task allocation. It is possible that one member of the team gets a task assigned which he does not want to do. This leads to a loss of autonomy and motivation which could lead to him performing worse than his other team members. This leads to another negative because everybody has their own tasks. It is clear to see who is underperforming. A scenario that could stem from this is that the member which is underperforming is only feeling worse which leads to more loss of motivation. It could also lead to a more hostile atmosphere where the other members start to despise the one member underperforming. This could happen because the other members are on track and are being dragged down by the results of this one other member.
6.2.1.3.3 Competition

Competition might seem like a strict negative aspect to most but that is not the case. The biggest benefit of competition that was discussed in 4.3 is rivalry. Rivalry is the main source of motivation behind a team to perform because they do not want to lose. This could lead to someone reaching his maximal potential. A good example of this is the Olympics. But according to Stucke competition does have its negatives (Stucke, 2013, p. 170).

Firstly it could be forced upon people which have no interest in competition. For example in the game where the players have two islands. One team might have no interest in the other island but they suddenly come to their island to steal resources. The only option that that island now has is fighting back to preserve the progress they have made. This only spirals in more competition because they are now enemies of each other. Competition could also lead to double the work (Tauer & Harackiewicz, 2004, p. 849). For example two children shoveling a half of a sidewalk. To complete their task faster they might shovel snow on the other half which interferes with their progress. As a result they both had to work longer and might even view each other negatively now.

6.2.1.4 Learn Specific Behaviour

Instead of learning the importance of all the aspects the game master could also take one small part of the aspect and teach that behaviour. This would be for example a grade school teacher taking up the role as game master. The teacher could use this role to then teach children to behave a certain way to specific scenarios. An example for this could be a specific collaborative behaviour. Take that rock in the game that could not be moved in the game by one player. He could use that as a way to teach children to ask for help. Then in the game the rock gets moved by the two players and the child takes back from this scenario that asking for help leads to success.
6.2.2 Game Master Tools

To create scenarios in which the goals of the game master can be played out the game master needs tools.

6.2.2.1 Sending Messages

The game master is able to broadcast messages to the survivalist on the island. The game master can choose to send it to everyone currently playing or to one island or even a singular player.

The purpose of this tool is to get players to act on specific situations.

For example a scenario where the game master broadcasts a message to everyone. The game master wants the players to collaborate so he can choose to broadcast a message to all the players which contains a hint that the rock in front of the mine can be moved with enough players.

Or the game master could start an artificial challenge by broadcasting a message that the first island to build a specific facility will be rewarded.

A scenario for broadcasting to a specific island could be motivating them to work together.

The game master could achieve this by notifying them that the other team is ahead of them in the progression of their island.

Broadcasting to a singular survivalist could be done to influence the team. For example the game master could broadcast a message to a survivalist saying that his other team member is withholding food which could start a more competitive atmosphere in the team.

6.2.2.2 Spawn Resources

The game master also possesses the ability to spawn resources. The resources could be wood and stone but also weapons.

The use of this ability for the game master could be rewarding behaviour. If the game master sees that one team is collaborating a lot he could reward them with spawning extra wood. This could motivate the team to continue that behaviour. He could also reward them for the challenges that could stem from the messages the game master could broadcast which was discussed in 6.2.2.1.

The game master could also use this ability to send ambiguous messages that could lead to different scenarios. For example the game master could give a player which was distancing himself from the team a weapon. This could lead to a fight breaking out on the island but it could also lead to him becoming a valuable asset to the team as a fighter against the enemy.
6.2.2.3 Force Roles

In this game as mentioned earlier there are roles to be played the roles are woodcutter, miner and gatherer. The players themselves have a certain freedom in choosing the roles they wish to play. But if the game master wishes to, he can assign roles to the players. The use of this tool is to steer certain team behaviour. If every player had a different role they would play separately from each other. But if they all had the same role they would need to adjust their plans and discuss what options they have now.

Adjusting the roles could also be used as a hint by the game master. If for example the players are way ahead in stone collection and are starting to fall behind with wood, he could make them all woodcutters forcing them to collect wood.
7. Conclusion

In conclusion to answer the main question of this thesis: How can the degree of collaboration, cooperation and competition be monitored and influenced using live game design while playing a multiplayer survival game?

The first step to answering this question was getting a better grasp on collaboration, cooperation and competition. Each of these aspects had their own aspects and types that made them unique and a beneficial addition to games.

What made collaboration unique was the common goal, team identity, combining of forces and maximizing their rewards as a team.

For cooperation it was the independent agents, goals that were not necessarily shared, terms of agreement, complementarity and synergies.

Lastly for competition you had the conflicting goals, rivalry, competition between individuals, competition between teams, free for all and competition for resources.

Now with this information about the aspects a design for a game that could include these aspects could be made. The information gave shape to a survival game that was based around surviving on an island. To force players to act on certain aspects challenges were made like opening up the way to the mine together. But the information also led to the design of the game mechanics that fit the specifics of the aspects. Collaboration ended up with the mechanic of moving heavy objects together with other players.

For cooperation the mechanics of trading with the other team and specific work roles were made.

Lastly for competition the mechanics of stealing and destroying the facilities of the other team were made.

With this playable game there needed to be a way to monitor the game while it was being played. To do this the role of game master was created. The role of game master is accessible to everyone. One problem is that the game master cannot watch the two islands at the same time. For that reason the game does have its way of monitoring automatically by checking the movement of the players, which communication options they use and what challenges they have completed. To influence the game the game master possesses some tools. The tools that the game master can use are: sending messages, spawn resources and force roles. These tools can be used to complete the goals of the game master which could be: showing the importance of the aspects, getting insight on player behaviour, show the positive and negative effects of the aspects and learn specific behaviour.

In the end it is important to know what makes collaboration, cooperation and competition unique. Only that way you can design a game that really brings the aspects to light. Clear design of the aspects also makes it possible for a game master to monitor them but also for the game itself. Influencing the aspects required some extra steps in the form of creating a role that could use tools to create scenarios around the aspects.
8. Future Work

8.1 The Game
There are a couple things the game currently lacks that could improve its quality and usefulness.

8.1.1 Facilities
Currently in the game the player can put the resources on the island in the crate and when the player puts enough resources in the crate he is able to build the facility. But the facilities are only used as a method of gaining points towards winning the game. What would make the game more interesting is if every facility had its own benefits. For example building a blacksmith makes it possible to upgrade tools or create weapons. This would also be interesting on the aspects of collaboration, cooperation and competition because players will have to discuss what facility would benefit the team the most and some facilities would align more towards one aspect for example the trading board is cooperative type building.

8.1.2 Dialogue Options
Currently the communication options in the game are very limited and an overhaul of the system could benefit the game a lot more, because more interesting scenarios could play out on the islands. What seemed like the most interesting option is the quick chat of Sea of Thieves which was discussed in 4.2.1.4 and shown in figure 5. One change that would be made is that when a player sends a quick chat near another player the other player can get a set of responses they could input to form some sort of dialogue.

8.2.3 Direction
Currently this game is a sandbox type game where you can monitor and influence the aspects of collaboration, cooperation and competition. In this thesis the idea of a psychologist or a teacher using the game as a tool to teach lessons or monitor certain scenarios was discussed. Although this is possible it is not specifically made for the teacher or psychologist because of this fact the game lacks in certain departments. It can do a lot but not everything is that useful. But a clear direction for the game could make it a very effective tool for example catering the game towards grade schoolers to teach lessons about the aspects. With that in mind more specific scenarios that the grade schoolers can relate to can be set up. Making the game a more worthwhile investment for the teacher to use.
8.2 Thesis

8.2.1 Feedback

What this thesis is lacking is feedback on the role of game master. The development of the role of a game master started very late in the product so there was no opportunity to let teachers, psychologists and other experts try out the role as game master. It would be very interesting and beneficial to hear what they think about it and what they would like to do as a game master, for example new tools that the game master could use or new interesting goals for the game master to achieve.
References


Appendix

Testing

Testing Goals
The goals of testing was to get feedback on if the network performed well with multiple players.
When joining the island it was clear that they had to survive.
If the mechanics that are currently in the game are clear and fun to use.
If players had any incentive of collaborating, cooperating and competing.

The Test
The tests were done in groups of three. They were all part of the same team and had to make a base camp. To do this they had to collect wood and stone from the island and place them in the corresponding building slots.
They were asked to think out loud and could ask questions if they got stuck.
There were five tests in total with all different people.

Feedback While Playing
Lack of sounds made it unclear if they were performing well or not.
Game needs to give more feedback if the team is progressing or not.
The location where items are dropped from the player was uncomfortably far so I had to reposition myself a lot for depositing resources.
Animations would make it a lot more lively.
The fog is way too dense.
Collaboration and cooperation seems like the way to go. Why would I compete with others on the island?
When everybody started carrying the network started to lag quite heavily.
Why should we make a basecamp? Does it have a purpose?
Feedback Afterwards From Survey

1 means completely disagree and 5 means completely agree in the figures.
That mechanics I had worked over the network
15 antwoorden

- 0 (0%)
- 0 (0%)
- 5 (33.3%)
- 9 (60%)
- 1 (6.7%)
### Extra feedback
12 antwoorden

- Moving the rock as physical object while carrying is very taxing on the network bandwidth. You calculate his translation plus his colliders which is the most taxing calculation on network. Most games limit this to player/vehicles.

- Island feels very empty and I feel like I can’t do much about it.

- I feel like I had no reason to compete with others.

- I feel like more mechanics would make the game more interesting. The game turned boring quickly. Especially mechanics that could be done with others would be a nice change.

- I would like more interactive mechanics between the others on the island.

- When players started carrying stuff the network started to suffer.

- It was unclear what the goal was of the game.

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- A lot of interaction is missing between the others in the island and making buildings felt like they had no use.

- It was unclear if wood needed to be collected from the trees or just gather everything from the ground.

- I did not get any feedback if I was performing good so I wasn’t sure if I was doing good. I would’ve liked to have more interactive mechanics with the others.

- When I started carrying objects other people started to teleport.

- Lack of animations and sounds made it a bit unsettling. Lack of clear end goal made it hard to find motivation to work for stuff.
Feedback Session Teachers (Dutch)

Charlie ter Horst

Notities 24 april 2020 - Feedbacksessie met Charlie ter Horst

Resource: boot om mee naar ander team te gaan?
Hebben ze interesse in ander team op ander eiland?
Bewapening tegen boten

Samenwerkend leren is een skill
In klasomgeving best lastig om te oefenen
Misschien is zo’n sandbox

Coöperatief leren
Positieve wederzijdse afhankelijkheid
Hier is wel Theorie over, zie bv.
  - https://wij-leren.nl/cooperatief-leren-artikel.php

Misschien opzet van
  - Groep 1: Game en daarna Samenwerkingsopdracht
  - Groep 2: Geen game (en iets anders) en daarna Samenwerkingsopdracht

Misschien om effect van game te
… is verstopt in knopjes van het spel
Waarom zou je samenwerken?
Dan moet dan ergens game technisch beloond worden
Bv. in World of Warcraft wordt je geslacht als je niet samenwerkt. Samenwerken in raids om armour te vergaren

Common enemy introduceren
Tent bouwen
Wegjagen beestjes terwijl iemand anders de tent bouwt
Lijkt het op Animal crossings?
Marcus: Dat is wel single player
Rust komt meer in de buurt

Inloggen op spel, dan skill kiezen, bv. iets kunnen maken dat anderen niet kunnen
Als skills asymmetrisch zijn, dan kan dat ook samenwerking afdwingen
Barter-achtige economie
Misschien voor economie-leerlingen interessant:
- hoeveel is hout waard?
- onderhandelen over prijs

Als je dit in onderwijs gebruikt, hoe gaat het dan gespeeld worden?
Dan moet het in 10 min. gespeeld kunnen worden, en in 30 min het verhaal duidelijk zijn.
Hoe kom je in 20 min tot de kern?
Of is het om thuis te spelen?
Marcus: Luxe van je eiland als mate van succes

Mogelijke leerdoelen:
- waarde van samenwerking
- onderscheid tussen collaboratie, cooperatie, competitie (is misschien minder relevant)
- mensen zijn van nature misschien snel geneigd tot competitie, terwijl
- economische thema's als marktwerking en specialisatie

Spel met producten en prijs, om effect van markt te ontdekken

Misschien keuze: Wil je generalist zijn, of specialist?
Specialisten zullen moeten samenwerken
Vroeger waren mensen meer generalistisch

Zou je als docent game master willen spelen, en zoja, hoe?
- Oefenen met omgaan met tegenslag
- Iets proberen en het lukt niet
- De tegenslag
- Zulke gedrag observeren is interessant voor docenten
- Anders: daar moeten studenten dan wel toestemming voor geven
- Als docent zou ik het niet per se veel willen beïnvloeden
- Ik wil cijfers zien, stats, als:
- resources, producten, hoeveel % van de map verkend, wat kenmerkt samenwerking?
- Bv. veel verhandelde items
  Chatten/dialogen/
  Marcus:
    - emotie op gezicht kiezen
    - eenvoudige keuzen in dialoog

Cool aspect is twee groepen die elkaar ontmoeten, bv. interessant

  - Maatschappijleer (ontmoetingen, 2 culturen)
  - Economie (marktverhaal)
Spelgedrag dient een speldoel, maar dat is nog wat anders dan leerdoel om een bepaalde vaardigheid te ontwikkelen of oefenen.

Welke inzichten zijn dat?

Wat ik nog mis zijn:
- positieve en negatieve aspecten van alle drie de typen gedrag
- competitie lijkt nu alleen negatief
- competitie kan ook positief werken, strijd hoeft niet altijd tot verwoesting te leiden
- collaboration zit er al goed in, maar collaboration kan ook negatief zijn, als dat doel eigenlijk niet optimaal is voor iedereen
- eigenschap van cooperation is rolverdeling
  - onderscheiden van taken
  - Marcus: misschien houthakkers, en andere rollen
- wat is je definitie van cooperation?
- Wat zou een negatieve uitkomst kunnen zijn?
  - Als teamverband meer verlies dan winst oplevert
  - Als iemand een specifiek doel had, en die speler valt weg, dan

Game master
- Marcus: kan meekijken en invloed uitoefenen op het spel, bv. door challenges of
  Onderscheid tussen C, C en C
  - Voordelen (nut) en nadelen van C, C en C
  - Is er draagvlak voor gezamenlijk doel? Zonee, dan moet ik switchen naar een
    cooperatief model van samenwerking
- Sonia: ik zou eerder een speler de game master maken, maar niet de docent
- Zou uitwerking van zo’n prototype interessant kunnen zijn voor educatieve
  toepassingen, bv. psychologie?
- Sonia:
  - ik dacht aan vaardigheid
  - Het is fijn als kinderen spelenderwijs leren met verschillende vormen van
    samenwerking om te gaan
  - Kan nuttig voor brugklas, of 4e klas
    - ze moeten vaak dingen doen in groepjes
  - Samenwerking kan leiden tot heel veel frustatie
  - Wat ik hier nog mis om educatief spel
    - welke inzichten wil je overbrengen?
      - literatuur over samenwerken
- omschrijving, activiteiten en discussie om het spel heen, bv. discussie over het
  speldoelen te geven aan spelers
- Sonia: Ok, maar sturen naar wat?
- Leerdoelen:

Literatuurtip voor Marcus:

Rols kiezen zoals houthakker specialisme zorgt voor samenwerking
Einddoel met resultaten kan gebruikt worden voor leren/refleteren
Kijken of er ook negatieve effecten zijn 3 aspecten
Puur sandbox