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Digital Game Development
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Digital Game Mechanics

- to create an analog board game prototype

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ACRONYMS & ABBREVIATIONS

FPS - First Person Shooter

Prototype - Analog board game prototype

ABSTRACT

Analog games miss a lot of quick games in terms of game time and play time in the FPS genre. This genre often takes more time to play in an analog game. Could the game play become quicker by examining the different game mechanics in order to give the players a smoother game play by a reduction of downtime.

Game mechanics that could be found in a digital FPS game such as *Doom III*, were converted to a prototype. These digital gameplay mechanics were converted so that an analog game could be played simultaneously. These game mechanics decrease the game time and down time in a way that a game using a turn based game order would not.

The digital game *Doom III* was used to create the prototype and eight analog games of different types and genres were examined to collect more unique game mechanics. All were suited for a multiplayer type of gameplay.

To get an understanding of what game elements were well liked in both digital and analog games, a questionnaire was created with twelve questions. The participants answered questions on the subjects of their favourite genre, missing game mechanics in both digital and analog games, well liked game mechanics, and also what the participants thought was impossible to create in a game in terms of game mechanics.

The results of both the analysis of the eight analog games and the answers from the participants created the base plan for the development of the prototype focusing on low downtime, re-playability, and an average amount of luck.

Several game mechanics were discussed and some of them were play tested. This resulted in keeping some game mechanics while others were removed because these game mechanics did not provide a rewarding gameplay. Several game mechanics were nearly impossible to implement without the use of a digital representation. An example on this type of issue was the first person view in the digital game.

The perception of skill based game mechanics could be moved to an analog board game but would have to be determined by other game mechanics instead of the player's physical capabilities.

The conclusion led to a prototype that could be played in an hour, which is a low game time for games in this genre. The FPS gameplay mechanics were converted to an analog game, but all game mechanics could not be transferred to the prototype without a conversion.

Keywords: Digital games, Analog games, First person shooter,
Board game, Game mechanics

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1 INTRODUCTION

In analog games not many games are played simultaneously. Since most similar games take a long time to play, this prototype was designed to reduce game time. Thereby making a quicker gameplay than other analog games in the FPS genre, based on play testing and time estimations from the publishers. Focusing on the conversion of gameplay from a digital FPS game into an analog board game. The focus was on the multiplayer gameplay, where the players were fighting each other.

Digital game mechanics and components of the FPS game *Doom III* could be associated with most FPS games as they are today. The *Doom series* is also one of the oldest, originating in 1996 and still played in this genre. This was the reason that *Doom III* was selected. Some of the game components and mechanics that were selected was the real-time based movement, FPS view, environment setting, reaction time of the player, marksmanship for accuracy, hidden movement for moment of surprise, weapons, equipment, ammunitions, camping, and cover. All of these above mentioned components and game mechanics are important for a FPS gameplay. *Doom III:s* mechanics and components captures a large part of the gameplay of a FPS game.

Typical analog game mechanics and components of a board game are in most cases based on strategic selections such as moving, pawn placement, dice rolling, card drawing, turn based, resource collection, unhidden movement, and rules that need to be learned before the players can play the game. These rules are often learned through reading.

1.1 GAME HISTORY

The earliest FPS game was *Hovortank3D* created by id Software in 1991. This was the beginning of a series of comparable games of the FPS genre such as *Quake*, *Unreal*, *Halo*, and *Battlefield 3*.

Digital games are not as old as their analog game ancestors first found in burial sites of Egypt. These games were over 5000 years old. The analog games have evolved over the years. A majority of the older games have been lost and forgotten, in terms of rules for these games, described by Wikipedia [8].

From the early 20th century the game industry was starting to change intensively with games like *Monopoly*, *Risk*, followed with miniature games like *Warhammer*, role playing games such as *Dungeons and Dragons*, and *Kult*.

1.2 EARLIER ANALOG GAMES

There have in fact been several attempts to convert a digital FPS game mechanics into an analog game ditto, for example the games *Tannhäuser*, *Space Hulk*, and *Mutant Chronicles: Siege of the Citadel*. The analog board game *Tannhäuser* is close to a FPS game in many aspects, such as the player versus player mode that was used in the prototype.

In *Tannhäuser* the game board is fixed, which means that in terms of re-playability the players only get two sides of the board to choose from. This is indicated by the

questionnaire as a downside. To compensate this loss of re-playability the game uses a variety of equipment to be chosen by the players at the beginning of each game session for each playable character. Both *Space Hulk* and *Mutant Chronicles: Siege of the Citadel* use a form of storytelling player that takes the role of the monsters, which is played more like a single player mode in *Doom III*.

1.3 RESEARCH QUESTIONS

- Can a digital FPS game mechanics be converted into an analog board game?
- How can the game mechanics found in a digital game be implemented to give the most suitable gameplay?

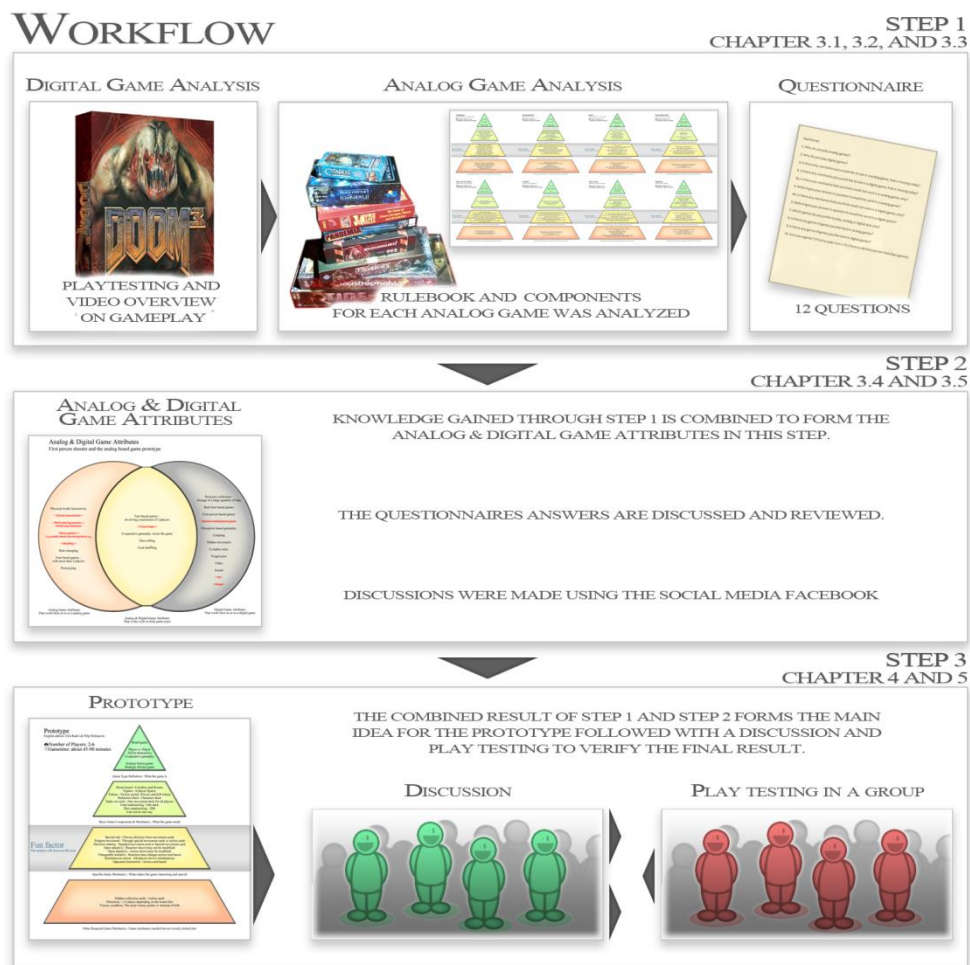


Figure 1: Workflow chart description in three steps

2 RESEARCH METHODS

To describe the workflow of the methods which are used for this bachelor thesis a workflow chart was created, see Figure 1. The workflow chart is divided into three individual steps.

2.1 STEP 1 - DIGITAL AND ANALOG ANALYSIS, AND GENERAL SURVEY

The FPS game *Doom III*, was reviewed to collect information about the gameplay that was needed to create the prototype. To understand how the gameplay was played in a multiplayer mode videos at YouTube [9] were viewed and game component such as weapons and environment of *Doom III*, to get an insight of how the players move, attack, and get a good understanding of the gameplay, as well as to play test of the game *Doom III*.

The analysis was made through reading general rules of the selected analog games and also by examining the games components to break down the differences between the analog and digital gameplay mechanics. The gathered information of each game was then stored in separate pyramid diagram information such as game mechanics, components, conditions, and types. Each of these pyramid diagrams were divided into four categories, where the third category was the category that the majority of the games mechanics were found in order to create a prototype and to make a more unique gameplay. The eight analog games that was used are *Citadels*, *Claustrophobia*, *Junta!*, *Neuroshima Hex!*, *Pandemic*, *Race for the Galaxy*, *Tannhäuser*, and *Tide of Iron*. These games were selected through personal experiences and the fact that they did not have anything in common, except for interesting game mechanics that could work well for the created prototype.

The creation of the prototype paid attention to the analog and digital gameplay, by the use of a questionnaire with twelve questions that was handed out to an amount of participants. The knowledge, desires, and thoughts of the participants on both gameplay and game mechanics were collected anonymously. The questionnaire was focused on both digital and analog games, to see if the result was different from participants that prefer either analog or digital games. These questions, see Appendix 12.4, were answered by a random group of individuals where the only specified data was their gender and age. The specifications were in addition to find out if there were any differences in the gender and age perspective of gameplay. This step can be found for further reading in Chapter 3.1, 3.2, and 3.3.

2.2 STEP 2 - SELECTION OF GAME ATTRIBUTES

The analog and the digital game attributes, are the result of the mixture between the analysis and the answers that came from the questionnaire. The different attributes are divided into the diagram shown in Figure 1, in Step 2. This diagram is divided in three areas that weave together to explain the merge of the analog and digital game attributes. This diagram describes where each individual attributes are placed and where each attribute fits the best. More information of this step could be found in Chapter 3.4 and 3.5.

2.3 STEP 3 - CREATION AND EVALUATION OF A PROTOTYPE

The prototype was created using both the information from Step 1, Step 2, and the information from Pulsipher [1] book on game design, trying to receive a “well played” gameplay. These gameplay methods of the prototype were discussed in group, after a game session where information about important game elements and game mechanics were reviewed from a FPS point of view. This step can be found in Chapter 4 and 5.

2.4 MAKING OF A PROTOTYPE

In some cases a prototype is manufactured in the development of a digital game, according to Pulsipher [1]. To answer the research questions where conditions are reversed, a prototype was created to break down the digital game mechanics to an analog board game. One of the most important factors in the conversion was to maintain a game value by creating an entertaining gaming experience, even in the case of this prototype.



Figure 2: Prototype example with a 6 player setting and token placement

2.5 PROTOTYPING

Digital and analog game mechanics and components were used in the creation of the prototype. Converting a digital FPS game mechanics into an analog board game, was done by mixing the analog and digital components and game mechanics to create a playable prototype. The prototype was focused on keeping a low downtime¹, getting a high re-playability², and reducing the chance of luck³ described by Pulsipher [1] book and Woods [3] in Chapter 7. It was important to give the players the option to select different types of weapons, actions and movement during the game, like in the game *Doom III*. In the setup the participating players should be able to choose if they want to start either with or without weapons, get weapons at random or by preplaced tokens in specific board tiles described on the setup. This choice was made to give more variety to the gameplay. See Figure 2.

¹ **Downtime:** Describes the time the player spends passive, waiting for other players to complete their actions. In a real-time based game such as *Doom III* the players may act at the same time, but real-time is rarely used in board games. The passive waiting time could in most cases be quicker by reducing the amount of actions or by the reaction where the players play at the same time.

² **Re-playability:** Means that the gameplay is not static, that the gameplay may change from one game session to another. Examples of methods using this type of game type to give a game more re-playability by drawing different cards, to build up the game board by board tiles like the prototype see Figure 2, encounters or events that differ in each game session.

³ **Luck:** A large amount of luck in a game is not well liked, according to Woods [3] in Chapter 7 book. For example a dice roll and cards can be used to give a better understanding on luck and the players do not want to have a 1/100 chance of getting a specific card or that a roll is crucial in order to win a game. It is important to get the right mixture of luck, chaos, and choice to get a working game.

To give the prototype a low downtime more research was made by analysing other analog games to find methods of simultaneous actions. This type of action was supposed to give the players a shorter game time as well as a low downtime. Players would not have to wait until it was their turn to play like in a standard turn based game. To describe this type of game style, games with these game mechanics were reviewed. The analog game *7 Wonders* uses a similar game mechanics.

When the prototype was created the objective was to keep the most significant game mechanics and components from the digital FPS game and to maintain a well-balanced gameplay. According to Pulsipher [1] the gameplay is the most important part of the game, because players does not want to play a game with a bad gameplay. Different categories of people may have other opinions or experiences of gameplay, these categories are described more in Pulsipher [1].

In the prototype just like in a FPS game, the player was only able to control one character at any given time. As an added feature the game could be more complex and would make the prototype more time consuming, in terms of game time. This is based on the simultaneous gameplay, which is discussed later.

By adjusting the number of board tiles in relation to the number of characters, the number of players is no longer a crucial part of the prototype in terms of game time. Additional players that participate in an analog game would normally increase the game time of a turn based game. But the game time is also depending on the players' earlier experiences. Decision making in each game round was taking different amount of time, for example the picking of a target to shoot at, could be one of these time consuming game situations that could appear during a game session.

The prototype was prepared so that the game could be played using a cooperative gameplay. This gameplay was most suitable with four or more players due to keep the interaction between the players at a high level, based on play testing of the prototype. If played in team play an even number of players are highly recommended to keep the game more balanced. Otherwise the opposing team could get a real advantage because of their number of actions.

The analog and digital games mentioned could be found in the Appendix 10.1, 10.2, and 10.3. Appendix 10.6 explains the different game mechanics, components, conditions, and types to get a better understanding of the description of the analysed games in each of the pyramid diagrams. These gameplay descriptions were based on the commonly used terminology in gaming circuits. To make it easier for the reader and to understand the functions of the different game mechanics used in the prototype.

3 ANALYSIS

In Chapter 3.1 the digital FPS game *Doom III* was analysed. Breaking down *Doom III*'s core gameplay mechanics and describing each of them in more details. See Figure 1, Step 1.

Eight analog games were selected in order to sort out the game mechanics, components, conditions, attributes, settings, and modes. These elements were sorted out and placed in the pyramid diagrams to build up the majority of the game elements of each analog game, in Chapter 3.2 take a look at Figure 1, Step 1 for further information.

In Chapter 3.3 the extracted data from the answers of the questions from all participants' thoughts on analog and digital gameplay mechanics were overviewed. See Figure 1, Step 1.

The results of the combination of both the answers from the questionnaire and the pyramid diagrams were needed to get a clear overview of more suitable solutions for the mixture of gameplay attributes that were necessary to convert a digital game mechanics to an analog game, by the use of analog game mechanics in Chapter 3.4, see Figure 1, Step 2

The answers were reviewed and discussed more in depth in Chapter 3.5 before entering Chapter 4 where the research was further exploring the choices that were needed in the creation of the prototype. See Figure 1, Step 2.

3.1 DIGITAL GAME ANALYSIS

Doom III is played using first person view. Players playing an analog game cannot see from the character's field of view in the same way as in a digital game, where the players use a digital display as the main source of view. First person perspective makes it impossible to detect opponents that are behind the character by sight, instead the player has to rely on other senses, such as hearing. In a FPS such as *Doom III* a player only plays one character at the time.

Real time based digital games are constructed on calculations when a player presses specific keys on a keyboard, joystick or any other form of game control. In FPSs the players often use the keyboard combination *WASD* for this type of real-time based movement. *W* to run/walk forward, *A* to rotate/strife to the left, *D* to rotate/strife to the right, and *S* to run/walk backwards.

Equipment and weapons are important for the gameplay, for the players to achieve the goal of shooting the other opponents in the game. The opponents may be artificial computer controlled opponents (also called AI or Artificial Intelligence) or other players. In FPS games such as *Doom III* there are several types of weapons to the player's disposal as well as armour, health packs, and key cards to open new sectors on a map. The weapons also hold a limited amount of ammunition, which could be restocked either by collecting a similar weapon or by ammunition packs that could be found on the ground. In the multiplayer mode, weapons, armours,

ammunition, health packs, and power ups are placed at specific locations on the map so that the players may automatically collect these items by stepping on them.

Doom III uses a graphic user interface, to describe the players current health, armour value, the amount of ammunition, collected weapons, and used weapon. The collected weapons are shown when the player picks a weapon from the ground and will be hidden after a couple of seconds.

Skill is based on the use of the controls (mouse/keyboard or joystick) and the player's marksmanship is important in order to hit the opponents, which could be hard if the player is not used to the controls. The player must aim at the opponent and shoot at the right time to get a kill. So this shows that the player also needs to react quick this is also why the reaction time was important, in order to kill the opponent, before the opponent was able to kill your player character.

The environment was often used to get an advantage, to hide in a dark corner or to climb up a ladder to hide from the opponent. In some areas the player may be more vulnerable for example when the player runs in a small corridor unable to side-step to safety. The lighting was also important for the settings and in *Doom III* this was used so that the players needs to use the flash light to see the opponents lurking in the shadows.

Doom III also uses a lot of sounds to get the players attention of where adjacent opponents are located. This element effect elevates the gameplay experience by creating an atmosphere where the players can not feel safe. This element was especially hard to deliver into an analog game, although more often used in films and digital games.

Moving, sidestepping, jumping are several of the movement mechanics in the FPS to avoid being hit, in a digital game this make much sense because the players reacts in real-time. This game mechanics are crucial to a digital game of the genre.

Cover or camping are gameplay mechanics used to hide from the players and are more often used in capture the flag. In this gameplay the players may wait at specific strategic locations on the map to gain advantages when a player moves in line of sight. In analog games the players are often given bonuses from cover. Situations like the capture the flag, where the other players are often picking a flag from the other player's team's base. The player that holds the flag is then supposed to bring the flag to their own base.

The digital FPS game has an age recommendation, because of the amount of graphic violence and a rough language. *Doom III* has a recommended age of eighteen. In analog games the age recommendations are different more representing the complexity of the games rather than the graphics and the rough language. An exception to this was the analog card game *Kult* that was highly criticized by the media in the middle of the 1990s, this game has an age recommendation of fourteen according to *Board Game Geek*. This may be due to its extreme graphic content and rough language, but this was not confirmed.

3.2 ANALOG GAME ANALYSIS

The goal of this analysis was to sort out game mechanics and components that were used to create the prototype. Analog game analysis was made using the gathered information from the eight analog games listed in Chapter 2. More information from the full analysis could be found in the Appendix 10.5.

SETUP AND USER INTERFACE

Two of the game mechanics from the game *Tannhäuser* were used, where the players could start with a set of combined equipment and weapon tokens which are combined in any way the player chooses and the players may also be able to collect equipment on fixed positions on the game board.

The user interface of this game holds similarities to a FPS such as *Doom III*, because it holds the amount of health, an amount of equipment or abilities, and statistics of the character.

REACTION TIME

The reaction time from *Tide of Irons* initiative was used to create a game mechanic that decides which of the players that shoots first in the prototype. This game mechanic is similar to the FPS reaction, such as the counter attack.

BOARD LAYOUT, LINE OF SIGHT AND WEAPON RANGE

Claustrophobia has a game board that is built using board tiles to give the game its environment in terms of narrow corridors and rooms. This type of environment is frequently used in FPS games, as well as the rules for line of sight, the range of weapon attacks, and was also used for the prototype.

SIMULTANEOUS ACTIONS

Junta! holds actions that were used for the simultaneous movement that was required to simulate the real-time movement. This type of action also gives the prototype a moment of surprise, because the players are able to hide their specific movement.

DIRECTIONS

The selection of the character direction plays a big role in the prototype. The game mechanics from the game *Neuroshima Hex!* Was used to describe the direction of a player's field of view similar to the FPS game *Doom III*.

EQUIPMENT AND WEAPONS

In *Citadels* the players' builds districts to win the game, some of these district cards give advantages to the player during the game. This game mechanic was used for equipment and weapons that were picked up during the game session, just like in a FPS such as *Doom III*.

HIDDEN COLLECTION CARDS AND RESOURCE COLLECTION

Race for the Galaxy is a card game that uses action based gameplay, where the player is using a hand of hidden cards and each turn selects one of these action cards to get advantages in the game. This game mechanic was used to create the movement cards for the prototype.

In *Race for the Galaxy* the players also draw an amount of cards which could be used as resources or to play the card for a given bonus. This game mechanic was working well for the gameplay of the action cards for the prototype.

TELEPORTATION BOARD

Pandemic uses cards in order to teleport from one place to another. This game mechanic was borrowed for the prototype, to be used for the special movement card warp which lets the player teleport from one portal to a random portal on the game board.

The reason why only the game *Tannhäuser* and no other similar games of the same genre were selected was because *Tannhäuser* was the only game that was played player vs. player.

The games *Tannhäuser*, *Space Hulk*, and *Descent: Journeys in the Dark* are also slow in terms of gameplay, referring to the stated game times of these analog games. But all of these games are also played turn based, which means that one player take one action and then another player takes one action. Rather than the already existing game mechanics from similar shooter games.

The prototype was not made to recreate existing work, where game mechanics and components are mixed from other analog games in order to build a more unique setting of a FPS game, such a majority of the game mechanics used to create the prototype. With the help of the different game mechanics the prototype could manage to achieve a lower game time, more re-playability, and the reduction of downtime, proved during a game session where the time was clocked to 1 hour this means that the game is at least half an hour shorter than the game *Tannhäuser*. Based on a group with players that was totally new to the game.

PYRAMID DIAGRAM

Diagrams of each game were created like the one below in Figure 3. This diagram was made through a design decision to describe an analog game and its structure.

The pyramid diagram describes the information of how the analysed games were placed and categorized, this was done after each game was analysed. The pyramid system was based on the gameplay analysis of the diagram presented in Woods [3] Page 148, Figure 7.1, with game mechanics. The complete game definitions of each game could be found in the Appendix 10.6, game definitions are based on the rulebook functionality of the game mechanics, component, types, and elements. Names of these game definitions is just a short description of the specific type and its functions.

Presenting each category to explain their specific purpose and function to clarify the diagram setup. The focus will later be centred to the third category of *Specific Game Mechanics*.

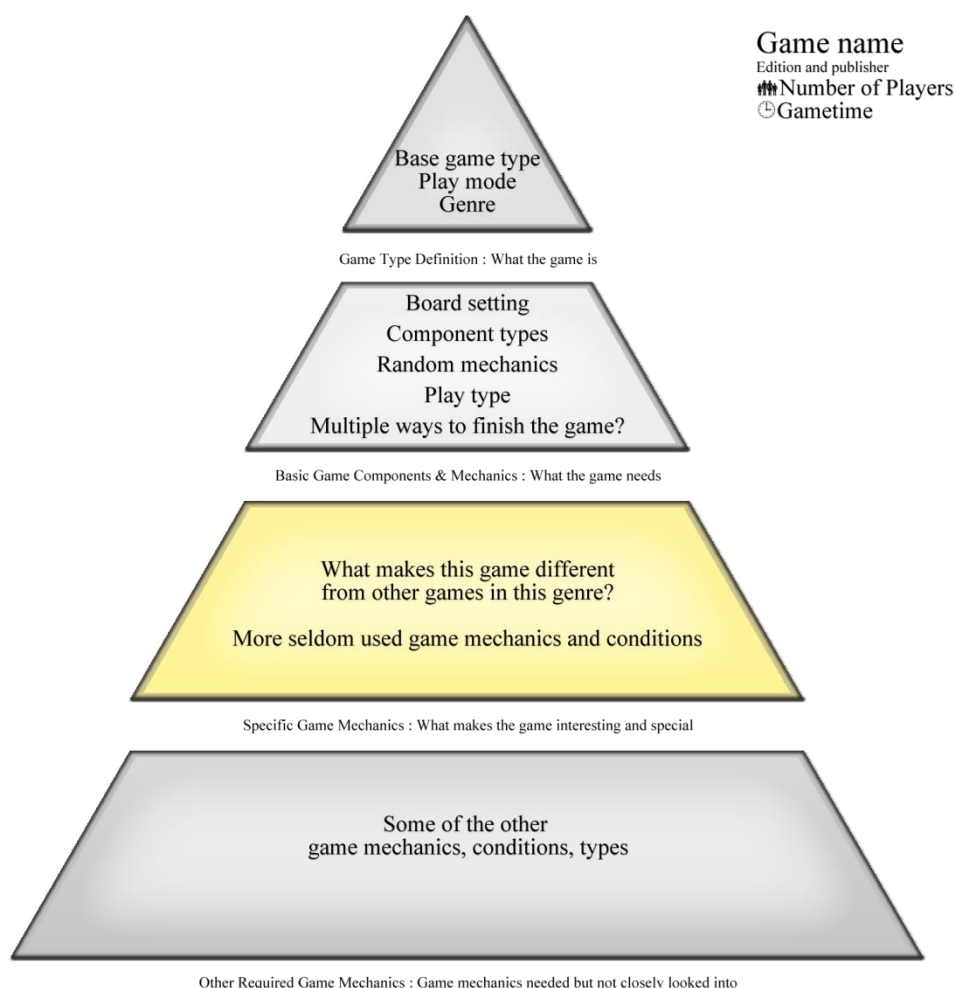


Figure 3: Pyramid diagram setup

GAME TYPE DEFINITION

The first category, in the top of the pyramid diagram describes the basic type of the game, genre, and how the game is played in order of play style. Some games could have more than one genre and play style.

BASIC GAME COMPONENTS & MECHANICS

The second category, describes the core types of the components of the game, such as board type, collection types, turn order, victory conditions in terms of how many ways the players can complete the game and which types of randomizing mechanics that play a role in this type of game.

SPECIFIC GAME MECHANICS

The third category, describes more unique game mechanics and conditions of the game, in order to make the game stand out from games within the same genre. This category will be called the "*fun factor*". These are vital game mechanics to get a fascinating gameplay. This was the category where most of the game mechanics for the prototype were found or invented. Such as the conditions by mixing existing game mechanics or conditions from other games.

OTHER GAME MECHANICS

The fourth category, describes the needed game mechanics and conditions, in order to get the game working. These game mechanics and conditions are often similar to the same type of genres as in any of the analog games in the same genre. The analog games in this category do not hold any extraordinary game mechanics to make the game stand out. Instead the game mechanics and conditions are still important in order for the game to work as predicted, but not for the purpose of this bachelor thesis.

The majority of the game mechanics described in this Chapter 3.2, are collected from the third category also described as the "*Fun factor*" in the pyramid diagram at Figure 3. Where "*Fun factor*" are just the definitions of more rare mechanics.

3.3 QUESTIONNAIRE SUMMARY

In this Chapter 3.3 the questionnaire was summarized, to get an overview of the participant's relationship towards the digital and the analog games. This was done in order to get a deeper understanding of why the participants played analog and digital games and to understand if there were any differences between age, gender or player perspective. The summarized result of this questionnaire analysis was discussed and reviewed further in Chapter 3.5. A total of 31 anonymous participants answered twelve individual questions about gameplay, game mechanics, most liked genre, and if they were playing games. The participants stated their proper age and gender in the survey.

Result: 24 of the participants where male

Result: 7 of the participants where female

AGES	-24	25-34	35-45	46+	UNKNOWN*
PARTICIPANTS	6	17	3	3	1

Figure 4: Describes the age of the participants of the questionnaire

GAMER	1	2	3	4	5
PARTICIPANTS	3	1	4	19	4

Figure 5: Describes the amount of gamer that the participant think they are, where 1 was considered no I am not a gamer.

The answers from the questionnaire combined with the analysis of the digital and analog games were used to create the diagram in Chapter 3.4 with the mixture of the digital and the analog game attributes. Though some of the answers on the questions 3-6 about missing game mechanics were removed, because personal experiences of already existing games that were using these type of game mechanics.

The age and gender could not show any statistical significant result, with the low amount of replies from the questionnaire. There was a huge difference in the response to question 3-6, when the participants answered depending on the value on last question "Are you a gamer?". Where there was no answers at all from 7 of these participants that answered the result 1-3.

The most important information of the questionnaires answers was the response to the analog and digital gameplay mechanics, because the prototype should keep the wanted game mechanics.

For more information about the questions answered in the questionnaire, see Appendix 10.4.

**The unknown category describes a participant that missed to fill in their proper age.*

RESPONSE TO THE ANALOG GAMEPLAY AND MECHANICS

The main response to why, the participants played analog games, was because of the social aspects, which was often played with friends and family.

The participants would like to experience more of the following mechanics in analog games, low downtime, re-playability, dynamic boards or cards, sounds, simple rules, player vs. game, and hidden movement.

The participants claim that the following mechanics would not work in an analog game: real-time based movement, massive multiplayer gameplay, player elimination, player vs. game, resource management, and physics.

The participants that preferred to play analog games, seem to like games with social interaction, such as parlour games and role-playing games. The majority of the female participants answered parlour games and the majority of the male participants answered role-playing games.

RESPONSE TO THE DIGITAL GAMEPLAY AND MECHANICS

The major response to why, the participants played digital games, was that the digital games were easier just to jump into without reading a lot of rulebooks, but also the creativity of the digital world in expressions of emotion towards the graphics, sounds, and video.

The participants would like to experience more of the following mechanics in digital games, social interaction mechanics, where the player may be able to draw on a map or improve cooperative gameplay, realism in looting, consequences such as NPC gets killed or cities wiped out, improved AI, interaction though new types of controls or more games like uses the *Playstation Eye camera*, strategic or tactic gameplay, simple gameplay, additional single player content, true virtual reality, and more advanced physics.

The participants claim that the following mechanics would not work in a digital game, true role-playing gameplay, true virtual reality with smell and sound, the shuffling of cards through the cause they differ, turn based, real life social interaction, and a logical thinking AI.

Of the participants who preferred to play digital games, the majority preferred to play FPS games and role-playing games.

CONCLUSION OF THE RESULTS FROM THE QUESTIONNAIRE

The answers on what the participants wanted to play could be a coincidence but according to both Woods [3] and Pulsipher [1] books the majority of the research shows nearly the same result on the gameplay mechanics and that the females liked to play more of the social games. Most of the participants would like to play more analog games if they were able to do so, but because of the aspects of gathering a group of people for an analog game session. The most preferred game form was the digital type among the participants.

3.4 GAME ATTRIBUTES

When the analysis of the digital and analog games had been made, a new diagram was made. This diagram depicts the mixture of game attributes which were needed to convert the FPS game mechanics to the prototype. The collected information from both the game analysis and the answers of the questionnaire were gathered and positioned in this diagram see Figure 6.

The digital game attributes that were found in the FPS Doom III was discussed with a group of individuals through the social media of Facebook that played a lot of first person shooter games, through observations of gameplay videos, and play testing of Doom III.

The analog game attributes were collected from both the game analysis and discussions on Facebook, on suitable game mechanics that could be used for the creation of the prototype, before the mixing of both the analog and digital type of attributes.

The diagram explains the different type of game attributes. Explaining how the digital and analog games are weaved together, to organize a diagram of most commonly used game attributes in either digital or analog games. This made a bridge between the two game types where they meet each other, to form game attributes that could work well in both of the above mentioned game types.

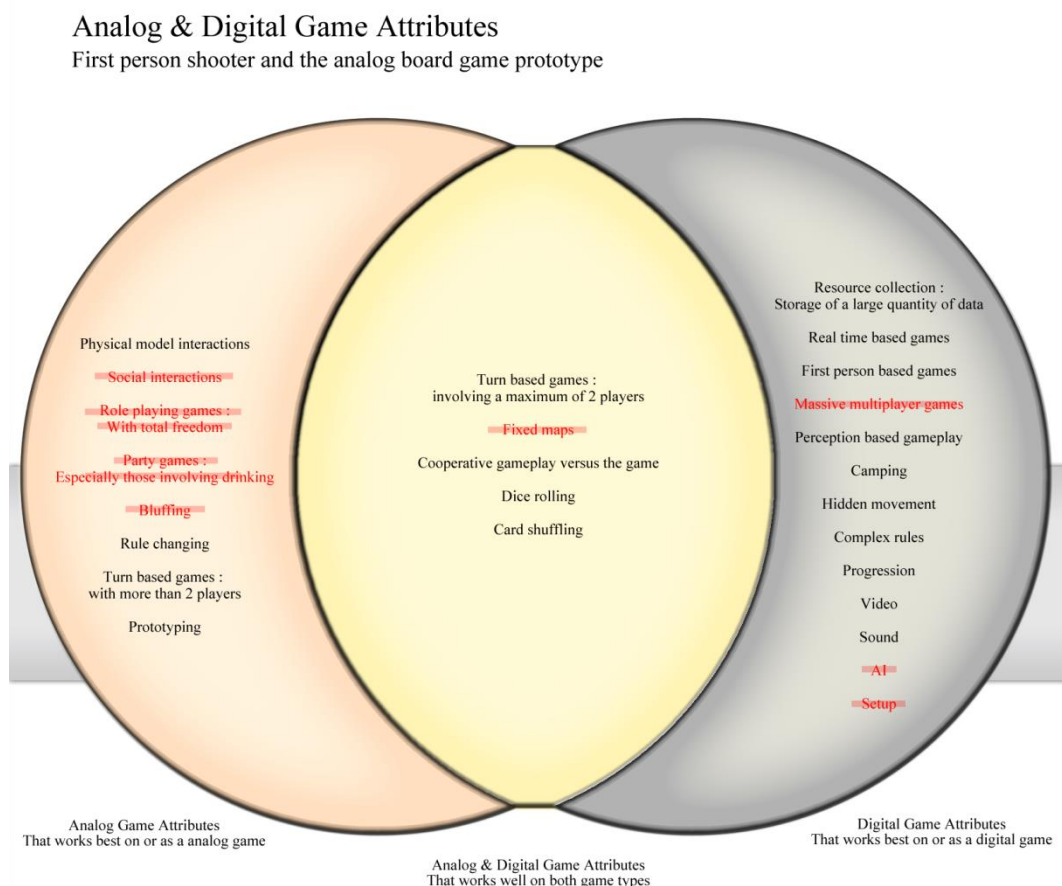


Figure 6: Describing game attributes

3.4.1 DIGITAL GAME ATTRIBUTES

The digital side to the right of Figure 6 describes the digital game attributes that work better in a digital game application. Some of these game attributes may be used on an analog game, but the attributes often need some conversion in order to work.

RESOURCE COLLECTION

Collection resources are in most cases very time consuming. This is the reason of why resource collection fits better in digital games, because the computer may store the information examples of games using a large amount of resource collection are the games: *StarCraft*, *Warcraft II*, and *Dune II: The Building of a Dynasty*.

REAL TIME BASED GAMES

This game type is very hard to implement in an analog game, because the digital platform is able to calculate the incoming data quicker than a normal person may calculate the same amount of data. For example the characters reactions, movement speed, directions, movement penalties, jumping, shooting which would be extremely hard to obtain in an analog game. *Sonic the Hedgehog* or *Super Mario* are examples of real time based games.

FIRST PERSON BASED GAMES

The closest form of analog gameplay based on first person was probably live action role-playing (*LARP*) or *Soft Air*. This bachelor thesis did not look into this type of gameplay. This game form is better preserved in a digital game rather than an analog game. Example of games which are first person based are *Thief*, *Doom III*, and *Battlefield 3*.

PERCEPTION BASED GAMEPLAY

Where the players need to aim in order to hit a target. The perception based gameplay are often seen in terms of sports in an analog way but seldom in games, by sports referring to games like dart, football, or hockey. This type of gameplay were used in FPSs such as *Doom III*, *Unreal*, *Quake*, and *Halo*.

CAMPING

Camping are often used in FPS games. Camping is when players stays on a strategic position waiting to shoot their opponent when a player's character gets within range. This could work in an analog game but the game mechanic is more suited for digital gameplay, rather than the analog gameplay. This attribute could increase both the downtime and the game time of an analog game, because these game mechanics encourage a passive game style, and is highly depending on the other player's activity in order to function. If a game mechanics for a mixture of camping and hidden movement would be used the camping could work in an analog game.

HIDDEN MOVEMENT

This type of game attribute is often used in real time strategy games such as *Warcraft III*, *StarCraft*, and *Warhammer 40.000: Dawn of war*. There are analog games that could be played using the hidden movement but these games often need an additional game of the matching type with a screen in-between like *Battleship*, or with *Axis & Allies* that have house rules (see Appendix [10.6]) for this type of gameplay. The most common form of hidden movement is the *Fog of War*. *Fog of War* are used to hide parts of the game board that is not visible to the players units.

COMPLEX RULES

These are rules which could be extremely time consuming to use. Many players who play analog games according to the questionnaire want to play games with rules that are simple to learn and with a low game time. In a digital game the players do not need to read rulebooks of five to forty pages in order to play the game, this does not mean an analog game cannot be complex. War games like *Advance Squad Leader* and *World in Flames* are examples of analog games with extremely complex rules and may take weeks in order to finish a game session.

PROGRESSION

Works on both platforms, but the progression attribute performs better on a digital platform. Role-playing game is the type of analog game that uses progression. There are some other analog games that use this type of game mechanics like *Necromunda*, *Blood Bowl*, and the expansion *Descent: Journeys in the Dark*, *Descent: The Road to Legend*. Digital games often use progression to maintain the players in a game. *Diablo III*, *World of Warcraft*, and *XCOM: Enemy Unknown* are just some examples of games with progression.

VIDEO

This media uses a digital platform and the closest part was to make some form of puppet show or theatre in the conditions of video reference. It is still not a video representation, though this attribute is more suited for digital games. Examples of video representations in games are *Diablo III*, *Dragon Age II*, and *Disciples III*.

SOUND

This media could be used in terms of an analog game, but the mixing and the timing was harder to achieve in an analog version for sound representations. There are some analog games that deliver a sound track, examples of these games are *Last Night on Earth: The Zombie Game* and *A Touch of Evil: The Supernatural Game* though these games are still played using an electronic device such as a DVD player, CD player or Blue ray player.

3.4.2 DIGITAL AND ANALOG GAME ATTRIBUTES

The mixture of the digital and analog attributes in the centre of Figure 6 describes digital and analog game attributes that work well in both analog and digital applications without losing a large amount of gameplay value. Even though the feeling of the different attributes may differ, depending on the type of the attribute. For example card shuffling for a board game gives a different feeling than the card shuffling on a computer, but both of the attributes work well in either way.

TURN BASED GAMES: INVOLVING A MAXIMUM OF TWO PLAYERS

A turn based game with two players, would work for both a digital and an analog game. The analysis of *Race for the Galaxy online* and *Heroes of Might and Magic* series are good examples of this attribute. Common for players that play digital games like *Race for the Galaxy Online*, is that they are impatient and very eager to begin to play a game with more than two players. The online players often drop out of games that does not start right away. Sometimes there were not even a chance to chat with the online players until they left the game session. Players playing these type of games are missing the webcam possibilities, this was discovered through the questionnaires.

CARD DRAFTING

Where each player receives a hand of cards, draws a number of cards, and passes the rest to the next player. Because this is a simultaneous game mechanic this type of attribute could work well on both the digital and the analog platform. Card drafting are used in the analog games *7 Wonders* and *Citadels*.

COOPERATIVE GAMEPLAY VERSUS THE GAME

Games where the player plays alongside with each other to fight the game itself or another player that takes the role of the storyteller, work well in both the analog and the digital games. For example game mechanics used in games like *Pandemic*, *Arkham horror*, *StarCraft*, and *Diablo III*.

DICE ROLLING

Rolling of dices works well on both analog and digital games. Randomizing is used in a large quantity of both of these game types. This attribute works until the amount of dices reaches a certain limit where it would be too complex to calculate all of the dices to get the results in an analog game.

CARD SHUFFLING

Could work well in both game forms, through analog games because of the function of the card shuffling, and in the digital game because of the card shuffling in order to save time. Card shuffling is used in games such as *Dominion*, *Race for the Galaxy*, *Ticket to Ride*, *Race for the Galaxy Online*, and *Magic the Gathering*.

3.4.3 ANALOG GAME ATTRIBUTES

The analog side on the left of Figure 6 describes analog game mechanics, and what works best in order of gameplay in analog games. This means that it is impossible to achieve these game attributes in a digital game.

PHYSICAL MODEL INTERACTIONS

Physical interaction is almost used in all type of analog games. This attribute involves the sense of feeling, touching the materials of the components for example moving figures on the game board, drawing physical cards, and rolling dices.

RULE CHANGING

By changing attribute in the game, for example when the player moves into the room it shall rotate 180 degrees and all players may draw a card instead of just moving and turning, would have been done in five seconds in an analog game. But this rule change could take hours in a digital game if it should be implemented in code and most of the digital games would need a large amount of code experience.

TURN BASED GAMES: INVOLVING MORE THAN TWO PLAYERS

Heroes of Might and Magic series is a digital game that could be played with more than two people, but in terms of downtime the gameplay is becoming too slow and there are a lot of waiting times before the player would be able to play the next game round. The digital versions of *Race for the Galaxy* and *Citadels*, *Race for the Galaxy Online* and *Citadels Online*. These games were nearly impossible to play, due to the waiting time of game sessions with more than two players.

PROTOTYPING

This game attribute could be used to quickly produce a prototype of an analog game for the purpose of play testing. To find out if the game is worth the time and effort for the developers. In an analog prototype the rules and the design decisions could easily be changed early in the production. Instead of spending hours on coding to accomplish the same result in a digital game, according to Pulsipher [1].

3.5 WORKFLOW DISCUSSION

With the analysed material from Chapter 3.1 to Chapter 3.4, there was enough of information as well as observation to configure the prototype. The prototype was based on the game mechanics collected from the analysis of the analog games and the clarity from the game mechanics from the digital FPS game. The answers from the questionnaires, gave a picture of what the participants were missing in games and also what they wanted in form of mechanics. In the terms of what the participants thought was impossible to create in a digital game or an analog game, could be discussed further. There are game mechanics that the participants thought would not work in a game, which have been used in games in the past. Gameplay similar to *Pandemic* and *Arkham Horror* where the player or players team up against the game was a mechanic that the participants would like to see in analog games and some participants thought would be impossible to recreate in an analog game.

The participants wanted to play analog games that had a low downtime. This could be achieved by collecting the most time consuming elements by finding out what sequence that is taking the most time, with this information the players need to check if that sequence could be played simultaneously. The analog games should also according to the participants include more re-playability, such as a dynamic boards or additional cards. The participants also wanted to include sounds in an analog game, there are two games which are described in the digital game attributes in Chapter 3.4.1, that are sold with a CD sound track that could be played during the game session. Participants wanted simple rules, the use of a DVD film with a tutorial of how the game should be played could solve this issue or simply by making a game with less complexity. Hidden movement was used in some games such as the *Dungeon Crawler* game *Space Hulk*. Hidden movement could be used in board games such as *Axis & Allies* and *Risk*. Players could use more than one game board and a screen between the two game boards to hide their armies (house rules) such as the game *Battleship*.

There are several analog games that have been transformed to digital games. This was discovered early in the analysis of the eight analog games. This does not mean that every game worked either better in the digital version. This depends more on how the developers converted the games. Some games had some issues with unstable servers and locked chat possibilities for new players which causes some problem when trying to put together players for a game session.

4 THE ANALOG BOARD GAME PROTOTYPE

In this Chapter the prototype of the FPS game, was created using game mechanics, found in the games that was analysed in Chapter 3 and the information given from the participants answers from the questionnaire in the same Chapter and at Figure 1 in Step 3.



Figure 7: Setting of the prototype

The main focus of the prototype in this specific situation was the game mechanics for the turn actions. This enables all players to play simultaneously, such as moving, shooting, and spawning to get a gameplay that is similar to a FPS game.

The prototype needed a game board for all players to interact with, see Appendix 10.6. The analog board type that was picked is the dynamic type to give the player more variations on how the game board is built up during setup, see Chapter 3.3 for further details. Corridors and rooms were used to create the game board setting, where rules were different in terms of line of sight to mimic a FPS. This type of board setting will also give the game re-playability through the large amount of different combinations of board setting, see Figure 7.

To become better at playing the game over time like in a FPS, the game mechanics of the analog games were studied to find ways to convert the marksmanship to the prototype. To make the game skill based, the prototype uses an amount of action cards that the player is able to combine in different ways to give the player, for example a better chance of hitting the opponent with a shot, new weapons, strategic advantages, and a reaction time value based on the players combined amount of command points. This gives the player a strategic skill based gameplay, where the players have to decide how they want to play.

The action phase was also giving the prototype a moment of surprise. By having unexpected things happening during a game session, there was a chance that

players might miss their opponent and even chances to hit their own teammates in a team player game mode, with for example special weapons, grenades, and rocket launchers. This action was also giving the players the ability to overview the total amount of luck and chaos, because the players may be able to influence their own odds, by playing action cards or changing dice values. This was giving the prototype a more stable gameplay than just pure luck of dice rolls and once again giving a gameplay more similar to a FPS game.

Ammunition used in FPSs like *Doom III*, in terms of resource collection see Appendix 10.6 is more time consuming in an analog board game such as the prototype. Ammunition may be of interest on specific weapons, such as grenades which could only be used one time.

Regarding gameplay it was not important to use ammunition in the prototype, because the players were intended to get killed several times during a game session. In FPS games, the killed character often loses their weapons and equipment so the purpose of the prototype was supposed to be the same. In some digital games a player might be able to pick up a weapon or equipment used by the killed character, like in the game *Battlefield 3*. This was a rule that could be used in the prototype.

The players should never be cast out of a game when they got killed according to Pulsipher [1] on player elimination. Instead they should be returned to the game board, on the following round.

All the necessary game mechanics are then placed in a pyramid diagram just like the other analog games that was analysed see Appendix 10.5. This was done by taking a closer look at each category and explained them in detail to describe the design process of the prototype.

GAME TYPE DEFINITION

Game setting board game, Player vs. Player, All for themselves meaning that all players should fight against each other, or team cooperative which means that players may play in a team if they have a group with four to six players. Genre of game was set in a science fiction, to explain the setting of the prototypes background story. The gameplay is that of the strategic shooter.

BASIC GAME COMPONENTS & MECHANICS

The prototype contains a number of action cards and movement cards. The movement cards are used in order to travel in the game, described later in Chapter 5.1. The action cards are used in order to change the results of a characters action, described in Chapter 5.3 and 5.4. There will be four types of tokens in the prototype which will be used to keep track of the amount of kills, spawn points, poison counters, and victory points. Like in *Doom III* the number of kills is the way to determine a winner at the end of the match. The amount of victory points collected by a player like in the game *Tannhäuser*, is used for special victory conditions such as *Capture the Flag* game mode. Spawn point numbers for the portals used on specific board tiles just like *Pandemic*, was made so that the characters may teleport from one board tile to another on the board. Poison

counters are used when a player plays a specific action card from the players hand in order to poison a board tile. There was six coloured figures which the players could choose from, red, green, blue, yellow, black, and white. Just like in the FPS *Doom III* the player may only play one character. The game also contains Reference sheet, such as Character sheets for each participating player to keep track of their character's health, just like the user interface in *Doom III*. The game contains two dices for each player of their corresponding figure colour, described above, to use the principles of dice rolls described in Knizia [2], where the players add the two rolls together to form the result. Room & Corridor board tiles were used in order to create the game board, this made the board setting dynamic and made it possible for the players to create a large quantity of levels. The dynamic board setting of tile placement was using the same type of setting as the analog board game *Claustrophobia*. The request from the answers of the questionnaire, where the participants wanted re-playability. Re-playability was gained through the dynamic board setting and the large amount of action cards. The prototype uses a combination of dices and cards in order to randomize the attack results. The turn was divided in two different actions; the reaction phase, and the action phase. Dices roll and the result of luck was the highest factor during the reaction phase. During the action phase the players instead got to choose how to play cards. The dice rolls could be determined by the choice of discarding cards for a specific change of the dice result of one of the two dices, this decision must be made before the dices are rolled. To give the players the alternative to use dices rolls, or to play the prototype more strategic in forms of a precise values, such as the change of a dice to a value of four before rolling the second dice. This would then give a value from five to ten. These actions will be discussed later in Chapter 5.5. The players can only win one way in the prototype, other methods are discussed in Chapter 7.

Prototype

English edition- Emi Rudvi

👤 Number of Players: 2-6

🕒 Gametime: about 45-90 minutes

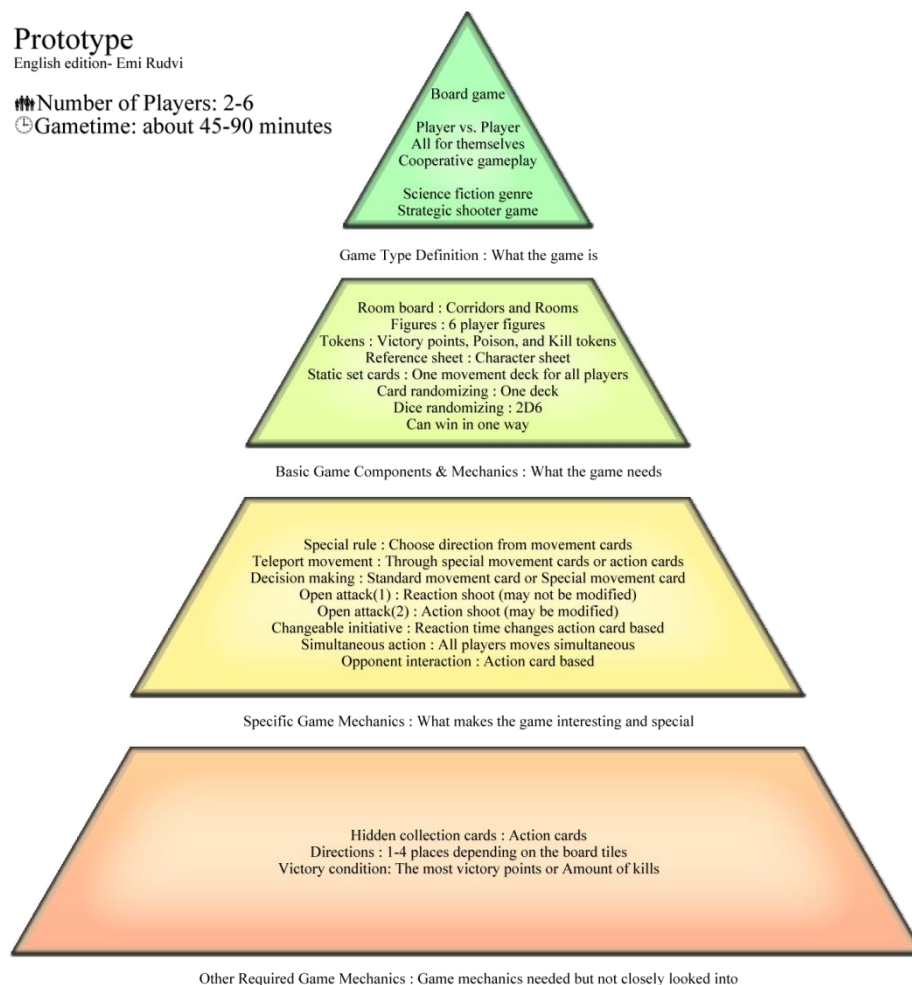


Figure 8: The prototype pyramid diagram

SPECIFIC GAME MECHANICS

The core part of gameplay of the game is described with the following game mechanics; Special rule, Teleportation board, Decision making, Open attack, Changeable initiative, Simultaneous action, and Opponent interaction.

SPECIAL RULE

The players chose one of their eight movement cards in each movement phase. Unless the player is playing a special movement card in the previous round, then they may only select from the four directional movement cards. The reason for implementing this limitation was because the special movement cards were too powerful to be used in every game round.

TELEPORTATION BOARD

Players may use the Warp movement card to teleport to a random portal on the game board. Both the Movement selection and the Teleportation board give the players a type of hidden movement, like the participants would like to see in an analog game according to the Questionnaire in Chapter 3.3. This movement also made it possible to flee if the characters were heavily wounded.

DECISION MAKING

When the players play specific action cards or movement card. Which could be the Special movement cards follow, stand ground, advance, or warp. It is important that the players decide to play their cards right in order to win. Participants wanted a high amount of re-playability. The decision making is also described in Woods [2] as a well-liked game mechanic according to Woods research.

OPEN ATTACK

In this prototype there will be two types of open attacks, determined by dice rolls. One in the movement phase and one in the action phase, described earlier in this Chapter *Basic game components & mechanics*. These two attacks are constructed to give a better average of luck and chaos, this gives the player the ability to change the outcome of the attacks final results.

CHANGEABLE INITIATIVE

The prototype was also using a changeable initiative in form of a reaction time, the initiative is based on the action cards actual command point cost. Like the reaction time in a FPS game like *Doom III*. The reaction time is further described in Chapter 5.3.

SIMULTANEOUS ACTION

All players will move at the same time after each player have selected their movement card. The movement cards will be revealed at the same time, all players will then move their own figures on the board according to their own movement card. All players will also roll attack dices and play action cards at the same time, this is why all players are using coloured dices of their characters specific colour. All dice could in this case be rolled by one player, to make the gameplay quicker. This way the game gets a low downtime explained by Pulsipher [1] and it comes as close to a real-time movement as possible.

OPPONENT INTERACTION

This game mechanic describes the effect a player could use to interact with their opponents. Opponent interaction could be used through specific action cards such as the *trip mines* or the *poison* that could be used to damage the opponents. This is to give the game more interaction when the players move around on the game board. This game mechanic also provides more gameplay action and gives the game more variety than just shooting.

OTHER GAME MECHANICS

These three game mechanics describe fundamentals that are needed for the directional movement, Hidden collection cards, and the games Victory condition.

HIDDEN COLLECTION CARDS

The players will draw a number of action cards from a face down action deck. Just like in the most card games for example, *Citadels*, *Race for the Galaxy*, and *Junta!*. These drawn cards are then kept hidden until the action cards are played or discarded.

DIRECTIONS

Depending on the layout on the board tile the players may move in 1-5 directions, depending on if a character may use a spawn point. Like the game *Claustrophobia*, that uses similar game mechanics. The directions for the prototype depends on the door pass way, this describes that the player may move in that specific location.

VICTORY CONDITIONS

The game will end when the amount of kills reaches a number decided before the game starts, at this point the most victory points collected will be the winner of the game. Victory points are awarded for killing an opponent.

5 DISCUSSION

In this Chapter 5 the prototypes different game mechanics were overviewed and discussed in detail, to explain why the prototype was played in a specific way. How it was changed to improve the prototypes gameplay. Looking closer to the core game mechanics of the prototypes movement mechanic which was the simultaneous movement. Without this game mechanics the game would gain a higher level of downtime which would cause the players to spend more time passive. Real-time movement could solve this issue, but this is a problem that have become too hard to be solved for this short amount of time. The game should not rely on the turn based gameplay used in analog games such as *Tannhäuser*, *Space Hulk*, or *Descent: Journeys in the Dark*, described earlier in Chapter 3.2.

After the discussion of the simultaneous movement in Chapter 5.1. Chapter 5.2 the selection of board type will be described the selection of board type and the board layout of the board tiles and also why the specific board type was selected. The prototype was made using a more dynamic board than the one used in the analog game *Tannhäuser*. This decision of the board design is a design decision to obtain a high re-playability as mentioned earlier. The fact that the board tiles were using square based board tile was not only to save some time on the cutting but also to limit the amount of directions that a character may travel to in each round. The size of the game board should be managed during the setup based on the amount of players that should participate in the game session.

Recommendations was to 9-12 board tiles to build the game board for a game session with 3-4 players. This recommendation was discovered after several game sessions, oversized game boards made the game sessions longer. The characters spent many rounds moving and was not involved in combat as frequently, as on the smaller game board.

The re-playability was also increased with the amount of action cards and the different amount of weapons discussed in the Chapters 5.3, 5.4 and 5.5.

Time consuming game mechanics that did not fit well in the prototype were removed to reduce downtime and game time of the prototype, but also to maintain a gameplay which will improve the prototype. An example of time consuming mechanics not used is the resource collection of ammunitions.

5.1 SIMULTANEOUS MOVEMENT

Simultaneous movement was important to come as close as possible to the real time movement used in a FPS. Simultaneous movement was also important for the actual moment of surprise and to get a hidden movement. In a FPS the game controls often uses *WASD* (described in Chapter 3.1) in order to update the direction that the player moves towards. In a digital game the computer takes care of all the moved characters in the game area which makes real time movement more possible in a digital game than in an analog game. The computer also holds the speed of the characters of how far the player are able to move each update.

A board game seldom uses real time movement, because there is no player keeping track of movement in the situation of how far the players may move over a specific time period. This game play may also give the players a natural way of changing their plans described in the example below. For example players may change their prior movement decisions, so that the player gain advantages because the opponent player moved to a specific location. This is both time consuming and boring for the participants of the game.

So in order to gain gameplay speed in the prototype, mechanics from the card game *Race for the Galaxy* were used to make the movement phase. *Race for the Galaxy* uses a mechanic where each player has a fixed set of cards (seven cards) and the player chooses one (in some cases two) of these cards in the beginning of each round in order to give all players that specific action phase.

Rules are changed in order to use the mechanic for movement, because in *Race for the Galaxy* the players gets a minor advantage from the played actions of a game round, this rule is removed. *Race for the Galaxy* is also a card game and do not contain a board setting as in the prototype. New rule for the movement cards are that a player may choose one movement card from their own fixed set of cards (one of eight cards see Figure 9) in each movement phase. This card effect does not apply to all players. To make the movement simultaneously all players reveal their own selected movement card at the same time. All the players then move their character on the board according to the rule of the players certain newly played movement card.

The idea of using this type of movement was to keep the movement hidden so that the moment of surprise may occur, to replace the fog of war used in a digital game or the perspective of the player's view.

In some cases when two players are in the same room or corridor, the players will be given the choice to follow the opponent's player wherever the other player decides to moves. This special movement card was made to make the character able to catch an opponent that tries to escape. In the FPS the players have the opportunity to follow another player and the possibilities to gun down the other player. The rules were changed in the board game to limit these special movement cards. Special movement cards cannot be used the next round if the player used them in the current round. This rule was strictly to get a better gameplay of the board game and to give the players an opportunity to flee. This issue was discovered during a game session in which the prototype was play tested by a group with four participating players.



Figure 9: Movement cards and special movement cards.

There could be other ways to make the hidden movements by the use of a story telling player, so that all players have their own game boards and the story teller can see all of the players' boards and tell the players when they run into each other. In this way the players do not need cards but the story teller decides when the players may or may not move, special movements could in this case be told or written down to the story teller. But this type of gameplay would probably just cause more problems than it would add to a "good" gameplay.

5.2 BOARD TYPE AND LAYOUT

The board was one of the fundamental parts of a board game. The game board should be used so that the mechanics of the movement cards could work as intended. The board types using a hexagon board or grid board would not be suited for the prototype. One of the reasons was that this would make the movement game mechanics taking players a very long time to find each other on the game board. The game of *Claustrophobia* uses a board type, interesting for the prototype, where each board tile holds one room or corridor. There are specific rooms that use special rules, but the main reason for this decision lays in the movement mechanics of *Claustrophobia* where the players may move one or sometimes two rooms or corridors in one turn. This suits the prototype very well.

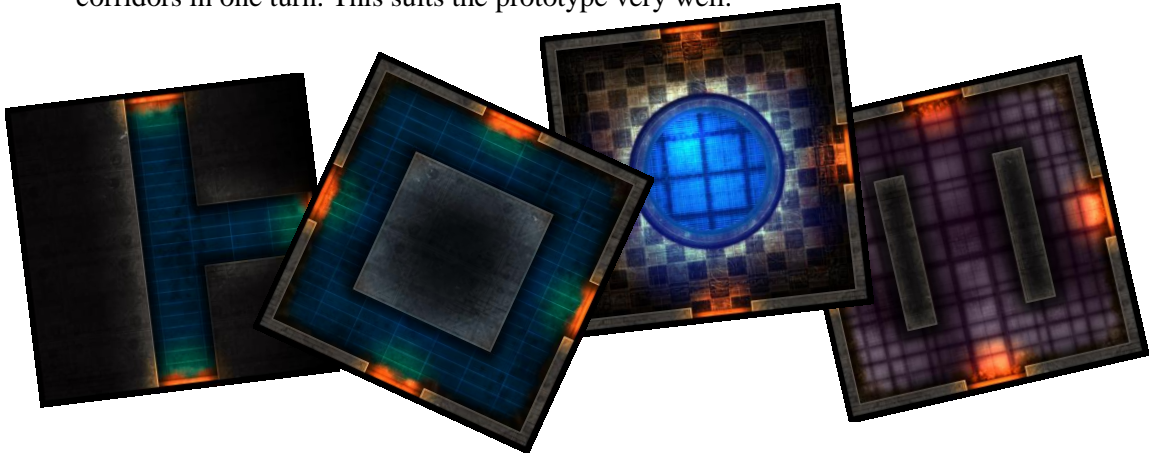


Figure 10: Corridor and Room board tiles

Corridors are tight and in a FPS a player that runs in small corridors cannot dodge bullets in the same way as in an open area. To illustrate this in the prototype players are given no negative values for shooting at opponents in a corridor one room away, if the player has line of sight. If a player in other cases are in a room they can dodge, strafe or jump in a FPS, so the player shooting on an opponent one room away will receive a negative modifier to the shooting players roll. Similar mechanics for this type of rule could be found in war games such as *Tide of Iron*, where the shooting player gets a modified value when they try to shoot figures placed in for example a forest or a bunker.

There are action cards that are restricted for use only in rooms or corridors, to make the players use the map to gain access to a specific action card, like a new weapon or the use of trip mines.

The prototype has a large advantage over the digital FPS, because of the flexibility to change the map each time the game is played. This could be done in different digital games through level editors, but it would take a lot of time to make a level. Comparing it to the analog version of a game, described in Chapter in 3.4.3(*Prototyping*) to change the board tiles in different directions, or even change the board tile during the setup of the game, to create a new game board. The prototyping of an analog game was also discussed by Pulsipher [1].

5.3 SKILL BASED GAMEPLAY

Skill in a FPS game is based on the mouse speed and the perception of the player. This could also be linked to the player's reaction time when the player shoots. Simulate a player's skill can be done in a several types of ways.

The players could be given a certain type of more skill based device if the players would prefer sport based skill, such as an arrow, water pistol. Where the player needs to use their accuracy for example the attacking player throws a coin from a distance of two meters on a small character poster to determine the damage made by the player's character. The character poster has different hit zones that describes the amount of damage made to the opponent's character. This gives a more skill based type of game play and would not work well for this prototype. Thou this might work well in a party game, the participants playing the game should in this case play the game outside to avoid breaking any valuable items.

The prototype will focus on a more strategic type of skill where the players earn bonus abilities after a set number of kills. Games that hold these types of game mechanics are games like *Descent: Journeys in the Dark* or *Mutant Chronicles: Siege of the Citadel*. In *Descent: Journeys in the Dark* where the character become better during a game scenario, especially in *Descent: The Road to Legend* where the players plays in more than one game session. In *Mutant Chronicles: Siege of the Citadel* the players are given different types of dices in order to give the players a better random chance when the player shoots at monsters.

In the prototype players will be given action cards and skill cards. The player will also be given more action cards during a game. When the player has killed another player without dying, the player will receive one additional action card and after killing two players without dying the player will receive two additional action cards. If this player dies, the player goes back to receive their standard hand size of four action cards.

This game mechanics were used to give the players a "feeling" of the skill in a digital FPS. The skill card see Figure 11 on the other hand, once the card is obtained, stays with the player throughout the complete game session. Though the skill card may be changed during the game session to a better card, depending on the amount of kills the player has achieved. The amount of stars on the skill card describes the corresponding skill level of the player, see Figure 11.



Figure 11: Skill cards for strategic skill

Other ways could be to give players a chart where the players may fill in their total amount of kills and store them in order to use the result of kills in their next session of the game. This could be an idea for tournament rules.

The reaction time is also very important part of the game mechanics in a digital FPS, because that player would want to shoot and kill their opponent before the opponent may be able to shoot. A way to fix this issue could be to roll a dice to contain a value in the beginning of each round as in the game *Tannhäuser*, but it does not make the reaction value based on skill, because the value is just a matter of pure luck. There is an out of the ordinary game mechanics used in *Tide of Iron* to describe the players' initiative, where the players receive an amount of command points each round in order to gain the initiative. The command points are also used in order to play special cards. This game mechanic gives the players a choice to either save command points to play first in the next round or to spend the command points to play cards that may help the player in a way described by the specific card. This game mechanic makes it possible for the players to choose their own way of playing style, instead of just getting a lucky roll. A variation of this game mechanics was used in the prototype.

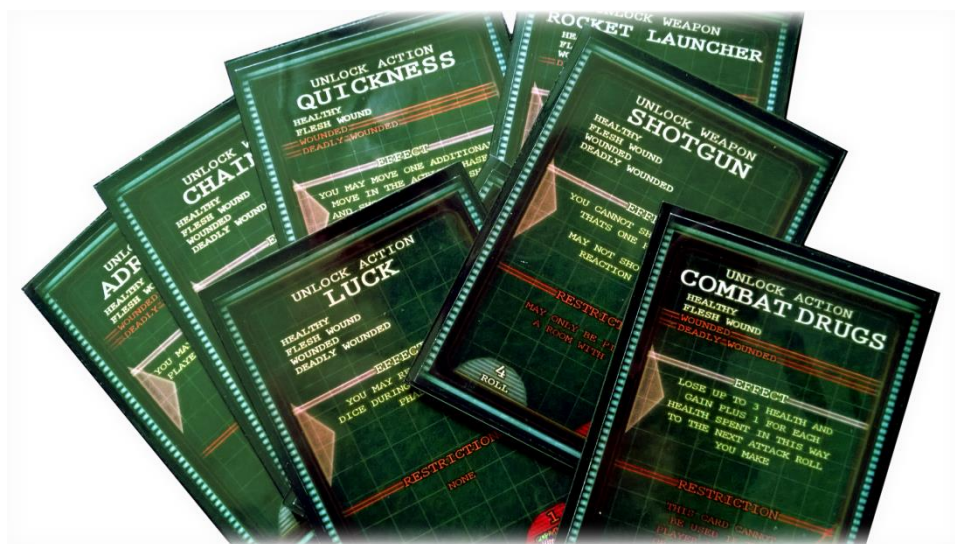


Figure 12: Action cards

At the beginning of each draw phase the players are given four to six action cards which hold three different values such as, special ability with special rules, dice value from four to six, and a number of command points from one to three. The players should count their total amount of command points after they have drawn their new hand of cards, this combined value is forming the player's reaction time value. The player may play cards at their action phase as usual. At the beginning of the next round the player's draws up to their players full hand size of four to six action cards see Figure 12. In this way the players need to make choices in order to maintain a high reaction time or lose the reaction time in order to save action cards. The negative factor of this game mechanic was that it gave the players a calculation time of five to fifteen seconds each round, depending on the player's mathematical capabilities.

5.4 EQUIPMENT AND WEAPONS

To explain the information of why the prototype uses cards for equipment, weapons, and strategic advantages lays in the background story of the game. To provide the information of the design of the background story a short summary of the game settings. The prototype was as described earlier in this bachelor thesis, set in a FPS environment in a multiplayer setting, the background story of the game was set in an alternative world, in a science fiction setting much like the movie of *The Running Man* (1987), where the participants are placed inside of a maze, with the only option to kill each other in order to win the game. The action cards represents locked abilities that the players may select in order to give their characters advantages during the game session.

This unlock of weapons, equipment, and action cards was based on the cost of command points, by discarding the same amount of action cards. Each weapon card uses a reference sheet for their corresponding weapons damage, and several of the weapons hold one special rule to personalize the specific weapon see Figure 13 to the left. Just like in *Doom III* the different weapons got their specific features and specializations, for example the rocket launcher that may deal damage to more than one player. If the rocket exploded to close to the shooting players character that character would be damaged by the rocket, or like the chainsaw that cannot be used to hit player characters at long range.



Figure 13: New Weapon card (left), Character sheet (right)

The layout was also discussed after the game session where the group decided that the reference sheets should be printed on the corresponding action cards instead, see Figure 14. Because the reference sheets were too time consuming for the gameplay so the action cards for the weapons were recreated, with the values of the damage table of the specific weapon used on the card, see Figure 13 (Left). The action cards for the light and heavy armour were also discussed, because these action cards were also too time consuming for the gameplay of this prototype. For the purpose of gameplay the armour lowers the amount of damage taken from weapons. With this in considerations the *Doom III* use of armour mechanics in the prototype must be reviewed further. Changing the values on the character sheet, see Figure 13 (right) by increasing the amount of damage a character may take or to give additional health points depending on the result of the attack roll could be another solution for this issue.

5.5 SHOOTING AND RANDOMIZING FACTORS

The shooting phase is an important part in a FPS game and to implement this game mechanic in the prototype, game mechanics using a reaction phase between the movement and action phase was added. The reaction phase idea were created after observing a couple of YouTube [9] clips that was focused on the gameplay of *Doom III*. The reaction phase is based totally on the reaction when a player sees an opponent player as the player enters a room or corridor.

The players that play *Doom III*, was never aware that their opponent is present until the player is able to see or hear their opponent. In order to shoot the player's character there needs to be for example, a line of sight to the player, unless the players uses a grenade or rocket, but then the attack roll would have been based on the result of luck rather than the skill of targeting the player. Unless knowledge of specific strategic positions in the environment was known from earlier game sessions, for example camping described in Chapter 3.4.1.

With these situations in consideration the players were given a reaction shot whenever they stood in the door well of the next board tile, the shot will in this situation be more based on the actual luck rather than the actual skill of the roll and may not be modified by action cards during the reaction phase. The players roll their two dices and compare the result stated on the reference sheet to determine the damage. The reference sheet holds two different tables of each weapons (R and A), one for the reaction phase (R) and one for the action phase (A). The game mechanic for the roll uses the same techniques as Bewersdorff [4], uses on Page 3-7 in Chapter 1, where the value of the two combined dices are added together to give a value between two to twelve. This dice combination makes the results of both two and twelve a minor chance to be rolled. This game mechanic gives a higher average of the rolls six, seven, and eight. This type of game mechanics would also give a lower chance of the result of a twelve then the roll of a twelve sided dice. This game mechanic was also used in the game *Settlers of Catan*.

		ROLLED VALUE							
WEAPON TYPE		2-4	5-7	8	9	10	11	12*	
CHAINSAW (R)	MISS	-	-	-	-	-	-	-	
CHAINSAW (A)	2	-	4	5	7	10	10	KILL	
REVOLVER (R)	MISS	2	2	2	3	4		KILL	
REVOLVER (A)	MISS	2	3	3	4	5		KILL	
SHOTGUN (R)	MISS	-	-	-	-	-	-	-	
SHOTGUN (A)	MISS	-	5	5	7	7	8	KILL	
DUAL SHOTGUN (R)	MISS	3	3	5	5	6		KILL	
DUAL SHOTGUN (A)	MISS	5	5	7	7	8		KILL	
MACHINE GUN (R)	MISS	2	2	2	3	5		KILL	
MACHINE GUN (A)	MISS	2	3	3	4	7		KILL	
FLAMER (R)	MISS	2	3	5	7	9		KILL	
FLAMER (A)	MISS	2	3	5	7	9		KILL	
ROCKET LAUN. (R)	MISS	-	-	-	-	-	-	-	
ROCKET LAUN. (A)	MISS	4	5	7	8	12		KILL	
SNIPER RIFLE (R)	MISS	-	-	-	-	-	-	-	
SNIPER RIFLE (A)	MISS	5	6	7	8			KILL	
LASER GUN* (R)	MISS	2	3	4	5	6		KILL	
LASER GUN* (A)	MISS	2	3	4	5	6		KILL	
PLASMA GUN* (R)	MISS	4	5	6	7	9		KILL	
PLASMA GUN* (A)	MISS	4	5	6	7	9		KILL	
GRENADE (A)	MISS	3	4	4	7	7		KILL	
TRIP MINES (A)	2	-	4	6	7	8	10	KILL	

* ROLLS OF DOUBLE 6 AND DOUBLE 1
MAY NEVER BE MODIFIED BY PENALTIES OR BONUSES

Figure 14: Reference sheet

The action cards represent actions that the character may take in the action phase. During the action phase, the dice could be changed for a fixed value by the use of action cards, or by applying advantages from specific cards such as the cover card which gave a negative modifier to all incoming attacks. This game mechanic gave the players both advantages to the results of the rolled dices values, or by the manipulation of the result of the players fixed dice value. The advantage of the roll was given by specific action cards. Only one of the two attack dices may be manipulated before a dice roll, by replacing the dice with a fixed value. This game mechanic was used to give the player less randomness and improve the flexibility of the game. The action phase takes place after the players have moved into the centre of the board tile. The game mechanic used in the action phase may be seen in a FPS game such as *Doom III* for example by taking cover, throwing grenades, collecting power ups.

5.6 HYBRID SUGGESTIONS

A hybrid could be created by for example using the digital *Microsoft surface 2*. The digital screen of the *Microsoft surface 2* could then be used as the platform, to contain the game board. Analog board pieces of the player figures, could then be used and put on to the digital game board. The real-time movement could in this case be fixed, because the *Microsoft surface 2* can read the markings under the models to obtain the players directions. The directions could then be used to solve the skill based gameplay, with this gameplay the players could be able to aim at their target. The computer used in the *Microsoft surface 2* could also keep track of the ammunition, health, and other key statistics.

Another possibility of creating a hybrid could be to build a robot prototype and use it on a printed 3D board. Where the players may drive around the robots on the game board to gain real time movement, using for example mobile phones as the digital controls for the robots. This game would cost a fortune to produce but as a relation to FPS games, mounted cameras on the robots head could be used. Where the players could use a phone in order to move and stream video to the phone. The robot may even be able to shoot. By implementing these mechanics the game is even more towards a digital game and in this Chapter 5.6 looking towards the adaption of both digital and analog game mechanics to create a hybrid.

5.7 EVALUATION OF THE RESEARCH

The evaluation of this research in relations of methods used in the analysis for the selection of the games in Chapter 3.2, was based on well-known and played analog games. These games were selected based on personal experiences from those specific games. Instead of this type of selection of the particular games the questionnaire could hold a list of independent games that the participants would like to see in this bachelor thesis, but in that case more information would have been necessary for the questionnaire questions. Games could also have been selected randomly.

The questionnaire could have been made digitally to make it easier for the participants to take part in the questionnaire. By this statement referring to a program like Adobe Forms Central [11] where the bachelor thesis could be sent directly to the participants instead of the paper and Facebook [10] recalls online in order to get a higher number of participants in this bachelor thesis.

In the research collection of play testing the prototype could have been tested by more groups of participants, where the participants first should play Doom III for thirty minutes and then try out the prototype. In terms of testing the prototype using a standard turn based movement to actually prove that the prototype would have been more time consuming, than the simultaneous action that is used at the moment, but the simultaneous action will reduce the downtime, because the players did not have to sit and wait for their turn.

CRITICISM OF THE SOURCES

The sources from the webpage *Wikipedia* [8] may not have the proper information. *Wikipedia* [8] could in fact be edited by any external user and this might cause a change of information, or even wrong information. Board Game Geek [5] was also a community for gamers, which allows the users to change information described by Board Game Geek [5] FAQ on their webpage.

6 CONCLUSION

All the digital FPS game mechanics cannot be fully converted into an analog board game. Mainly because of the first person view and the real-time based movement. The first person view was in this case totally removed from the prototype. But in terms of the shooter part, the major aspects of the gameplay could be moved from the digital game and into the prototype.

Game mechanics that could be successfully converted from a digital FPS game into the prototype are the majority of the game mechanics, described in Chapter 3.1. The game mechanics need to be tweaked, to make the gameplay of the prototype use a more strategic type of skill based gameplay. There were examples in Chapter 5.3 that describe game mechanics that could be used to use the marksmanship.

The digital game mechanics can be implemented, to give a more suitable gameplay in terms of low downtime according to the game time of similar games such as *Tannhäuser* and *Space Hulk*. This was confirmed in a range of play tests of the prototype. Analysis of analog and digital games in order to sort out the game mechanics would be able to help the developer to get a more suitable gameplay based on facts of studies of the specific game genre and the play test sessions. The game analysis gives the developer a chance to come up with new ideas.

7 FUTURE WORK

The making of a prototype could also be used parallel to the development of a digital game, in order to try out gameplay mechanics and components. This parallel development could give the developer a better overview of the gameplay mechanics and components, so that the rules can be changed quicker without getting into coding issues. Or if the gameplay does not work as intended as described by Pulsipher [1]. From a developers point of view it could be of interest to use the parallel development method in terms of play testing, such as a time calculation with and without the making of a prototype.

The prototype was limited to player versus player mode, but could be extended to involve monsters like the game *Doom III*, with a dungeon crawl type of gameplay this could be the next challenge. Where the players may face the game with a story teller or with the game mechanics to play versus the game. This could be done through tokens placed in different rooms and corridors, with an additional monster deck. The game would in this case need some game mechanics for the monster movements and special rules for the monsters behaviour during combat.

Further analysis to find more game mechanics to get a large library of game mechanics that could be used to ease the game development in both the digital and analog game industry. Table top games and role-playing games would certainly be of interests for a more detailed analysis. Roleplaying games because these type of games often contain more rules and stories, than the board games. In this case referring to the *Warhammer 40.000* and the world of *Dungeons & Dragons*.

There are some major issues with the simultaneous actions, if the player wants to control more than one pawn in the prototype during a game session. This issue is linked directly towards the movement cards. When the player's selects one movement card each round would have needed to be changed. This problem could be of interest for future work.

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www.youtube.com
- [9.1] Doom 3 BFG Edition Video Review, IGN
<http://www.youtube.com/watch?v=bAIGefvjRjo>
Date: 2013-05-18
- [9.2] Doom 3 BFG Edition - Multiplayer Gameplay, Graveside Entertainment
<http://www.youtube.com/watch?v=wjPmx2HISRY>
Date: 2013-05-19
- [9.3] Doom 3 Online Multiplayer Gameplay, FirstThirtyMinutes
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www.facebook.com
Date: 2013-05-26
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Date: 2013-05-26

IMAGES

Toxic, used on the prototype for the poison tokens
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9 LIST OF FIGURES

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Figure 2: Prototype example with a 6 player setting and token placement

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Figure 5: Describes the amount of gamer that the participant

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Figure 7: Setting of the prototype

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10 APPENDIX

This is the appendix for listed games mentioned in this bachelor thesis, questionnaire, pyramid diagrams, and game definitions.

10.1 DIGITAL GAMES

Game title	Company
<i>Battlefield 3</i>	Electronic Arts
<i>Citadels Online</i> (http://ciudadelas.net/conten , 2013-05-21)	Unknown
<i>Diablo series</i>	
<i>Diablo</i>	Blizzard Entertainment
<i>Diablo II</i>	Blizzard Entertainment
<i>Diablo III</i>	Blizzard Entertainment
<i>Disciples series</i>	
<i>Disciples: Sacred Lands</i>	GT Interactive Software
<i>Disciples II: Dark Prophecy</i>	Infogrames Entertainment
<i>Disciples III: Renaissance</i>	Akella
<i>Doom series</i>	
<i>Doom</i>	id Software
<i>Doom II: Hell on Earth</i>	id Software
<i>Doom III</i>	Activision
<i>Dragon Age series</i>	
<i>Dragon Age: Origins</i>	Electronic Arts
<i>Dragon Age II</i>	Electronic Arts
<i>Dune II: The Building of a Dynasty</i>	Virgin Interactive
<i>Heroes of Might and Magic series</i>	
<i>Heroes of Might and Magic: A Strategic Quest</i>	New World Computing
<i>Heroes of Might and Magic II: The Succession Wars</i>	The 3DO Company
<i>Heroes of Might and Magic III: Complete</i>	The 3DO Company
<i>Heroes of Might and Magic IV</i>	The 3DO Company
<i>Heroes of Might and Magic V</i>	Ubisoft
<i>Heroes of Might and Magic VI</i>	Ubisoft
<i>Halo series</i>	
<i>Halo: Combat Evolved</i>	Microsoft Game Studios
<i>Halo 2</i>	Microsoft Game Studios
<i>Halo 3</i>	Microsoft Game Studios
<i>Halo 4</i>	Microsoft Game Studios
<i>Hovortank 3D</i>	Softdisk
<i>Quake series</i>	
<i>Quake</i>	id Software
<i>Quake II</i>	Activision
<i>Quake III: Arena</i>	Activision
<i>Quake 4</i>	Activision
<i>Race for the Galaxy Online (Board Game Arena)</i> (http://sv.boardgamearena.com/ , 2013-05-21)	Unknown
<i>Sonic the Hedgehog</i>	Sega Corporation
<i>Spacewar!</i>	Self-developed
<i>StarCraft series</i>	
<i>StarCraft</i>	Blizzard Entertainment

<i>StarCraft II: Wings of Liberty</i>	Blizzard Entertainment
<i>Super Mario Bros series</i>	
<i>Super Mario Bros</i>	Nintendo
<i>Super Mario 64</i>	Nintendo
<i>Thief: The Dark Project</i>	EIDOS Interactive
<i>Tomb Raider</i>	EIDOS Interactive
<i>Ultima Online</i>	Electronic Arts
<i>Unreal</i>	GT Interactive Software
<i>Warcraft series</i>	
<i>Warcraft: Orcs & Humans</i>	Blizzard Entertainment/Interplay
<i>Warcraft II: Tides of Darkness</i>	Blizzard Entertainment
<i>Warcraft III: Reign of Chaos</i>	Blizzard Entertainment
<i>Warhammer 40.000: Dawn of War series</i>	
<i>Warhammer 40,000: Dawn of War</i>	THQ
<i>Warhammer 40,000: Dawn of War II</i>	THQ
<i>World of Warcraft</i>	Blizzard Entertainment
<i>XCOM: Enemy Unknown</i>	2K Games

10.2 ANALYSED ANALOG GAMES

This list is detailed to give the right information, because some of these games have more than one version and may be very different from each other, like rules or setting.

Citadels

Faidutti, Bruno, third edition, 2010, Fantasy Flight Games

Claustrophobia

Croc, English first edition, 2009, Asmodee and REBEL.pl

Junta!

Eric Goldberg, Ben Grossman, and Vincent Tsao,
Purgatory English first edition, 2005, Purgatory Publishing, Inc. and West End Games

Neuroshima Hex!

Michal Orazc, Z-Man Second edition, 2008, Z-Man Games

Pandemic

Matt Leacock, Nordic first edition, 2009, Lautapelit.fi.

Race for the Galaxy

Thomas Lehmann, English first edition, 2007, Rio Grande Games

Tannhäuser

William Grosselin and Didier Poli, Fantasy Flight first edition, 2007,
Fantasy Flight Games

Tide of Iron

John Goodenough, Corey Konieczka and Christian T. Petersen,
English first edition, 2007, Fantasy Flight Games

10.3 ANALOG GAMES

Game title	Company
<i>Advanced Civilization</i>	Avalon Hill
<i>Advanced Squad Leader</i>	Avalon Hill
<i>Arkham Horror</i>	Fantasy Flight Games
<i>A Touch of Evil: The Supernatural Game</i>	Flying Frog Productions
<i>Axis & Allies</i>	Nova Games
<i>Battleship</i>	Milton Bradley
<i>Blood Bowl</i>	Games Workshop Ltd.
<i>Call of Cthulhu</i>	Chaosium Inc.
<i>Castle Panic</i>	Fireside Games
<i>Chess</i>	Unknown
<i>Descent: Journeys in the Dark</i>	Fantasy Flight Games
<i>Descent: The Road to Legend</i>	Fantasy Flight Games
<i>Diplomacy</i>	Allan B. Calhamer
<i>Dominion</i>	Rio Grande Games
<i>Dungeons & Dragons</i>	Tactical Studies Rules Inc. (TSR)
<i>Fluxx</i>	Looney Labs
<i>Formula D</i>	Asmodee
<i>Fury of Dracula</i>	Fantasy Flight Games
<i>Ghost Stories</i>	Repos Production
<i>HeroQuest</i>	Milton Bradley's
<i>Jyhad / Vampire: The Eternal Struggle</i>	Wizards of the Coast
<i>Kult</i>	Äventyrsspel
<i>Last Night on Earth: The Zombie Game</i>	Flying Frog Productions
<i>Lord of the Rings</i>	Hasbro/ Wizards of the Coast
<i>Magic the Gathering</i>	Wizards of the Coast
<i>Monopoly</i>	Parker Brothers,
<i>Mutant Chronicles: Siege of the Citadel</i>	Pressman Toy Corp.
<i>Necromunda</i>	Games Workshop Ltd.
<i>Puerto Rico</i>	Rio Grande Games
<i>Risk</i>	Parker Brothers
<i>Scrabble</i>	Self published
<i>Sid Meier's Civilization: The Board Game</i>	Fantasy Flight Games
<i>Space Hulk</i>	Games Workshop Ltd.
<i>Talisman: The Magic Quest Game</i>	Games Workshop Ltd.
<i>The Beer Game</i>	Boxer Games
<i>The Settlers of Catan</i>	Mayfair Games
<i>Ticket to Ride</i>	Days of Wonder
<i>Trouble</i>	Kohner Bros.
<i>Twilight Imperium series</i>	Fantasy Flight Games
<i>Warhammer 40.000</i>	Games Workshop Ltd.
<i>War of the Ring</i>	Fantasy Flight Games
<i>Werewolf</i>	Lui-même
<i>World in Flames</i>	Australian Design Group
<i>7 Wonders</i>	Repos Production

10.4 QUESTIONNAIRE

1. *Why do you play analog games?*
2. *Why do you play digital games?*
3. *Is there any mechanics you would like to see in an analog game that is missing today?*
4. *Is there any mechanics you would like to see in a digital game that is missing today?*
- 5a. *Is there any mechanics that you think could not work in an analog game and why?*
- 5b. *Referring to the answer in question 3 would this work in an analog game?*
- 6a. *Is there any mechanics that you think could not work in a digital game and why?*
- 6b. *Referring to the answer in question 4 would this work in a digital game?*
7. *Which games do you prefer to play, analog or digital and why?*
8. *Is there any genre of game you like best in analog games?*
9. *Is there any genre of game you like best in digital games?*
10. *Are you a Gamer? (1-5)*
(Where 1 was I am not a gamer)

10.5 ANALOG GAME PYRAMID DIAGRAMS

These are the eight analog games, that was analysed in Chapter 3.2 to collect game mechanics, components, attributes, genre for the prototype. For further details study the Appendix 10.6 for greater understanding on the conceptual ideas of the game definitions for each of the eight following pyramid diagrams.

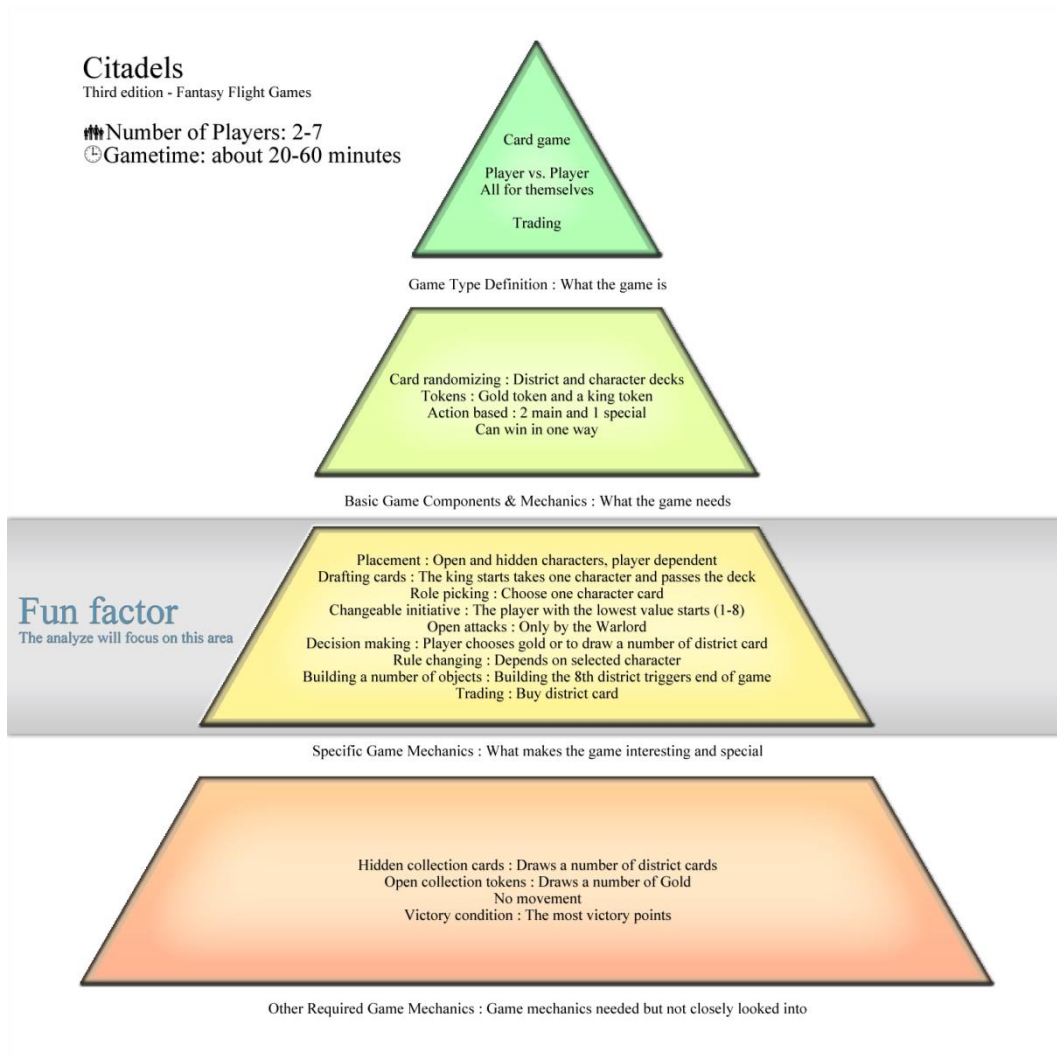


Figure 15: Citadels pyramid diagram

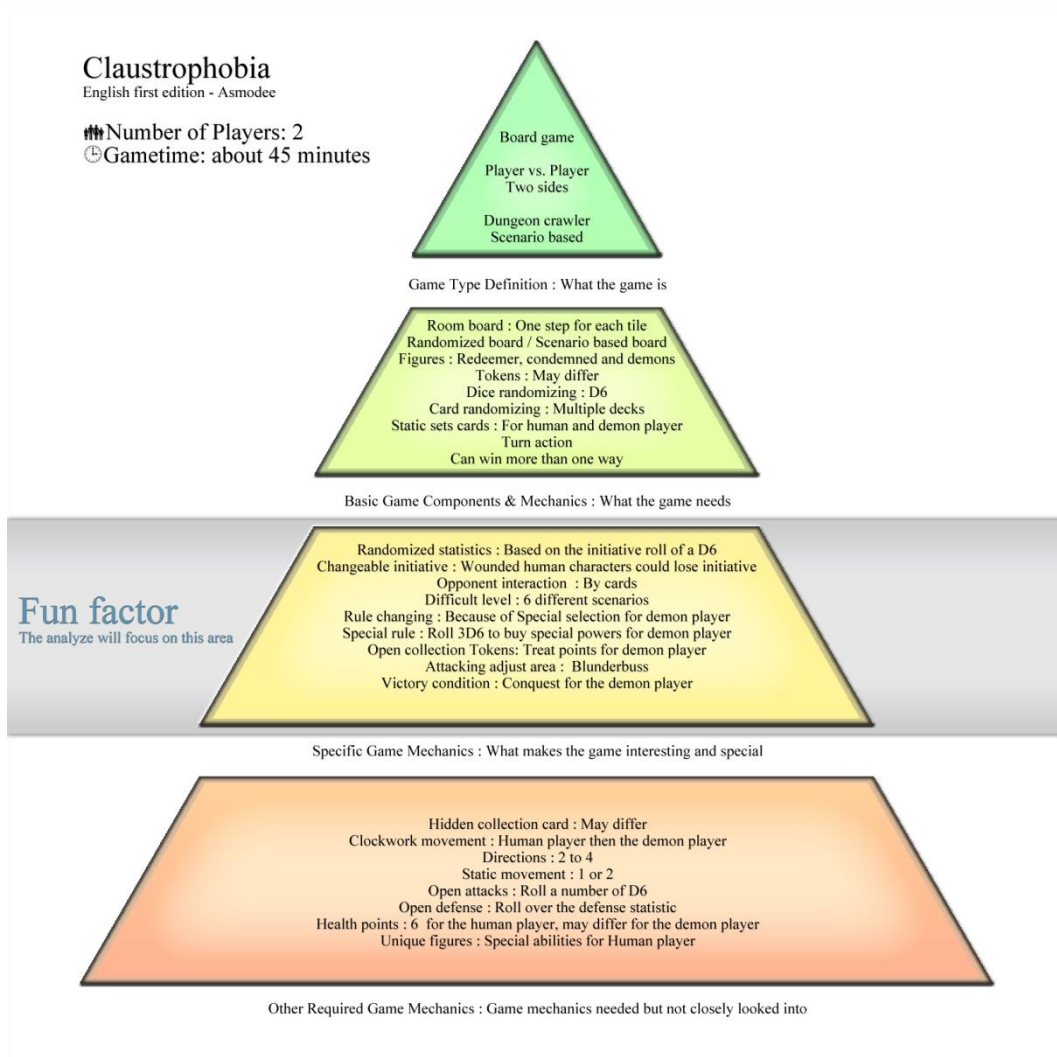


Figure 16: Claustrophobia pyramid diagram

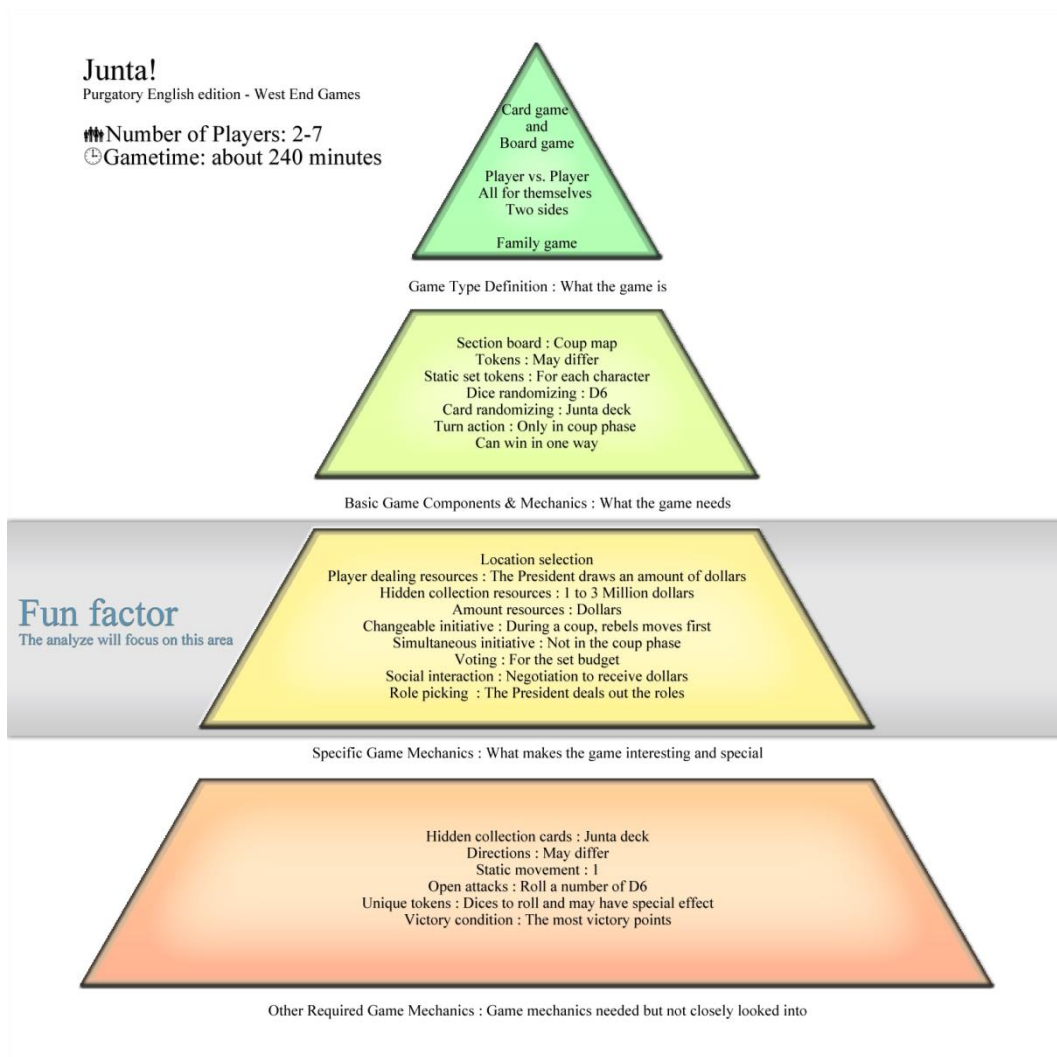


Figure 17: Junta! pyramid diagram

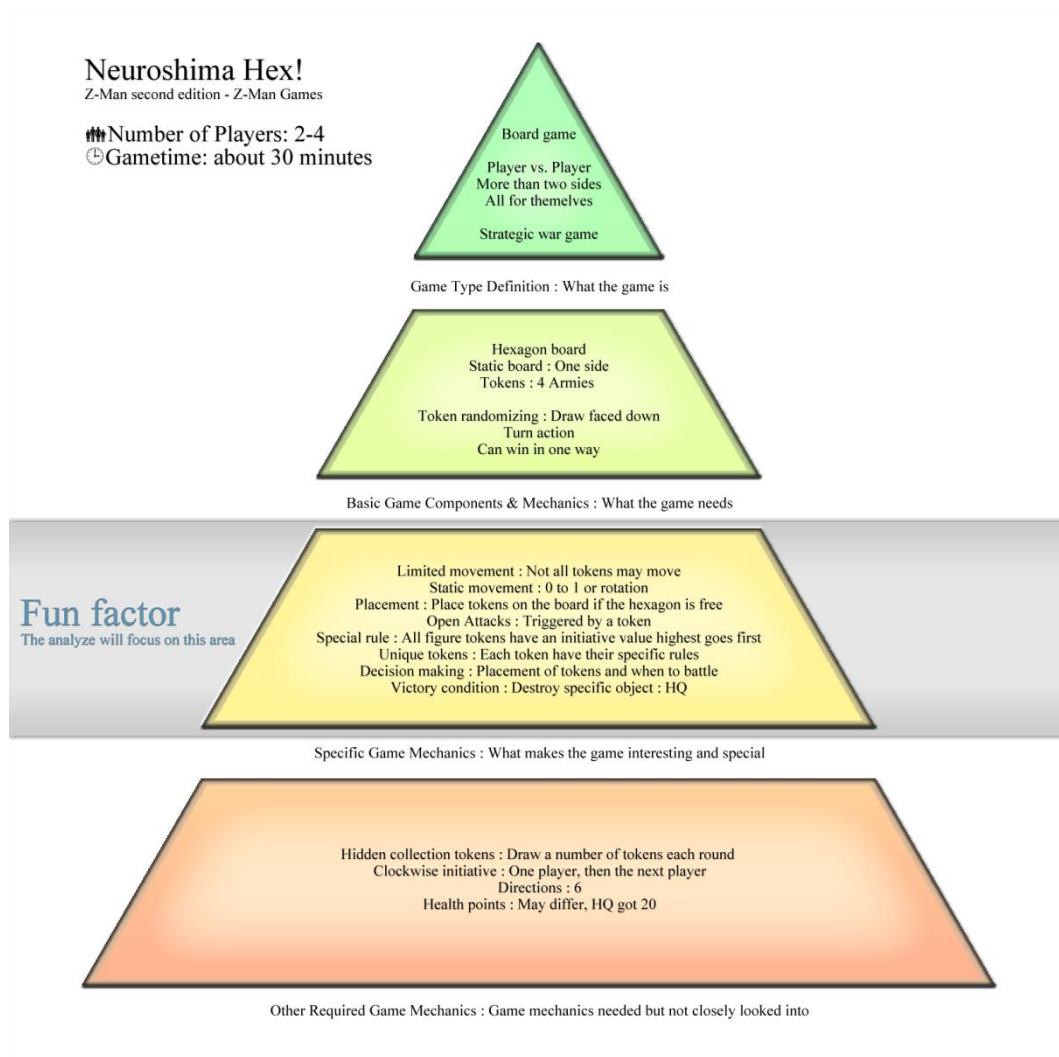


Figure 18: Neuroshima Hex! pyramid diagram

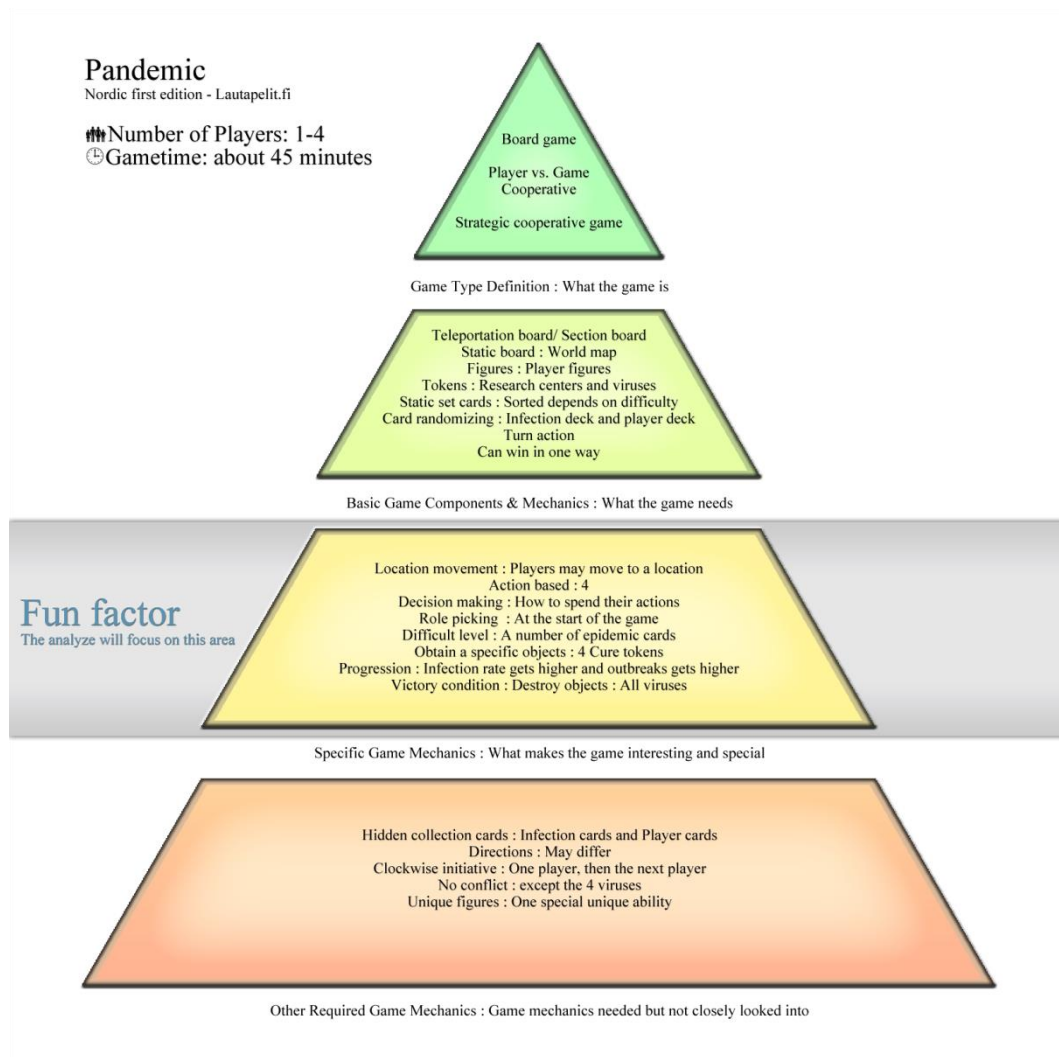


Figure 19: Pandemic pyramid diagram

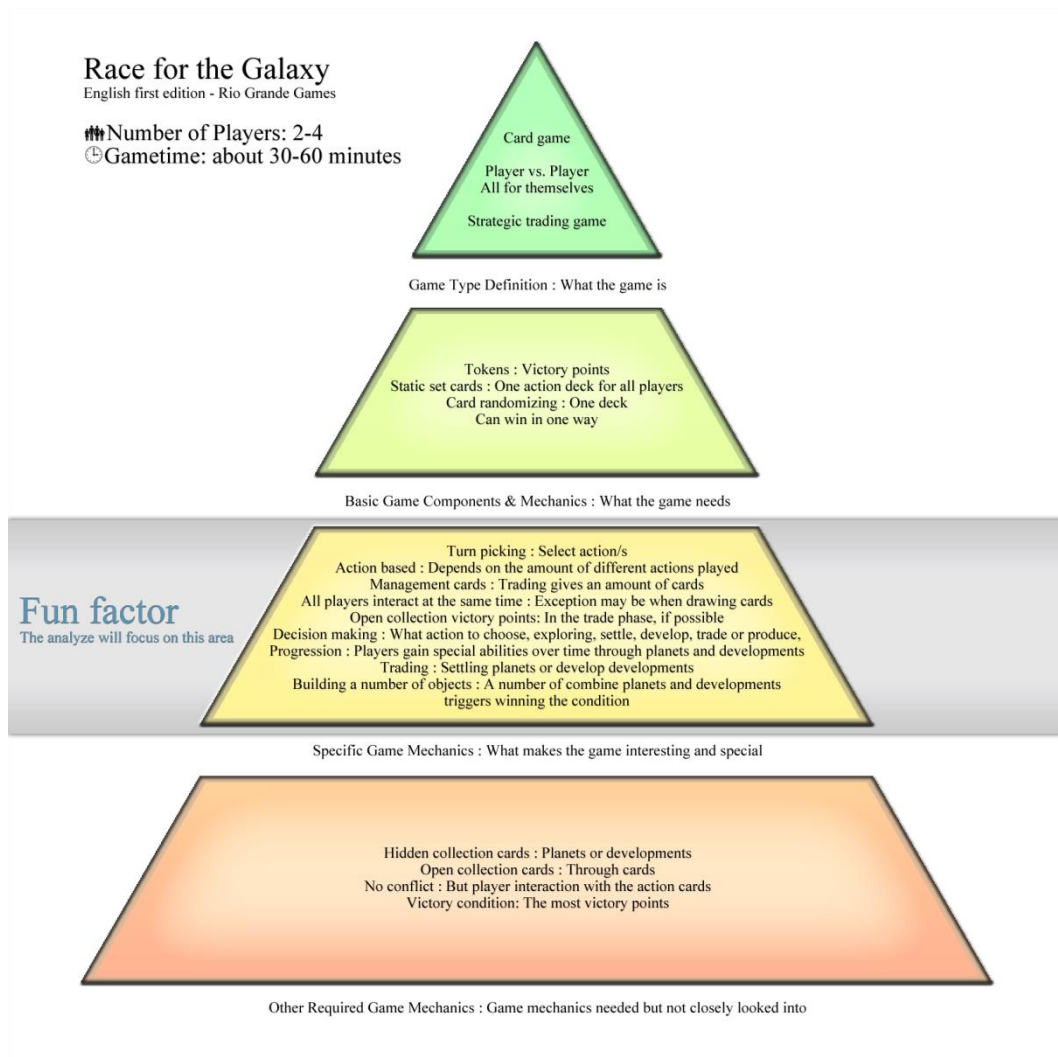


Figure 20: Race for the Galaxy pyramid diagram

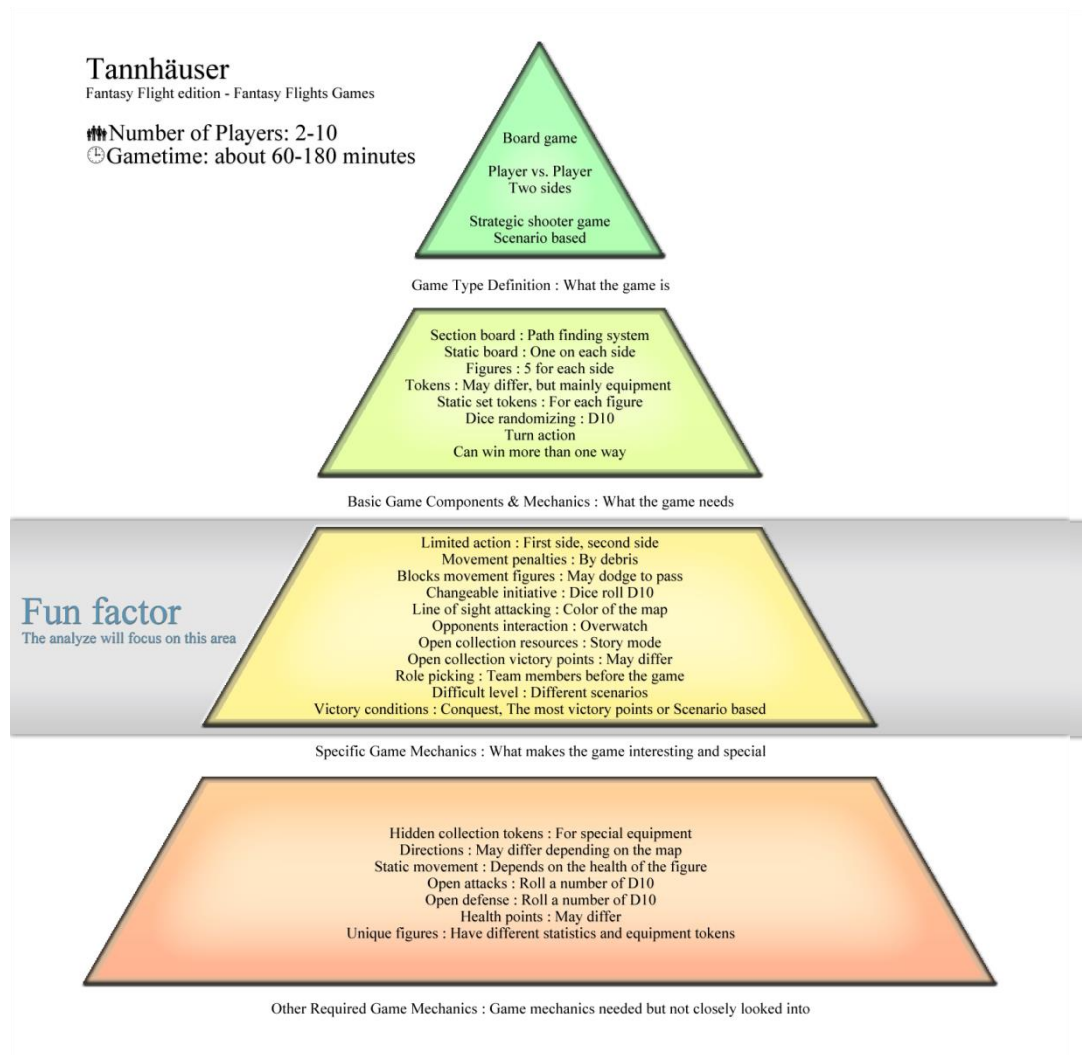


Figure 21: Tannhäuser pyramid diagram

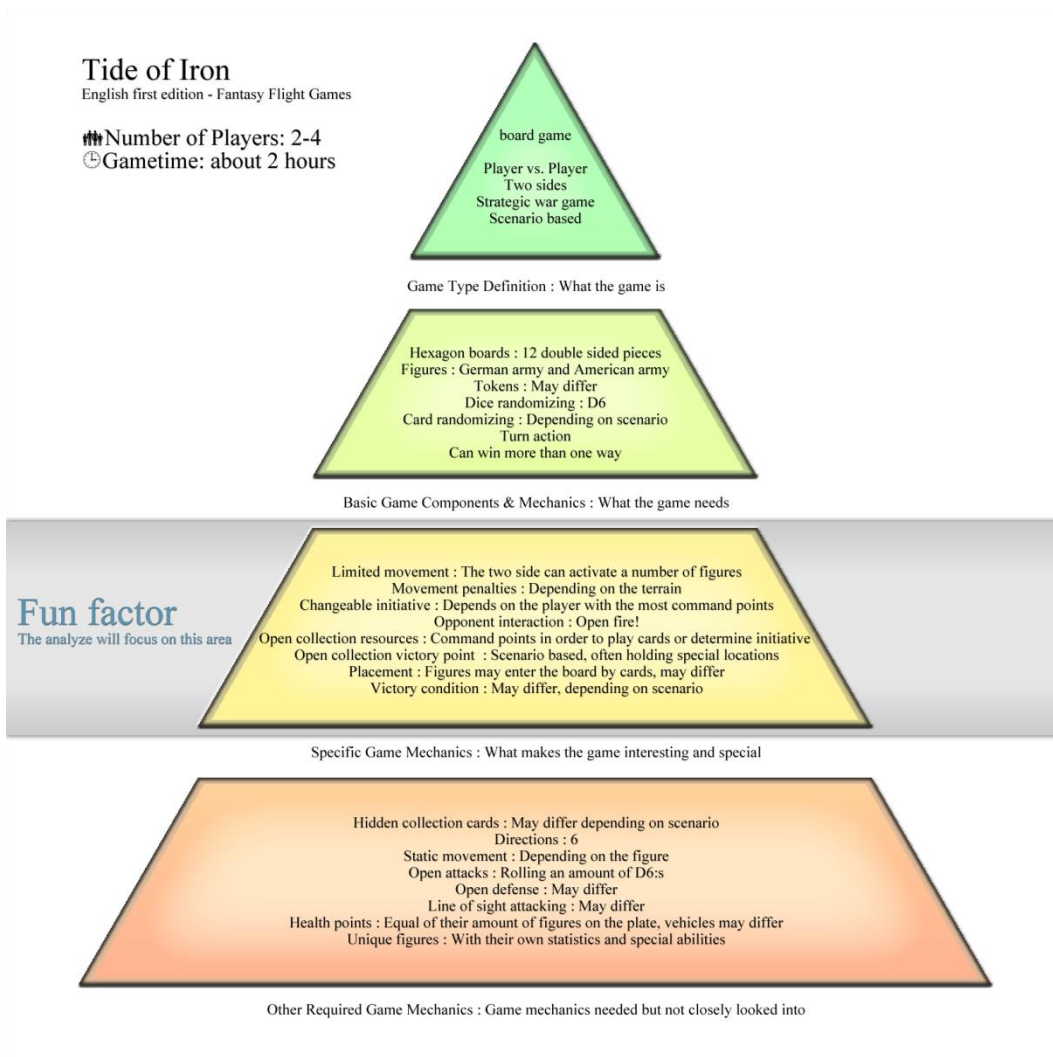


Figure 22: Tide of Iron pyramid diagram

10.6 GAME DESCRIPTION

These game descriptions are not specified definition of any game principles. The game descriptions are in fact to explain the under laying mechanics of the analog games analysis in this bachelor thesis. The game descriptions are based on both 25 years of personal experience, as well as the knowledge of existing game mechanics used in a large quantity of analog and digital games.

BASE GAME TYPE

There are several different base types of games in this bachelor thesis. Definitions of these base game types, components, conditions, and game mechanics will be described throughout the research of this bachelor thesis.

BOARD GAME

The game has a board that the players are able to interact with, often some kind of game board setting, figures, and/or tokens, it may contain, a number of cards, and decks, any number of dices or any other specified game component. In a board game the board plays the fundamental role of the core mechanics. Example of board games are *Advanced Civilization*, *Tide of Iron*, and *Arkham Horror*.

CARD GAME

The game are based on a number of cards and decks, but may also contain tokens, board sheets to keep track of for example a turn order. The cards plays the fundamental role of the core mechanic. Examples of card games are *Race for the Galaxy*, *Citadels*, and *7 Wonders*

ROLE-PLAYING GAME

These game contains a story teller that guides the players through the game, taking the role of all the characters that are in the player's surroundings and how the characters react towards the players. The story teller also describes the world around the group of players, this group will be challenged by the story teller. Role-playing games does often use several types of dices to randomize the result of the player's actions. Role-playing games uses the story telling as the core mechanics of gameplay. Examples of games are *Kult* and *Dungeons & Dragons*.

TABLE TOP GAME

A Table top game does often contain a (none board grid) terrain, 360 degree angle of movement, where the player in games like *Warhammer 40.000* and *Necromunda* uses some kind of measure stick in order to check distance, move models, line of sight or other special rule conditions that could appear. The core mechanics of the table top game is that it may be expanded into a really large scale, because it does not use a specific board.

BOARD TYPE

The board type describes how the game board is built. It also illustrates how the players may move to into different locations, sectors or squares around the board. This is not a game mechanic, but the board type definitely has an impact on the movement of a games mechanics.

HEXAGON BOARD

The board is based on a hexagon grid and when movement between tiles is involved that makes movement possible in six different directions. Games using this board type are for example, *Advanced Squad Leader*, *World in Flames*, and *Neuroshima Hex!*.

RACE BOARD

The board type are uses one direction, common parlour games often uses this type of movement, games such as *Monopoly* and *Formula D*.

ROOM BOARD

The Room board allows movement in at least 4 directions but could vary through different games. Games like *Claustrophobia* and *Ghost stories* uses this type of board type.

SQUARE BOARD

This board type supports any number of squares where the player may move, in 4 or 8 directions, if the player are able to travel in the diagonal. These board type is used in games similar to *Descent: Journeys in the Dark*, *HeroQuest*, and *Blood Bowl*.

SECTION BOARD

The board is lined up in sections and may have any number of connected sections to it, this means that the player might have more or less squares to move too from different sections. Games using this type of boards are for example *Axis & Allies*, *Risk*, and *Junta!*.

TELEPORTATION BOARD

The players may teleport to any direction on the board. Example of games that uses some terms of this board type is, *Pandemic*, *Arkham Horror (as Deputy of Arkham)*, and *Talisman* in some cases.

NO BOARD

The board type is not used in this type of game, but may have a sheet in some form to store collected information of the game.

BOARD SETTING

The board setting of the board, this is an approach of how the layout is used, in this particular game board. This category got three different types that can be used for the board setting, Static, Randomized, and Scenario.

STATIC BOARD

The board setting is fixed, this mean that the board will not change between each game sequence. This setting type is used in *Ticket to Ride*, *Trouble*, and *Tannhäuser*.

RANDOMIZED BOARD

The board is more or less different each time the player is playing the game, this will give the players more variation of the game board than a fixed board. *Settlers of Catan*, *Ghost Stories*, and *Twilight Imperium* are good examples of this kind of board setting.

SCENARIO BASED BOARD

The board pieces of this board setting may be fixed for each scenario, but holds variations of a Randomize board. In this way the board setting is more depending on the amount of scenarios available or the player's imagination to create more scenarios. Boards using this board setting are for example *Tide of Iron*, *Space Hulk*, and *Last Night on Earth: The Zombie Game*.

COMPONENT TYPES

This are the different types of components that is used in the games, in order of keeping track of resources, Victory points, Cards, Tokens or figures on the game board. These categories may be combined with the Component mechanics.

RESOURCES

Are present in many games and are defined and illustrated by components listed in this category.

VICTORY POINTS

Are another type of resource that is often used to win the game, not all games uses this type of resource but a big majority of the games selected in this essay does contain victory points.

CARDS

Cards are used mainly in card games, but board games often uses cards for random situations or to use in the opponents round. But could also be hidden victory conditions in some games.

TOKENS

Tokens are often used as a part of a board game as markers that tells the player how much health they got or if they have a bonus, but could also hold a large amount of the core mechanics of the game like cards.

FIGURES

Units is often used in war games, table top games, board games but not often in card games. The unit's holds the main role of describing the player's army/single model and it may in some cases even contain information, such as attack value or defence value or both.

REFERENCE SHEET

The game contains a board with holds some form of information used in the game.

ACTION MECHANICS

This are core conditions for the game in to describe how the game is played. The game condition also describes if the game has an end or if the game could be won in more than one way.

TURN ACTION

The movement is separated so that the players and takes turns. In order of actions. Games using this type of turn order is for example *The Beer game*, *Dominion*, and *Battleship*.

REAL-TIME ACTION

The actions are done in real-time with means that players may react at the same time, this is rarely used in a board games. Role-playing games uses some form of real-time, but when it comes to combat it is often turned to turn actions instead.

SIMULTANEOUS ACTION

All players plays their turns at the same time. Are used in the card game *7 Wonders* and *Race for the Galaxy*.

CLOCKWORK ACTION

One player takes a turn/action then passes the turn to the player to the left, when that player is done he passes to the left and so on until all players have taken their turn/action. *Claustrophobia*, *Pandemic*, and *Magic the Gathering* are games that uses this type of clockwork actions.

ACTION BASED

The player has an amount of actions for each game round. These action points may be spent in any way the player desires. Games using this game mechanics are games like *Pandemic* and *Space Hulk*.

PLAYER MODE

Is the game, as a Player vs. Player like a typical war game like *War of the Ring*, cooperative like *Pandemic*, all for themselves like *Junta!*, Players vs. Player in a game of *Claustrophobia* or Player vs. AI/game mechanics like *Super Mario Bros* on a digital console.

PLAYER VS. PLAYER

This means that the players plays the game against other players. Games like *Dominion*, *Chess*, and *Formula D* uses this game mode.

PLAYER VS. AI/GAME MECHANIC

This means that the players plays the game against an AI or a game mechanic that is either done by a computer or card/token or rule specified by the game rule, in other words the player plays against the game, this type of game may also include a temporary opponent that also plays as a player.

PLAYERS VS. ONE PLAYER

This means that the players plays the game against one other player, often seen in dungeon crawl games, such as games like *HeroQuest*, *Descent: Journeys in the Dark*, and *Mutant Chronicles: Siege of the Citadel*.

COOPERATIVE GAMEPLAY

This means that the players together plays the game and tries to achieve the same goal to win the game as a group, games like *Pandemic*, *Arkham horror*, and *Ghost Stories* are "good" examples of this kind of gameplay.

ALL FOR THEMSELVES

This game mode are played without any team play, everyone for themselves, there can only be one winner or more than one if the players are even at the end of the game. Games of this type are *Ticket to Ride*, *Neuroshima Hex!*, and *Race for the Galaxy*.

CONFLICT CONDITIONS

Many games have some sort of conflict in order to get a more motivating gameplay. This research will only look at the type of conflicts conditions that inflicts players through combat or through interaction on the opponents turn.

TWO SIDES

There are two sides in conflict, typical games of this conflict condition are war games such as *Tide of Iron*, *Axis & Allies*, and *War of the Ring*. Games where there often are one "good" side and one "bad" side.

MULTIPLE SIDES

Games with more than two sides are often games with more negotiations where the players needs to make alliances, bribe, intimidate or just be inactive until the player are able to make a steps forward, and win the game. Typical games with this conflict conditions are games like *Advanced Civilization*, *Diplomacy*, and *Junta!*.

OPPONENTS INTERACTION

Interaction can be made against other opponents during the game for example the opponents round, like the *interrupt* and the *instant* in *Magic the Gathering*, or by the *overwatch* rules in *Space Hulk*.

NO CONFLICTS

The game is not made for conflicts.

WINNING CONDITIONS

Almost all games have some form of winning conditions, some types found in the analysed games are mentioned below. First take a look if there are more than one way to win.

NO END

In this type of game, the players can never win. Game like uses this game conditions are often games like, *Dungeons & Dragon*.

CAN WIN IN ONE WAY

There is only one way for the player or players may win. Games with one way of winning are for example *Pandemic*, *Chess*, and *Trouble*.

CAN WIN MORE THAN ONE WAY

There are multiple ways for the player or players to win. Games with multiple wins are games like, *Twilight Imperium*, *Sid Meier's Civilization: The Board Game*, and *Kult*

THE MOST VICTORY POINTS

Loads of games uses victory points to determine a winner, the victory points are often scored all over the game, like the card game *Dominion* where the players buying victory cards, *7 Wonders* where the player gain victory points from the diverse combinations of cards but also from individual cards.

CONQUEST

Games with total domination such as *Axis & Allies*, *Risk* where the player is the only one left with units, is more suitable for the conflict condition two sides, because it may involve player elimination described by, Pulsipher [1].

PROTECT

This is regularly more of an objective rather than a winning condition. For example in *Castle Panic* the players need to defend their turrets in order to not be defeated and lose the game.

REACHING GOAL/END

Victory conditions like these are often used for race games like, *Formula D* where the players are aiming for a goal or family games where the players go from a start to the finish like the game *Trouble*.

SCENARIO BASED

The victory conditions may differ depending on the scenario of the game. Like *Tide of Iron*, *Descent: Journeys in the Dark*, and *Claustrophobia*.

DESTROY OBJECT/FIGURE

Destroying a specific object to win may be the one ring in the game of *Lord of the Ring*. Or like in *Fury of Dracula* where the players need to find Dracula and kill him, in order to win the game.

OBTAIN A SPECIFIC OBJECT/FIGURE

Like in the game of *Talisman* when one player controls the *Crown of Command* will become the winner if all other players are eliminated or like in *Sid Meier's Civilization: The Board Game* when a player builds the *Space rocket*.

BUILDING A NUMBER OF OBJECTS/FIGURES

The game ends if a player has built a number of buildings. Like in the game *Race for the Galaxy*, when one player has placed a total amount of twelve cards on the board of either Developments and/or Planets.

TIME LIMIT

The game ends at a certain point, when time ends. If the *Outbreaks meter* of *Pandemic* goes to the top the game wins. Or like the *Terror meter*, or *Doom track* in *Arkham Horror* that will trigger the end game.

NO WINNING CONDITION

There is no way to win the game, these games are often role-playing games with some exceptions in *Kult* the player can actually win the game. But the game can also have losing conditions.

MOVEMENT MECHANICS

There are numerous of ways to travel in games and below are some of the techniques, which a few of the analog games analysed in this bachelor thesis as well as game mechanics brought to the prototype.

LIMITED MOVEMENT

Defines a restricted action game mechanic that limit the number of figures/tokens that could be activated on this specific round. Such as a player may only travel with a number of figure/tokens. Then the player needs to pass the turn to the opponent. Are used in the game *Tide of Iron* and *Blood Bowl* in terms of *turnover*.

HIDDEN MOVEMENT

This is for example, a movement that are kept hidden until a player marches into the area that contains enemy units. Games using the hidden movement game mechanics are *Fury of Dracula*, *Space Hulk*, and there are house rules for *Axis & Allies* that could use this game mechanic.

DIRECTIONAL MOVEMENT

The players may only travel in one direction, like the games *Monopoly*, *The Beer Game*, and *Trouble* the player may not move backwards, just forward.

LOCATION MOVEMENT

The player places cards/tokens of their choice for the location type that the player wishes to move to. Like in the game of *Race for the Galaxy*, uses a similar game mechanic for the action cards.

DIRECTIONS

Frequently depends on how the game board looks, if it uses square based tiles, hexagon based tiles, or other types of board types. The amount of directions may vary between game boards, for example hexagon board games has six directions and square board games has either four or eight possible directions.

PLACEMENT

This movement is referred to when a players places figures/tokens on the board during play time not during the setup of the game. Games that uses this game mechanics are for example, *Neuroshima Hex!*, *Tide of Iron*, because the can deploy figures/Tokens by cards or by mechanics.

NO MOVEMENT

This game does not have a type of travel.

ONE MOVEMENT

How many steps a figure/token may take each round that the figures/tokens are moving. In this case only one step. Games uses this game mechanics are games like *Risk*.

STATIC MOVEMENT

The player has a fixed value that this specific figure/token may move each round. Games using this type of movement are for example, *Axis & Allies*, *Space Hulk*, and *Descent: Journeys in the Dark*,

RANDOM MOVEMENT

How many steps that a player's figure/token may take each time they are moving. Decided by a dice roll or any other random element, for example cards. Games using this type of game mechanics are games like *Monopoly*, *The Beer game*, and *Trouble*.

COMPONENT MECHANICS

This component mechanics, describes the diverse types of game mechanics that could be used by cards, tokens, figures, resources, and victory points used in the game.

OPEN COLLECTION

(Card/tokens/figures/resources/victory points)

The player takes any of the above mentioned components from a pool and every player may count the specific component another player has collected during the game.

HIDDEN COLLECTION

(Card/tokens/figures/resources/victory points)

The player takes any of the above mentioned components from a hidden pool, this means that the amount of components may have a random value on each specific component and no other player may see the result of the component until the end of the game or until the token/card are revealed.

PLAYER DEALING

(Card/tokens/figures/resources/victory points)

A player may take a look at the above mentioned components and deals them out in any order the player wishes. This sometimes means that a player may be left out or be given a lower amount of resources.

MANAGEMENT

(Card/tokens/figures/resources/victory points)

(If more than one type of resources)

There is several types of above mentioned components that needs to be collected, for example constructing a building like in the game of *Settlers of Catan* a player needs to collect different components in order to build a *road/ village/ city*.

AMOUNT

(Card/tokens/figures/resources/victory points)

This indicates the specific amount of different of the above mentioned components in the game and what the component may be used for.

COMBINING

(Card/tokens/figures/resources/victory points)

Players need to collect the above mentioned components in order to combine them with other related components, like in the game *Advanced Civilization* where players collect the same type of *goods*. Or the collection of letters in the game *Scrabble*.

STATIC SET

(Card/tokens/figures/resources/victory points)

Each player/side have a fixed amount above mentioned components that may differ from the opponents above mentioned components, For example games like *Fury of Dracula*, *Tannhäuser*, and *Neuroshima Hex!*.

DRAFTING

(Card/tokens/figures/resources/victory points)

The above mentioned component are drafted, this means that players take an amount of components and sends the rest of their components to the next player in order to draw an amount of components, this goes on until players have reached a specific condition that tells the player to stop drafting the component. This game mechanics are used in games like *7 Wonders* and *Citadels*.

SELECTION

(Card/tokens/figures/resources/victory points)

The player may select the above mentioned component and put the component into play. They are often selected from the players hand or from the board. Like the played tokens in *Neuroshima Hex!* or played cards in *Magic the Gathering*.

UNIQUE

(Card/tokens/figures/resources/victory points)

Both sides have different start settings, in statistics but could also be in numbers on the above mentioned components. Games using this setting are for example, *Tide of Iron* and *Claustrophobia*, with are scenario based and players never plays the same type of units.

REGULAR

(Card/tokens/figures/resources/victory points)

Both sides have the same start settings in the beginning of the game and the same number of above mentioned components. Games like *Trubble*, *Monopoly*, and *Chess* all got the same setting for all participating players.

BLOCKS FIELD OF VIEW

(Card/tokens/figures/resources/victory points)

The above mentioned component may not, attack components that are block by the line of sight.

HEALTH POINTS

(Card/tokens/figures/resources/victory points)

The above mentioned component got a number of health points before they are defeated and are removed from the play area if they are defeated.

EVERLASTING

(Card/tokens/figures/resources/victory points)

The above mentioned component cannot be removed from the play area by the loose of health points. But there could be other ways to remove the components from the play area.

NO TYPE

(Card/tokens/figures/resources/victory points)

The game does not contain any of the above mentioned components.

INITIATIVE MECHANICS

Initiative is used in all types of turn based (none simultaneous action) games, in order to have one player to be the starting player.

CHANGEABLE INITIATIVE

The initiative changes each round, this may be because of dices rolls or any other mechanics such as controls object, contain the most/less points, or of any other reason. Games using this game mechanics are for example, *Tide of Iron* and *Tannhäuser*.

STATIC INITIATIVE

The initiative is fixed and the same player always starts, this maybe because of a rule or a statistics value. Games using game mechanics are *Fury of Dracula* and *Claustrophobia*.

CLOCKWISE INITIATIVE

The initiative is made in a turn based order, the player does his actions then passes the turn to the next player (to the left). Games that uses this game mechanics are games like *The Beer Game*, *Monopoly*, and *Scrabble*.

SIMULTANEOUS INITIATIVE

All players acts at the same time, often made by choosing simultaneously. This often means that the players hide their move until all are finished with their selections. Exception could be card games like Bluff, Party games that involves questions or negotiation. A game using this game mechanics are for example *Race for the Galaxy* and *7 Wonders*.

RANDOMIZING MECHANICS

Games often uses random events in order of fate or uncertainties in order not to succeed all times, though there are games that only involves skill and decision making rather than randomness or odds, often Eurogames as described Woods [3], Page 79-119. *Puerto Rico* is a "good" example of Eurogames.

DICE RANDOMIZING

The game uses dice rolling as their core game mechanics for the use of randomizing. *Risk*, *Axis & Allies*, and *Tide of Iron* example of games that uses a large amount of dices.

CARDS RANDOMIZING

The game uses cards as their core game mechanics for the use of randomizing. Games using this game mechanics are for example *Race for the Galaxy*, *Citadels*, and *7 Wonders*.

TOKENS RANDOMIZING

The game uses tokens as their core game mechanics for the use of randomizing. *Neuroshima Hex!* and *Scrabble* are examples on games using this game mechanics.

NO RANDOMIZED OBJECTS

The game does not use any form or randomizing factor and are more based of the player's talent than uncertainty. *Chess* and *Puerto Rico* are examples of this.

CONFLICT MECHANICS

If there is a conflict there are often an assault as a response of a disagreement. These are the game mechanics that describes the process of elements surrounding a conflict.

OPEN ATTACKS

The assaults are made opened, so that opponents receive the information of statistics, amount of figures, before they may decide to engage in combat. Like in games of *Tide of Iron*, *Risk*, and *Necromunda*.

HIDDEN ATTACKS

The assaults are made from a hidden play area, by cards or by tokens. The players will keep the pieces hidden until the attacking player engage in combat. Games using this type of game mechanics are for example *Fury of Dracula*, *Kult*, and *Dungeons & Dragons*.

LINE OF SIGHT ATTACKING

This is often used in war games and table top games to determine the line of sight to make an attack against an opponent. Games like *Tide of Iron*, *Necromunda*, and *Advanced Squad Leader* uses this game mechanics.

ATTACKING ADJUST AREA

This type of mechanics is repeatedly used for hand to hand combat attacks, where the player units stands next to an opponent's unit, but could also be ranged combat if the game is based a map of a larger scale, such as a world map like *Risk*.

OPEN DEFENCE

The defence are made opened, so that opponents receive the information of statistics, amount of units, before they decides to make an assault. Games using this game mechanics are games like *Tide of Iron*, *Risk*, and *Claustrophobia*.

HIDDEN DEFENCE

Just like attack the values are kept hidden from the opponent until they are engaged by for example an attack. Games using this type of game mechanics are for example *Fury of Dracula*, *Kult*, and *Dungeons & Dragons*.

GAMEPLAY MECHANICS

There are a group of gameplay types of game mechanics that can have a large role in how a game is played.

SOCIAL INTERACTION

Social interaction is very important for this type of games to work and to get the most of the game. Games of this type is *Junta!*, Role-playing games such as *Dungeons & Dragons*, *Kult*. The games that uses this game mechanics often has negotiations, bluffing or acting as a part of the gameplay.

DECISION MAKING

The mechanics is often used in drafting games where the player makes a choice, but could also be moves in games like *Chess* to choose and move a specific figure, *Race for the Galaxy* where the player chooses an action each round.

STRATEGIC

The games core mechanic is strategic and the randomness is not a big part of the game, it is more important how the player move or when the player move or when to make an attack, or even how the player are placing units. Such as games as *Neuroshima Hex!*, *Scrabble*, or *Puerto Rico*.

ROLE/TURN PICKING

These games are highly based on the picking of turns or roles, such games are *Citadels*, *Race for the Galaxy*, *Twilight Imperium (3rd edition)* where the player may choose an turn/action or role for one single round and choose another one in the next round, in games like *Race for the Galaxy* the other players may use the same action as well but the player that chose the action will get an advantage from the chosen action.

RULE CHANGING

Rule changing are games where the rules may change over time, a good example of the is the game *Fluxx* where in the beginning of the game a player has three cards may play one card then draw one card, the played card gives new rules to the game, *Twilight Imperium (3rd edition)* where the players are able to change the rules by voting on a card with new rules for the game.

MOVEMENT PENALTIES

The movement may cost more or less in several conditions, for example a player moves up hill, this move costs an amount of steps that the player loses. Games using this game mechanics are for example, *Tide of Iron*, *Warhammer 40.000*, and *Necromunda*.

BLOCKS MOVEMENT

(Card/tokens/figures/resources/victory points)

Figures may not move past or over sections controlled by another player or opponent. Games using this mechanics are games like *Claustrophobia*, *Blood Bowl*, and *Tannhäuser*.

VOTING

These games are often of the social interaction type, the game *Junta!* is using this mechanic in order to vote against the budget presented by the president, but also in *Twilight Imperium (3rd edition)* mentioned in the Rule changing type above. There are also card games like *Jyhad/Vampire: the eternal struggle* that uses this game mechanics when they are voting for the politic action by call or pass.

DIFFICULT LEVEL

The game contains a variation of difficult levels for new perspectives for players that are more experienced. To give the players a new or harder type of game. Games that uses this mechanics are for example *Claustrophobia*, *Arkham Horror*, and *Ghost Stories*.

PROGRESSION

If there is a story line then the players may contain a sort of progression, where players may keep their characters for an extended cycle of game sessions, to gain for example experience, items, and traits. Typical games are *Descent: Journeys in the Dark*, with the expansion *Descent: The Road to Legend*, and role-playing games.

TRADING

This gameplay type of games have their game mechanics focusing on the trading and buying. Games like *Puerto Rico* where the player producing and selling goods. *Settlers of Catan* where the player collects materials to build *villages/ cities/ roads* or *development cards* but also *Ticket to Ride* where the players building *railroad* between different cities with a combination of cards.

SPECIAL RULE

Special rule that are more extraordinary for the type of game this special rules needs to be explained further.

LOCATION SELECTING

The player chooses locations, in several of ways to interact with. Just like the location selection of the player's position in *Junta!*.

RANDOMIZED STATISTICS

The game uses statistics as their game mechanics for the purpose of randomizing. Games using this game mechanics are *Claustrophobia*, where the players rolls a six sided dice in their initiative phase, there characters for the *redeemers side* will then receive the rolled row of bonuses on described by their *character sheet*.

OTHER GAME DEFINITIONS

DUNGEON CRAWLER

A typical dungeon crawler game is where the players, runs around in narrow tunnels and rooms, killing monsters, gaining experience, items.

HOUSE RULES

This type of rules is not a part of the games rulebook instead it is an optional rule made up by the players. To get a different gameplay, or "*better*" gameplay.