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How can real-time strategy game design be improved?

Master's thesis in Computer science and engineering

ADAM MALMQUIST

MASTER'S THESIS 2022

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Department of Computer Science and Engineering
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Gothenburg, Sweden 2022

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Supervisor: Staffan Björk
Examiner: Mikael Wiberg

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Department of Computer Science and Engineering
Chalmers University of Technology and University of Gothenburg
SE-412 96 Gothenburg
Telephone +46 31 772 1000

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Abstract

Real-time strategy games have dropped in popularity since their peak around the turn of the millennium. During the same time period, the MOBA genre has emerged and become one of the most played genres. This thesis examines what the main problems with the RTS genre are, and what can be learnt from the successes of the competing MOBA genre. Data from various sources has been collected and analysed to produce a theory that explains the strengths and weaknesses of the RTS genre. In addition to this, a game study has been carried out to compare the most popular games of the two genres. The end result of the thesis is a set of guidelines that based on the newly acquired knowledge suggest how RTS game design could be improved.

Keywords: Computer, science, computer science, design, interaction design, game design, gaming.

Acknowledgements

I would like to thank my supervisor, Staffan Björk, who has been very supportive throughout the entire thesis and contributed with several interesting ideas and discussions, as well as much valuable practical advice.

Adam Malmquist, Alingsås, October 2022

Contents

1	Introduction	1
1.1	Research problem	1
1.2	Research question	3
1.3	Stakeholders	3
1.4	Planned type of results	3
1.4.1	Intermediate results	4
1.4.2	A theoretical approach	4
1.5	Ethical issues	4
2	Background	7
2.1	Strategy games	7
2.1.1	Real-time strategy	7
2.1.2	History	8
2.1.3	Other sub-genres	12
2.1.3.1	4X	12
2.1.3.2	Grand strategy games	12
2.1.3.3	Multiplayer Online Battle Arena	13
2.1.3.4	Tower defence	13
2.1.3.5	Real-time tactics	14
2.1.3.6	City-builder	14
2.2	Current status of the RTS genre	15
2.3	Possible reasons for decline	16
2.3.1	MOBA games	16
2.3.2	Lack of innovation	16
2.3.3	Complexity	16
2.3.4	Attention-demanding	16
2.3.5	Console gaming	17
2.3.6	New business models	17
3	Theory	19
3.1	Wicked problem	19
3.2	Cognitive Flow	20
3.3	Self-determination theory	21
3.4	Affordance	21
4	Methodology	23

4.1	Grounded theory	23
4.2	The MDA framework	24
4.3	Game design patterns	25
5	Planning	27
5.1	Overall plan	27
5.2	Working process	28
5.2.1	Scrum	28
5.2.2	Pomodoro	29
5.3	Time plan	29
5.3.1	Initial time plan	29
5.3.2	Updated time plan	30
6	Execution and Process	33
6.1	Prestudy	33
6.2	Theory creation phase	34
6.2.1	Getting started	34
6.2.2	Data collection	34
6.2.3	Coding	35
6.2.4	Categorisation	36
6.2.4.1	First iteration	36
6.2.4.2	Second iteration	36
6.2.4.3	Third iteration	37
6.3	Game study phase	37
6.3.1	Real-time strategy games	37
6.3.2	Revisiting the theory	38
6.3.3	MOBA games	39
6.3.4	Finishing the game study	39
6.4	Finalising the theory	39
6.5	Guidelines	39
6.5.1	Brainstorming	39
6.5.2	Categorisation	40
6.5.3	Writing the guidelines	40
7	Results	43
7.1	Game study	43
7.1.1	RTS	43
7.1.1.1	Skirmish mode	43
7.1.1.2	Co-op mode	44
7.1.1.3	Campaign	45
7.1.1.4	Factions	45
7.1.1.5	Competitive play	45
7.1.1.6	Game modes	46
7.1.1.7	Tutorial	47
7.1.1.8	Other thoughts	47
7.1.2	MOBA	49
7.2	Grounded theory	51

7.2.1	Skill	51
7.2.1.1	Depth	52
7.2.1.2	Hard	53
7.2.1.3	Progression	55
7.2.1.4	Decision	56
7.2.2	Variety	59
7.2.2.1	Variety	59
7.2.2.2	Balance	60
7.2.2.3	Casual/competitive	61
7.2.2.4	Learning	62
7.2.2.5	Role	63
7.2.3	Comfort	64
7.2.3.1	Social play	64
7.2.3.2	Negative emotions	65
7.2.3.3	Ladder anxiety	66
7.2.3.4	Outcome responsibility	67
7.3	Guidelines	68
7.3.1	Onboarding	68
7.3.1.1	Guideline #1	68
7.3.1.2	Guideline #2	70
7.3.2	Manageable difficulty	71
7.3.2.1	Guideline #3	71
7.3.2.2	Guideline #4	72
7.3.2.3	Guideline #5	74
7.3.2.4	Guideline #6	75
7.3.3	Broad appeal	76
7.3.3.1	Guideline #7	76
7.3.3.2	Guideline #8	77
7.3.3.3	Guideline #9	78
7.3.3.4	Guideline #10	79
7.3.4	Varied gameplay	80
7.3.4.1	Guideline #11	80
7.3.4.2	Guideline #12	80
7.3.4.3	Guideline #13	81
7.3.4.4	Guideline #14	82
7.3.4.5	Guideline #15	83
7.3.4.6	Guideline #16	83
7.3.5	Negative emotions	84
7.3.5.1	Guideline #17	84
7.3.5.2	Guideline #18	85
7.3.5.3	Guideline #19	86
8	Discussion	87
8.1	Results	87
8.1.1	Theory	87
8.1.2	Game study	89

8.1.3	Guidelines	90
8.2	Process	93
8.3	Validity	95
8.3.1	How to verify	96
8.3.2	Validity in process	96
8.4	Generalisability	97
8.5	Ethical issues	97
8.5.1	Negative attention on games and companies	97
8.5.2	Reinforcing the notion of a dying genre	98
8.5.3	Usage of collected data	99
8.5.4	Guidelines lack empirical evidence	99
8.6	Future work	100
9	Conclusion	103
9.1	The resulting theory	103
9.2	List of results	104
9.3	Next steps	105
	Bibliography	107
A	Appendix 1	I

1

Introduction

A real-time strategy (RTS) game is a strategy game played in real-time, as opposed to a turned-based gameplay. Each action performed by the player takes effect instantly, and not at the end of the turn. In a strategy game, the focus is on making a plan for how to win the game and align actions with this plan, often under time pressure. The player needs to think ahead and adapt the strategy to what is happening in the game. Typically, the gameplay features base-building, resource gathering, exploration, production of military units and battles between large armies. The end-goal is usually, but not necessarily, to militarily defeat the opponent.

Dune II [52] by Westwood Studios was the first game described as an RTS and it was a great success and its innovative gameplay inspired many other games to come and the genre as it is known today was born. Games like *Command & Conquer* [48] by Westwood and Blizzard's *Warcraft: Orcs & Humans* [23] came to dominate the genre but there were many other great titles as well. Publishers were willing to invest money in the genre and the gamers showed a large interest in the games and the games were selling well.

After a very successful decade, the genre began to lose its popularity. Gamers moved away to other genres and publishers became hesitant of investing money in a genre that was not as profitable anymore. Today the genre is not by any means dead, but its golden age is over, and it is more of a niche genre. Fewer RTS games are released, and less money is invested in their development. Last time a AAA RTS was released was probably *StarCraft II* [16, 14, 15]. In the Entertainment Software Association's 2020 Essential Facts [1], no age or gender category has RTS as their top 3 favourite genre.

1.1 Research problem

The research problem in this thesis is the decreased popularity of the real-time strategy genre. As stated in the introduction, it is a genre that has had difficulties competing with other genres the last decades and has become more of a niche genre that many gamers rarely pay attention to. For a master thesis in Interaction Design, it would be interesting and appropriate to study this problem from a game design perspective. There could be reasons that are not directly related to game design,



Figure 1.1: Dune II

that still have had a significant impact on the RTS genre's popularity, but I will ignore these unless there is a very strong connection to game design.

When I first got this idea for the thesis, I searched on the Internet to verify that the general opinion about RTS popularity really was what I had assumed and to get a sense of what theories there were about possible causes, and I found that lots of people had been asking the same question, but there was no consensus or a standard answer to it. There seems to be a large interest in the question, possibly because there still are many gamers that enjoy real-time strategy - or at least wish there were more and better games available - and would like for the genre to make a comeback. The numerous and sometimes contradicting explanations also show that this is not a trivial question, which makes it suitable for a deeper investigation like in this master thesis.

In the planning phase of the thesis, I decided to narrow down the scope to focus on what makes the MOBA genre a more popular genre than RTS and what the RTS genre could learn from the MOBA genre in terms of game design. The MOBA games are likely one of the main contributors to the decline of RTS, so in that sense it is a good choice for answering the general question of why real-time strategy games lost popularity, but it is also an interesting option in terms of game design and worth studying only for that reason. RTS games and MOBA games are similar in many ways and share history since MOBA initially spawned from RTS; this is described in more detail in the background chapter. Studying two closely related genres would be interesting because it could create a better understanding of what effects the differences in game design between the genres have on the gameplay; what makes one of them one of the most popular genres of all genres and the other one a niche

genre; and what could be learnt from this and applied to real-time strategy games to improve them and make them more attractive to MOBA players.

1.2 Research question

*What can RTS game design learn
from the MOBA genre?*

1.3 Stakeholders

There are a few relevant stakeholders that may be interested in the results of this thesis. One is the gamer who would benefit from better and hopefully also more RTS games to play. Gamers that already play RTS would enjoy seeing the genre being revitalised and gamers who until now have stayed away from RTS would be more likely to appreciate the genre if its shortcomings were identified and addressed.

Another stakeholder is game developers who wish to work with making real-time strategy games but is unable to, because publishers today are unwilling to invest money in development of new RTS titles. If the genre become more profitable publishers would allow more titles to be developed and invest more money in them which would yield higher quality.

For the publisher there is an obvious opportunity of making a lot of money if real-time strategy would regain its lost market share.

My academic background is in the Software Engineering program on Chalmers and I have now decided to finish the Interaction design and technologies master's program after a very long break. I studied the game design track, so the focus of the thesis will therefore be on game design and to apply a game design perspective on all the findings made in the research. It could also be possible to do this thesis focusing on the user interface, but that is not the way I have chosen. I consider myself to also be a stakeholder, as I am a long-term RTS enthusiast and would like to develop an RTS game myself someday.

1.4 Planned type of results

The planned result of the thesis is to have created guidelines for how to design better real-time strategy games. This will of course not be a complete guide for how to make RTS games, but the intention is to identify issues that are prevalent in RTS games and suggest how these can be fixed. This will be the end-result. To accomplish this objective, the strategy is to reduce the complexity of the research question by breaking it down into smaller sub-problems that are easier to work with. This will also be regarded as results of the thesis and they will lead to the end-result. This will provide a foundation of concepts and ideas to build the guidelines on.

1.4.1 Intermediate results

Here are some of the intermediate results I plan to have created before making the end-result guidelines.

- A definition of what a real-time strategy game is on a genre level. What genres are related and how do they differ.
- Important concepts that are found in most RTS games and different ways they can be implemented.
- Analysis of the greatest titles and most important companies involved in the genre.
- Summary of conventions of the genre and expectations gamers may have on an RTS game.
- Description of how the popularity of the genre has developed over the years compared to other genres.
- Study of what other games are popular today and what do people enjoy in them.

1.4.2 A theoretical approach

A prototype game will not be developed in this thesis. Although this could be relevant input to the creation of guidelines, this is out of scope for this thesis. A large part of the work will be collecting information related to the research question and analysing this data. In that sense, this thesis will be more theoretically oriented than practically. The focus will be on game design and when touching other areas that might be relevant for the research question – like for example business models – these will be looked at from a game design perspective.

1.5 Ethical issues

Mentioning games and companies in a negative manner could be bad for their business. Mentioning games and companies in a positive manner could give them an unfair advantage that might just be the result of irrelevant factors like my own personal biases or randomness.

Asking how RTS can be made more popular could – contrary to the intention – contribute to strengthening the idea that RTS is a dead genre and decrease its popularity further and have negative effects for the stakeholders.

If interviews are made, it is important to be careful how this data is used. The data needs to be stored safely, the purpose of the interview should be clear to the interviewee in beforehand, and the level of anonymity should be agreed upon and be guaranteed, even though the information in this thesis might not be that sensitive.

When making guidelines, people might actually follow them, and that makes it important to not make claims that are not based on reasonable evidence. If a game developer follows the guidelines and the end-result is bad because of this, that could cost much money - that might be personally invested - and ruin a game project.

2

Background

2.1 Strategy games

Real-time strategy games belong to the wider strategy game genre; therefore, it is necessary to first discuss what a strategy game is. Worth noting is that strategy games also include table-top strategy games and that early strategy video games were a continuation of these, closely imitating their gameplay until game developers learnt how to utilise the computer's capabilities, enabling other possibilities. Although the table-top games are interesting, they are out of scope of this thesis, so from now on strategy games will only refer to strategy video games.

Many games have strategic elements built into them, but not all of them could be classified as strategy games. Simon Dor [10] looks at ways to define the strategy genre and finds that while games can be classified after what they represent (iconic) or after their mechanics and systems (formal), he prefers to let the players themselves do the classification through their experience of the game (experiential). This would include the historical and cultural background of the games, which is impossible to catch in a definition consisting of a few criteria. Therefore, in the conclusion he suggest that an adequate definition would be “any game belonging to a certain tradition that goes back to wargames, that involves more strategy than the usual video game, that includes certain gameplay conventions and that is inscribed in certain communities' manifestations.”, leaving room for others to fill in the gaps in further studies. He also mentions that there might be games that fall outside of this definition that also could have influenced the strategy genre without being a part of it, such as simulation games.

This definition is a good starting point for approaching the strategy genre. The next sections will cover the sub-genres of the strategy genre, by briefly describing them and giving a few examples of popular titles belonging to the respective genre.

2.1.1 Real-time strategy

In a real-time strategy game, a player is fighting a war against an opponent. The player begins to harvest resources that are used to construct buildings and produce military units. There are often different categories of buildings available: military buildings are needed to produce units; economical buildings are used for gathering

resources; and other buildings may provide technological upgrades that improve the capabilities of units and buildings. In the beginning of the game the players do not have much information about the game world, making it important to send out a scout to find resources, the enemy base or information about the terrain and strategical locations. When the player's units leave an area, it is often hidden behind "fog of war", letting the player remember the terrain but hiding transient information such as location of enemy units. To increase the income of resources, players often need to build expansions at the location of scouted resources. During the game, the players' armies engage in combat with each other. The composition of the army is important, as there many types of units to choose between; all having different strengths, weaknesses, and special abilities.

The construction of buildings and gathering of resources are parts of the gameplay that is somewhat abstract. Although, the gameplay is said to be played in real-time, it usually only takes a few minutes to finish a building; new technology can be researched just by paying a set amount of resources and waiting a short while; a military unit is fully trained and ready for battle within a few seconds; resources are quickly mined and as soon as they are brought to the main building, they are ready to be transformed into any building or unit. These aspects of the game are often not designed to be realistic simulations of what they represent. The military units are less abstract, in the sense that they do things that are more aligned in timescale with the game time, e.g. walk a distance, engage in battle.

The individual units are not controlled directly by the player. Instead, they are given commands that they do their best to obey. For example, the player commands a unit to move to a specific location. The game then uses an algorithm to calculate the best route to get from the unit's current location to the location it was commanded to. The unit starts walking along the calculated path without the player actively making it do so, but if it walks into an unexpected obstacle, it must update its route to reach its destination. The units can also react to hostile activity without the player needing to command them to do so. If a unit is attacked it normally shoots back in a real-time strategy game, without waiting for player input. It can also start following enemy units, if not told to hold ground. This means the player is not in full control of the units, that, at least to some degree, can make their own decisions if left without orders. However, if the player has commanded a unit to do something, it will in most games follow this command.

2.1.2 History

The first game that had all features that today are associated with real-time strategy games was *Herzog Zwei* [54], which was released in 1989, actually to the Sega Mega Drive console which might be surprising to some, since the PC has been the main target platform for the majority of RTS games. Although primitive in many aspects, it allowed the player to build units, make expansion bases to generate more resources, and attack the enemy players; all this taking place in real-time from a top-down perspective.

Dune II [52], released in 1992, developed by Westwood Studios, was the first game to be classified as a real-time strategy game. This is the game that laid out the foundation for the RTS genre, on which the coming games would continue to build on. It had a resource called 'spice' that grows on fields, which harvesters collect and bring back to the player's refinery where it is converted to credits which are used to construct buildings and train units. Areas of the map that the player still has not visited is hidden behind a black fog of war, not being revealed until units are sent there to explore.

Blizzard Entertainment released their new real-time strategy game *Warcraft: Orcs & Humans* [23] in 1994, a game set in a fantasy world in which where the monstrous humanoid orcs invade the human kingdom of Azeroth. Blizzard would be the main competitor to Westwood who the following year, 1995, released their first game in their long-running game series *Command & Conquer* [53] - a game inspired by its predecessor *Dune II* [52], but this game is set in the near future where a global military alliance is fighting the rebellious Brotherhood of Nod over the the mysterious alien mineral tiberium which has spread over the world. The same year Blizzard released a sequel, *Warcraft II: Tides of Darkness* [19], where the orcs once again try to invade Azeroth. In 1996 *Command & Conquer: Red Alert* [49] was released, intended to be a prequel to the previous *Command & Conquer* [48]. The Soviet Union is fighting an alternate history World War 2 against the Allied Nations, in a time-line where Adolf Hitler has been erased from history through time-travel.



Figure 2.1: Warcraft: Orcs and Humans

The *Warcraft* games and the *Command & Conquer* games were all well received and developed the at the time immature RTS concept further. The Blizzard games and Westwood games had many similarities in regards of gameplay, but both series also had their own unique style. *Warcraft: Orcs & Humans* [23] had two main resources, gold and wood, which were collected by worker units. In *Warcraft II: Tides of Darkness* [19], oil was added to these for construction of naval units. Gold was mined in gold mines and wood from cut down trees. The workers are also

2. Background

responsible for constructing buildings. In the *Command & Conquer* games there is only one resource, tiberium/ore, which grows on field to be collected by a harvester vehicle. Buildings are not built by a worker unit, but is constructed by clicking its corresponding icon on a sidebar; a countdown starts and resources are consumed until the building is done; the player then finally clicks a location on the ground where the building should be deployed.

In *Warcraft: Orcs & Humans* [23] units are trained in specific buildings, while in *Command & Conquer* [48] they are trained by clicking a unit's icon on the previously mentioned sidebar, and when it has been fully trained it walks out of any assigned unit or vehicle producing building. A feature that *Command & Conquer* [48] introduced, which has not been copied to most later RTSs, was the vehicles ability to kill infantry units by running over them. This made even the unarmed harvester a potential threat to infantry. *Warcraft II: Tides of Darkness* [19] introduced two-layered fog of war, which means unexplored territory is black on the map, but when explored vision will only be provided as long as there are units in the area. When the units leaves an area, a new fog will be added to the area which hides enemy player activity but the bare terrain will remain visible. All games use tech tree, meaning that the construction of certain buildings and units is only possible if other buildings required to do this have been constructed first.



Figure 2.2: Command & Conquer

Apart from Blizzard and Westwood, Ensemble Studios managed to successfully enter the competition of the RTS market, with their historical age game *Age of Empires* [46], released in 1997. It was in style more like *Warcraft: Orcs & Humans* [23] than *Command & Conquer* [48]. It features a more complex resource system, with four different resources that can be gathered from several different sources: food, wood, stone and gold. While *Command & Conquer* [48] and *Warcraft: Orcs & Humans* [23] have few factions, in the initial games have only two, *Age of Empires* [46] has many. In *Age of Empires* [46] the factions share tech tree, but depending on what civilisation is chosen there might be some units and technologies missing and minor bonuses added. In *Age of Empires II* [47], which was released in 1999, each

civilisation is given its own special unit. In Blizzard's and Westwood's games the differences between the factions are bigger both visually and in terms of design. The technology tiers are divided after historical periods which the player upgrades from stone age through iron age. After each upgrade, new buildings and units become available.

After the successes with the *Warcraft* [23, 19] games, Blizzard's next game *StarCraft* [13] from 1998, would take place in a future distant world far away in the galaxy where the Terran, Zerg and Protoss races wage war against each other. The three races are completely asymmetric and have their own distinct set of unit and graphical look, creating disparate gaming experiences depending on the choice of race. Despite the races being very different, the game designers managed to make the game balanced, especially after the release of the expansion pack *StarCraft: Brood War* [17], so that regardless of which race the player picks, the win rate is roughly the same. This in combination with a high skill ceiling made the game a very popular e-sports, especially in South Korea, and contributed largely popularising e-sports for a large audience. *StarCraft* [13] still has a large and active community, even though it is more than 20 years old.



Figure 2.3: StarCraft: Brood War

Warcraft III: Reign of Chaos [21] was released in 2002. The main new feature was the incorporation of RPG elements in the gameplay, with special hero units with an experience system, that would upgrade the stats and abilities of the hero when a new level has been reached. When the hero dies it can be brought back to life at an altar. The heroes also have an inventory that can store a set of items that upgrades the hero further. The game focuses on micromanagement of units and heroes and less on keeping up a high production. The player can also fight neutral units that are spread out over the map to gain experience and items. *Warcraft III: Reign of*

Chaos [21] might also be remembered for its support for custom maps with greatly modified gameplay; most notably *Defense of the Ancients* [28], which spawned the spin-off genre MOBA.

Company of Heroes [24], 2006, by Relic Entertainment, is also worth mentioning for its innovative gameplay and features. It is set during World War 2 and focuses more on the units and less on production. Resources are gain when the player takes control over territory, and the units act as squads and not individuals and might take advantage of the ground and objects located in it which they can take cover behind. *Company of Heroes* [24] got a sequel in 2013 and Relic Entertainment also has its relatively popular *Dawn of War* [26] series, set in the Warhammer 40000 universe.

StarCraft II: Wings of Liberty [16] from 2010 was the last large RTS title that Blizzard released, except for its expansion packs and remasters of old games. There are no known plans for new titles from Blizzard, but *StarCraft II* remains the most played RTS. The *Command & Conquer* [53] series has been cancelled after a few less successful sequels after EA's purchase of Westwood Studios.

2.1.3 Other sub-genres

The strategy genre has apart from real-time strategy many other sub-genres. The most important of these are described in this subsection.

2.1.3.1 4X

The four Xs in 4X stand for eXplore, eXpand, eXploit and eXterminate, referring to the main gameplay element. 4X games have a large scope, including economy, diplomacy, technological development, and military warfare, providing a complex gameplay. Many of these games are turned-based but there are also real-time 4X games. Game session may last several hours. The most well-known 4X games are the *Civilization* [40] games who are dominating the sub-genre.

2.1.3.2 Grand strategy games

Grand strategy is strategy at the highest level, in the perspective of a nation who is participating in a war. This includes managing resources, production and alliances – basically everything all mean that are available to a nation. Games representing war at this level are called Grand strategy games. The difference between grand strategy games and 4X games is not clear as there is a quite big overlap between their scope, which leads us back to Dor's definition [10] which tells us to look at the gameplay conventions.

Many of the defining titles among the Grand strategy games are made by Paradox Development Studio [37], being *Europa Universalis I-IV*, *Crusader Kings I-III* and *Hearts of Iron I-IV*. Other important titles are the games in the *Total War* [3] franchise by Creative Assembly and the classical game *Risk* [34]. Military combat is often abstracted away in these games, often only being represented in gameplay as



Figure 2.4: Civilization

movement of armies or troops. The games take place mostly on a high-level world map, representing the territories with low detail. The *Total War* [3] games switch to a tactical mode when armies engage in combat, complementing the grand strategy gameplay realistic battles.

2.1.3.3 Multiplayer Online Battle Arena

MOBAs are games where two teams are fighting each other on an arena, trying to destroy the other team's buildings. The team that first manages to destroy the opponent's main building wins the game. Each player controls a single hero unit by issuing commands to it. The hero gains experience for killing opponent heroes and computer-controlled units that are spawned frequently. The experience is used to upgrade the hero's special abilities and stats. The resource system is often simplistic, only feature one generic resource which can be used to buy items to the hero, that enhances its capabilities.

The genre can be seen as spin-off to real-time strategy games, as it has similar features and user interface but focuses on untypical aspects of it. The game that popularised the genre was *Defense of the Ancients* [28], usually just called *Dota*, and it started as a custom map in Blizzard's real-time strategy game *Warcraft III: Reign of Chaos* [21]. Later a standalone version, *Dota 2* [8], was developed by Valve. Other popular MOBAs are *League of Legends* [32] by Riot Games and *Heroes of the Storm* [12] by Blizzard. These games are played competitively as e-sports, *League of Legends* [32] being the largest of all e-sports.

2.1.3.4 Tower defence

Tower defence is a game where the player defends a base or a territory from attacking enemy units, by building defensive towers that will shoot at the attackers. The



Figure 2.5: Defense of the Ancients

enemy units attack in intervals, that get increasingly difficult to fend off, as their numbers and strength increase for each wave. The towers may be upgraded to deal more damage or get other enhanced abilities and if they take damage, they can in some games be repaired. The goal of the game is to survive until all waves have been defeated. Sometimes tower defence games are considered to be a sub-genre to real-time strategy games as most features of tower defence also are present in RTSs. Some of the first tower defence games to gain great popularity were implemented as custom maps in *Warcraft III: Reign of Chaos* [21].

2.1.3.5 Real-time tactics

A real-time tactics game is in its purest form basically a real-time strategy game, without base-building and resource management, entirely focusing on the micro-management of the military units. However, the line can be hard to draw between these genres since there are many games that would fit somewhere in between these two concepts.

2.1.3.6 City-builder

The most well-known city-builder is Maxis' *SimCity* [38] from 1989, where the player is the mayor of a city and controls the city's economy, infrastructure and construction of buildings. A city-builder is not really a strategy game since there is no winning condition and it is not representing a war scenario, but since buildings are constructed in real-time strategy games in a way similar to that of a city-builder, they are nevertheless worth mentioning since there is some overlap in gameplay. Among modern city-builders *Cities: Skylines* [42] is worth mentioning, along with

the rebooted *SimCity* [39] from 2013.



Figure 2.6: SimCity

2.2 Current status of the RTS genre

The number of new RTS releases are not as high as it was during the golden age, but many new titles are still released every year, so when some people talk about RTS as a dead genre, their claims are very exaggerated. However, looking more closely at the new games, it becomes apparent that a significant part of them are either remasters of classical titles, or sequels to them. Blizzard has released remastered versions of the original *StarCraft* [13] and of *Warcraft III: Reign of Chaos* [21], and there are no known plans for a sequel to them or an entirely new franchise within the RTS genre. All the *Age of Empires* games have got remastered, and the same thing has happened to the early *Command & Conquer* games. The fourth instance in the *Age of Empires* series was released in the late 2021, but *Command & Conquer* [53] seems to be cancelled game series for the moment.

This indicates that there is a loyal RTS fan-base that are willing to pay money for new games, but remastering old successful games is cheap and making a sequel has more predictable outcomes than starting a new franchise. Currently many game developers seem reluctant to make larger investments or risk making a game that might not perform good enough. The consequence is that the players get what they are used to, often games of high quality, but the same old gameplay and story lines become repetitive and little innovation is given the RTS genre.

Apart from this, the most active studio involved in real-time strategy games today is Relic Entertainment, which has developed the popular *Company of Heroes* series [24, 25], the *Dawn of War* [26] series and has been working on the honourable task of making the next *Age of Empires* game which now has been released. Petroglyph Games have released several titles of great variety the last years, where *Grey Goo* [31] might be the most interesting in terms of innovation, but the studio also was

assigned to make remakes of *Command & Conquer* [48] and *Command & Conquer: Red Alert* [49].

2.3 Possible reasons for decline

There are some well-known high-level explanations to why real-time strategy games have lost popularity since the early 00s. I will describe the ones that I regard as most likely to be the cause of the decline. Although some of them are not directly related to gameplay, they will be mentioned here to provide a more complete overview of the problem, even though they are out of scope of the thesis which focuses on game design.

2.3.1 MOBA games

MOBA games are similar to RTSs, and since the rise of MOBA coincides with the decline of RTS, it would be of interest to investigate the causality of this correlation. This is the reason this thesis will focus on.

2.3.2 Lack of innovation

During the 90ies the RTS genre developed quickly, both in terms of gameplay and graphics. Every year took big steps forwards in all aspect of game design. However, an RTS released today is not very different from an RTS released in the middle of the 2000. The rate of innovation has decelerated significantly. This might have had the effect that the novelty-seeking gamers have moved on to other genres, where they find more innovation.

2.3.3 Complexity

Real-time strategy games are known to have a steep learning curve. Since it belongs to the strategy genre, it is natural that the player needs knowledge of the game to master the game. However, as a beginner it might be difficult to get started with the game, as the lack of knowledge makes it hard to play the game proficiently. There are many complex decisions to make which the beginner will be unable to understand the consequences of and the beginner will easily be defeated by a more experienced player and will feel that there was no realistic chance of winning. This likely reduces the amount of fun the player will have playing the game until acquired enough knowledge and skill to actually be able to enjoy the game, which might never happen if the player abandons the game before learning how to play it.

2.3.4 Attention-demanding

Another potential issue with RTS games is that they are very attention-demanding. Later in the game there are activity all over the map, while the player can only view a limited section of it at a time, making it necessary to constantly react to events occurring across the map and move the camera to the location. The player rarely

gets time to rest, but need to stay alert while not forgetting to produce new units and keeping workers occupied. Real-time strategy games are known for requiring the player to have a high number of actions per minute, often referred to in the abbreviated form APM. This creates opportunity for competitive gamers to develop great skill as the skill ceiling is high, but as a less experienced player the gameplay can feel overwhelming and always needing to be on full attention can be energy draining.

2.3.5 Console gaming

Real-time strategy games are much more popular on PC than on console. The reason is that to be able to control an RTS game efficiently the player needs a mouse and a keyboard. In the ordinary gameplay of an RTS game, the player needs to be able quickly select units, choose the appropriate command, and select a location where to perform the command. This cannot be done with a game-pad very easily, although attempts have been made to adapt the RTS user interface for console gaming. This makes the incentives small for publishers to develop real-time strategy games for console. Publishers prefer games that work on all platforms, so they can reach the maximum number of potential customers. The console's share of the market has grown on the expense of PC.

2.3.6 New business models

Real-time strategy games are often sold as premium games, that is, the player pays a one-time fee and can then play the game forever. In recent years, the free-to-play model for games has been successful in games where the base game is free, but more content and features can be unlocked by doing micro-transactions. This does not work as well in RTS since keeping the game balance is a main concern and adding new units or abilities to paying players could easily break the balance and also lead to a pay-to-win gameplay which does not fit well in a genre where competitive play is essential. Not being free-to-play could be an issues for gamers who have got used to not paying for games and expect them to be free, which could have had a negative impact on RTS.

3

Theory

In this chapter, theories that have been identified as interesting in context of the research question are listed.

3.1 Wicked problem

A wicked problem is a complex problem to which no optimal solution can be found. The term was originally used within social planning but has later been adopted in other fields where problems with the same properties are being addressed. Horst Rittel and Melvin Webber defined wicked problems like this: [43]

- There is no definitive formulation of a wicked problem.
- Wicked problems have no stopping rule.
- Solutions to wicked problems are not true-or-false, but better or worse.
- There is no immediate and no ultimate test of a solution to a wicked problem.
- Every solution to a wicked problem is a "one-shot operation"; because there is no opportunity to learn by trial and error, every attempt counts significantly.
- Wicked problems do not have an enumerable (or an exhaustively describable) set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.
- Every wicked problem is essentially unique.
- Every wicked problem can be considered to be a symptom of another problem.
- The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem's resolution.
- The social planner has no right to be wrong (i.e. planners are liable for the consequences of the actions they generate).

It was later realised that design problems are essentially wicked problems and the concept was adopted by designers, first popularised by Richard Buchanan. Consequently, the theory is relevant for game design as well. [4]

3.2 Cognitive Flow

In 1975, the Hungarian researcher Mihaly Csikszentmihalyi first formulated his theory about what he called Flow [6]. He had found that a person performing a task would enter a positive emotional state if there is a certain balance between the difficulty of the task and the skill in performing the task. The task should be challenging without becoming too difficult to induce flow.

Flow can be defined as:

- Extreme focus on a task
- Great control
- Merging of action and awareness
- Loss of self-awareness
- Distortion of the experience of time
- Intrinsically rewarding, autotelic.

Tasks that create flow usually have the following characteristics:

- Concrete goals and manageable rules
- The goals can be achieved through actions within the person's capabilities
- Recurring feedback on how well the person is doing
- No distractions

Games that make the player get into the state of Flow, are more likely to create more engagement with the game, since Flow is a positive emotion that the player will seek to recreate. Therefore, game designers need to design their games in such a way that Flow is possible and easily achievable. In an article at Gamedeveloper [7], Sean Baron discuss how the concepts of Flow Theory can be applied to game design. Game developers should maximise flow by considering these factors.

Humans have a limited ability to process information. If too much is happening at the same time, understanding goals and rules becomes hard, which will prevent flow from being achieved. The game should clearly present goals to the player using all available measures, such as HUD, non-playable characters, and various cues and splitting attention should be avoided. For example, when new mechanics are introduced late in the game, the player needs to be trained to use them.

The difficulty of the task needs to be well balanced if it should lead to flow. If a task in the game is too difficult, the player feels too stressed and loses flow and might stop playing altogether. What stress level gives best performance is individual, which makes preset difficulty levels unlikely to hit the optimal level.

The game must give feedback to the player and the timing of feedback is important. Feedback directly after or in the middle of a task creates association between the action and its result. Feedback on progress regarding long-term goals motivates the player to fulfil the goals.

Cluttered HUD and UI can overload the player with information. The decisions the player need to do should be limited by eliminating options and features that do not provide any additional value to the game.

3.3 Self-determination theory

Edward L. Deci and Richard Ryan have developed a theory of what creates motivation in a person [45]. They separate intrinsic motivation - which is the will to do a certain activity because it stimulates a persons's internal psychological needs - from extrinsic motivation - which is a motivation that is external to the person and is not directly related to the activity in itself, for example working to get money.

They also found that there are three basic psychological needs that are universal: autonomy, competence and relatedness. Autonomy is a person's possibility to make decisions freely and not being restricted by others in doing this. Having control of the activity is crucial for experiencing autonomy. Extrinsic motivations can reduce autonomy if a person feels an activity is not done by choice, but for an external reason. Competence means a person feels confident in its ability to perform an activity proficiently and being in control of the end-result. Relatedness is achieved when a person feels connected to others, and they show interest of and give positive feedback for activities the person is participating in.

When these psychological needs are met, the individual performs at a higher level and experiences more well-being. On the other hand, if activities are primarily motivated extrinsically these positive effects will disappear. Self-determination theory can be applied in the field of game research to explain what makes a player motivated to play a certain game and how to design games to satisfy the psychological needs of autonomy, competence and relatedness [2].

3.4 Affordance

The American psychologist James J Gibson formed a theory about what he called affordance [33]. The word he invented himself, in order to have a term that described the interaction between a person and an environment in the sense that the environment supports a set of actions and the player is able to perceive that these actions are possible. This idea was later adopted by interaction designers and should therefore be usable for game design, where affordances could be a relevant concept within games.

4

Methodology

This chapter contains descriptions of methods that are regarded as relevant within the context of this master thesis, and will be used in the upcoming work.

4.1 Grounded theory

Grounded theory was developed by Barney Glaser and Anselm Strauss in 1967 [35]. The term refers to the philosophy behind the method, namely that a theory should be grounded in data. Unlike traditional research, GT therefore focuses on collecting data from which a new theory emerges. Existing literature on the topic is not read until after the new theory has been found to prevent the research being disturbed by preconceptions.

The research starts by identifying a research area, for game research this is often players. As early as possible, the data collection is initiated. The data could come from any source. For example, observing players playing a game, reading manuals, game reviews or other documents of interest, interviewing persons or making surveys.

As the data is collected, codes are added to the data. A code is either a word or a short phrase that describe a concept. This is called open coding. The codes will begin to form patterns indicating that a new concept has been found. Concepts will in turn be grouped into categories. The goal is to find one core category that can explain a certain behaviour that is studied. The data collection continues until additional coding does not produce more concepts. As the work progresses, the amount of codes and their internal relationships grow and this needs to be documented. In GT the documentation is called memos.

Initially all data should be coded, but when the core category has been found, coding is limited to the core category and other categories that are connected to it. This is called closed coding. The relationships between the core category and the essential categories are identified in a process called theoretical coding. Theoretical codes emerge from the data and integrates categories into a coherent theory.

Lastly the pre-existing literature is read and adapted to the resulting grounded theory. This part of the method needs to be modified since the hand-in of the planning report requires a theory chapter where relevant concepts and frameworks

are described. To accomplish this mandatory requirement studying existing research has to be done earlier than is typically done in Grounded theory.

4.2 The MDA framework

MDA, an abbreviation of Mechanics, Dynamics, and Aesthetics, is a framework for analysing games, dividing their components into three categories: mechanics, dynamics, and aesthetics [44]. These categories describe a game on three different levels of abstraction. Mechanics are the basic components of the game, including rules, actions available for the player, and other low-level properties. Dynamics describes mechanics at a system level, where mechanics combined with other mechanics and the input from the player creates a certain behaviour. Aesthetics is the highest level, which aims at pointing out what kind of experience the game generates for a player.

The paper gives a few examples of aesthetics that are found in games.

- Sensation – game as sense-pleasure
- Fantasy – game as make-believe
- Narrative – game as drama
- Challenge – game as obstacle course
- Fellowship – game as social framework
- Discovery – game as uncharted territory
- Expression – game as self-discovery
- Submission – game as pastime

Games could pursue multiple aesthetics goals in varying degrees, and there could be several other aesthetics than the ones listed as examples. Aesthetics is what makes a game enjoyable for the player. Knowing what aesthetics the game is aiming for, the developer can then design and tune mechanics so they produce dynamics that will yield the desired aesthetics.

MDA is a tool for analysing games and it does so at a high level of abstraction, thus serving as a good starting point for game design analysis, but requiring complementing theories and frameworks for identifying specific mechanics and dynamics and recognising patterns in the design of these. The aesthetics mentioned in the paper are not a final or exhaustive list of all thinkable aesthetics, and they are vaguely defined which probably mean the ones that are relevant for the thesis will have to be defined more clearly and new aesthetics may need to be identified.

4.3 Game design patterns

The MDA framework [44], described in the previous section, gives a high level overview of the components of a game. However, it does not provide many example of what could be included in the categories mechanics, dynamics and aesthetics. To be useful for analysing the components of a game, the framework needs to be complemented with other resources that provide more knowledge of what could be included in the categories. Luckily, there are a few good resources available on the Internet that would be appropriate to use in combination with MDA.

Here is a list of potential resources to use:

- Game Design Patterns [29]
- Game Ontology Project [30]

5

Planning

This chapter describes the planning that was done before starting the actual thesis work. It contains an overall plan, working methods, and time plans.

5.1 Overall plan

I decided to primarily look at the research problem from the perspective of reasons for why gamers prefer MOBA games to RTS games. This perspective is more narrow and limited in scope and does not provide an exhaustive explanation to why real-time strategy games are not as popular as they were in the late 90s, but it addresses an important aspect of the problem, which potentially makes a wicked problem (3.1) less wicked.

The thesis was divided into three phases. First, there would be a theory phase of which the output would be a theory explaining why MOBAs are more popular than RTSs. The resulting theory would then in the second phase be applied to RTS and MOBA games; both to prove that the theory itself is usable and to generate input for the third and last phase, where guidelines for how to design RTS games to be more competitive against MOBA games would be written.

I wanted to approach the research question by following the Grounded theory (4.1), but due to requirements in the course plan for the master thesis it would not be possible to follow the rules and guidelines for a traditional grounded theory strictly as a prestudy had to be done where different theories had to be investigated, which breaks the idea of going into the work without preconceptions. Ideally the reading up on existing theories should be done last, but the method had to be adapted to the circumstances, meaning I would have to try to not let the existing theories affect the new theory that was created. Not until after having finished the conceptualisation and categorisation, it would be appropriate to go back to the theory chapter and see how the new theory related to the existing ones.

Grounded theory is a flexible method that allows collection of data from all thinkable types of sources. This seemed useful since there were many different types of sources that could be relevant for this work. No matter if it is an article, a forum post, an interview made specifically for this thesis, or data produced in a later stage of the

thesis, it should be possible to insert it in the theory. Since it was unknown at this stage exactly which source types would be used, this method seemed appropriate. Also it allows using source types that are very different to each other together, and can be used for finding connections between these that might be hard to find otherwise if the method is incapable of handling different source types. Grounded theory provides a systematised method for handling and working with the data and through coding and categorisation makes the data meaningful and understandable. In this thesis the aim was to find the best arguments and ideas for how to improve the RTS genre, and reason about them. This is to be contrasted with quantitative methods where the proof is found in the numbers, although that might be a different way of approaching the same research question that could have other benefits.

For the second phase I had planned to make a comparison between the RTS and MOBA in terms of game design patterns. I decided to use the MDA framework (4.2) at high level in combination with resources describing game design patterns (4.3) at a more specific level. My assumption was that the two at surface similar genres should share many game mechanics, but they are tuned differently to produce other dynamics and aesthetics. I planned to do this for *StarCraft II: Legacy of the Void* [15], *Age of Empires II: Definitive Edition* [11] and *Company of Heroes 2* [25], which are the most popular RTS games, and for *League of Legends* [32], *Dota 2* [8], and *Heroes of the Storm* [12], which are the most popular MOBA games and *League of Legends* [32] is also one of the most popular games across all genres.

The games, decomposed into their game design components, was then to be analysed with the theory formulated in the previous phase. I intended to map the conclusions from the theory with the identified game design patterns, to find the parts of the RTS genre that appear to be most problematic, but also to determine what parts that should not be changed because they either are contributing positively to game experience or are essential for keeping the identity of a game as an RTS game.

In the third and last phase I had planned to write guidelines based on the knowledge collected in the first and second part, and these guidelines would be the answer to the research question suggestion how the game design of RTS games could be improved.

5.2 Working process

In this section the planned work process and other supporting methods are described. The aim was to be as flexible and efficient as possible, so there was never an intention to follow these methods strictly.

5.2.1 Scrum

A Scrum-influenced [56] way of working was planned to be used where high-level stories of all work items would be created and put in a backlog. Dependencies between them would be identified which makes it easier to decide in which order to do them and what is critical to do early in order to avoid getting blocked later and

where there is risk of getting into trouble.

During the thesis some stories would be expected to be removed, while others would need to be added to the backlog. The expected content in the end-report would not be set in stone and would likely change until its completion. Dividing Work into sprints was considered to make sure the different hand-ins are handed in on time with satisfactory content.

Scrum is most often used for developing software, but I thought it would work well for a thesis where one is also addressing a complex problem that needs fast adaption to use time efficiently and to ensure the effort is put where it generates most value. Another benefit with Scrum was that I have experience of using this method from work.

5.2.2 Pomodoro

Since I was working with this thesis in the evenings my available time was limited, it was of important to make maximum use of the time I had. To succeed with this, it would be beneficial to use a technique that aids staying focused, working on the right thing and avoid spending too much time on a single task. The Pomodoro Technique [55] is a time management method that seemed suitable for this purpose. It has the following steps:

1. Choose a task
2. Set a timer to 25 minutes
3. Work on the task until the timer rings
4. Take a short break (3-5 minutes)
5. Go back to step 2

Usually the technique includes keeping track of how many intervals have been done and taking a longer break after four intervals, but since I did not work that many hours per day, I simplified the method and removed long breaks.

5.3 Time plan

I was working with the thesis at half speed, that is 40 calendar weeks. I also worked full time and had other obligations, so the time available varied from week to week. Therefore, the time plan was expected to change after I had started working with the thesis and got a better sense for in what pace I would be able to work. Here is the initial time plan as it looked before the work began. The plan is divided into phases to which the starting week is indicated in bold, followed by a list of subtasks.

5.3.1 Initial time plan

This is the initial plan that was suggested in the thesis proposal.

Phase 1

8 weeks – Prestudy

- 3 weeks: Study theory – Look for models, concepts, and frameworks relevant for the research question and decide which ones to proceed with
- 3 weeks: Study methodology
- 2 weeks: Write planning report

Phase 2

24 weeks – The actual work. Three parts, 8 weeks each. First theoretically focused, second practically focused and lastly focusing on the result guidelines.

- 8 weeks: Theoretical part. Work with findings from prestudy
- 1 week: Book interviews
- 1 week: Interview gamers and/or game developers
- 1 week: Compile results
- 5 weeks: Do research based on theory
- 8 weeks: Make guidelines based on previous results

Phase 3

8 weeks – Write report and prepare presentation

5.3.2 Updated time plan

After having completed the prestudy phase, the plan was updated to be aligned with the newly acquired knowledge and the better understanding of what the coming work would be. The notes describe changes that were made to the plan due to unforeseeable reasons after the work had started.

- **Week 9:** Prestudy
 - 6 weeks: Look for models, concepts, and frameworks relevant for the research question and decide which ones to proceed with.
 - 2 weeks: Make a plan for the rest of the thesis.

(Hand in planning report)

Note: This took longer time to finish than expected due to sick children and less time available for work. I pushed the rest of the thesis three weeks forward to compensate for that. The next phase should have started in W17.

- **Week 20:** Make a grounded theory
 - 6 weeks: Data collection. Use various sources such as: articles, forums, game reviews, and post-mortems.
 - 2 weeks: Plan and execute interviews.
 - 2 weeks: Create categories and relations
 - 2 weeks: Integrate existing theories

(Updated plan from here on, due to unplanned low activity during holiday)

- **Week 38:** Analyse games with MDA framework and game design patterns and analyse findings with resulting theory in previous step
 - 6 weeks: Identify patterns in popular RTS and MOBA games
 - 2 weeks: Analyse how patterns align with theory
- **Week 46:** Write guidelines
 - 4 weeks: Create guidelines based on previous results
- **Week 50:** Report
 - 8 weeks: Write and finalise report
- **Week 6:** Done

6

Execution and Process

In this chapter the working process of the thesis is documented.

6.1 Prestudy

The prestudy was made to create a plan for the thesis and to find theories relevant for it and methods for how to work.

In supervision meetings, theories that could be of interest were suggested. These theories were most of the times not created with the specific intention of being applied to game design. Therefore, first the theories had to be understood in general in their original context, using the sources where the theories first were presented. To understand how these theories could be applied to game design, some additional reading was necessary. The site *Game Developer* [9] (which at the time of the prestudy was known as *Gamasutra*) was useful for this purpose, as it had articles discussing most of the theories from this perspective.

The theory about Cognitive Flow (3.2) and Self-determination theory (3.3) seemed to be most useful for the upcoming work, while the theory about Wicked problems 3.1 would be good for comprehending the great complexity of the problem.

An overview of game research methods [41] was read and grounded theory (4.1) was found to be an interesting method for the thesis. It was decided to base the work on this method but not follow it strictly. The reasons for choosing this method for inspiration is that it allows using any thinkable source and provides a way for compiling this data and interpret it.

The MDA Framework (4.2) and game design patterns (4.3) would be useful later on to analyse the data and experience of playing RTS and MOBA games.

It was decided that first a theory should be created that tries to explain the issues with the RTS genre, but also what makes it good and what it can learn from MOBAs. This would be the first phase of the thesis. The next phase would be a game study where different RTS and MOBA games are played, and analysed using the theory that had been created then. Finally guidelines should be produced that give game designers recommendations about what to do and not to do when designing an RTS

game, using the results from the previous phases.

A time plan was created that specified how much time each phase should take and when the thesis was expected to be finished.

6.2 Theory creation phase

During the prestudy it had been decided that a method inspired by Grounded theory 4.1 should be used, but it was not going to be followed strictly to create more freedom to adapt the method after the needs for this thesis.

6.2.1 Getting started

For organising the data collected, Microsoft Excel was used. All data was placed in one single table where each row represents an observation. In this initial stage each observation had an id, the actual data, a code, an URL to where the data was found, and in some cases some notes. The id is unique and grows incrementally and was used for storing the order in which the data was collected so that the data could be read chronologically if sorting the table by id. Notes were added to the observations occasionally to provide some context and make them understandable without having to go to the source and read the full text.

6.2.2 Data collection

With this basic structure set up, the data collection could begin. A problem that arose directly was how long each data item should be. One way of organising the data is to do so called line by line coding. Then each sentence in a text becomes a data item with a code. But if more sentences are included it becomes easier to follow how the author is reasoning, but the entry might contain several statements about different things, making coding more difficult. The work started without finally deciding how to do it.

First off, the data items were longer, but then the codes had to be too abstract to fully summarise the content. This seemed inappropriate since the idea was to have many concrete codes that then would be organised into high level categories and core categories, so quite quickly the approach was switched to one closer to line by line coding. Most items were one or two lines. Literally doing line by line code was to take the idea to far, since one statement was often made using more than one sentences, and then one sentence by itself would not make sense taken out of context. The rule of thumb was that one data item should contain one statement that was made with as few sentences as possible to express that statement.

Data was collected from a wide range of sources, with search engines being the main way of finding them. Theoretically there was no limitation to what sources to use or what they could be, but in practice most of them were articles, forum posts, and interviews. Search phrases related to the research question were used in the search

engine to get results to read through. On Internet forums like *Reddit* and *Quora*, where the topic were discussed in many threads, many interesting posts were found. Some of the threads had many replies and contained long discussions with several different opinions, which resulted in much data. In forums, it is also easy to find related topics as a list of these often is provided. Many articles were also found. They tended to be longer and discussed topics more in depth, which complemented the briefer but more diverse forum posts. Reading the sources, new ideas arose about which direction to go next.



Figure 6.1: Data collected using Excel

Initially there was an intention to also do interviews with game developers and use these as a source, but in the stage of the project when this was planned to be done, there were difficulties finding time to work and the actual working hours were late in the evening and irregular, so it was decided to not make interviews.

6.2.3 Coding

The coding was done in such a way that each statement was associated with a word describing the statement. Each statement was only allowed to have one code, mainly to make the data more easy to manage and to improve the quality of the codes by only using the best code. In reality though, sometimes it became a bit arbitrary which code to use as there were several that could describe the statement equally good. In those cases it might have been useful to allow multiple codes, but in general it worked well and was beneficial for the create process to have this restriction which forced a choice to be made. There were no clear rules imposed for what type of codes to use but the idea was that they should reflect a player's experience of a game, when that was applicable, so that problematic aspects of the real-time strategy genre could be understood.

Basically, the workflow was as following:

- Find an interesting source
- Read the source
- Copy the interesting parts to a temporary document

- Split it up into statements
- Copy the statements to the data table
- Code the statements

6.2.4 Categorisation

This work proceeded until it became difficult to find sources with ideas and perspectives not already reflected in the data. This was taken as an indication the data had reached a level of saturation, where it would be an appropriate time to start creating categories. Category names will be written in italics and core category names in bold. Two new columns were added to the data table: category, and core category. All codes were looked closely at to find relations between them and to see what they had in common and how they could be generalised. Already at this stage it was clear that there were a few aspects of real-time strategy games that many of the participants brought up as problematic, e.g. they are hard to play which resulted in a category discussing this issue that simply was called *Hard*, and that they are big and complex and take long time to learn which resulted in the category *Learning*. There were also much data that just were discussing what game elements real-time strategy games contain.

6.2.4.1 First iteration

An initial attempt create core categories was made. The categories were grouped into **Fun**, **Pain**, and **Game design**. The first one contained statements about what players perceive as fun, the second one statements about what the problems of the genre are, and the third one statements general statements about game design in RTS games. This categorisation did not help to interpret the data any better than just reading the sources, since it just pointed out what was good and what was bad, with a miscellaneous category with data that was neither.

6.2.4.2 Second iteration

To improve the categorisation some of the data was reinterpreted and moved in to other categories. Especially the data in the **Game design** category was reworked, to make it more player oriented. While the other categories described from the players' perspective how they perceive the game, **Game design** described what game elements RTS games contains from a more objective perspective. This kind of data is useful as well, but it would serve the theory better as whole if spread out over all categories to complement the subjective statements. In the end this category was removed at all, and its data was placed in other categories.

The new core categories after this work was **Incentives**, **Variety** and **Challenge**. The idea with these new categories was that they all should reflect aspects of real-time strategy games, and each aspect should have both positive and negative sides and include comparison with the MOBA genre. The category **Incentives** is what motivates the player. **Variety** is a quality of the game that lets the player be creative

and explore a wide range of possibilities in the game, e.g. new concepts not seen in other games, rich and varied content, many interesting mechanics, and multiple ways to play the game. **Challenge** represents the problems with RTS games, e.g. they are hard to play and takes long time to learn.

6.2.4.3 Third iteration

After the second category iteration, the categories had become better, and the theory had started to take form. The categories were now more useful for explaining the underlying data, but more work needed to be done. The **Incentives** was still somewhat vague, as it did not specifically tell what type of incentives motivates the player. Much of the data in that category talked about things related to the skills needed for playing RTS games, and practising and becoming better seems to be rewarding for many players, while more casual players still enjoy developing their skills in more relaxed ways. Therefore the category was changed to **Skill**. Some of the data was rearranged to better align with the new category. **Challenge** was renamed back to **Pain** as the data that was talking about positively challenging aspects had been moved to **Skill**.

The intention with the categories were that all of them should have positive and negatives sides. During the categorisation iterations, it has been difficult to find categories that were not either mainly positive or mainly negative. This could have been the case because of bias in the data, that had been collected with the focus on problems with RTS. It was decided to resume data collection using the existing code and categories, but with the intention of complementing the data where it was needed to remove the bias. After this had been done a summary of each category was written to create a first draft of the theory, and this concluded the first phase of the thesis.

6.3 Game study phase

The next phase of the thesis was the game study. The study was done in two parts. First real-time strategy games were played, followed by MOBA games.

6.3.1 Real-time strategy games

StarCraft II: Legacy of the Void [15], *Age of Empires II: Definitive Edition* [11], and *Company of Heroes 2* [25] were selected for playing since they were the most popular RTS games at the time of the study. The choice of games after their popularity was made to represent most players. It would also have been possible to select games so that they primarily reflect the variance within the genre, but playing the popular games were considered to have more benefits. Much of the data in the theory was referring to these three games, making a study of them most relevant for interpreting the data. Also playing obscure games had already been done in the prestudy phase, so there was already a basic understanding of the genre in general. The selected games are also quite diverse and represent different positions on the scale of casual

versus competitive, strategy versus tactics, pacing etc.

While playing, notes were taken after each played match. First notes were placed in categories to align with the theory, but this required analysis work after each session, so the method was switched to a more simple one where the notes only contained date, game, and any reflection made while playing, saving the analysis for later. This worked much better and produced a better documentation of what had been done, that was easy to follow later on.

All three games were played at the same time, in contrast to first playing only one of them, then moving on to the next one, etc. This allowed making comparisons between the games already from the start and prevented spending too much time on one single game. It worked well for the games that there were previous experience with, but for the game that had not been played before, that is *Company of Heroes 2*, it was harder to get started than it could have been if it the game had been given full focus.

6.3.2 Revisiting the theory

Before proceeding to the MOBA games, the theory was revisited and a short summary of it was written. Seen in the light of the notes from the RTS game study, some parts of the theory did not seem useful for explaining that experience. A new iteration of the theory was initiated. An attempt was made to take the **Pain** core category and break it down into three new categories (Hard, Learning, Frightening), all representing different problems with RTS. If the result of this had been satisfactory, the data would have needed to be reinterpreted or excluded from the theory. This would have been a quite large change to do this late in the thesis, but the attempt was cancelled before getting that far.

This experiment lead to a new idea about how to improve the categories though. Instead of starting over with entirely new categories, it could be enough to just rearrange some of the data. The data in **Pain** that was talking about how difficult the game is could be moved to **Skill** and the data talking about how long it takes to learn the game could be moved to **Variety**.

What then was left in **Pain** category was data talking about things that psychologically intimidate the player such as ladder anxiety, outcome responsibility etc. These are things that make the players feel uncomfortable while playing, so the category could be renamed to Discomfort, but since the other categories are positively framed, it was instead renamed to **Comfort**. The category only described the lack of comfort and the amount of data was also smaller than in the other categories, so a new data collection phase was started to make this category more robust and nuanced.

6.3.3 MOBA games

The game study could then proceed. *League of Legends* [32], *Dota 2* [8] and *Heroes of the Storm* [12] were to be played. These are the most popular MOBA games, and were selected for the same reason as the real-time strategy games were selected after popularity. Notes were taken while playing, in the same manner as in the RTS phase. This phase was quite straight forward as most issues had already been encountered and solved in the RTS phase and the work method could be reused, but with other games.

The main difference was that these games the author had almost no prior experience with, which could have been a problem, but in fact it was not but instead it illustrated that MOBA games are efficient at onboarding new players and get them up to a skill level quickly were the game is enjoyable. This knowledge would become important later for the end result.

6.3.4 Finishing the game study

A summary of the results from the game study was written, where the notes were compiled into coherent text. A list of important concepts and experiences was created for both genres based on the notes. This list was then expanded to a text explaining the results.

6.4 Finalising the theory

The theory had reached its final form after the fourth iteration in the middle of the game study. It was not planned from the beginning, but taking a pause from the theory work and working with something else for a while, was beneficial for coming to the necessary conclusion about how to make the theory coherent and meaningful.

As the theory was considered to be final at this point, no more data collection or changes to the categorisation were made. The work with presenting the theory could therefore start. A summary of the theory explaining the core categories and the categories was written. This summary was then used as a base for the section describing the theory in the results chapters.

6.5 Guidelines

The guidelines are the end result of the thesis. They are based on all other results produced in this thesis and the knowledge acquired during the process.

6.5.1 Brainstorming

A brainstorming session was held to come up with as many guidelines as possible. This yielded a number of 27 guidelines. Only the heading was created to not waste time on writing text before knowing exactly what guidelines to include in the final

result. The headers were written in imperative form, saying what to do, or not to do, or what to think of, when designing an RTS game.

Some of the guidelines were duplicates, or very closely related, and could therefore be removed or merged into one single guideline. Others could be split to more precisely describe aspects of the guidelines. In some cases, a guideline could be split into more guidelines by shifting the perspective, e.g. from player perspective to game designer perspective.

6.5.2 Categorisation

Since there were quite many guidelines, it would make them easier to read if they were put into different categories. They were divided into different areas they described. The guideline categories bear some similarity to the theory categories, which is natural since they are based on the theory. Still they are not identical to the theory categories and the intention was not that they should represent the theory.

The guidelines categories are: Onboarding, Manageable difficulty, Broad appeal, Varied gameplay, and Negative emotions.

6.5.3 Writing the guidelines

After the outline of the guidelines had been created, the process of writing them started. Each of them was given a five questions which they should answer:

- Why is this a guideline relevant?
- How should it be implemented?
- What are the problems with it?
- When is it applicable?
- What other guidelines is it related to or collides with?

These questions were first answered briefly with just important keywords and short phrases, to get a idea of what the final guidelines would look like. A few of the guidelines then appeared to not add that much value to the end result by being too similar to others or having too weak argumentation to support the claim. Small rearrangements were made in the categorisation as some guidelines after having been expanded showed to fit better in a different category than the one they originally was placed in.

When this work had been finished, 19 guidelines remained. The next step was to convert the notes to running text. After that the guidelines were refined a few times, with adding references back to the theory and other parts of the thesis, and examples of games that relate to the guidelines. The guidelines were also gone through one

more time to find connections between the guidelines, which were added to the text to make it easier for the reader to know how the guideline relate to each other.

7

Results

7.1 Game study

Here the results from the game study will be presented grouped in categories based on shared themes between the games. Since the gaming sessions were played by the author of this thesis, this subsection is written in first person and contain personal reflections and opinions.

7.1.1 RTS

Three RTSs were played during the gaming phase: *StarCraft II: Legacy of the Void* [15], *Age of Empires II: Definitive Edition* [11] and *Company of Heroes 2* [25]. The latter of these I had never played before, but the other two I were familiar with, although many years have passed since the last time I played them and since then many changes had been made to both games.

7.1.1.1 Skirmish mode

Skirmish mode, meaning playing a game against AI players, is a quick way to get a grasp of how the game works without playing the entire campaign or going online and play against human opponents. It can also be used for training and some people play it just for fun. I played many skirmish games and found that the games were not that enjoyable if the AI was too easy. In *Company of Heroes 2* this was less of a problem since I did not know the game, but in the other two games I had to increase the difficulty quite a lot until the AI became challenging. The easy AI was not realistic in the sense that it was not playing bad in a natural way but appeared to only be hindered by restrictions in how much it was allowed to produce, so it did not feel rewarding to defeat it. I got the same feeling in *Company of Heroes 2* on the easiest AI, where I initially had no idea what I was doing but could win the game quite easily anyway. It did not seem to matter what I was doing in the game because I would win anyway and winning the game gave no indication I was improving at the game. An other issue with AI players in general is that they often fail to apply an even pressure during a game. Pressure makes the game fun, and often the AI can make some good attacks in the beginning of the game and apply some pressure, but if the player manages to repel these initial attack waves, the AI will lose momentum and the rest of the game will not be that interesting.



Figure 7.1: Company of Heroes 2

I noticed that the games became more fun to play as soon as I got a sense that I was in control of what was happening in the games. *StarCraft II* was the game I had played the most before and also most recent in time, so it was primarily in this game I experienced control. I knew what buildings to make, how many workers to produce, when to expand and what units to produce. Knowing how the game works reduces to cognitive load a lot, because many situations can be reacted to instinctively and brain-power can instead be put on strategical thinking and performing fun tasks, but when playing a new game there is a lot of information that needs to be processed actively and that leaves less room for the more interesting aspects of the game. Following a simple build order was a useful help to quickly increase the feeling of control. Spending resources fast and not getting blocked by population cap were problems that occurred frequently and caused frustration and broke the feeling of control.

7.1.1.2 Co-op mode

Co-op missions provide a way of playing together in teams with friends or random players, against the AI. This is a more relaxed and casual game mode, where the idea is to have fun and cooperate instead of being competitive and defeat an opponent. All three games support co-op missions, and in *StarCraft II* and *Age of Empires II* they seem to be newer additions that were not there at launch. I tried the co-op missions in *StarCraft II* and I have to admit I found them quite fun. The missions were diverse and varied, with different goals and objectives in each of them. Before starting the game, the player selects a commander to play, which depending on the choice give different abilities and units. The commander gains experience after each game which unlocks more abilities and units. Exactly two players participate in each game and the gameplay differs a lot from a standard game.

In an interview[57], Tim Morten, the former production director for *StarCraft II*, tells that co-op missions at the time were the most popular game mode and that

they give non-competitive players a reason to stay with the game after finishing the single player campaign. In *Age of Empires II*, the co-op missions were in beta stage at the time of gaming phase of the thesis, but are now available in the live game. Co-op games seem to be something that the gamers enjoy and the game developers are willing to more effort on.

7.1.1.3 Campaign

The single player campaign is the classic mode that has been with the genre since the beginning. It is a good way to get started with a new game, and it is the place where the game can present its universe and lore, and tell a story for the player. In *Company of Heroes 2* the campaign takes place on the eastern front in World War 2, following a Soviet lieutenant. Since I had not played *Company of Heroes 2* before, playing the campaign gave a good introduction to how the game works, and the game is a bit different from ordinary real-time strategy games, so that was useful, especially since the tutorial missions were very brief and basic. The campaign is a suitable format for teaching the game, since in each mission a few new units and techs are introduced, giving a natural progression that lets the player learn a small portion of the game at a time. The campaign also has more room for variation, as some units and mechanics that would be too imbalanced or extravagant for multiplayer games can be used in the campaign where immediate fun could be a higher priority than perfect balance. I had some problems finding the optimal difficulty level in *Company of Heroes 2*, and if it is too easy the game gets boring and if it is too hard gets frustrating after having retried on the same mission a couple of time.

7.1.1.4 Factions

How factions were implemented in the three games varied greatly. *StarCraft II* has three distinct asymmetrical races, while *Age of Empires II* have a total of 42 civilisations that are quite similar with each of them having one or two unique units or buildings and a set of special bonuses. *Company of Heroes 2* has five asymmetrical factions. In *Age of Empires II* the number of factions is high, which made learning and remembering the differences between the factions hard, and the differences are quite small which made the choice seem to not have that big of an impact on the game. In *Starcraft II* the races are very diverse, even visually, which makes it easy to intuitively understand the differences. In *Company of Heroes 2* the differences are large, but the units all look quite similar as the game is set in World War II and has a more realistic style, which means more playing is needed to fully grasp the factions than was spent in this study.

7.1.1.5 Competitive play

Playing competitive games was scary as I did not felt well enough prepared for facing human opponents. In *Company of Heroes 2*, I skipped this part altogether and stuck to playing the campaign and skirmish missions as I was struggling with learning the game. In the other two games, I played a few competitive games, but it was not as fun as it used to be back in the days when I was making an effort to become good



Figure 7.2: Age of Empires II: Definitive Edition

at the games. Also starting a game and knowing it could take more than an hour to finish was a big commitment and risky as I knew I could be interrupted at any time and multiplayer games cannot be paused.

7.1.1.6 Game modes

Age of Empires II has many game modes that make the gameplay more varied. The most common is Random map where the player starts with little resources in the lowest technological tier on a computer generated map. There are three win conditions: eliminating all opponents, constructing and defending a wonder for a certain time, and collecting and defending all relics on the map for a certain time. There were also many other game modes that I tried out at least once against the AI. For example, *Capture the relic* where the player starts with an indestructible monastery and the first one to capture the relic in the middle of the map and bring it to the monastery wins; and *King of the Hill* where there is a monument in the middle of the map that should be captured and controlled for a set period of time to win. These modes were fun and introduce other objectives than the standard elimination objective, and that changes how the game is played. In the latter example, first the player needs to be aggressive to take control of the monument, then the player needs to play defensively to defend it, while the focus is on the centre of the map. This produces a different flow of the game than in a normal game where attacking and defending is happening all the time and attention needs to be spread out all over the map. The objective can remove some of the dynamic gameplay, as it creates high incentives to play in a certain way and puts full focus on a limited area of the map. This can be compared to MOBAs, which can be seen as very restricted RTSs, so the conclusion is that objectives need to create new possibilities and dynamics and not only lock down the games to focus on what already is present in them and accentuate that, because in that case it will quickly become boring to play them. *Age of Empires II* has attempted on this, but in my opinion they have not succeeded very well and I would guess the non-standard game modes are not very popular, but

it is nevertheless interesting to look at and learn from, and if done better it could create new interesting dynamics.

7.1.1.7 Tutorial

Tutorial missions can be a great tool for teaching the game to new players. Among the RTS games I played, *StarCraft II* had the best tutorials. There are three missions, which each enables more units. The missions are designed like a normal Skirmish mission against one AI opponent. The player is given detailed instructions about what to do next in the shape of fine-grained sub-objectives. The missions cover a whole match from start to end, and the player gets to defend and attack and eventually defeat the opponent. What I liked with this type of tutorial missions is that it teaches how to play an actual match and puts the mechanics in their real context, instead of having missions where mechanics are taught individually without tying everything together. As *StarCraft II* was the game I had played the most before I did not get to experience this tutorial as a true beginner would have, but I would have appreciated something similar in *Company of Heroes 2*, where the tutorial missions only taught the very basics. Then after completing the tutorial missions when I was going to play a Skirmish there were many elements I had not been exposed to before and I did not really know what to do.



Figure 7.3: StarCraft II: Legacy of the Void

7.1.1.8 Other thoughts

It might be the case that more innovative games might be harder to learn if they differ from standard RTS game. *Company of Heroes 2* has some features that are not that usual in real-time strategy games. The player does not build that many buildings and do not have workers that collect resources. Instead resource points are captured, which start to generate resources. The focus in the game is more on tactics and micromanagement of units and victory is achieved by collecting victory points, not defeating the opponent. All this is different from the original RTS formula created in the early *Command & Conquer* and *Warcraft* games, which

means *Company of Heroes 2* and its predecessor were somewhat revolutionary when they were released, but I had to admit the game was a bit confusing in the beginning, which I guess people that are inexperienced with RTS games in general feel when the first try out the genre.

One thing that is frustrating in games that have a population cap that is increased by building more houses, is that is so easy to forget to do it, and then production stops and resources start to pile up. This happens often in both *StarCraft II* and *Age of Empires II*. In addition to this *StarCraft II* also has other macro-management mechanics that boost the production rate in different ways depending on what race the player selects, that need to be performed within fairly short intervals which adds to the cognitive load.

Building placement is a subtle but interesting concept in RTS games. In *Age of Empires II*, buildings can be placed in such a way that attackers cannot reach workers. Early on in the game units are too weak to damage buildings so a wall of buildings makes good protection until later stages in the game when getting access to siege weapons. In *StarCraft II* the building placement is less important but on some maps where there is just a tight entry to the main base, buildings can be placed there to prevent enemies from coming in. Personally I find it exciting when mechanics can be used in unexpected and maybe unintended ways to gain an advantage over the opponent. One more example is in *Age of Empires II* where workers rapidly can start construction of buildings in front of an army to block their path, which has tactical importance as it makes it possible to trap troops that are trying to escape or help defending a position that otherwise would be impossible to hold.

In *Company of Heroes 2* the terrain is tactically important. Units can take cover behind obstacles which will lower the risk of them taking damage. It is also important for the vision of the units, as there is a system that makes a unit only able to shoot at a target it can see, which is different from many other RTS games where units usually can attack units as long as they are in range, or if some other more simplistic model is used. The terrain also changes over time. If a building is destroyed it changes how units can take cover. Many objects are destructible which has the same effect. If a vehicle is destroyed it will remain in the map until the game is over, and units can take cover behind it. Visually there is a huge difference between the beginning of the match and the end of the match, as everything where there has been battle will be in ruin. These features greatly contribute to the realism of the game, but also adds more tactical options for the player.

In *StarCraft II*, I noticed that some changes to make the game easier had been made since I played the game. It seems like Blizzard thought that the game was too hard for beginners. Now there are indicators at resources displaying current and max number of workers on minerals and gas sites, so that the player does not have to count workers to make sure resources are gathered optimally. When the game starts the workers are sent to mineral patches automatically, which is something you almost always want to do anyway, but I suspect it reduces the risk of a beginner

doing a mistake early in the game or if the player tabs out to another window while the game is loading. The loading screen displays hints that teach random facts about the game, which can be useful. Also the game starts with more workers than it used to be, which shortens the early game and also eliminates some very early rush strategies.

7.1.2 MOBA

I played the three games *Heroes of the Storm* [12], *Dota 2* [8], and *League of Legends* [32]. Although I played the original *Defense of the Ancients* [28], the *Warcraft III: The Frozen Throne* [22] custom map, back in the day, I consider myself a beginner to above mentioned games. As this gaming phase was limited in time I only experienced the games as a beginner, as it would require more time to become intermediate in any of the games. The beginner phase is an important phase though, because it is crucial that new players are not intimidated by the game so that they continue playing and proceed to higher ranks. Therefore I think this study was valuable.

All three games had tutorial missions that taught the basics of the games. The concepts that the player is introduced to in these missions were easy to understand as they were similar to what I could remember from *DotA*. This includes basic movement, items (except in *Heroes of the Storm*), waves, towers, and primary and secondary objectives. The next step was to play against AI players, before actually playing against real players. In all games, getting to this level was easy and at this point I felt I had got enough practice to be ready to take on real opponents.

In *League of Legends* and *Dota 2* the player buys items that is placed in the inventory and the items boosts the stats of the hero or add new abilities if they are not consumables that when used restore health or many or have some other temporary effect. In both games there are a large amount of items and to know which ones to buy would be impossible for a beginner, but luckily the game suggest what items that are appropriate to build for the hero the player is playing. This system seems to work decently and mitigates the learning curve issue in this area of the game.

In all games, there are many heroes (champions in *League of Legends*) to choose between. They all have different abilities, roles, stats and difficulty. They also have their own unique visual appearance and personality. At the time this was written *League of Legends* has 157 champions, *Dota 2* has 122 heroes, and *Heroes of the Storm* has 90 heroes. As a beginner, this feels overwhelming, and the number of possible combinations of teams is enormous. This seems to be the place where the complexity lies in the MOBA genre.

It would take long time to play through all of them and learn what they do, so this was not simply possible given the limited time available for this phase in the thesis, hence this study is written from the perspective of a beginner. Improving in the game, at least getting from beginner to intermediate, seems to be related to a large extent to acquiring more knowledge about the heroes/champions. When a player is new to the game, each match presents a new lineup of heroes that the player never

has seen before, so even if the player acquires more knowledge in each game, that new knowledge might not be beneficial in the next game. This creates a feeling of stagnation after the initial quick progress when learning the basics. The player keeps playing but does not perform better relative to the other players participating in the match.

To learn all heroes would probably take several hundreds of matches in any of the games, which is a large investment of time. However, since these games are free-to-play all heroes might not be available until they are unlocked which restricts the amount of heroes to choose between for the player. This might actually be good for the new player as it makes the goal of playing through all of them more attainable. Sticking to the same hero for a while and learn how to play it properly might also be a good strategy in the beginning, creating some sort of consistency at the cost of gaining experience.

In the early stages of the game, the flow of the game is slower and this is a good time to get acquainted to a new hero. All abilities are described if hovering their icons with the mouse, but it might be too much text to have time to read it all when the game has started. To find the right item to buy would also take long time if reading the description for all of them, so I just went with the recommended items. Later in the games there are big team fights where all or most of the players are involved. These are very confusing as there is so much information on the screen at the same time, making it very difficult for an inexperienced player to discern what is happening when all heroes are firing their abilities at each other.

One thing I found annoying was being killed unexpectedly because I did not realise I was in danger. This mostly happened when I was surprised by the use of abilities I did not fully understand. It felt more fair to die when I knew I was taking a risk and felt that I had a chance to escape the dangerous situation. Having to wait until the whole time until respawn was not very fun after these situations.

I played *Heroes of the Storm* with some friends that had played the game much and was very familiar with the games. I did not find anyone I knew to play the other two games with. We communicated with each other via voice channel in Discord. Playing some games of a MOBA together is a nice way to spend time with friends online. Had we not been playing *Heroes of the Storm* we would likely not have talked using the voice channel.

As a beginner, more experienced friends can give you advice and guidance while you play. They can recommend what heroes are appropriate for your skill level, what items to buy, warn you when you are about to get into a dangerous situation and give general feedback on how you play in a friendly manner. In the public chat people are usually not very constructive and friendly to new players that are bad at the game.

The game is not so intense that it is impossible to talk while playing most of the time, which makes the experience more social because talk is not strictly restricted

to topics directly related to the game. Playing with friends also decreases the risk of being in a team where your allies send toxic comments.

The main objective of all these three MOBA games is to destroy the other team's main structure (Nexus, Ancient, Core). When this is done the game is over. However, there are also sub-objectives like destroying towers and killing powerful neutral units, to make the gameplay more varied. *Heroes of the Storm* is the game that provides most variety in this area of the game, as the maps all have different sub-objectives that changes the gameplay and makes other strategies viable.

In *League of Legends* and *Dota 2* most games are played on the same maps, but in *Heroes of the Storm* there is a pool of maps with varying themes, design and sub-objectives. Also the maps do not follow the original map design of *DotA* as much as the other two games, even though the basics are still there, e.g. three lanes, towers, two bases on the opposing sides of the map, and waves of computer controlled units.

Playing any of the MOBAs are not nearly as demanding as an RTS in terms of how many Actions per minutes are required to perform all the necessary tasks, as the player generally only controls one unit. The player may still need mechanical skills like fast reflexes, good timing and the ability to perform a difficult skillshot, but it is not comparable to managing production and controlling an army of a large number of units at the same time. Personally I did not feel as drained of energy and hyper-focused as I do after playing a game of RTS. It is a more relaxed experience.

7.2 Grounded theory

In this chapter, the resulting theory of the grounded theory inspired working method is presented. The theory consists of three different aspects that, according to the data, are important for answering the research question. The categories are then divided into sub-categories that in detail explain different aspects of the main category. There are relations between the categories and none of them are completely isolated from the other categories. Some of the data could certainly have been placed in one of the other categories as the phenomena they describe often to some degree are overlapping and therefore not easily separable from each other.

The descriptions of the categories contain a selection of quotes from the data collection that the categories are based on. Each quote is followed by an index, which can be used to find the quote and related information in appendix A, and a few words summarising what type of source the quote is taken from.

7.2.1 Skill

As discussed in the Background chapter, the nature of the real-time strategy game genre resolves around achieving objectives during time pressure, more specifically defeating the opponent. To be successful in doing this, the player needs to develop skills in the game that is being played. If the player is not in possession of adequate

skills and therefore unable to play the game proficiently, games will be lost and the experience will not be that enjoyable. On the other hand, if the skilled player manages to defeat the opponent, the experience will feel very rewarding. This is true for many other game genres, but in real-time strategy games this is very accentuated and important for understanding what motivates the players and what might potentially drive them away from the genre.

A large part of the data is of the character that is seems to be talking about skill in different ways, at least so it has been interpreted in this study, therefore skills is the first category in the theory. What skill means will be analysed further in the following sub-chapters, with the intention of identifying the strengths and weaknesses of skill in the context of real-time strategy games, comparing with MOBA games as far as the data allows.

7.2.1.1 Depth

Real-time strategy games usually incorporate some resources that need to be managed, but apart from these concrete resources there are also so called implicit resources, that are not built into the game but are just as important to manage properly. These are time, attention and information. Performing tasks takes time and given the real-time nature of the game the time needs to be used better than the opponent. Attention is a crucial resource as many things are happening at the same time. Armies might be fighting at different locations, while an expansion is suffering an attack while production needs to be kept running. Information needs to be collected and is usually incomplete if the game implements fog of war. In MOBAs, two factors are easing the need for implicit resources. The games are simpler which reduces the need and there are team mates to share the burden with.

"And, most importantly, they have you do all of these things with limited resources. In most RTS, there will be 1, 2 or more concrete resources to acquire, manage, and spend as well as implicit resources like time, attention, and knowledge of what one's enemy is up to." #273, strategy game blog

Skill ceiling is the limit to how skilled a player can get. For games that are played competitively this is important that the skill ceiling is high, ideally so high that it is practically impossible to reach it. If the skill ceiling is high, this creates a range of skill levels the player might be at. The more skilled player should most of the times defeat the less skilled player, otherwise there might be too much randomness built-in to the game, which would undermine necessity of skill. That could be acceptable in a more casual-oriented game, but would likely not be appreciated by the competitive player. The competitive player who is committed to mastering the game needs to feel that there always are areas where the skills can be improved further. It also adds to the amusement of watching professional games where the highly skilled player could performs stunning moves that seem insanely difficult to the average player.

"It is our sincere belief that a successful RTS should have an impossible mechanical skill ceiling, otherwise, the game will get solved and, subsequently, die." #141, game

developer

The opposite of skill ceiling is the skill floor, which is the minimum amount of skill that is required to play a game. The lower the skill floor the more accessible the game becomes, but the risk is that simplifications made to the gameplay with the beginner in mind, might lower the skill ceiling and upsetting the advanced players, that may feel that the game is dumbed down and interesting possibilities are removed for no good reason. There needs to be balance between these two concepts if the game should be appealing to both experienced RTS players and beginners. On the other hand, if the game designer focuses too much on the wishes of professional gamers, the game will be designed for a very narrow target group that will not represent the actual player base.

Chore actions are actions that contribute little to the overall experience of the game. A game developer defines them as following:

"'Chore' actions are repetitive actions that don't inherently offer any decisions of strategic import and are of poor value compared to visually intuitive and strategically dynamic actions (like unit micro or decision based-macro abilities like Chrono-boost)." #147, game developer

These actions might raise the skill floor to a higher level as they increase the total amount of tasks the player needs to execute. Always remembering to perform these tasks in time will give an advantage against an opponent that neglects these tasks, making them more or less mandatory. In that sense they admittedly are a part of skill, but one that might not add much fun to a game, and takes away focus from other more interesting parts of the gameplay and consumes the player's limited attention.

"By freeing up player attention, skill can move from invisible to intuitive, from routine to dynamic, and from a list of chores to strategic execution." #148, game developer

7.2.1.2 Hard

Real-time strategy games are very demanding of the player. The amount of tasks to execute in almost all stages of the game is huge. For the new player it is virtually impossible to perform all of them. The beginner can try to prioritise and carry out the most important ones, but in practice what will happen is that the unspent resources will pile up, production will be slowed down and the player will fail to react to important events across the map. The key is to play fast to get time to do all tasks. A former professional StarCraft player and coach describes it as following.

"Simply put, most RTS games are exhausting. As someone who has achieved a relatively high level of play in numerous popular RTS games, my best coaching advice for the vast majority of players would be to play more and to play faster. In most instances being able to micro, macro, and multi task is the biggest obstacle keeping players from pushing their play to the next level."

A player that is able to do considerably more tasks will have a great advantage against a slower opponent, even if the opponent is better at other aspects of the game. Actions per minute (APM) is crucial to increase in order to improve one's skills. If the player knows what to do but does not have the capacity to execute all of the actions, this can cause frustration and prevent the flow state from occurring (3.2). The same Starcraft player continues:

"Many times, I hear players getting frustrated as they ultimately know what and how to execute, but their fingers cannot keep up. Often a player with higher APM will trump an opponent who might otherwise make better decisions and have a better grasp on the game. There are always exceptions, but most players would agree that a 300 APM player will beat a 100 APM player almost every time." #1, pro-gamer

Not only does the player have to be fast, it is also needed to do the right thing. This involves micro-management, macro-management, multi-tasking, planning, and reacting to what the opponent is doing. The player needs to be good at many skills at the same time, which makes RTS games stand out in how demanding they are of their players.

"Well, ultimately, it means 'RTS are hard!' I told you I'd say it again. practically, RTS require constant high level mental engagement from players, exercising planning and concentration in ways that are not seen in FPS, RPG, MOBA etc, broadly speaking." #280, strategy game blog

But playing fast is not necessarily the most fun way to play a game, even though it is effective. Focus on APM means less focus on other areas in the game that potentially might be more interesting and constantly having full attention on the game and maintaining a high APM can be exhausting and stressful. This might make RTS games less accessible to casual gamers. Many forum users complain about this. Here is an example:

"RTS died as a mainstream genre when the concept of APM became widely understood, and this killed it as a simple form of entertainment. Playing StarCraft 'right' is not actually fun for the majority of people, but if you don't play it 'right' you're stuck doing skirmishes vs the easy AI." #137, forum user

RTS games can be very unforgiving. One single mistake can turn the entire game into a loss and the consequences of minor mistakes that are being repeated throughout the game accumulate and lead to a certain loss. Either way risk of doing a fatal mistake is always present which creates stress. This does not have to be a bad thing for all players; it is arguably one reason RTS has been so popular in e-sports since the tension that is built up makes the game exciting to watch, and it is most likely contributing to what makes the game interesting for many players, but for the casual player it might make the game be perceived as unreasonably hard and lead to uncomfortably high stress levels that make the player choose to play a more relaxed game instead.

"I was highly rated in AOE2 back when it was on the Microsoft Zone. In the

beginning the climb through the ranks was fun, but by the time I reached 1900ish Elo, it just became insanely stressful. One misstep early game could put you far enough behind that your fate was nearly sealed, even if you didn't "gg" for another 20-30 minutes." #109, forum user

To improve a player needs to practice but getting enough practice is not easy when playing a few games consumes all your energy. "That was an issue that I had with Starcraft 2. I wanted to play more so that I could practice, but after one or two games I'd be mentally exhausted." #165, forum user

Some of the older games are unmodern and difficult to control. In StarCraft, only 12 units at a time can be controlled and moving entire armies, especially through narrow areas, is not easy to do. New games generally do not have these issues, but going back to play the classic games is not that easy for someone that is not familiar to the genre. However, many of the classic RTS titles have been remastered and that could be an opportunity for the developer to remove issues that make games unnecessarily hard, but hard core fans are often reluctant to accept changes made for these reasons.

7.2.1.3 Progression

Progression in RTS functions a bit differently from that in MOBA. In RTS the progression is generally driven by construction of new buildings and researching upgrades. These will when they are completed enable more options in terms of units, buildings, and upgrades, that can be used to fight the opponent. In MOBAs the progression is basically the level the hero is at and the items in the inventory that is bought for the gold that the player earns. The term progression has other meanings but the data in this study is describing the progression of the player's powers and capabilities.

One notable difference between the genres is that the progression in MOBAs is similar too that in RPG games, but fit into a relatively short game sessions. It is possible that gamers that enjoy RPGs are compelled by this, giving the MOBAs advantage over RTS games, where the RPG systems are either non-existing or not given a central place in the gameplay.

"Starting out weak and powering up over time is a common element of many games. Mostly, these are RPGs of some sort, but MOBAs apply the same idea to every single match. It's kind of like playing a multiplayer PvP RPG at super-speed, going from level 1 to the level cap in 20-40 minutes (depending on the game). And then when it's over, you get to do it again with a different team, different character, different opponents, etc. so that it's not just the exact same thing every time." #125, Quora user

The progressions in MOBA might be more abstract, while in RTS they are more concrete. In MOBAs the players earn experience and gold which is translated into increased stats and abilities, so what team has progressed the most is not easy to see by just watching the game. There is often also a team progression, with how many

buildings that have been destroyed, but it is not always easy to know what team is in the lead. In RTS games most progress is manifested on the map. When the player gets a better economy this will be visible through the number of workers and expansions. The resources gathered will be spent on buildings and armies that also are visible on the map. When a player wins a battle the success can be measured in how many of the opponent's units were killed, and just comparing the size of the armies gives a clear indication who is ahead.

"For similar reasons, games like LoL and Dota 2 struggle to communicate who is ahead at a glance. Gold income, objectives taken, and towers felled are all factored into which team is ahead, but nothing is as intuitive as seeing a baneling connect with a blob of marines or a nuke land on an unwitting army." #151, game developer

In MOBAs the player can never lose experience that once has been gained. Gold that has been earned will be spent on items, that will remain in the player's inventory until the game ends. This means progress in MOBAs are irreversible, but this is not the case in RTSs. Buildings and armies can be destroyed, and to replace them the player has to gather and spend more resources, but many times it is very hard to make a comeback if too much damage has been made. This difference in the progression systems can contribute to the relatively high difficulty of RTS games (7.2.1.2).

"That being said, I do think in general that RTS can have too many points of failure. Too many advantages conferred that can be lost or squandered. I think there's a middle ground here. But importing flawed itemization/scaling models into strategy frameworks aren't solving any problems." #195, strategy game blog

How the progression works differently in MOBAs can have an impact on what the players perceive as fun in the game. The fact that the game revolves around leveling up a character affects how the player sets up goals for the match. During a match the player might focus more on leveling up the character than achieving the ultimate win condition, which can create a more relaxed attitude towards the game and the end result.

"You don't have to win in a MOBA to have fun. I was having a lot of fun leveling up my character in Smite, when I realized that my team was losing horribly. We ended up losing the match, but I enjoyed just leveling up my character for no reason." #117, Quora user

7.2.1.4 Decision

During a match a player makes thousand of decisions, some of them are small and have only short-term effects, but some of them are big and will define the remainder of the match. A fatal mistake ends the game directly, while smaller mistakes will accumulate and reduce the chances of winning. Decision-making is an essential skills for being successful in real-time strategy games, and the game developer needs to provide with a multitude of interesting options.

"To win, players must think critically both in the short term and long term. In the short term, misplaced armies, mismanaged units, and mistimed abilities (assuming the game contains active abilities of some sort, either on units or in the form of global effects like superweapons) can cost a player a match outright. In the long term, inefficient economy growth, passivity, and misreading of an opponent's strategy can leave a player in an unwinnable position" #275, strategy game blog

Real-time strategy games often make use of FOG OF WAR. This means the player only gets information from areas of the map where there are friendly units or structures located, and other areas will be covered with a fog that hides enemy units and buildings that have not been observed. The fact that all players have imperfect information about the game state has many implications on the decision making on the tactical and strategical level, and also creates a need to continuously gather updated information about the opponent. If the opponent starts producing a unit, that requires the player to take action to be able to counter it, then it is crucial that the player receives this information in time to stop the opponent from making a lethal attack.

"While I do not consider Fog of War itself to be a required element of real-time strategy games, I do consider uncertainty of other player's actions to be incredibly important. Economics, time pressure, and competition are all intensified if all players are forced to proactively seek out information on the actions, strengths and vulnerabilities of their opponents, and to defend against their opponents learning the details of their own actions, strengths and vulnerabilities." #258, strategy game blog

The real-time aspect of the RTS genre, puts the decision-making under stress since many decisions have to be made under a short period of time, often based on incomplete information. There is a constant time pressure, that requires the player to always be fully focused.

"Anyone can make a good decision given enough time, but RTS enforce critical thinking by forcing all participants to constantly evaluate the quality of their decisions and the efficiency of these same decisions." #242, strategy game blog

"This further reinforces the concept of "pressure" and the need to make good decisions, as well as testing and improving a player's ability to multi-task, as they must defend their own investments and use them as wisely as they are able." #251, strategy game blog

Real-time strategy games tend to be intense, and the amount of potential decisions to make often exceeds the player's capacity, which makes it necessary to sometimes prioritise some and neglect others. This is related to the need for high APM to perform well discussed in 7.2.1.1. Also the importance of certain types of decisions varies between games, and will appeal depending to different player groups depending on their preferences. Here follows a few examples of what type of decisions that some players prefer.

"Player focus should be on making better decisions, micro, and positioning." #101, professional gamer "I am in the same spot. I love COH/COH2 so much. complex unit interactions > managing ingame economies" #169, Reddit user

Some decisions are made before the match has started. Choosing the right civilisation based on the map in games like *Age of Empires II: Definitive Edition* [11] is a decision made before the game starts. Usually though, in a typical ladder game, the player chooses what faction to play without knowing what faction the opponent has selected and what map to play, which removes the strategical quality of the decision.

"Most pro players at the highest level will pick their civilisation based on what map they are playing in any given match." #20, professional gamer

Controlling space of the battlefield is important, as it limits the opponent's ability to make good decisions.

"By far the most important aspect to designing any 'good' RTS is space control. Controlling space in most strategy games (even if not RTS) is at times difficult to define, but also the most crucial aspect to the general ebb and flow of any game. By having more room to maneuver, a player will have more options in their arsenal, while the competitor, who is more limited, must account for a greater variety of threats. The most common ways to control space (from a game design perspective) are generally terrain, units, and defensive structures. But space can be controlled in other, less obvious ways as well. For example, the fog of war mechanic puts an emphasis on scouting and decision making with incomplete information, or resource scarcity can funnel players to certain sections of the map." #4, professional gamer

Since real-time strategy games have the reputation of being too hard (7.2.1.2), some developers have in their attempts to target this issue managed to oversimplify their game, and thereby remove the depth that makes the game fun. Here is an example of a Reddit user claiming this is the case in *Grey Goo* [31].

"Grey Goo's issue was that it streamlined both the macromanagement and micromanagement. There were no areas left to have any depth to them. Macromanagement boiled down to building refineries, micromanagement boiled down to sending units to the fight. There were bushes and stuff but in the grand scheme of things, all tools at your disposal are letting your units charge in or fall back." #167, Reddit user

In RTS games the army can be divided into smaller parts to execute missions on different sites of the map. Sub-armies can be composed of different unit types, which will make them suitable for different types of tasks. For the decision-making this means there will be multi-tasking, since things will happen all over the map at the same time. Where to spend the resources need to be prioritised. Here is a big difference from MOBA games, where the player typically only controls one unit. Much is happening all over the map at the same time in MOBAs as well though, and the player needs to be aware of what the other players are doing, but is only in direct control of his or her hero unit.

"Even with units having unique roles within an army, it is inescapable that units can occupy unique points in space and time within a match. Armies can be subdivided to contest, harass, decoy, zone/control or capture various points on the map. Individual units can be killed, multiple units can act independently from one another." #188, strategy game blog

More action all over the map creates more possibilities and increases the importance of strategic and tactical decision making. To achieve this, the game designer can add incentives spread out over the map that make the player move around armies or scout what the opponent is doing.

"Overall, make spaces outside of the main base and expansions strategically valuable to hold." #90, professional gamer "Make resources or objectives numerous and spread out (not just centralized at mining bases or your starting point)." #91, professional gamer

7.2.2 Variety

Variety is what keeps a game interesting after having played it a decent amount of time. It gives the player a chance to experience new things and situations and creates room for creativity, but it also makes the games hard to learn as the amount of knowledge required to play proficiently increases with the variety.

7.2.2.1 Variety

Variety fills the game with content. As discussed in 7.2.1, real-time strategy games revolves around skill, i.e. planning, decision-making, multi-tasking etc. To make this interesting, games need to present novel features that differentiate from what the player already has seen in other games, otherwise RTS games easily feel repetitious and boring.

"The planning isn't enough, the multitasking and micro themselves aren't enough, though there is a high degree of satisfaction in artistic or novel play and execution" #283, strategy game blog

"Diversity is good, and all the more so in RTS. Different players will pick different options depending on different factors: aesthetics, gameplay style, unit availability, unit specific abilities, difficulty in executing, personas, etc. Although it makes balancing a game harder, variety is also the spice of life for games! Players demand it, and the more you have, the more fun your game has the potential to be." #5, professional gamer

A great variety can be achieved by having simple mechanics that can be use together in many different combinations.

"RTS doesn't need to be complicated, strategy games are fun for their simplicity of mechanics but breadth of possibility. For the same reason Chess is fun. it gives you enough diversity with simple mechanics that you can do so many things with it."

#172, Reddit user

But the game designer needs to be careful, so that not too many different mechanics is added if they not improve the overall quality of the game. If a unit gets too many mechanics it gets difficult to use, and a unit gets too complicated mechanics it might be confuse the player how and when to use them.

"SC2 is going the wrong way, trying to be more exciting and physically challenging by adding more spells and actives that do flashy things but end up making the units harder to balance and more complicated to use." #173, Reddit user

In MOBA games, the variety is mostly found in the available hero units. This is the most important difference from RTS games, as in MOBAs the player only controls one single character and which character the player chooses defines the entire match. In RTS games this can be compared with choice of faction, which might have an even bigger impact on how the match plays out, but there are usually just a few factions available to choose between.

"On account of the large roster of playable characters, and their unique abilities/skillsets, a player will always experience something new, every game. Such is the appeal of these games." #140, Quora user

MOBA games usually just have one map, and between the games this map is similar because it is based on the original DotA map. RTS games have many available maps and these tend to be replaced with new ones over the seasons. Games like Age of Empires have random map generation which creates even more variety, so maps is an area where RTS has the upper hand in terms of variety.

"In terms of map designs, let's face it. MOBAs, aside from Heroes of the Storm, tend to not be very inspired. Most of them, the vast majority, are spinoffs and slight modifications of the original DOTA map." #196, strategy game blog

7.2.2.2 Balance

Variety is generally considered to be a positive thing in the data of the study, but there is a risk that the balance of the game will suffer if the game has much content. Balance means that the game is fair and gives players about the same chance of winning no matter what faction they choose to play as and that no single unit or strategy is too powerful. If there is balance problems in a game, that will in fact impact the variety negatively as it reduces the number of viable choices. The players want to win and if there is one strategy that is unbeatable, many players will use it and that would affect the multiplayer experience to the worse.

"Balance is the yin to the yang of variety. Balance of any game is tough, and in an RTS it is particularly important because most players identify with a specific race/faction. More variation means harder to balance. For example in chess, a mirrored game with no unit variety between two sides is imbalanced just because one side moves first." #6,1, professional gamer

7.2.2.3 Casual/competitive

Players have various motivations for playing real-time strategy games. Many of them may enjoy competitive play and improving their skills and this is what many people associate the genre with. This is not surprising given the popularity of the StarCraft games in e-sports and should be cherished in future games, but at the same time there are many potential players that prefer a more casual experience, and it seems like this crowd has received too little attention while the focus has been mainly on competitive play. Competitive play is still what many players like though, so taking it to the other extreme and make RTS games for casual players only would remove something essential for the genre.

"Now this is my opinion because I like to play competitive games as well as enjoy the rewarding feeling of improving at them." #163, Reddit user

However, it is important that the game developer realises that it is necessary to appeal to other types of players, and to add more ways to enjoy the game for those who would be satisfied with just its competitive side. Games need to appeal also to those who like to play more casually or are not that into multiplayer games. There seems to be many players that would appreciate if real-time strategy games put more effort in to casual game modes, and this could bring more a lot more players to the genre. MOBAs have found a formula that works for both competitive and casual gamers, and that might explain why they are so popular. Casual players might want to see more co-op missions, custom maps, campaigns, social games or just a more relaxed way of playing 1v1 games. There might be many possibilities to explore and this kind of variety could broaden the playerbase.

"While great for its target audience, I think that this focus on competitive multiplayer leads to a few problems particularly in drawing in casual or non-competitive multiplayer crowd." #305, strategy game blog

Real-time strategy is a great format to present a story and develop a rich lore. This can be done in a single player campaign, but the same material can also be used in co-op missions or as the basis for custom maps. This could attract more casual gamers. The Blizzard RTS games have always had great single player campaigns and that have likely helped them become so popular as they are. The single player experience is also somewhat isolated from the rest of the gameplay, so there is little risk that it would interfere with the competitive gamers which can just ignore the campaign if they are not interested in it. There might also be some positive interaction between single player and multiplayer in terms of lore. The game needs to have its unique visual theme and feeling, and this is where the lore comes in. There needs to be a story that explains why the game consists of the factions and units it consists of, and the campaign can provide this and it gives the multiplayer experience some necessary context. Otherwise there is a risk that the game becomes either generic, or that things in the game seem to have been put there more or less randomly.

"Exploring worlds that interest me and moving pieces around in an expansive lore

filled universe is super fun for me, with emphasis on strategy instead of action." #170, Reddit user

The core RTS gameplay is fun not only in competitive 1v1 games, but can work well with other game modes. If the competitive aspect was taken out of the picture, other aspects of the game would be put in the foreground which would emphasise things that normally not get so much attention when the players only are trying to win the match. The players could be more creative with what strategies to use, they can spend more time just enjoying the visual details of the game, they can let themselves be more immersed in the world that is presented by the game etc. The same gameplay would be more accessible for the casual player, but at times it would let the competitive players take a break from the competitiveness and see the game in a different light.

"The lesson is clear: if you create compelling gameplay, make sure you allocate space for dedicated casuals to experience that gameplay.", #155, game developer

7.2.2.4 Learning

Variety has a negative side in that it makes the game harder to learn. Real-time strategy games are often criticised for having a steep difficulty curve. In the data this is often incorrectly referred to as having a steep learning curve, but what this means is that the games take long to learn and during this time the player will lose many games, which makes difficulty curve a more accurate term. The reason for this is that a lot of knowledge is needed to be proficient, and that takes time to acquire since the games are big and complex. This initial phase can be demotivating and players might stop playing altogether.

"The more knowledge that is required up front to participate meaningfully, the greater the burden is to a prospective player. When a burden is too great, this can cause "bounce," where a would-be player feels too overwhelmed to participate in a game, or tries and ricochets off, never to return." #149, game developer

Except for knowledge, there are many tasks to learn, and as discussed in the Skills (7.2.1.2) category, they also need to be done fast. There is simply a lot to learn in the beginning for a new player to get to a level where one feels to be in control of what is happening in the game and has a chance of winning against a human opponent. If the player manages to get through the initial struggle of learning the game, the game will become more fun to play. RTS games tend to be hard to master though, so the players will never feel that there is nothing new to learn or that they have perfected their play. There is always room for improvement and this is one thing that makes the genre interesting.

"You have to choose what to focus on at first: micro- or macro-control, scouting, timings, map control, taking strategic positions, multitasking, improving technologies or rushing. It's vital to anticipate the enemy's actions and use tricks. You couldn't possibly master everything at once. It's a long journey where you focus on each element and learn step by step." #176, Reddit user

Luckily, there are ways to speed up the learning process. Watching replays can be a great learning tool. The players can analyse their own recorded matches and see what went wrong, and they can watch replays from other players and learn from them. Replays are supported in most modern RTS games and the same system is usually available in MOBA games as well.

"In the StarCraft 2 community in particular (as well as in the Supreme Commander community during its heyday) it is very common to see players spend almost as much time going over their replays, both of victories and defeats, as they do actually playing; they want to see what both they and their opponent did well and did poorly."
" #264, strategy game blog

7.2.2.5 Role

RTSs and MOBAs provide different ways the games could be played to satisfy the player's preferences. In RTS games, one common way to do this is to let the player choose between factions with varying degrees of similarity. In games like StarCraft the factions are completely asymmetrical, meaning they share no units, buildings or upgrades and are visually distinct. In other games like Age of Empires, there are many factions to choose between but the differences between them are more subtle - largely limited to a unique special unit and minor bonuses. In MOBAs the match defining choice is what hero the player selects.

Players may prefer various playstyles and it is important that the game make many of these feasible and not only reward a few of them unreasonably much. There might be players that prefer to be aggressive, and makes rushes and constantly keep attacking. Others might like to play defensively and slowly build up a big army while having a great defence around the base. Some like doing a lot of micro-management with intense battles and optimising the performance of the units, while others enjoy the macro-management aspect of the game, by building a strong economy and making sure production always is high. These are all different playstyles that need to be supported, be it through specialised factions or versatile units.

Team games have the potential to let team members specialise on tasks they like doing or are good at, but unfortunately RTS games have not managed to take advantage of this opportunity, since there are usually no way good for a player to focus on a few tasks without being punished for neglecting other tasks that the team members ideally could take care of. In MOBAs the entire game is built for splitting responsibility between team members, as different heroes have different natural playstyles and there are several lanes that needs to be covered and specific heroes may be more or less suited for a specific lane. In RTS games all team members need to generalists and build their own army, run their own economy etc, but in MOBAs the team composition is critical to get right since heroes have different strengths and weaknesses, and some have synergy effects and some complements others.

"It also opens up opportunities for players to specialise within a team, something at which MOBAs excel and RTS do not." #213, strategy game blog

RTS games are often focusing at just eliminating the opponent, but if other objectives were added to the game, other skillsets could become more successful and expand the possibilities for how to play the game and adapt playstyle after preferences.

"Objectives make room for different skillsets (like heroes in MOBAs that are good at taking down towers, vs heroes that are good at farming the jungle, vs heroes that become wrecking balls in the later game) to be successful. Then, if a player prefers turtling up and holding territory, they can contribute in a meaningful, obvious way to a victory." #206

7.2.3 Comfort

Players need to feel comfortable while they play video games. At least the data show that some players feel discomfort while playing RTS games, and that there are a few common reasons for that.

7.2.3.1 Social play

One of the strengths of MOBA games is how suitable they are for social play. They are designed for being played in teams, they are not as intense as RTS games are, and they are not as focused on individual performance. This strength make MOBAs attractive for casual players who like together with their friends. A game developer claims that:

"The vast majority of casual players like to play games socially.", #156, game developer

In MOBAs, the player joins a team which is facing another team, but teams game do not have to be played this way. Another way, that might work better with RTS games, is to have a team playing against AI controlled units or opponents. This is called player versus environment. This opens up many possibilities since the game design does not be perfectly balanced between teams, and no symmetry between the players's team and the environment is required. Co-op missions is another way to have casual team games, which resembles ordinary single player missions but involves more players.

"Coop PvE provides a way for casual players to engage in the experience they love after completing all single player content. Better yet, they can do it with their friends, making their experience more fun, and extending the life of your game.", #159, game developer

One problem with team games is that if the player does not have friends that play the same game, the player will have to play with randoms, which might still is a team game, but not as social. This could remove some of the benefits with team games, as the social aspect of it is reduced and there is a risk that the player will move to another game which his or her friends are playing.

"However, people who don't have friends to play with (it is really fun with friends) or a liking for strategy-based games, you'll probably get bored.", #121, Quora user

Team games also rewards other skillsets than solo games, as the player needs to coordinate their actions and strategy with other players. Also some level of communication is useful, even though many team games with random players have limited communication with a few messages in the chat and use of mini map pings to draw allies' attention to a certain location. If playing with friends more communication takes part, and a voice chat is often use.

"Coordinating with other players is a distinct, rewarding, and visually intuitive skillset that has a proven track record in the RTS space", #157, game developer

It also allows for specialisation within the team, which can add more variety and lets players focus on the parts of the game they find most interesting. For the player that is interested in making strategies, team games adds another level to it as the additional complexity gives more possibilities.

"... They also allow you to focus on certain aspects of the game that you enjoy more, so long as you have teammates who can fill in the others. You can play different roles on the team to give you totally different experiences. Coming up with team strategies is where more interesting than in games where you are by yourself.", #129, Quora user

To optimise the experience of team games, the game must be designed for being played this way. Most RTS games are designed for solo games in first hand, and this affects team games negatively, so to better accommodate players mainly interested in team games, this has to change and that will have a great impact on game design.

"Team dynamics really impact unit, map, economical, balance and pacing design choices in various and sundry ways that can't fully be accounted for in games designed intentionally to support 1v1 as its default format.", #222, strategy game blog

7.2.3.2 Negative emotions

Losing a match in a real-time strategy game can create negative emotions in the player. Except for the disappointment of losing a game which is normal reaction in all games. Everyone would rather win than lose, otherwise there would be no point in having a win condition. However, the specific nature of the RTS genre, which is much about being intelligent and out-smarting the opponent, makes losing humiliating and striking the ego for some players. A Quora user expresses the feeling of losing a 3v3 game of *StarCraft II: Legacy of the Void* [15] like this:

"When looking at the game statistics at the end clearly placing me toward the bottom I also felt as though I was less of a game player and perhaps even less of an intelligent person." #288, Quora user

No-one likes to feel unintelligent, and unfortunately RTS games can make players feel that way when they lose. If losing in a first person shooter game, the player might think it happened due to slow reflexes or bad precision which might not be that hurtful to the self-esteem. An other source of negative emotions is the high difficulty of many RTS games which makes the player feel stressed. The player has to play at a constant high pace, be fully focused, and there are many dangers that if not responded to correctly will result in a loss.

"Starcraft 2 is particularly stressful. It's the epitome of a hard game, with one mistake often being your last. The body responds to a stressful situation by avoiding it in the future and if it's stressing out when playing a match of SC2, then it makes sense that the body subconsciously avoid it.", #301, strategy game blog

Taking the stress felt when playing and the humiliation of losing, the player might experience a high level of discomfort that could remove all the fun in playing. Luckily this is compensated for by the reward of winning and the joy of playing, but for some players the negative side dominates and then it becomes a problem.

7.2.3.3 Ladder anxiety

Ladder anxiety is a fear that players experience when playing games that have a ladder system. In these games, the results of all ranked matches are recorded, and is visible to everyone. The players may also be divided into grades after their results. Players that perform well will be promoted to a higher grade and players that do not will be demoted to a lower grade. This make some people anxious while they play, because they do not want to be demoted.

"The existence of a form of RTS anxiety known as "ladder anxiety" is acknowledged by Blizzard, the makers of the RTS StarCraft and StarCraft 2. They discuss how this comes from nervousness about the ranked matches and going up or down in rank from gold to silver to bronze." #284, Quora user

This anxiety seem to be most prevalent in solo games, even though team games also can be ranked. Since solo games are central in real-time strategy games, ladder anxiety is seen more often in this genre, than in MOBA, where matches usually are played in teams.

"In short (haha), I have a really weird anxiety now when I play SC. When I play with friends or a team it's not as bad, but 1v1's is just really stressful on me, even though it wasn't in the past. I've been playing a lot of DoTA/HoN recently as well, so I'm still active competitively, but for some reason RTS just gets the best of me." #299, Reddit user

Even though there are other ways to play a game than ranked 1 vs. 1, this mode is often promoted which can influence less competitive players to choose this when there might be other ways of playing that suit them better.

"When you go into the matchmaking menu, you're immediately greeted with your

league badge and your rank. Ranked mode is the default multiplayer mode. Even the quick match option, Unranked mode mirrors this. The name Unranked itself seems like the mode is only secondary to Ranked, making you feel like you should be playing Ranked.", #304, strategy game blog

There are games though that present the different multiplayer modes in other ways, which shows that game developers are aware of the problem and try to minimise its severeness.

"In DotA 2, matchmaking is divided into Normal Matchmaking and Ranked. Ranked is regarded as a special mode wherein you try your hardest to do well and be graded based on your win and losses through MMR" #307, strategy game blog

7.2.3.4 Outcome responsibility

As discussed in 7.3.5.1, playing on the ladder can create a lot of pressure, but it does not only happen on the ladder. At all skill levels, players seem to feel an intense pain when losing. The former professional Starcraft player Aleksey "White-Ra" Krupnyk describes is a following:

"I remember meeting my fans who told me their hands shake in fear when they're playing even on bronze or silver level. People tend to view competitions very seriously and no one wants to lose – the pressure is tremendous.", #175, professional gamer

One reason why there is discomfort when playing RTS games is that they are often played as solo games, which means the player is fully responsible for the outcome of the match. After losing a game, some players will think they lost only because they are terribly bad at the game, which might be a thought that is hard to stand as the player might view themselves as being good at strategy games, intelligent, not a newbie, etc. Losing games provides proof of the opposite which can create a cognitive dissonance in the player. In MOBA games, which are played in teams, there are other team members to blame for a loss, which takes away some of the discomfort. Even though it might not be true that the team members are more responsible for the loss, the possibility gives a way to escape these thoughts.

"Some believe that it's the ladder itself. SC2 is a 1v1 game (for the most part) and having no team mates to take the blame for losses means that every loss is on the player. It's a psychological blow to the ego.", #302, strategy game blog

Except for having teams that diffuse the blame, an other option is to introduce random elements in the game. Then a losing player can blame the loss on an unfavourable random event.

"Multiplayer games that use teams and RNG to diffuse blame but are competitive enough to hook people is the methodology which has seen the massive success of online PC gaming over the last decade (LoL/Dota2/PUBG/Fornite/Apex)." #107 Reddit user

The positive side of being responsible for the outcome is that when the player learns to handle it successfully and adapts a mindset of learning by mistakes, it can be a valuable lesson that can make them enjoy skill-centered games like RTS games even more, and the mindset can be transferred to other areas in life.

"Ladder anxiety can be combated by the right mindset, one where the player is constantly seeking to learn, to improve, and to enjoy the competition. Sure, losing sucks, but the good players will incorporate the lessons from their losses to turn future encounters into wins." #268, strategy game blog

7.3 Guidelines

In this section the guidelines are presented. They have been divided into categories that focus on specific game design topics.

7.3.1 Onboarding

7.3.1.1 #1 Make it easier for new players to get started

RTS games are overwhelming to new players. If a player is completely new to the genre, it is far from obvious what to do, and quite a lot knowledge is required to play the game (7.2.2.4). Getting started is not easy and many games would benefit from having better ways of teaching the player the basics of the game. If the players does not acquire a certain level of skill and knowledge fast enough, the risk is that the player will lose interest in the game and stop playing it. This risk could be reduced if the design of the built-in systems that introduce new players to the game were improved.

First of all, most games already have tutorial missions, e.g. *Company of Heroes 2* [25]. This is a good way to teach the player how the game works. Usually the tutorial missions are enough for preparing the player for the first missions in the single player campaign, but if the player wants to go directly to multiplayer some more practice is most likely needed. Often tutorial missions just teach the player the very basics like how to control the camera, how to build structures and train units, and how to command the units, but they do not go further than that - possibly because the game designers wish to not spoil content that will be revealed later in the campaign. However, if the desired outcome of the tutorial missions is that the player is ready to play online against real opponents, these priorities might have to change. The missions could walk the player through the entire tech tree and demonstrate how to use all units in a suitable amount of situations. For a new player it might be confusing to be thrown into a complicated game, so it is important that the game provides the player with numerous instructions about what to do next and concrete and achievable goals, which ideally will put the player in a flow state (3.2). It might also be good to portion out the tech tree on several missions to avoid overloading the player with more information and options than he or she will be able to process. These missions can be separated from the basic tutorials mission since this much

training is not necessary to start playing the single player campaign, and logically they are more related to multiplayer matches. *StarCraft II: Legacy of the Void* [15] is an example of how this can be implemented.

If the player chooses to play the campaign, this is a good opportunity for the player to slowly get introduced to all the units and mechanics of the game, unlocking a few new units every mission. One problem learning the game from the campaign is that campaign is very different from competitive online matches. The missions are not designed as an ordinary match where two opponents are trying to exterminate each other, instead they are integrated in a larger story and may feature other objectives, goals, and special mechanics not present in the multiplayer mode.

When a new player chooses to play multiplayer, it will most likely not be easy at first (7.2.1.2). One thing that real-time strategy games can learn from MOBAs, is that having a simplified game mode could be a way to keep the beginners interested while learning the game and gaining experience. In *Dota 2* [8] there is a New player mode, which deals with the complexity that comes from the large amount of heroes, by limiting them to a smaller number so that the player will be facing the same heroes as long as this mode is played. Also the shop is simplified to make it easier to choose the right items to buy. In the context of an RTS this cannot be incorporated directly but needs some adaptation. For example, tech tree could be simplified so units get unlocked, some advanced upgrades could either be researched from start or disabled, reduce number of workers needed to saturate a resource site, lower the population cap to reduce the need for multitasking, give units more hitpoints to lower risk of accidentally dying with them if not paying enough attention to what they are doing. Also providing plenty of hints about what to do next would be good to keep the player busy. Adding incentives for the player to explore the gameplay could be achieved by adding sub-objectives that let the player practise tasks that otherwise are easy to miss (Guideline #14).

When following this guideline it is important to make sure this will not affect experienced players negatively. Tutorials should be optional, or at least skippable, because experienced players will feel they are a boring delay until starting the real gameplay. Integrating the tutorials in the campaign can make it a more coherent experience and that could be a valid design choice, but then the player should not feel that some of the game's value is lost if the tutorial is skipped. Relying on the single player campaign too much for teaching the game could be dangerous since many players do not play through the campaign, and the campaign is very different from multiplayer matches, unless it not only consists of a set of skirmish missions which usually not is the case.

Designing the simplified game mode has a few potential risks. It might not be obvious how much to simplify the game. If the game is too simplified it might not be fun even for the beginner. Also the game mode should prepare the player for moving into the standard mode and if making the simplified mode too easy the leap to standard mode might be too big to take anyway. One solution for this could be to add levels of simplification, where the better the player gets the less simplified the

game will be, but that could possibly make the whole system too complicated. It might also be hard to determine what areas of the game that need to be simplified the most.

This guideline is applicable when expecting many players that have no or little past experience of playing RTS. This should be the case for most RTS games, unless there are very special circumstances, like in a super-niched game with only hardcore fans or remasters of old games with an existing playerbase, e.g. *Warcraft III: Reforged* [20]. If the game is not very oriented towards competitive multiplayer play, this might also not be the place to invest most focus on, since less skill would be necessary to fully enjoy single player missions and casual games.

7.3.1.2 #2 Make practice more efficient

Competitive games are more fun to play if the player is good at the game and knows what to do. The faster the player can get to a skill level where there is a decent chance of winning a game against a human opponent, the better. After that the match making system should be able to find opponents that are about equal in skills. In popular newly released games there might be many other beginners to play against, but in many existing games beginners are not that many and that makes this problem even bigger. Until the player can compete with intermediate players there is a risk that the player will get tired of losing most of the games and abandoning the game altogether (7.2.1.2). Therefore the game should implement systems for training the player to get past this critical beginner stage as fast as possible (7.2.2.4).

This can be done in many ways. One is to have training maps that specialise in practising certain tasks. These could include basics like micromanaging an army, spending resources without letting them pile up, multi-tasking in general etc., like using the abilities of a specific unit or performing a simple build order. To some extent, this is done in *StarCraft II: Legacy of the Void* [15], but it could be expanded much further. The granularity of the practice maps is up to the developer to decide what is deemed a reasonable level. This system could be improved even further if the game collects data from the player's matches to identify weaknesses that can be improved and offer the player to practice for these. AI opponents could also be a great tool in this context, but historically AI players in real-time strategy have not been good enough to be that useful, given the complex nature of the genre. They often make poor and strange decisions and are not very similar to human players in how they play. This might improve in the near future given the fast development of AI that is taking place right now.

Practice is important, but it is not always that fun. Even if the game developer designs a very efficient system for training the player, the player might not be interested in spending too much time on practising offline. To make a training system that collects data from real games means that the player needs to play actual games for it to work properly. This might be hard if the player is not feeling ready to play or is experiencing ladder anxiety.

Following this guideline is important in games where the players are eager to play multiplayer. In games with small a playerbase, beginners will not easily find other beginners to play with, instead they will most of the times be matched against better players and will have no chance of winning. These games will not be enjoyable and after a couple of these games, the beginner will likely feel demotivated to play more.

7.3.2 Manageable difficulty

7.3.2.1 #3 Make skill ceiling high to accommodate competitive gamers

The skill ceiling is the limit of how good a player theoretically can get. The higher the skill ceiling, the larger the variety of skills there are to develop and the harder the skills are to master. The skill ceiling should be practically unreachable, so that no player ever will feel that there is no point in continuing practising because there are no aspects of the games that he has not already perfected. If it is possible to play the game perfectly, the game is probably too easy and lacking of depth (7.2.1.1), making the matches predictable and repetitive and likely neither fun to play nor watch. If having a higher skill ceiling, practising the game will be more rewarding as the time invested in practice will mean that the player will have more skills and be able to defeat more players, which resonates with most people's notion of fairness. That the winner was more skilled should be the primary reason explaining why he or she - and not the opponent - won the game. Occasionally the game can be decided by luck or other factors, but too much of it undermines the fairness in letting the game be decided by skill. If there is an abundance of things to practice on, the need for having boring chore actions that stress the player's ability to multitask but providing little other value to the game, is reduced in favour of more interesting tasks that makes the game more fun. In mostly older games, there are built-in limitations on the control of units and production that were a legacy from games dating from times when the genre was not as mature, that make the games harder than necessary.

Achieving a high skill ceiling can be done in many ways. Here a few ways will be suggested. Enabling a wide range of skillsets to be useful creates many options for the player. It is more fun for the player if the game can be played in such a way that is suitable for the personal playstyle, but the more types of viable strategies, the more there will also be to learn, especially when the skillsets can be used together in many different combinations (7.2.2.5). This can be implemented in having factions that are particularly good at a specific set of tasks, or having units available to all factions that specialise on tasks requiring a certain skill set. For example, a defensive player might like to build strong base defence structures that can fight off early enemy attacks, while building up a large and powerful economy. Another player that prefer playing aggressively, might benefit from having units that can harass the opponent and kill off many workers while not investing that much in the attack or having the ability to produce large quantities of cheap units to flood the opponent with waves of attack. One benefit of having a variety of skills is that it makes the game less predictable and more appropriate and interesting for e-sports.

Another way, on a lower level from a design perspective, is to add many, but simple, mechanics, that can be combined in many ways. To know all mechanics and how to use them in the many diverse situations that can occur in a game, takes a lot of practice and leaves room for creativity in finding new ways to use the mechanics. *Chess* [5] is the typical example of this, were the famous set of pieces with simple and easy to understand mechanics, creates a very complex and deep game with an extremely high skill ceiling.

A third dimension that adds to the skill ceiling is the map pool. It might change every season, as in games like *StarCraft II: Legacy of the Void* [15] or remain stable over time, but nevertheless the map is a factor the player needs to take in consideration as maps can have very different features that affect what strategies and tactics will work and which ones that will not.

The main issue with trying to increase the skills ceiling is that it can also make the game harder (7.2.1.2). The idea is that there should be many ways to play and that there always should be more tasks to get better at performing, but without at the same time increasing the total skill the player needs in order to be able to play the game at all. It is hard but important to balance this properly, since most players are not professional e-sports gamers, but highly skilled players are important for establishing a game as an e-sport which will be very positive for the game's popularity among all player groups (7.2.2.3).

When adding more types of skill there is a risk that not all of them are fun. If a strategy is very powerful and hard to defeat, many players will be tempted to use it, even if it is not fun to perform, which in the long run will be bad for the game if the problem is not solved by a patch making the strategy less viable, or the meta-game changes so that everyone learns how to counter the strategy.

Following this guideline works best when the game is expected to attract competitive gamers that will want there great practice to give them an edge against other gamers and when the game is played as an e-sport which needs to be fun to watch. It may also be followed in other, more casual games, it would probably not do any harm, but for the game developer it might not be the right thing to focus on.

This guideline could be in conflict with **Guideline #4** if it makes the game hard to play. These two guidelines could be followed at the same time, and that is also recommended to make the game appealing to a maximal amount of players, but they need to be in balance and some compromises might need to be done.

7.3.2.2 #4 Make skill floor low to make game accessible

Skill floor is the minimum skill needed to play the game and have fun (7.2.1.1). If the skill floor is high, it will take longer for beginners to be able to enjoy the game. Real-time strategy games are known for having high skill floors, which is causing a few problems that have been discussed in this thesis. The biggest risk is that beginners are unable to enjoy the game, especially if they try to play online, and abandon the game before having learnt enough to get above the skill floor, and thereby miss an

opportunity to enjoy the full experience of the game. Some players do not like the competitive focus that some games have and prefer a more relaxed gameplay that does not demand that much of an effort just to play the game. Another reason to have low skill floor is that it makes it easier for a group of friends to play together when there are members that are on varying skill levels (7.3.3.4).

The skill floor can be made lower in many ways. What is important is to target the issues that new players are facing that hinder them from having fun with the game. The game itself can be made easier by removing some of the complexity that creates a big need for knowledge, but this should be used with moderation since it risks hurting the depth of the game (7.2.1.1). Another way to reduce the skill floor that does not risk this is to make it easier for the new player to process all information and provide guidance for making reasonably good decisions. The game can be generous with giving the player hints about what to do next, warnings when the actions of the player likely will lead to a dangerous situation, and reminders for the recurring tasks that otherwise are easy to forget.

Multitasking is difficult as a beginner, as it requires tasks to have been repeated so many times that they more or less can be done automatically without spending much mental power. Here adding the possibility of automating some tasks that risk being neglected if too much is going on simultaneously is a good help. Setting rally points so that workers start working as soon as they have been completed training and military units moving to a given location automatically have been the standard for a long while (e.g. *Warcraft III: Reign of Chaos* [21]), but there are likely other ways to improve and expand this principle that could be investigated. Also the units itself could benefit from becoming more intelligent to reduce the amount of required micromanagement, so that they can solve certain tasks independent of the player's command.

These types of changes risk upsetting hardcore fans and competitive gamers, as they tend to be conservative when it comes to removing or simplifying features they have become used to. If beginners get too much help it could be seen as if they were given an unfair advantage. When the game developer chooses to simplify parts of the game to make it more accessible, caution has to be made to avoid ruining features that give value to better players and that contribute to the things that can be practiced and mastered to get an edge against the opponent, positively adding to the skill ceiling (7.2.1.1).

This guideline is relevant when the game is unreasonably hard for beginners and there are many mechanics that adds to the difficulty for the beginners without making the game more fun or deep for the experienced players.

It collides with "Guideline #3", as following this can lower the skill ceiling if not done with caution. Both these guidelines are important and should be followed but they need to be in balance. It is also related but not identical to "Guideline #5".

7.3.2.3 #5 Reduce amount of APM needed to play proficiently

Real-time strategy games require that the player has a high number of actions per minute, APM. This is exhausting to continuously be playing in high pace, which could make some players stop playing the game or not play as much as they would if the game was less intense (7.2.1.2). Playing fast is also one of the more important skills to have, because a player that is substantially faster than the opponent will most of the times win the game. To be able to compete it is necessary to practice a lot on increasing the APM, in expense of other things that could be more fun or interesting to practice (7.2.1.4).

The need for APM can be lowered in many ways. One way is to make the game easier so that less APM is needed. Complicated abilities that requires much micro-management can be reworked or removed altogether. They can also be changed so the cost for not performing these tasks fast enough is lowered. The player can be given powerful tools to more efficiently control the game with fewer clicks. Setting rally point and auto-casting abilities are already present in most games (e.g. *Warcraft III: The Frozen Throne* [22]). There could be more advanced way of controlling big number of units, like for instance having a button for assigning all idle workers to work or to redistribute them to other resources if their allocation is unbalanced. There could be smart ways of selecting and controlling all military units at once. The units can be given more intelligence to perform tasks autonomously. Units could be designed for performing decently well without having to micromanage each unit in an army individually.

One problem with trying to lower the importance of high APM is that having a high APM is actually a skill, and players train hard to be able to maintain it. Some people certainly like the feeling they get when playing with high APM. If being able to play that fast, it likely puts the player in the flow state (3.2). If playing fast is not needed for performing well in the game, these player might get disappointed because they would find the game not being challenging enough to get flow.

One question is how far the game developer is willing to go when it comes automation, as this might be sensitive changes to do. For example, buildings that increase the population cap could be built automatically; and injured units could retreat when their hitpoints fall below a certain level. There is a risk that these features would upset competitive gamers. Also it might annoying if the units take to many initiatives on their own that differ from what the player wants them to do.

This guideline is useful in APM-intensive games like *StarCraft II: Legacy of the Void* [15], but in more relaxed games it might not be that necessary to reduce the need for APM. If overdoing this, this guideline could conflict with "Guideline #3". It also partially overlaps with "Guideline #4".

7.3.2.4 #6 Be aware of implicit resources like time, attention and information in game

The concrete resources in a real-time strategy game are visible on the screen, e.g. the workers mine gold that can be spent on training soldiers. The implicit resources are not visible, and not built in to the game, but nevertheless they must be managed and spent wisely. The implicit resources that have been identified in this study are time, attention and information (7.2.1.1).

In the beginning of the game, the player is given some time to execute a build order before engaging the enemy. It is important to have a sense of what state the opponent might be in after a certain amount of time. On the tactical level it is useful to be able to calculate how long time it takes to move an army a certain distance or who would win a base trade. The game has its natural flow of time. Some games have a quick build up until the action begins, while others are slower, and this produces very different experiences. Timing is also important, as a well planned and executed build order can give the player an opportunity to attack the opponent in vulnerable state where defending is impossible. This is called a timing attack.

Attention is a mental ability to stay focused on the game, process and react to a constant stream of information, and multitask when things are happening at the same time on different locations. This ability is limited and the player needs to prioritise where to put the attention. Paying attention is also consuming much energy and will make the player feel tired after playing for some time.

Information is gathered when the player makes observations in the game. In most games the opponents actions are hidden behind the fog of war and the player needs to scout to know what the opponent is doing. If the player fails to have a somewhat correct mental image of the opponent's game state, the risk of making faulty decisions is high. The information available will always be incomplete and the player might misinterpret some observations or not be able to keep all of it in memory.

Be aware these implicit resources exist, as this might not be as obvious as concrete resources. These resources are more related to the player's interaction with the game and the player's cognitive functions than to the game itself, therefore they will have other limitations. Players will have a varying level of capacity of these. Depending on what type of game the game developer is intending to make, these resources need to be adapted to the desired gameplay. In a casual RTS it would not be necessary to use implicit resources optimally and push the players to their limits. On the other hand, in a game first and foremost played competitively, demanding much of these is likely unproblematic (7.2.2.3). Worth noticing is that games that punish players that do not manage their time well enough, will be perceived as hard and unforgiving (7.2.1.2). Games that require full attention and extensive multitasking will drain the player of energy and also if the player is failing to do all the tasks that are needed to be done for playing proficiently, flow state (See 3.2) might be prevented from occurring. Getting information constantly about what the opponent

is doing adds more tasks for the player to do and if the opponent has many options that could potentially kill the player if caught off-guard, this can add stress and lose of control over the game (7.2.3.2).

These resources are theoretical and are probably most usable if they are seen as a tool for understanding and reasoning about the player's interaction with the game and how the player will experience the game, and what consequences requiring too much or too little of these will have. It might not be a good idea to actually try to quantify the implicit resources and use them as a measure of how well the game reaches some arbitrarily set goals.

7.3.3 Broad appeal

7.3.3.1 #7 Add ways for different types of players to enjoy the game

For an RTS to be successful and reach a large audience, many types of players need to find something they can appreciate in the game. In this thesis, a couple of dimensions have been found that attract different groups of players. The most important ones seem to be how much the game is adapted for competitive gaming and how well suited the game is for team games. The popular MOBAs have succeeded in both of these with appealing to both sides of the spectrum, and here there are lessons to be learnt for RTS games (7.2.2.3).

Generally, as been noted throughout the thesis, RTSs are competitive games, especially the most popular ones. The goal is almost always to simply eliminate the opponent, and there is often a ladder that ranks the players after their performance. While this gives many players all the incentives they need to play, there are other players that would prefer less focus on the competitive side. If they are interested in a more artistic experience, having a solid single player campaign is a good aim. In campaign the game designer has more creative freedom, as every game mechanic does not need to be perfectly balanced. Here a story and character development fit in well, that increase the player's identification with a character - something that MOBAs do better as the player controls just one single unit with a unique personality, e.g. *League of Legends* [32].

When playing multiplayer, more game modes can be added that are more relaxed and more oriented towards having fun. The objectives could be altered so that the player would not have to defeat the opponent by elimination to win. *Company of Heroes 2* [25] is an example of this, as the winner is the one who reaches a certain level of points first which are earned by holding strategic positions. *Age of Empires II: Definitive Edition* [11] has a long list game modes that are diverging to varying degrees from the standard mode. *Warcraft III: The Frozen Throne* [22] had elaborated support for custom maps and many of these were a lot more casual than the gameplay in the basegame. See also: Guideline #14

Team games are also something that could be improved in RTSs (7.2.3.1). In MOBAs it is part of the core gameplay, and modes where the player is not playing in

a team is an anomaly and does feel that natural. Almost all real-time strategy games are built for primarily being played as 1 vs 1, and therefore most design decisions are made from the perspective of what benefits that mode best. Usually team games work exactly as solo games, except there are more players on the map. But if team games were taken more seriously, they could differ from solo games and have their own rules to make the experience more fun, and to promote cooperation and let the players complement each other. If leaving the traditional concept and conventions, there are many opportunities to create an innovative gameplay (7.2.2.1). The team could share resources and buildings or upgrades, have units that need to interact with allied units to perform their task, give each other team bonuses. Teams games have the potential to be a lot more interesting than they are today if more effort is put on designing them.

Combining all of this in one game will require much work and be expensive, which is not a problem for a triple-A studio, but not be feasible for a smaller studio which might need concentrate its efforts in one area. If focusing on team games, a single player campaign might not fit into the gameplay, but might open up for a more refined cooperative mode. It might also no be desirable for all games to aim for appealing to as many players as possible. The game developers can already have a secure fanbase with clear expectations of what the game should contain, and going outside of this may only lead to disappointment.

7.3.3.2 #8 Let the player adapt playstyle after personal preferences

Ideally there is not one single way to play the game but plenty and diverse (7.2.2.1). If all games end in all players mass-producing the same unit, which is the case in some well-known real-time strategy games, e.g. the tank rush in *Command & Conquer: Red Alert* [49], few players will enjoy the experience, even if they win with this strategy. The matches will quickly become predictable and repetitive. Therefore there need to be many viable strategies to choose between, and the number of strategies should not be fixed, but new strategies should keep getting discovered long after the release day, as this would mean the game is dynamic and complex. The opposite would be that the game gets solved, that is, the optimal way of playing is found and any deviation therefrom will reduce the chance of winning. When there are many ways of playing the game the players can adapt their playstyle after their own personal preferences (7.2.2.5). Also the opponent will have its own playstyle, and surprise the player with an unexpected move which will make the game more exciting.

In MOBAs, like *Heroes of the Storm* [12], this manifests in the choice of hero, of which each has unique abilities, attack type and stats, enabling diverse playstyles and often the same hero can be played in several ways.

In real-time strategy games, the choice of faction is probably the most defining choice when it comes to playstyle. The degree of symmetry in the factions vary from game to game, and there might be games that do not have a faction system at all, but that is uncommon. In games that are highly asymmetrical, e.g. *StarCraft*:

Remastered [18], there is a great opportunity to design each of them to work well with separate playstyles: aggressive or defensive, quality units or quantity of units, low risk or high risk, good at air units or good at ground units, etc.

Introducing non-standard objectives in the game, may enable other skill sets that usually are not rewarded in the ordinary gameplay, or put emphasis on skills that usually are less important (7.2.1.1). In team games, team members can specialise and focus on their preferred tasks. For this to work, the game needs to be designed in such a way that all players do not have to be generalists. It should be possible to split up different responsibilities within the team. (See "Guideline #14")

The more factions there are and the more distinct they are, the harder balancing them becomes (7.2.2.2). For games with asymmetric factions, restricting their number to three or four is probably a good idea. Having only two can make the game a bit monotonous, as there will be only three matchups, of which two are mirror matches, although it allows an interesting dualism that can be beneficial for the storyline. For examples, see the early *Warcraft* [23, 19] and *Command & Conquer* [48, 49, 51, 50] games.

Depending on if the game is designed primarily for solo or team games, the other mode might suffer from being the secondary mode. If trying to add specialisation within the team in team games, this might not be easily transferred to solo games (7.2.2.5). Normally though, the problem is the other way around, with team games being the down-prioritised mode.

7.3.3.3 #9 Make the game accessible for players that have limited time and attention

"Guideline #6" is about implicit resources within the player in relation to the game, but there are also arguably implicit resources within the player in relation to his or her environment. Time and attention were discussed in the before mentioned guideline, but they are also relevant in another way in this context. How much time the players in the target group can be assumed to have and are willing to spend on the game, is a relevant factor when designing a game; so is how much attention they can put on the game while playing, and a highly competitive game like *StarCraft II: Legacy of the Void* [15] will require much of this. For example, a teenager may have several hours every day to spend on mastering a game, and will have few distractions while playing, while a parent to young children might only have some spare time to spend on games occasionally and then expect to get interrupted at any time. Both examples of players could surely be interested in RTS games but their experiences and investment in the game will be different.

RTS games are generally deep and might be more adapted to young players with much time, but there could be ways to help players that lack time and are unable to be fully focused while playing. If having little time, it might be good if the matches on average are shorter. Playing a game that takes more than an hour and have a slow build-up phase might not be that tempting. This does not have to make

the game more casual either. Making remasters of older games seem to be popular these days and if the player has previous experience of the game, the otherwise long learning phase can be skipped or shortened which lets the player have fun sooner. If attention is disrupted often, the game developer can try to make the game less punishing if the player is not fully focused. If they units have more hitpoints, they would not die instantly if the player reacts too slow while walking into the enemy's army, giving him or her a chance of repairing the mistake. (See 7.2.2.4 and 7.2.1.4)

One risk of adapting to a player group, that seemingly has little time or is unable to focus, is that it, if taken to far, could make the game boring to play or more casual than the presumed playerbase would enjoy. They might prefer the classic RTS experience that they are used to and accept the fact that there will not be that much time to play it.

This guideline can be followed when targeting or trying to reach a specific player group for a game or for specific feature or game mode within the game.

7.3.3.4 #10 Make the games more appropriate for social play

Playing together with friends online is a way of socialising, especially in the last two years where social distancing has been practised. (See 7.2.3.1) Playing with friends is more fun than playing with random players. Often players are communicating with each other using *Discord* [36] or other voice chat application. Usually talk will not be restricted to communicating about what is taking place in game, but other types of conversations will also take place. This makes gaming into a social activity, where people can bond or maintain relations with each other. If the game is appropriate for playing together, there is a potential for groups of friends spending a lot of time in the game. It might be most fun to play together as a team, but it is also possible to split up and play against each other or if being just two players, play a simple one on one game, but team games are probably the best form as that necessitates communication.

In MOBA games (e.g. *Dota 2* [8]) this comes naturally as they are built for teams games with teams usually consisting of five players, which means there is plenty of room for many players. In RTSs playing games with many players is not as popular, although it is possible, and the games tend to get messy. As discussed earlier, real-time strategy games need to be better suited for playing in teams, as this will improve the foundation for social play. (Also see 7.3.3.1)

RTS games tend to get intense quickly, so maintaining a more relaxed conversation not strictly confined to the game itself is harder than in MOBAs (7.2.1.2). Maybe the most competitive and attention demanding game will never be popular for social gaming. In these games unnecessary talking might just be conceived as disruptive, but in more casual and relaxed games the RTS format could definitely fit for social gaming. (Also see 7.3.3.4)

7.3.4 Varied gameplay

7.3.4.1 #11 Look for mechanics and dynamics in other genres that could fit into the RTS

Warcraft III: The Frozen Throne [22] borrowed a couple of concepts from RPG games in a way that at that point was seen as innovative and the game itself is now an RTS classic, but it also laid the foundation for the MOBA genre with the creation of the famous custom map *Defense of the Ancients* [28]. Read more about that in 2.1.3.3. This is a good example of how elements from other genres can be included in an RTS game to create novel gameplay (7.2.2.1).

In this thesis, except for RTS, MOBA is the genre that has been studied most thoroughly. Other genres will most likely have gameplay that may be of interest to an RTS game developer, but that is out of scope of this thesis and has not been examined in detail. What is important when taking game mechanics from an other genre is that they fit within the existing gameplay. Any new additions must not undermine the systems that are already implemented or are highly expected to be in an RTS game.

If it is not feasible to copy a concept directly into the game, it can still serve as inspiration. Maybe there are lessons to be learnt anyway. For example, MOBA games (e.g. *League of Legends* [32]) provide variety through the great number of hero combinations that can appear in a game. While it is possible to add hundreds of hero units to an RTS game, that might not add much value in this context. However, if the game developer understands why this adds value to a MOBA, it might be possible to translate this idea to something that fits better in an RTS.

Total genre crossovers do not seem to work very well. Several attempts have been made to incorporate first person shooter gameplay into real time strategy games (e.g. *Natural Selection 2* [27]), but they have not been very successful or left a lasting impact on the gaming community. RTS-FPS hybrids usually switch mode between seeing the battlefield from above in the classical RTS way and moving to the perspective of an individual unit that the player can control in first person. Even if an idea looks good on paper, it might not work in reality since the mechanics and dynamics in one genre might not blend well with those of another genre, making combinations seem forced and unnatural.

The *Total War* games mix battles in real-time with turn-based management of economy and logistics, and thereby take a big step away from the classical RTS formula while keeping some of its important elements. While these games are popular, going this far in mixing genres the game will most likely not be perceived as an RTS games by most players.

7.3.4.2 #12 Make use of entire map to make gameplay more dynamic

The entire map should be explored and fought on during a game. There should be no dead zones that there are no good reason to visit. The more the players move

around the map, the more action there will be and the more tense the game will get. If armies walk around across the map the importance of engaging the enemy at the tactically right location is high. Controlling the space becomes essential for out-smarting the opponent. Many strategical and tactical options appear when the armies are not standing still that gives the game depth. If the players have few incentives to go to various sites on the map they will wait in their base or take the shortest route to the enemy base, which makes the game repetitive and predictable, while the opposite makes the game interesting and dynamic. See 7.2.1.1 and 7.2.1.4.

This can be achieved by spreading out the resources over the map which will force the player to be active. There might also be other things placed out in the map that the player can take advantage of: neutral buildings with various functions, neutral units that can be killed for experience and loot, items that give a bonus when picked up, etc. If the game has non-standard objectives these can motivate the player to command units to all parts of the map. For example, in *Age of Empires II: Definitive Edition* [11], a few relics are put on the map that will generate gold when captured and if the player takes all of them to a monastery that player will win. In MOBAs, it is natural that the players initially are responsible for different parts, or lanes, of the map. There are many paths to walk from one place to another, neutral units are spawned all over the map, and the player can also teleport to other locations. Another way is to make resources last shorter time, making it more urgent for the players to find more resources and create expansions.

This can make the game harder and more intense, as attention will need to be divided across more locations, which can be problematic and is discussed in: Guideline #6. It will punish players that play passively or prefer to use turtle strategies, which will not work as well if one or two bases are not enough to sustain the economy. In the end it is a matter of what dynamics (4.2) are desired but the designer should be aware that it could impose restrictions on playstyle (Guideline #8). The game will become a bit more demanding so if the game developer is looking for a more casual game design, this guideline can either be ignored or compensated for by making other parts of the game easier (7.2.2.3).

7.3.4.3 #13 Let the player focus on the interesting parts by eliminating chore actions

A chore action is a recurring task that is mandatory and not very difficult to perform (7.2.1.1). It does not add much strategical depth or entertainment value to the game, but is repetitive and since it is mandatory and cannot be ignored, it steals attention from other more interesting tasks and increases the number of actions per minute that is required for playing the game. Too many chore tasks make the game less enjoyable, therefore it is recommended to keep their numbers down. They also add to the number of needed APM (Guideline #5).

If a task has been identified as a chore, the developer can try to remove the task altogether if the game design allows such a change. This might not be applicable in all cases. The task might be an necessary component of a larger system, that cannot

easily be removed without breaking the game. In these cases, the game developer can try to make the task more meaningful, e.g. in the *StarCraft* [18][15] games the player needs to regularly construct buildings to increase population cap, but these buildings also have secondary functions that make the placement of the building important and can give a tactical advantage.

Some players will think that performing chore actions efficiently and punctually is a significant part of the skill set associated with real-time strategy games. It indeed makes the game harder and more demanding of the player (7.2.1.2), so the statement is true in that way, but combined with a high skill ceiling (Guideline #3), the player could prioritise non-chore actions instead. Sometimes chore actions also are essential to accomplish a certain aesthetics (4.2), e.g. they can sometimes be meditative.

7.3.4.4 #14 Add sub-objectives to add more variety to the game

Many real-time strategy games follow a similar flow. Efforts are made to build up an economy, train military units and upgrade technology. The main objective is to eliminate the opponent. To add more variety to the game more sub-objectives can be added to the game. Of course constructing a building that gives access to a new unit type can be seen as a sub-objective, but this happens more or less independently of the opponent. If one player builds a building, nothing hinders another player from building the same building. It is not a competition of limited resources.

MOBAs have sub-objectives built in to the map. In *Dota 2* [8], towers protect the lanes from hostile heroes and units. When they are destroyed the attacking players get a reward (7.2.1.3). There are also special creeps that only can be killed once, but are hard to kill and when they die they drop a powerful item. This kind of sub-objectives, which to some degree is optional, introduces another layer of strategy that is not seen in real-time strategy games that often (7.2.1.4). The players can decide if and when to attempt to do the sub-objective and when it is done the outcome can not be negated. Except for giving the player more options, having more sub-objectives can make the entire game more varied, as they significantly can modify how the game is played. It lets the player do other tasks than just ordinary collecting resources, producing units and directly battling the opponent. If the game already is undesirably complex and hard to learn it might be better to not include sub-objectives that would make these problems even worse (7.2.2.4).

Adding sub-objectives in the maps might not be as easy as in MOBAs, as there is not one single map that is played all the time but plenty, and all need to be balanced and well-designed. However, not all of the maps need to have sub-objectives, and which ones to use can differ from map to map. This will make the game more varied (7.2.2.1). The complexity of the sub-objectives can range from very simple, e.g. move a unit to a specific location to earn a reward, to very complex activities with many steps. The rewards must be in parity with the cost of accomplishing the sub-objectives, otherwise they would just be ignored.

7.3.4.5 #15 Consider the trade-off between adding more variety and losing balance

Adding more variety, which is recommended in several of the guidelines, also has its downside that needs to be taken into consideration (7.2.2.1). The complexity of the game grows for every unit that is added, and including one more faction creates a number of new match-ups. The balance of the game is extremely important, at least for competitive oriented games, and the greater the complexity is the harder achieving balance becomes (7.2.2.2). Any new addition to the game can in itself be well designed, innovative or increasing fun, but no matter how great an idea seems, the game designer must look at how it would affect the whole of the game and weigh its benefits against its costs. Many of the other guidelines suggest or imply adding more variety to the game, which consequently puts them in conflict with this guideline, which purpose is to prevent the game designer from adding too many features to the game without questioning whether they make the game better as a whole, or if they undermine other goals the designer is trying to achieve. As an example of a nearly perfectly balanced game, *StarCraft: Remastered* [18] is often brought up.

7.3.4.6 #16 Be aware that overly complicated mechanics may not give interesting dynamics

Since the real-time strategy genre has been around for decades, being innovative is not easy. In their pursuit of novelty, game designers that try hard to come up with new game mechanics that stand out from existing games, risk making mechanics that are gimmicky, over-engineered or unnecessarily complex, but not adding much true value to the game in terms of creating interesting dynamics, providing strategical or tactical depth, or simply being fun. *StarCraft II: Legacy of the Void* [15] have many complex units which all have some special ability, upgrade or can be transformed into something else, but the game serves as a positive example of a game that is near being to complex but actually manage to balance the complexity and making everything work together.

The risk is that the overly complicated mechanics are hard to use in proportion to the benefit of using them against an opponent or that they add to the amount of chore actions (Guideline #13). A better approach for designing mechanics in RTS games is to make them simple, but usable in many situations and combinable with other mechanics (7.2.2.1).

There is probably room for some complicated mechanics as well though. Everything does not have to be simple. Overdoing this guideline could possibly produce games that as a whole will be perceived as simple and shallow, so finding the balance is important.

7.3.5 Negative emotions

7.3.5.1 #17 Find ways to reduce ladder anxiety

Ladder anxiety is the fear of losing a competitive game. The risk of losing, and thereby experience negative emotions, makes the player feel anxious just before starting a match. This might make the player play fewer matches, or stop playing the game altogether. It can also take away the fun of playing if the player is worrying about losing during the entire match. Reducing ladder anxiety will make the game more enjoyable for players suffering from it, and prevent them from stop playing the game. (7.3.5.1)

The problem of ladder anxiety can be hard to solve. For the individual who is suffering from it, there may be strategies to overcome it, but from the perspective of the game developer, the best option is probably to make sure that there are other appealing ways to play the game than ladder. Unranked games let gamers play the game without worrying about ruining their stats. In many games, ranked game is the default mode, but it does not have to be that way. *Dota 2* [8] offer Unranked as the default way of playing, leaving Ranked for the competitive players who are highly motivated to improve at the game and perform at a high level every game. If doing this, a minor recommendation would be to not call the mode Ranked and Unranked, because that implies Ranked is the normal way of playing.

Although the games are not ranked, it would be necessary to have some kind of hidden ranking system to let players play against opponents at about the same skill level as themselves.

MOBA games are played in teams (e.g. *League of Legends* [32]) and in team games ladder anxiety is less of a problem, because the responsibility for the outcome (7.2.3.4) of the game is shared between the the team members which lessens the pressure on the individual player. In real-time strategy games one-on-one games are more common, which results in more ladder anxiety. Games that focus more on team games should therefore have fewer people experiencing ladder anxiety, so promoting team games and investing much resources in designing them would be a good idea. (Guideline #7, Guideline #10)

Splitting the players into two groups, ranked and unranked, could have some drawbacks. one is that waiting times when queuing up for a match could get longer than if most players were in the same pool. that could be a problem, especially for games with smaller playerbases where waiting times can be long as they are. it could heighten the minimum skills required to be able to compete on the ladder, if only highly competitive players were playing ranked games, and most of the less skilled players were sticking to unranked games. that could make ladder games very difficult and not fun for beginners and intermediate players, that want to play ladder games and or not having ladder anxiety.

7.3.5.2 #18 Find ways to diffuse blame for losing to make players feel less bad about their performance

Losing a game creates bad feelings for the player and fear of losing makes the game less enjoyable. Especially in a real-time strategy game, losing can be hurtful for the ego, as it can be perceived as the winner has outsmarted its opponent and is more intelligent which might be extra humiliating (7.2.3.2). In a real-time strategy game the player will feel fully responsible for the loss when it is played as a solo game (7.2.3.4). In MOBA games like *Heroes of the Storm* [12] the responsibility is obscured in the sense that there are other team members to share the blame with. This can reduce the fun the player has when playing and reduce the urge to play the game at all.

This problem can be dealt with in at least two ways. The game can be designed for having team games as the primary mode (Guideline #7. This might not be as simple as it sounds, since MOBA games usually have ten players playing in the same game. While this is not impossible in traditional RTS games to have 5v5 games, it is likely not a very popular mode and those games tend to get chaotic and messy, and when ten players have maxed out armies at the same time, computer performance can suffer. They are not designed for being played this way, so there could also be balance issues that would become obvious if more 5v5 games were to be played (7.2.2.2). On the other hand, the more common form of team games: 2v2 and 3v3 - might not give the full effect hiding the blame. Instead the player could start worrying about ruining the game for someone else. But if the game was built around 5v5 (or any other mode with a large number of players) it would probably be very different from current RTS games that mostly are designed for solo games. Except for this being a route to innovation and novel gameplay, it would naturally solve the problem of too much pressure in solo games (7.2.1.2). The negative side of team games is that there might be players that direct their disappointment of losing towards team members they deem as not being as good as themselves and type toxic comments to them in the chat; a behaviour that is not uncommon in MOBA games (Guideline #19).

An other way of addressing the blame issue is to add game elements that are outside of the player's control, which the losing player then can attribute its loss to. This could be hostile NPC units, resources being spread out unevenly over the map, or other random events that could affect the outcome of the game. Then player could blame the loss on external factors like bad luck. This is slightly problematic as it would definitely make the game more casual, and for competitive games as little randomness as possible is desirable (7.2.2.3). It is thinkable that some random events that could make the game turn in favour to another player, could actually be a somewhat fun mechanism in a game where the players do not take the outcome too seriously and mainly are having fun. There is a risk though that the player who is in the lead but loses as a result of randomness will find that unfair and frustrating. Also earlier phases in the games risk becoming pointless if all progress can be reverted by random events.

7.3.5.3 #19 Find ways to reduce risk of toxic behaviour

Toxic behaviour is not nice for them who are affected by it. It could make some players unwilling to play at all. In team games, players that are beginners or someone else that makes a critical mistake, might receive many negative comments. This is not an easy issue to solve as there always will be people who will try find an opportunity to be mean, but there are some ways to reduce the risk of this happening.

If there are points or score in the game, these could be hidden and not presented until the end of the game, to avoid pointing out someone as being worse than the other players. If it is not obvious who is good and who is bad there might be fewer toxic messages in the chat. This will only help to some extent though, since it is easy to see in-game if someone is playing really bad.

The chat can be restricted in varying degrees. In MOBA games, where team games are more common than in RTS games, they are dealing with more toxic behaviour. One solution that is used in some games, e.g. *League of Legends* [32], is to only allow chat between allied players. This does not prevent allies from communicate and cooperate, but stops communication with the other team for better and worse, but likely this removes a lot of toxic messages. The communication between allies could also be restricted further. Chat could be reduced to predefined messages that cover common scenarios in the game. An other option is to just let players mute players they do not wish to receive messages from.

Restricting the communication makes the game less social and the social aspects of the game add much value to the game, so the developer has to think carefully if this trade-off is worthwhile (7.3.3.4). Different games seem to have different types of player-bases and in some games the problem with toxic behaviour might be worse than in other games, and then stronger measures might be called for. If going for restricted communication within the team, the drawback is that it makes cooperation harder, but depending on the game, predefined messages might replace free chat sufficiently.

8

Discussion

This chapter contains discussions about results, process, validity, generalisability, ethical issues and future work.

8.1 Results

In this section the intermediate and final results of the thesis are discussed.

8.1.1 Theory

The resulting theory describes three concepts that are important for understanding what makes a real-time strategy game fun to play, but also how these concepts can be problematic and what issues players and other participants in the study perceive that there exist. The theory catches most of the issues that frequently come up in discussions about real-time strategy games on the Internet. There might be a risk that there are more issues that have been missed in the data, but given the amount sources that has been included in the study and that they were not mentioned anywhere there, these issues are probably not major ones.

There could also be a risk that there are issues brought up in the data that have not been given enough space in the analysis of the data and the resulting theory, as well as in the guidelines. This is hard to know as in that case there could be many reasons. The data could be expressed in such a way that the issue that has been talked about does not appear to be as severe as the person describing it in reality thinks it is, only because of how the statements were formulated. Some issues might be out of scope of the thesis, but still be important for analysing the issues with RTS games. One thing that was not given much attention was factors outside of the game, like how the community around the games are. There might also be a risk that there is a built in bias in the theory that comes from the author's own opinions.

Positive aspects of the games was generally harder to find data for, as people often do not talk as much about what is good, as this might be taken for granted, while problems are more likely to be brought up for discussion in different forums. Therefore there is a risk that some positive things about real-time strategy games

are missed, that could have been valuable for discussing what makes a game good. This problem of negatively biased data was realised during the process, and efforts were made to actively search for positive data. In the earlier stages of the work, more focus was put on finding issues, and that was also reflected in the data in the sense that it mostly talked about negative things. But later more focus was put on the positive aspects to compensate for this. When searching for data, not only using search phrases formulated as problems was important.

The material from the prestudy was generally usable. Especially cognitive flow (3.2) and self-determination theory (3.3) were useful for understanding some of the main issues with RTS games. The theory states that to playing RTS games proficiently often requires full attention over long time periods, heavy multitasking, and having great knowledge of the game, while making strategically and tactically correct decisions. Successfully executing all this simultaneously is difficult and often requires much practice, otherwise it is not likely that the player can get into the state of Flow. This was later confirmed and experienced in the game study phase, where the author played games that he had various amounts of previous experience with, and the more skill he had the more enjoyable the games were, and the game he had not played before was hard to get into during the limited time of the game study and playing it lead to some frustration.

The theory describes three different areas that have been identified as being important for the players. These are **Skill**, **Variety** and **Comfort**. There is some overlap between the categories. For example, the **Skill** category says that the large number of tasks to execute makes the games hard, and the **Variety** category says that fully learning a game with high complexity is hard. These statements are related and there are more examples. Therefore many of the guidelines reference categories within more than one core category. The overlap is not so big though, that it makes the categorisation meaningless. All core categories centre around concepts that are distinct at the highest level, and most of the categories would not fit in a different core category, but when going into detail, some of the categories discuss similar topics from different angles and provide additional perspectives and nuances.

It took quite much work to come to the final form of the theory. The core categories were not set until late in the work, in the middle of the game study. Finding good categories, that are not forced or artificial, and that actually help understanding the data better, was challenging. Many iterations and reworks were done before the categories were finalised. Finding the harmony and balance in the theory was the hardest thing. Each category had to describe something that is relevant for the research question, while being distinct from the other categories, and complex enough to have both positive and negative aspects. They also needed to be at a similar level of abstraction and make about equally strong claims. Ideally they would also represent the same amount of data, so that no category would be built on significantly less data than the others.

If the categories were set earlier, these could have been used more in the game study. It could have had an effect on how the gaming experience was interpreted,

as the games were played without being seen through the filter of the final theory. However, most of the data was in place when the game study started, and the main issues with RTS games were known at that time. Also the categories, in the form they were at that time, had similarities with those of the final result, so to a quite large extent the theory was used for the game study anyway, but not as much as was planned.

Almost all data that was collected has been coded and categorised and included in the final data collection. There might have been a few statements that were removed because they were of too low quality to be worth including in the data collection, but no data was removed for other reasons. As it was important to let the theory emerge from the data, it would have been problematic to choose to not use data for other reasons, such as a statement contradicts other data or is not aligned with the general conclusions of the theory.

There are however some categories that generally are more descriptive and does not contain as many opinions, such as the **Decision** category, which contains many statements of what kind of decisions that can be made in a game, but most of these statements do not point at a specific problem or contain strong opinions. Categories like these might catch some statements that otherwise would be hard to place in a category, but it does not hide important problems that deserve more attention.

The three core categories seem to be a good abstraction since all problems that are within the scope of the thesis that have been encountered can be placed within one of these three categories. There is no data that had to be left out, or had to be put in a category where it did not fit at all, although there might be a few examples of data that arguably is a bit forced into a specific category. This could be because of that in the later stages, closed coding was used, which means no new codes could be introduced and statements had to be placed in one of the existing categories, but this was not a big problem, since the sources that were selected at this point were meant to complete the data where it was missing some nuances or angles, and the statements could most of the times easily be placed within the existing categories.

8.1.2 Game study

The result of the game study is basically a summary of the experiences of playing a set of RTS games and MOBA games. While reading these results might be interesting and provide more knowledge about the genres and the specific games, these results have a more intermediary character. The idea of the game study was initially to apply the theory created in the previous phase on practically on a few games, but as stated above, the theory had not reached its final form when the game study started, so the theory could not really be fully applied on the games. Therefore the results of the game study does not have a lot of references to the theory, neither does it use the names of the categories when it describes its findings. The results of the game study can therefore be read without first reading the theory.

The selection of games represent the most popular games in the respective genres.

For the MOBAs this approach seems good, as the genre is relatively new and not as diverse as the RTS genre. For RTS, this choice can have been a bit more problematic, both since the genre has more variety and as it is the main focus of the thesis. A few more could have been good to add to the game study to better represent the diversity to the genre, but realistically the time was limited and the playing more games would probably have meant spending less time on each, which would not have produced results of lower quality as it takes long time to get started with a RTS game. Also many games were played during the prestudy, which could be seen as good enough, as it contributed to the author's knowledge and experience of the genre, and the most important effect this hopefully had was that it could have reduced the bias when the guidelines were written.

The experience of playing games confirmed many of the conclusions from the theory, which suggests the theory has caught something that is real and is relevant for players. One risk was that the resulting theory could have become too abstract and fail to describe the strengths and weaknesses of the real-time strategy genre in a way that is relevant for players and useful for writing guidelines. Having the outline of the theory in mind when playing directed the attention towards some of the key areas that had been identified as problematic, and how these areas differ between RTS and MOBA games. For the author of the thesis, this created a personal experience of some of the issues that he was aware of theoretically, especially those that related to being new to a game.

Playing the games also helped identifying the important game design patterns and terms that necessary to use for talking about the respective genres. This would become important for the guideline writing as here many times many of these words were used.

One different approach that was considered, but not realised, was to take the results from the game study and use it as a data source in the theory. If that would have been done the results leading forward to the guidelines would have been more streamlined and need fewer separate chapters to be presented. The data would also be produced with the intention to fit the research question, but that would also have been the case if interviews were made. The problem with adding data to the theory, that is dependant on the theory is that it could have a self-reinforcing effect on the theory. If the data partially suggest or imply some type of claim that is not full stated or supported by the data, there is a risk that the author could fill in the missing pieces unintentionally in the game study, and then there would be a bias in the theory. Keeping the theory and game study separate, would make this kind of bias more obvious if it makes it way into the guidelines, as it would be easier to track the reasoning to either the theory or the game study.

8.1.3 Guidelines

There are in total 19 guidelines. They seem to capture all the important points of the theory and the discoveries from the game study. It cannot be ruled out that some important ideas have been neglected, or that some of them could have been explored

and developed further. If this is the case the data is available in Appendix A. Here all statements are listed, but there is also an URL to the actual source, so that it can be read in entirety. If there are any parts of any of the sources that contain important reasoning that has been omitted in the data collection, the readers of the report can read this as a complement, or to get the context of some data that is of special interest.

The guidelines are based both on the theory and of the game study. As discussed in the previous section, the idea is to keep these two intermediate results separate and not bring them together until the very end, i.e. the guidelines. The theory describes what other persons think about RTS, and secondarily MOBA, and the game study is about one person's experiences with a set of related games. By keeping these apart as much as possible, it becomes clearer in the guidelines what type of material the guidelines are basing their claims on. When games are referenced in the guidelines, it usually means it refers to an experience made in the game study or the prestudy where many games were played in free form just to build up the authors knowledge and experience of the variety of games.

The grouping of the guidelines is just a way to present the guidelines and serves no other purpose than to make the reading of them easier. The guidelines could be read in any order, and any given guideline should be possible to read and understand without reading all the other guidelines. In case there are relations between guidelines, these are written in the end of each guideline. The grouping is a bit arbitrary and could have been done in many ways or be skipped altogether.

The terminology in the guidelines was established mostly in the game study phase. There are many game design patterns (4.3) that are shared between most real-time strategy games, or MOBA games, and actually many are shared between the genres. Initially the plan was to analyse game design patterns more in depth, but as it turned out, this was not really needed as the theory evolved and the game study was carried out. The resulting guidelines are not making claims at that level which would require knowledge of specific patterns to understand the ideas that are suggested and discussed. To understand the guidelines, it is probably enough to be familiar with the most common recurring concepts and patterns, but no obscure or highly specialised terminology is used, and just being somewhat familiar with the genres should be enough.

In the guidelines, references to much of the theory and to many games are found. All parts of the theory are not references equally often. This could indicate that there are some parts of the theory that are weaker than others. Maybe they are less relevant for the research question as formulating guidelines based on them was not as fruitful. However, even though the guidelines are the end result, the less referenced categories of the theories can be of interest anyway, depending on who is reading the report. It is difficult to know what categories will be most useful before actually starting to write some of the guidelines. The fact that some data is grouped together in a seemingly less useful category, also means it is separated from other data that ends up in other categories that more guidelines are based on,

and it might be the case that the important categories requires the existence of less important categories, just to make distinctions that make the underlying ideas they try to convey appear more clearly.

There also seem to be some covariance when some of the parts of the theory are referenced. This could mean there are connections between categories that have not been fully explored. The references are written out explicitly, but a compilation or visualisation of how the different parts are connected have not been made. This could be an interesting exercise to do and it might reveal some more insights of the theory that are embedded in it and only but only implicitly.

Some of the guidelines are partially inspired by experiences made during the game study, e.g. 7.3.1.1 where it is suggested to consider including a simplified game mode. This idea comes from *Dota 2* [8] where this concept is implemented. Others are more based on ideas that come from the theory. If they are based on the theory and the theory uses several sources that independently of each other discuss the same idea, the claims can arguably be seen as more objective than claims made only based on the game study. Luckily all guidelines have references to the theory and no one is solely on the game study, which should reduce the risk for bias.

No major contradiction between the theory and the game study has been found. Generally the results agree with each other, or complement each other. When they are discussing the same thing they offer slightly different perspectives and nuances. It would have been much more difficult to write guidelines if there were big differences between these two results. That could be an indication of that the range of games selected for the game study could have been too narrow and not representative for the RTS and MOBA genres in total. This did not happen, so probably the choice of games was good. As the most popular games were selected, one could suspect that the data in the theory often refer to these games as well though. An other possibility could have been that there is a wide range of opinions that people may hold, and the ones that often are expressed on the Internet are different from the ones of the author of the thesis. Now, this did not happen, but if it had happened it would have risen many interesting questions about the results.

The guidelines bind the whole work together and is the place where all the phases of the thesis are brought together. Ideally all parts of the thesis contribute to the guidelines to an extent that is comparable to the efforts that was put into the respective parts. Admittedly, some parts of the theory was not as easy to transform into guidelines. The length of the guidelines vary for that reason. In some of them there is just not so much to say, and no long reasoning text is needed to motivate their existence. Others are very long and contain many arguments, examples and multiple detailed suggestions about how it can be implemented. Maybe the varying complexity stems from differences in how specific the guidelines are in the topic they handle. The longer guidelines may cover multiple closely related concepts or topics that could have been broken up into more guidelines, but it is not self-evident that it would be easier to read the guidelines if splitting the biggest ones. It could lead to more repetition of the context and duplication of chains of thought, and the number

of guidelines is quite high as it is.

The categories that were not used as much for the guidelines can contain interesting findings anyway. The readers can draw their own conclusions and apply them on their specific context, that might be outside of scope of this thesis, or they can just come up with their own guidelines that might be different from the ones presented here. There is a risk that the guidelines has a built-in bias towards the opinions of the author, but it might very well be possible to read the theory and make a completely different interpretation of it and then come up with a different set of guidelines.

8.2 Process

The process has been highly affected by the personal circumstances of this thesis, as it has been worked with at the side of a full time job and family life with two small children. Therefore throughout the entire thesis, there has only been limited time available at late evenings and early mornings. Initially it was thought that the thesis would be worked on at 50% speed but in reality, many of the weeks, less time than that was spent, and the work has been paused a few times due to different reasons. How much time there has been to spend on the thesis has been decided very much by external factors that have been hard to predict and that has made detailed planning difficult to do.

During the data collection, this had the effect that data that was publicly available was prioritised, as it could be digested at any time without the need to schedule meetings or require much work being done in a short time. This excluded some types of data that could have been interesting to include in the collection, e.g. interviews with game developers. It was first planned to make interviews but this had to be cancelled due to aforementioned reasons. At days when there was only very little time available, there would at least be time to read a shorter article or some forum posts and process that data. This helped maintaining the habit of working with the thesis, even when it was difficult to find time.

The high variance of available time made it difficult to track how much time actually was spent, which was necessary to get an idea of how the thesis progressed and to decide when it was time to proceed with the next step. When not knowing how much time is spent on a task, and the task has no obvious end when it is definitely done, there is a risk that too much time is spent on it. At some point the decision has to be made that it is good enough and spending more time on it would not be justifiable. An other consequence was that it was hard to set an expected end date to the thesis. It had to be moved forward many times. Too the author this was not a big problem though as there was no hard deadline when the thesis absolutely had to be finished.

Doing the thesis over such a long time, about 1.5 year from start to end in calendar time, albeit with a few pauses in between, has some downsides but also some upsides.

It is not easy to remember all the details that has been done earlier in the process, when much time has passed. This makes documentation important, and having that helped immensely writing the final report. Staying motivated the entire time was also a challenge, but creating and maintaining good routines was important to keep working and not giving up, and not focusing too much on being finished on a specific date prevented any potential stress. Also the supervisor did a good job at encouraging when it was needed. The positive side is that there has been plenty of time to reflect on all the information that has been gathered and draw important conclusions from them. In best case this has contributed to a better and more qualitative end result of the thesis.

The process of creating the categorisation was probably the most difficult part of this thesis. It took long time until it had reached its final form and it required several iterations where it was large changes were made to it. Creating the categories were probably difficult because here much of creative work had to be done to make the collected data comprehensible and to present it in a coherent way. The data could theoretically be categorised in an infinite number of ways. There could have been more than three core categories, and the underlying data could have been grouped in more or fewer categories. There was a high degree of arbitrariness in this process as it could have done in many other ways and it was not easy to know when it was good enough.

Sometimes it was hard to capture the message of a text when breaking it down to statements. Most of the statements consisted of just one line, which hides much of the context if only reading an individual statement. However, the Excel document was made to preserve the order of the statement so they could be sorted to recreate the full article to read the context.

Each statement was given only one code. Sometimes a statement could be equally well described by several codes, and then it would be necessary to choose one of them and not make use of the others. This could have lead to some of the data not being optimally coded, but it made the data a lot more manageable, as it became easy to look up what statements were using a certain code.

Most of the work was done in an iteratively. There was a high level plan about what to do and when, but how to do it was intentionally undecided. Different ways of working was tested and if it was deemed as successful the results were kept and developed further, but in the cases where it turned out that a way of working did not produce good results or had other unexpected drawbacks, the work could be discarded so that something else could be tried instead. The benefit of working this way is that several methods can be tried out without spending too much on the ones that do not give the desired results, and it reduces the risk of sticking with a method that is unsuitable for the work that is being done.

During the theory phase many decisions had to be made about how to practically organise the data. It can probably be done in hundreds of ways, so there was no obvious way to do it or some established best practice to be inspired of. Testing

different ways to see what works best was how this was handled and in the end a method was found that satisfactory was used for organising the data, with focus on having the data easily sortable after codes, and later on also categories, to make the data accessible when creating the categories. This seems to have been a good priority as the categories went through many iterations and changes during this phase.

One question that is interesting but impossible to answer is how different the end result would have been if the grounded theory inspired method would not have been used, but the same sources had been used and analysed and guidelines were created without having the categories to reference to. Probably the main issues would have been identified anyway, but it is more uncertain all the nuances would have been caught, as the organisation of statements into codes and categories, made it possible to sort related statements and read them together which would give a better overview of a specific concept. It was also easy to see how much data there was in a certain category and that would be an indication of the level of saturation the category had reached. The categorisation was also helpful for seeing concepts from different angle which created a better understanding of them. It revealed connections between problems the RTS genre has and other aspects that many players enjoy, which in turn is important in the guidelines where solutions to problems are suggested, and if these connections are not understood properly, there is a risk that trying to fix a problem could accidentally break something else that is essential for the genre. This is probably one of the biggest benefits of the grounded theory inspired method.

8.3 Validity

The validity of the results of the thesis, given the nature of design research and the method used in this thesis, is not as easy to verify as it would have been in a more concrete field. The theory is based on a collection of statements that have been gathered from numerous different sources, but the interpretation of the data is qualitative, in the sense that is i trying to identify interesting and relevant ideas and concepts found in the data based on the perceived importance rather than relying on frequency or statistics.

The game study is based on one person's experience playing three real-time strategy games and three MOBA games, and the results of it are, because of that, not claiming to be a universal truth, but serving the purpose of improving quality of the interpretation of the theory data and adding some sort of detection of incongruities between the conclusions drawn from the theory and the experiences of playing the games, or games similar to those, that are discussed in the data, which would indicate that some misunderstanding could have happened somewhere, or that the data covering a specific area is scarce and needs to be extended. The game study also boosted the creative process in the final stage of the thesis, when the guidelines were created, which definitely improved the quality of them, and probably also their validity since their author had more practical experience of what he was writing about. Therefore, the game study contributes to the overall validity of the results,

although this part of the thesis is playing a more supportive role than the others.

The guidelines are the final results of the thesis, and is the answer to the research question. Their validity is derived from the validity of the previous phases, i.e. theory and the game study. Since the guidelines are not tested, this might be a weakness in terms of validity. How this can be done is discussed in the next subsection.

8.3.1 How to verify

The validity of the guidelines could be increased further if they were being applied by actual game developers. If multiple game companies were following the guidelines, the games that were produced following these, could be studied and thereby the guidelines could be evaluated. The games could be compared to each other and to other games not consciously following the guidelines. There are likely many methods for doing these kind of studies.

A suggestion would be to interview players to hear what they think of the games, and to find out if they seem to appreciate the consequences of following the guidelines, or if they think it has had a negative impact on the games. This would also confirm the validity of the underlying theory. Given that game design is a wicked problem, there is a risk that while the issues that the guidelines address have been solved at the same time as new ones have been introduced that might be as severe as the original ones, which would require more research. It would also be interesting to interview the game developers about their experiences of following the guidelines.

However, since it is not likely that game developers will adopt these guidelines and start producing games using them any time soon, it might be wise to suggest another option and that would be to request qualitative feedback on the guidelines from game companies, or to just study their games to see if they are doing what is suggested in the guidelines, and if so evaluate how well it works.

8.3.2 Validity in process

The validity of the thesis can also be verified by following the process which is well documented in the thesis. How the data was collected and how and why all major decisions were made can be read. The data is listed in the appendix with links to their sources, where the statement and its full context can be read. The guidelines are referencing back to the theory when they are based on that and on the game study when that is based, and in the cases where pre-existing theories from the theory chapter were used, that is also specified. It should therefore be easy to follow how the guidelines were created and how they are motivated.

8.4 Generalisability

While all the guidelines are written with the intention to improve real-time strategy games, it is thinkable that some of them are relevant for other genres that are suffering from similar problems like the RTS genre does. The underlying theory - with its three categories: **Skill**, **Variety**, and **Comfort** - might also be applicable for other games. Almost all the data that the theory is built on, is discussing either RTS games or MOBA games, but there are also at least some general statements that could be useful in other contexts as well, but probably it would be more interesting to look at the theory and see how the categories are relevant for a game of a different genre, or the genre in total.

All the categories have positive and negative sides, which creates opportunity to compare both strengths and weaknesses between genres. However, the connections between categories and sub-categories might be different, and at the sub-category level, some of the ideas might be too specific for RTS, but parts of the theory could probably be generalised to some extent.

For example, if a game is very oriented towards competitive play, there might be similarities with RTS games, and the **Skill** category would be interesting to read. If the game has a high complexity then **Variety** could contain some more insights. Competitive shooters - preferably those that are not team based - or grand strategy games could be good candidates for doing this kind of study, as these would share many aspects of real-time strategy games.

Since one of the goals with this thesis was to learn what MOBA games are doing better than RTS games, it is also possible that there is something to learn from RTS games that could be applied to MOBA games. In many ways, MOBA is a solution to some game design problems that exist in real-time strategy games, as it is a spin-off genre, and therefore some of the trade-offs that were made when the new genre emerged now may appear in a clearer light. Given that many MOBA games are similar and it seems difficult for the game developers to innovate, it could be worth investigating if there is something valuable in the RTS genre that was thrown out. If the game developers roll back some of the design decisions that were made, new possibilities might appear and the genre can avoid stagnation.

8.5 Ethical issues

Before starting the theses, a few ethical issues were anticipated to appear and were to be considered throughout the entire process. These were described in the introduction (1.5). In the following section these ethical issues are discussed.

8.5.1 Negative attention on games and companies

Mentioning games and companies in a negative manner could be bad for their business. When mentioning games and companies in a positive manner, there is a risk

that it would give them an unfair advantage.

First of all, many of the games mentioned in the thesis are old, especially those that are brought up as examples where the research problem is presented. These games are already well-known and it is reasonable to expect that most people that are interested in the real-time strategy genre, are familiar with these games and can put negative remarks about them in a context without exaggerating the importance of these remarks. Many of the games are not being actively developed anymore and have already passed their peak of profitability a long while ago, and are not sensitive to negative feedback in that sense either. Newly released games, especially from smaller studios, would be more sensitive to negative feedback.

In the data, there are a few occurrences of games from smaller studios being discussed negatively. One approach would be to censor the names of the games to protect the game studios, but this road was not chosen as it would make it difficult to understand data if omitting game titles, and it would still be possible to find the title if going to the original source since all URLs are found in the raw data (A) and the URLs need to be presented, otherwise it would lower the validity of the results. The way negative remarks were generally handled, was to not give negative remarks an unproportionally big space in the thesis, and in the case of a negative phenomenon general to the genre, by finding multiple examples of games where it can be observed.

The game study is a part of the thesis where specific games are studied more closely, and it thus contain many concrete observations of specific games, and some of these observations can surely be seen as negative. The game study also contain the subjective opinions of the author and are not to be seen as neutral or representative of what the majority of gamers think about the games being studied. This is clearly stated in the beginning of the section, so the reader should be aware of this. The game study also cover the biggest games in the RTS and MOBA genres, which should not be sensitive to negative feedback due to previously mentioned reasons.

Throughout the thesis when games are discussed, the intention is to analyse mechanics and dynamics of the games, rather than reviewing the games and giving them a rating. If some part of the game is claimed to be negative, it does not mean the entire game is bad and not worth playing. It just means there are some aspects of it that might be problematic, and it is probably interesting to discuss because it is a general problem within the genre. Also no game is perfect and negative aspects can likely be found in any game.

8.5.2 Reinforcing the notion of a dying genre

Before the start of the thesis, there was a worry that researching how to restore the historic popularity of the RTS genre, just would contribute to the idea that the genre more or less is dying. This idea seem to be held by many on the many forums on the Internet, so by writing a thesis about it could make it seem even more true. That could decrease the popularity of the genre even further which would be very unintentional and negative for all the stakeholders.

Although this risk might be real to some extent, it would have been higher if the thesis had reached different conclusions. The guidelines present constructive ideas how to make better real-time strategy games, and the theory identifies aspects of the genre that make it fun to play, and aspects that are problematic but not impossible to improve. Had the result instead been that there is nothing good with the genre, there are no thinkable solutions to its problems, or there is nothing the RTS games do that MOBAs do not do better and the RTS genre will inevitable die, the severeness of this ethical issue would be higher, but on the other hand, if this were the case and the conclusions were correct, there would no point in trying to save the genre.

During the work, a few things have been learnt that challenge the notion of a dying genre. It is true that RTS used to be a bigger genre than it is today, and after its peak its popularity has definitely declined. It is easy to extrapolate this development and anticipate that it will continue until the genre is fully extinct. This might be one reason why people believe the genre is dying. This do not seem to be the case however, as the popularity of the genre seem to have stabilised. Nowadays one might say that RTS is a niche genre, but it is not a dead genre and it does not look like it is going to die anytime soon. New games are released regularly, some of the bigger franchises receive sequels and there are several entirely new titles that look promising. Instead of reinforcing the idea of a dying genre, this thesis should provide correction and nuance to it since it is overly negative and not up to date with recent development.

8.5.3 Usage of collected data

In the introductions potential ethical issues around usage and storage of interview data are suggested. This did not end up being a problem, since no interviews ended up being made due to previously described reasons. All data that has been used is either public or has been produced by the author of the thesis himself, therefore it is fair to assume that users that post their opinions online publicly have agreed that they have no control of in which context their posts can be used. The raw data contain nothing that cannot be found using a regular search engine. If a user regrets a post that has been included in the data, there will still be a copy of it here but no specific user names of forum users are included in the raw data or the results and the URL will point to a deleted post which makes it unlikely the user can be identified.

One risk is that the author of a source item has been misrepresented or misunderstood. This might be upsetting to some people and also be negative for the correctness of the conclusions, if they would be relying to much on an incorrect interpretation of a statement. The raw data contains URLs to the original sources, so at least it should be easy to find the statement and read it in its original context.

8.5.4 Guidelines lack empirical evidence

As stated in the section about validity (8.3), the guidelines have not been tested in practice and there is no guarantee following them will improve the quality of

the game. The guidelines are based on experiences people have had playing existing games, but no play testing has been done on a game that has adopted these guidelines. Therefore it might be an ethical problem that the thesis instruct game developers how to design their games, when there is no empirical evidence that the guidelines lead to better result.

However, the thesis is fully transparent with how the guidelines were created and what they are based on. The thesis does not promise that following the guidelines will lead to financial success. It should be clear what expectations would be reasonable for a game developer to have on the guidelines. The game developers need to read the argumentation for each guideline and only follow it if they are convinced that the argumentation is valid and well supported, and they are aware of what expectations they can have on the guidelines effect on the end result.

Even if game developers started following the guidelines and it turns out that the games that were released consequently were objectively better than games that do not follow the guidelines, it is not certain that they would reach a larger audience, generate more profit, or vitalise the real-time strategy genre as a whole.

8.6 Future work

This thesis has focused on players, but there are other stakeholders as well, like game developers, that could be studied, which would give a different perspective. Some sources come from game developers, but even in these games are discussed primarily from the players' perspective, which is natural since that data is public and the expected audience is gamers. It would be of great interest to find out how game developers, with experience of developing RTS games, are reasoning about game design and what the great difficulties are. The same grounded theory inspired approach (4.1) could be used.

It is also thinkable that there could be of interest to study the financial side of the business, to look further on different business models and other considerations made that have an effect on the willingness to spend money on developing RTS games. An other aspect that was mostly left out in this thesis is the communities belonging to different games which also could be studied.

As discussed in the section 8.3 the guidelines are not tested, which is something that should be done in the future. This can likely be done in many ways, but since this work has been entirely theoretical, some practical verification would surely be beneficial for the trustworthiness of the results. Ideally game companies adopt the guidelines and follow them while developing their next game, but if this is not possible it would be good to just receive feedback from game companies about what they think of the guidelines.

Making an RTS game is a huge project, but it could be interesting to make a rudimentary prototype to demonstrate how some of the guidelines could be implemented in practice. This could for example be made as a modification or a custom map to

an existing RTS game.

9

Conclusion

This thesis is investigating why the previously widely successful genre of RTS had declined heavily in popularity since its golden age. In parallel to this the MOBA genre has been studied, as it is a related genre that has grown to one of the bigger genres. The intention was to understand what makes MOBA games appealing to large player groups, and how this knowledge can be used to improve RTS games and make them attractive to a broader audience.

This is how the research question was formulated in the introduction (1.2):

*What can RTS game design learn
from the MOBA genre?*

To answer this question, a theory was created that aims to explain what makes RTS games fun to play and what their main issues are. A game study was also performed where the most popular RTS and MOBA games were played. Finally, based on the theory and the game study, guidelines were created which in which all acquired knowledge is distilled into recommendations to game developers about how to design RTS games and what pitfalls to avoid.

9.1 The resulting theory

The answer to the research question is the theory (7.2). It describes three concepts that have been identified as important for understanding the problems with the real-time strategy. These concepts have in the theory been given the names: **Skill** (7.2.1), **Variety** (7.2.2), and **Comfort** (7.2.3).

Skill is a central aspect of real-time strategy games. The player must be able to proficiently make decisions, plan, multi-task, micromanage units, and macromanage the economy, all under time pressure. This is not easy to do, and this makes RTS games suitable for competitive play, as there are many different skills to master and it is always possible to improve even further. This makes real-time strategy games very demanding, and sometimes stressful, which can be frightening for beginners or players looking for a more casual experience.

Variety is what keeps a game interesting after having played it a decent amount of time. This can be achieved by providing different game modes to choose between, multiple and diverse factions and units, a large and changing map pool, a wide range of strategical and tactical options which can be combined in surprising ways etc. This gives the player a chance to experience new things and situations and creates room for creativity, but it also makes the games hard to learn. Beginners will likely have no idea what to do in their first game, and to compete with other players quite much knowledge of the game is required.

Comfort is the player's ability to enjoy the game without experiencing negative emotions that remove all the fun from the game. These can come from the stressfulness that comes from the intense gameplay or the frustration of not knowing what to do in a given situation. An other source is so called ladder anxiety, i.e. fear of losing a competitive game, or just the pain of losing a game and knowing there is no one else but oneself to blame for the loss. Because the tendency to play competitive games, the lack of comfort is prevalent among many players from time to time. Social games with friends, or team games in general, seem to increase comfort and so does casual modes which offers a more relaxed gameplay.

9.2 List of results

Here is a summary of the results. These are identical to the guidelines presented in 7.3.

1. Make it easier for new players to get started
2. Make practice more efficient
3. Make skill ceiling high to accommodate competitive gamers
4. Make skill floor low to make game accessible
5. Reduce amount of APM needed to play proficiently
6. Be aware of implicit resources like time, attention and information in game
7. Add ways for different types of players to enjoy the game
8. Let the player adapt playstyle after personal preferences
9. Make the game accessible for players that have limited time and attention
10. Make the games more appropriate for social play
11. Look for mechanics and dynamics in other genres that could fit into the RTS
12. Make use of entire map to make gameplay more dynamic
13. Let the player focus on the interesting parts by eliminating chore actions
14. Add sub-objectives to add more variety to the game
15. Consider the trade-off between adding more variety and losing balance
16. Be aware that overly complicated mechanics may not give interesting dynamics
17. Find ways to reduce ladder anxiety
18. Find ways to diffuse blame for losing to make players feel less bad about their performance
19. Find ways to reduce risk of toxic behaviour

9.3 Next steps

In this thesis, a theory has been produced that explains what the main problems with the real-time strategy genre is. A theoretical approach (1.4.2) has been used, meaning most of the conclusions are based on data that has been collected and analysed. Therefore supporting the conclusion with practical data would increase the credibility of the theory and the guidelines that are based on the theory.

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A

Appendix 1

Raw data to the resulting theory (7.2).

Table A.1: Raw data

Id	Data	Core	Category	Link
1	Simply put, most RTS games are exhausting. As someone who has achieved a relatively high level of play in numerous popular RTS games, my best coaching advice for the vast majority of players would be to play more and to play faster. In most instances being able to micro, macro, and multi task is the biggest obstacle keeping players from pushing their play to the next level. Many times, I hear players getting frustrated as they ultimately know what and how to execute, but their fingers cannot keep up. Often a player with higher APM will trump an opponent who might otherwise make better decisions and have a better grasp on the game. There are always exceptions, but most players would agree that a 300 APM player will beat a 100 APM player almost every time.	Skill	Hard	URL
2	It is no coincidence that the most popular games and esports these days are team games. Going online to a lonely experience queuing into the ladder abyss leads to a disconnectedness that is not appealing to most people. As time goes on (accelerated by COVID) more of our daily lives are digital and remote, and people yearn for connection through gaming. Having 1v1 as the de facto main way to compete deters sociability, community, and ability to play and/or hang out with friends. Don't get me wrong, some people love the accountability and determinism to the wins and losses they incur through 1v1, but I would argue most (whether they admit it or not) prefer the lack of accountability and ability to defer to blaming teammates or other variables. All of this leads to 'ladder anxiety', a stressful experience for players, in a society that is already feeling more anxious and more stressed in their day to day lives.	Comfort	Win/lose	URL
3	In general RTS has always been considered one of the 'nerdier' genres and perhaps for good reason. If you compare any RTS game to Fortnite, COD, Among Us, or other popular games out there it is definitely less 'snackable'. It is harder to jump into an RTS and start playing immediately without any background or serious study. If you haven't played, it isn't exactly intuitive or easy to understand for viewers either. On the other hand, there is a case to be made that other popular games exist which require similar levels of learning, whether it's MOBAs, MMOs, autochess, or various shooters with skill based abilities. Maintaining a high ceiling for pro play while leaving opportunity for all levels of players to enjoy your game is key to large commercial success for all publishers and a balance that has been hard to strike within RTS specifically. The ideal competitive RTS being mechanically easy to learn, hard to master.	Variety	Learning	URL
4	By far the most important aspect to designing any 'good' RTS is space control. Controlling space in most strategy games (even if not RTS) is at times difficult to define, but also the most crucial aspect to the general ebb and flow of any game. By having more room to maneuver, a player will have more options in their arsenal, while the competitor, who is more limited, must account for a greater variety of threats. The most common ways to control space (from a game design perspective) are generally terrain, units, and defensive structures. But space can be controlled in other, less obvious ways as well. For example, the fog of war mechanic puts an emphasis on scouting and decision making with incomplete information, or resource scarcity can funnel players to certain sections of the map.	Skill	Decision	URL
5	Diversity is good, and all the more so in RTS. Different players will pick different options depending on different factors: aesthetics, gameplay style, unit availability, unit specific abilities, difficulty in executing, personas, etc. Although it makes balancing a game harder, variety is also the spice of life for games! Players demand it, and the more you have, the more fun your game has the potential to be.	Variety	Variety	URL
6,1	Balance is the yin to the yang of variety. Balance of any game is tough, and in an RTS it is particularly important because most players identify with a specific race/faction. More variation means harder to balance. For example in chess, a mirrored game with no unit variety between two sides is imbalanced just because one side moves first.	Variety	Balance	URL
6,2	With the popularity of gaming/esports on the rise, balance could see the most benefit from focus as the industry, and people within, mature and provide much needed expertise. Publishers should look to put more time, resources, and energy into listening to domain experts who can understand and guide the balance or design to all games.	Variety	Balance	URL
Continued on next page				

A. Appendix 1

Table A.1 – continued from previous page

Id	Data	Core	Category	Link
7	Lumber, gold, minerals, tiberium, stone, food, ammo, fuel, etc. One human component that makes RTS enticing is the ability to be something bigger than yourself. Be a general, a king, a commander, or god and control the fate of the world/universe at your fingertips. Besides fighting, there is an innate human drive to collect, build, and ultimately amass the biggest/best army, hero unit, or best economy.	Variety	Role	URL
8	AOE2 is one of my favorite games out of all RTS's when it comes to space control. Terrain is extremely important.	Skill	Decision	URL
9	High ground is a huge component when considering where to push or how to approach each unique map.	Skill	Decision	URL
10	Units receive a +25% bonus in damage when attacking from an elevated position, as well as taking 25% less damage from the unit from below.	Skill	Decision	URL
11	You have a plethora of defensive buildings to choose from including walls, towers, and the ever oppressive castle.	Variety	Variety	URL
12	All maps are randomized, which leads to players having to scout and then plan out where to prioritize resources.	Variety	Variety	URL
13	Attacking or defending becomes a very conscious choice depending on the faction, surrounding terrain, and general playstyle you enjoy.	Variety	Role	URL
14	AOE2 delivers a wide range of different civilizations to choose from, even if these civilizations play more or less the same.	Variety	Variety	URL
15	The vast majority of units, buildings, and tech are available to all civilizations.	Variety	Variety	URL
16	Each civilization has some unique components when it comes to specialized units, tech, and natural/passive boons.	Variety	Role	URL
17	This generally leads to a game that feels more bland overall when dealing with more or less the same unit compositions, buildings, and tech paths game after game.	Variety	Variety	URL
18	Overall AOE2 is enjoyable to me because of it's great space control which more than makes up for its lack of flavor in variety.	Skill	Decision	URL
19	Although bland, AOE2 is a well balanced game.	Variety	Balance	URL
20	Most pro players at the highest level will pick their civilization based on what map they are playing in any given match.	Skill	Decision	URL
21	Some of the map factors might be if it is a water/navy based map, open or closed, or even tournament format/rules on civilization picking.	Skill	Decision	URL
22	There is still personal preference ultimately as well, but AOE2 throughout all skill levels provides many pathways and strategies to reach victory.	Variety	Role	URL
23	AOE2 sports one of the most diverse balance of resources with food, wood, gold, and stone.	Variety	Balance	URL
24	All resources are unique and have their own special use, method of collection, and importance depending on what stage of the game you are in.	Skill	Decision	URL
25	Commonly players will look to restrict one or more resources of their enemies economy to bottle neck their choices with units, tech, or infrastructure.	Skill	Decision	URL
26	Don't fret however, as soon as a player can make a market they have the option not only to rebalance their economy but also make up for any ground lost by the lack of a particular resource (although at an inflated price).	Variety	Balance	URL
27	Markets in AOE2 are used by professionals and newbies alike by granting all players the ability to customize their resources to a specific strategy (example being a castle rush), or simply help with their overall macro if they have 4,000 extra wood and little gold.	Skill	Decision	URL
28	Definitive Edition has been one of the best (if not the best) re-launches out of all the notable RTS's to date, revitalizing a large portion of their scene.	Variety	Learning	URL
29	Despite all the praise, AOE2 still faces 2 of the 3 evils that plague most RTS's; it is a very tough game to improve at simply because the mechanics required are tough to master.	Variety	Learning	URL
30	Unfortunately, I don't see many casual gamers picking this game up for the first time and sticking with it through a tough learning curve and grindy path to climb.	Variety	Learning	URL
31	On the other hand, team games are surprisingly fun if you can find friends at a similar level to play with.	Comfort	Team	URL
32	SC1 sports a plethora of options when it comes to space control and is a big reason why it has stayed so relevant for so long.	Skill	Decision	URL
33	Units attacking from low ground have a 47% chance to miss their shots entirely, and the general clunkiness of SC1 makes moving any large army up a ramp or through a choke difficult.	Skill	Hard	URL
34	Terran armies that push out and are disconnected by the fog of war feel disjointed and isolated, but a well maintained push consisting of siege tanks, mines, and turrets feel tough to break for any race.	Variety	Role	URL
35	Zerg's fast units such as zerglings or hydrazes generally grant early map control which leaves Zerg the option to control the pace of the game.	Variety	Role	URL
36	Zerg constantly looks to poke holes, counterattack, or flank an opposing army with lurkers, mutalisks, or defilers.	Variety	Role	URL
37	Protoss implements either strong timing attacks or research interesting tech options such as fast dark templar to gain an edge.	Variety	Role	URL
38	Eventually Protoss players amass an unstoppable force of powerful units like the zealot, dragoon, high templar, and arbiter to overrun their opponents.	Variety	Role	URL
39	Starcraft 1 has a natural crutch because it is an older game as well - players only have the ability to control 12 units at once and unit pathing is clunky.	Skill	Hard	URL
40	This makes moving any army difficult and slows the game down to make sure you are investing the right amount of attention to position and consider moves prior to investing the time and energy to execute them.	Skill	Hard	URL
41	All three races are unique in units, tech, aesthetics, and playstyle.	Variety	Role	URL
42	Each race feels 'on brand' to what they are meant to feel like.	Variety	Learning	URL
43	Terran: very human-like, often relying on being defensive at first, then pushing in a calculated precise way.	Variety	Role	URL
44	Protoss: a high tech alien race, units not as plentiful as they are powerful.	Variety	Role	URL
45	Zerg: buggy, animalistic, and try to overrun their opponents in a swarm.	Variety	Role	URL
46	Each race has a wide range of characteristics and each delivers a very different experience for all players.	Variety	Variety	URL
47	Map makers are to be credited a lot for this, not only for making new maps, but also for keeping the game fresh and exciting through interesting maps that give birth to interesting strategies.	Variety	Variety	URL

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Table A.1 – continued from previous page

Id	Data	Core	Category	Link
48	Very linear economy reliant on two different resources - minerals and vespene gas.	Variety	Variety	URL
49	Generally speaking, tech advancement to higher tier units is more heavily dependent on vespene gas.	Skill	Decision	URL
50	Unlocking higher tech and units feels extra rewarding in a game that requires a high level of mechanical skill, is clunky, and based on positioning.	Skill	Progression	URL
51	It is much easier to grab 12 high-tech battlecruisers and attack-move around the map lazily compared to microing 60 (12 at a time) lower-tech goliaths to defend against the air units as they sail towards victory.	Skill	Hard	URL
52	Taking expansions is a high risk, high reward endeavor as workers are not as 'smart' and scale less per base, thus rewarding extra expansions with fewer workers per base.	Skill	Decision	URL
53	SC1 was practically a national sport being called by many the 'Mecca of Esports'.	Variety	Casual/competitive	URL
54	Although an older game, it still has a strong fan base both globally and in South Korea.	Variety	Casual/competitive	URL
55	Much of its initial popularity as well as its longevity can be attributed to not only its dominant 1v1 esports scene, but its fun and balanced team games as well.	Comfort	Team	URL
56	2v2 is extremely fun and very entertaining at high levels of play, and it was even part of its pro league system for a time as well.	Comfort	Team	URL
57	As for casual teampay, anyone who has played this game surely at some point has played team or FFA games on Hunters or BGH.	Variety	Casual/competitive	URL
58	Although it sports both a hardcore and more casual fan base, it would be hard to imagine any newcomers picking up SC1 given it's tough mechanics and steep learning curve.	Variety	Learning	URL
59	For a game that was released in 2006, COH is a beauty and something different for RTS fans.	Variety	Variety	URL
60	Each map is broken up like a jigsaw puzzle.	Skill	Decision	URL
61	The more sectors you connect and control the more resources you get, naturally making every inch worth fighting for.	Skill	Decision	URL
62	It is also a directional cover based game, where units take more or less damage depending on what cover they are in, examples being in the middle of a road vs. behind a stonewall or in a house.	Skill	Decision	URL
63	The units and defensive structures in this game make it a space control masterpiece.	Skill	Decision	URL
64	With barbed wire, tank traps, sandbags, mines, machine guns, tanks, light vehicles, artillery, etc. at the hands of any commander, this game becomes a WW2 based chess match where decision making and positioning is the most important part of any player's mind.	Skill	Decision	URL
65	Overall COH1 has a distinct and unique aspect to each faction you can play.	Variety	Role	URL
66	During this WW2 RTS you can choose between the allies (USA/British) or the axis (Wehrmacht/Panzer Elite).	Variety	Role	URL
67	The game is pretty realistic and each faction has a unique way of playing, although all have similar paths of infantry, artillery, as well as light and heavy armor.	Variety	Role	URL
68	The grouping of races into factions simplifies matchups for the players and balancing for the devs.	Variety	Balance	URL
69	The US faction is based on early game strength, maneuvering, and aggression; flanking is everything for a US player.	Variety	Role	URL
70	While the Wehrmacht opts to be defensive, stable, and scale aggressively into late game to the point where a loss is inevitable if given time to ramp up.	Variety	Role	URL
71	Even at the most basic level, Allied Riflemen do more damage up close and Axis Volksgrenadiers do more from range, a matchup that personifies the factions and clearly illustrates how they're meant to be played.	Variety	Role	URL
72	Panzer Elite and their British counterpart are a bit more wonky. Panzer Elite are fragile, micro intensive, and very agile (my personal favorite faction).	Variety	Role	URL
73	British primarily rely on the support of other British units, overlapping each unit's specialties to cover their weaknesses and to overwhelm their opponent in a concentrated force, or relying on their strong artillery.	Variety	Role	URL
74	It is hard to know for certain the overall balance of COH1 because it simply wasn't given a shot at becoming an esports when it came out in 2006; it was way ahead of its time and esports were still in their infancy. Based on top pro preference, there is a clear consensus that the Wehrmacht faction is strongest and is picked most often, while British are deemed the easiest faction to play at most levels or game modes.	Variety	Role	URL
75	The maps' cap point system makes for a very novel and intriguing game.	Variety	Variety	URL
76	There are 3 basic types of resources: Manpower, Ammo, and Fuel.	Variety	Variety	URL
77	Income is gained passively via the territories controlled, and they must be connected to the HQ sector to provide income.	Skill	Decision	URL
78	Manpower is used most often for almost all units and buildings and functions much as minerals do in Starcraft.	Skill	Decision	URL
79	Ammo is used for upgrades to units, off-map artillery support, and abilities.	Skill	Decision	URL
80	Fuel ends up being the most important resource at the beginning of the game and entirely dictates the ability to tech which sometimes leaves fuel-less players dead in the water as they reach the mid game.	Skill	Decision	URL
81	COH1 also grants players the ability to 'call in' specialized units to bolster an already favorable battle, or when in a bind for some much needed help.	Skill	Decision	URL
82	Players are forced to maneuver all over the field; even when massively out-matched, strategic points can cut the entire income (and supply) away from the opponent thus crippling them.	Skill	Decision	URL
83	The game is at almost all times 'winnable' given good decision making and maneuvering.	Comfort	Win/lose	URL
84	The resource system and map design completely drive player movement, decisions, and flow of the game.	Skill	Decision	URL
85	COH1 is a masterclass in what a modern day RTS could be. It is unique, not mechanically difficult, has team games that are fun and exciting at all levels, and has a reasonable learning curve.	Variety	Variety	URL
86	Squad based infantry and control point based map design encourage small skirmishes all over the map and lowers the need for larger armies.	Skill	Decision	URL

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A. Appendix 1

Table A.1 – continued from previous page

Id	Data	Core	Category	Link
87	The game mechanic of cover and defensive options pushes the game towards being out on the field of battle, being active and microing units instead of dealing with annoying macro mechanics.	Skill	Decision	URL
88	COH1 is more about outsmarting and outpositioning your opponent more than anything else.	Skill	Decision	URL
89	The game is intuitive and semi-realistic making gameplay easier to watch than most RTS as well. Anyone who has watched Band of Brothers or Saving Private Ryan can clearly imagine a machine gun firing and suppressing an infantry squad that's huddled behind cover, while another squad flanks that machine gun with grenades to uproot it.	Variety	Learning	URL
90	Overall, make spaces outside of the main base and expansions strategically valuable to hold.	Skill	Decision	URL
91	Make resources or objectives numerous and spread out (not just centralized at mining bases or your starting point).	Skill	Decision	URL
92	Terrain needs to be tactical and important, not just aesthetic.	Skill	Decision	URL
93	Units/buildings/tools that are less mobile but good at holding space or sieging are important, but there has to be a trade off of resources/time/vulnerability.	Variety	Balance	URL
94	AOE2 is the only game that I would consider 'bland'. Counterweight to that blandness is the superior balance AOE2 has. To keep variety and help balance I would recommend 3-4 races/factions that are diverse with unique sub choices beneath each race (similar to how COH1 does Commanders). Best of both worlds.	Variety	Variety	URL
95	There should be at least 3-4 different resource types - 2 is too bland and boring.	Variety	Variety	URL
96	Market from AOE2 is a great rebalancing tool and also helps casual players.	Variety	Casual/competitive	URL
97	Also COH1s call-in mechanics for specialized units not only is fun but helps casual players with spending their resources.	Variety	Casual/competitive	URL
98	Macro mechanics should be minimalized as they are generally seen as boring and tedious.	Skill	Hard	URL
99	Team play should be the standard/normal (2v2+?) game mode.	Comfort	Team	URL
100	Mechanics should not feel like a chore and design should emphasize accessibility and strategic depth.	Variety	Variety	URL
101	Player focus should be on making better decisions, micro, and positioning.	Skill	Decision	URL
102	The game needs to be easy to learn and ideally easy to watch.	Variety	Learning	URL
103	People don't want to play a long 1v1 match and lose.	Comfort	Win/lose	URL
104	People prefer team games where they can blame their lack of skill on their teammates.	Comfort	Win/lose	URL
105	If it is 1v1 it has to be short and random, like hearthstone so they can blame their lack of skill on randomness but also not have too much time wasted on a loss.	Comfort	Win/lose	URL
106	It's not hyperbolic at all. Ladder anxiety is a real thing and places hard limits on 1v1 games mainstream success.	Comfort	Win/lose	URL
107	Multiplayer games that use teams and RNG to diffuse blame but are competitive enough to hook people is the methodology which has seen the massive success of online PC gaming over the last decade (LoL/Dota2/PUBG/Fornite/Apex).	Comfort	Win/lose	URL
108	It's hard to describe how stressful and intense high-level 1v1s in an RTS are.	Skill	Hard	URL
109	I was highly rated in AOE2 back when it was on the Microsoft Zone. In the beginning the climb through the ranks was fun, but by the time I reached 1900ish Elo, it just became insanely stressful. One misstep early game could put you far enough behind that your fate was nearly sealed, even if you didn't "gg" for another 20-30 minutes.	Skill	Hard	URL
110	I also remember occasionally getting wins after winning the first battle or even doing something like stealing a boar or sheep from my opponent.	Skill	Hard	URL
111	That's the same reason Quake also died. 1v1 Dueling is unforgiving, intense, and the skill cap is off the charts.	Skill	Hard	URL
112	Tbh the skill ceiling is huge in RTS, I remember joining a multiplayer game in SC2 and within 5 mins I got rolled hard definitely put me off	Skill	Skill	URL
113	Pretty much this. Kids these days need instant gratification and RTS doesn't give them that.	Skill	Hard	URL
114	MOBAs are addictive. The gratification of obtaining a kill is hard to find, and brings back gamers by the millions.	Skill	Progression	URL
115	MOBAs are very simple to understand. They have a basic, almost a sport field feeling to them, very balanced and simple.	Variety	Learning	URL
116	MOBAs quickly become fast paced.	Skill	Progression	URL
117	You don't have to win in a MOBA to have fun. I was having a lot of fun leveling up my character in Smite, when I realized that my team was losing horribly. We ended up losing the match, but I enjoyed just leveling up my character for no reason.	Skill	Progression	URL
118	LoL was introduced to me by a friend. At the start, it sounded weird and boring (just get to the nexus/base and win) and it looks kind of boring (laning phase is farming and harrassing). When I started, I played with my friend, and I smiled when we had one of those win moments (a triple kill in bot lane, getting to ace, even the occasional pentakill).	Comfort	Team	URL
119	As I got a little more advanced, I realized even playing solo was fun. There is a kind of beauty and happiness when you win a 4v5 with your mid laner afk. Getting the triple, quadra or penta kills were satisfactory, and I enjoyed winning.	Comfort	Win/lose	URL
120	However, I like strategy based games, and before League of Legends I avidly played WC3 and Starcraft. Since there is a strategy in the game and a lot to think about (when to gank, when to harass or farm, how to tower dive, if I should roam or push...), I liked it.	Variety	Learning	URL
121	However, people who don't have friends to play with (it is really fun with friends) or a liking for strategy-based games, you'll probably get bored.	Comfort	Team	URL
122	The game is really simple if you look the global goals, that is, go to enemy camp and destroy their ancient, but behind that lies a game with so many mechanics that every game won't be the same, even when you reach 1000 or 2000 games played.	Variety	Learning	URL

Continued on next page

Table A.1 – continued from previous page

Id	Data	Core	Category	Link
123	Every hero has it's things you need to learn, strong and weak points, some special mechanics that CAN MAKE the difference in the battles. Every hero also is thinked in a way that it should be played, but if you know your stuff you can basically play any hero anyway you want and still own the game.	Variety	Learning	URL
124	The learning curve can be hard to master, and the community, especially starting, can be really harsh and awfull, but if you stand and continue playing and getting levels, you will be paired with better people, and that's when Dota 2 shines at his best, and it's a wonderfull game to play :)... better with friends of course ;)	Variety	Learning	URL
125	Starting out weak and powering up over time is a common element of many games. Mostly, these are RPGs of some sort, but MOBAs apply the same idea to every single match. It's kind of like playing a multiplayer PvP RPG at super-speed, going from level 1 to the level cap in 20–40 minutes (depending on the game). And then when it's over, you get to do it again with a different team, different character, different opponents, etc. so that it's not just the exact same thing every time.	Skill	Progression	URL
126	Snowballing. If one team gets a progression advantage early on, that makes it easier for them to continue to increase that advantage. If you gained that advantage when all things were equal, how likely is it that you are going to have trouble after gaining it. Even if you make a misplay and lose ground once you have the advantage, you probably still have the advantage from what you've already built up leading to that mistake. This is snowballing, and it results in some matches being decided within the first 5 minutes, but they don't actually end until you go through the motions for maybe the next half-hour - or concede. Doesn't make for a fun match. If the game tries to prevent snowballing, then it probably will have the exact opposite problem. They make the end game fights much more important than the early game fights, so that one single misplay by a team with the advantage could result in them losing the entire match right then and there. The fact that they were winning the game decisively up until that point counts for absolutely nothing. The only thing that counts is that one mistake they made 20 minutes into the match. So rather than the match being decided in the first 10% of its duration, it's instead decided solely by the last 2%. I refuse to call this a comeback. A comeback is when you overcome the effort the opponent spent beating you with an even greater effort of your own. Not by capitalizing on a single mistake and instantly winning.	Variety	Balance	URL
127	I'm not sure what to call it, but what I'm referring to is the fact that someone who has played a MOBA for a long time has an insurmountable advantage against someone who is new. That may sound obvious, but I'm more referring to the fact that skills do not transfer very well from one MOBA to another. If you're amazing at one FPS, you can put up a good fight against a experience player in any other FPS, but that is not the case with MOBAs. And it's not because of the practice required to develop the skills (though that is certainly part of it), it's because MOBAs have a utterly insane amount of mechanics. There are so many heroes (over 100 in some games), they all have their unique abilities, unique builds, unique strategies, and semi-unique things you need to know or do to counter them. It doesn't matter if you are the most technically skilled gamer on the planet who has mastered 3 different MOBA games. When you play your 4th, you will be crushed by anyone who has been playing that game for a long time, because the most important factor of being good at a MOBAs is simply knowledge of its mechanics. If you haven't memorized all of the abilities of the enemy's characters, all of the builds/items/skills/whatever else that you need for your character, and any unique mechanics of the map, then you have a massive disadvantage.	Variety	Learning	URL
128	Time to be a little controversial. In MOBAs, technical skill only gets you so far. Like I said above, no amount of technical skill will overcome the experience advantage if you haven't memorized all thing things you need to memorize in the game. Even among experience players who don't have that problem, actually playing most characters in a MOBA is really easy. Once you know the tactics and abilities, using them isn't hard at all. This makes MOBAs really appealing to a wider variety of gamers who maybe don't have the skills to be competitive in an FPS or a fighting game, both of which require immeasurably more technical skill than a MOBA at the higher levels. What separates good teams and bad teams in a MOBA is not skill, but strategy and teamwork.	Skill	Skill	URL
129	Games where you work as a team have a number of benefits. They allow you to play with your friends. They also allow you to focus on certain aspects of the game that you enjoy more, so long as you have teammates who can fill in the others. You can play different roles on the team to give you totally different experiences. Coming up with team strategies is where more interesting than in games where you are by yourself.	Comfort	Team	URL
130	Unfortunately, they also allow you to defer blame when anything goes wrong. While that doesn't sound too positive, it does appeal to certain people. Some people like a game where they can just do whatever and force their team to pick up the slack. And some people will always blame their team for every loss, so that they can convince themselves that they are still good, and maybe next match they'll have a better team. So they keep playing.	Comfort	Win/lose	URL
131	I play league of legends, because right now it is the most famous moba, and absolutely love their Esports.	Variety	Casual/competitive	URL
132	Apart from that its easier than dota/dota 2. Very easy to grasps but hard to master.	Variety	Learning	URL
133	League of legends is fair, anyone who has the time but not the money can grind through the game and unlock the champs and runes,	Skill	Progression	URL
134	and others like me who have money but don't have hours to spend on the game can buy those champs and skins with small about of money.	Skill	Progression	URL
135	Also the more you play the better the game feels, you can not love it by playing 10 games, 10 games you might not even come across the vast champ pool.	Variety	Learning	URL
136	I really feel like RTS as currently designed has a fundamental problem with the disconnect between what most players want to do (have big cool battles with armies they built) vs what the game often demands you do to play optimally (the frantic hotkey dance, mostly ignoring the actual friggin battles).	Skill	Hard	URL

Continued on next page

A. Appendix 1

Table A.1 – continued from previous page

Id	Data	Core	Category	Link
137	RTS died as a mainstream genre when the concept of APM became widely understood, and this killed it as a simple form of entertainment. Playing StarCraft 'right' is not actually fun for the majority of people, but if you don't play it 'right' you're stuck doing skirmishes vs the easy AI.	Skill	Hard	URL
138	The experience needs to allow for a wider range of playstyles. Perhaps a granular AI assist feature where players can choose to be more micro or macro focused, depending on what's fun for them, and let an AI counterpart do the heavy lifting when it comes to APM. For pro gamers who love mashing hotkeys, the AI assist should be something you can disable.	Variety	Role	URL
139	RTS can't grow as a thing if most people try to pick it up and immediately slam into a brick wall of APM accessibility.	Skill	Hard	URL
140	On account of the large roster of playable characters, and their unique abilities/skillsets, a player will always experience something new, every game. Such is the appeal of these games.	Variety	Variety	URL
141	It is our sincere belief that a successful RTS should have an impossible mechanical skill ceiling, otherwise, the game will get solved and, subsequently, die.	Skill	Skill	URL
142	Conversely, many classic titles are considered unplayable today due to the game demanding the player learn, then master, an overwhelming number of tasks before participating in the core experience.	Variety	Learning	URL
143	At the core of RTS, the player is promised that they will make meaningful decisions in real time against one or more opponents.	Skill	Decision	URL
144	Throughout development, we used Lalush's "Depth of Micro" as a compass for building and testing units which were easy to command, but challenging to command optimally.	Skill	Skill	URL
145	These elements make the game harder at higher difficulties, but don't really affect low level play experience. Mid tier players are also given concrete and obvious goals for mechanical improvement.	Variety	Learning	URL
146	Traditionally fun elements of building and commanding an army are locked behind archaic interfaces. The experience of commanding an army with one or more active abilities often involves a lot of clicking and tabbing just to aim abilities. While this definitely raises the skill ceiling, it does so at the cost of a much higher skill floor. New players see exciting abilities they will not be able to play with for weeks or months, get frustrated, and leave.	Skill	Skill	URL
147	"Chore" actions are repetitive actions that don't inherently offer any decisions of strategic import and are of poor value compared to visually intuitive and strategically dynamic actions (like unit micro or decision based-macro abilities like Chronoboost).	Skill	Skill	URL
148	By freeing up player attention, skill can move from invisible to intuitive, from routine to dynamic, and from a list of chores to strategic execution.	Skill	Skill	URL
149	The more knowledge that is required up front to participate meaningfully, the greater the burden is to a prospective player. When a burden is too great, this can cause "bounce," where a would-be player feels too overwhelmed to participate in a game, or tries and ricochets off, never to return.	Variety	Learning	URL
150	MOBAs benefit from the isometric gameplay perspective, but due to the focus on heroic characters, they are bogged down by the innumerable abilities, synergies, and interactions each individual character has with every other character. To understand a game's state, MOBA viewers need to have memorized spreadsheets worth of information.	Variety	Learning	URL
151	For similar reasons, games like LoL and Dota 2 struggle to communicate who is ahead at a glance. Gold income, objectives taken, and towers felled are all factored into which team is ahead, but nothing is as intuitive as seeing a baneling connect with a blob of marines or a nuke land on an unwitting army.	Skill	Progression	URL
152	League of Legends has a dedicated laning phase where players learn critical skills like tower aggro, last hitting, and ganking alongside an ally. Compare these experiences to an RTS where often a simple, easily overlooked mistake straight up kills a player. To learn what killed them, players then have to stop playing, boot up a replay, and watch themselves lose all over again while looking for a few specific mistakes, among many, that cost them the game. The difference is as stark as it is unnecessary.	Variety	Learning	URL
153	Instead of dumping players in a dark and dangerous map with a handful of resources and workers, RTS titles can and should give clear goals and intuitive tools to reach them.	Variety	Learning	URL
154	Over 50% of any competitive game's player base is strictly casual.	Variety	Casual/competitive	URL
155	The lesson is clear: if you create compelling gameplay, make sure you allocate space for dedicated casuals to experience that gameplay.	Variety	Casual/competitive	URL
156	The vast majority of casual players like to play games socially.	Comfort	Team	URL
157	Coordinating with other players is a distinct, rewarding, and visually intuitive skillset that has a proven track record in the RTS space	Comfort	Team	URL
158	Designing and balancing for 1v1 and 2v2 is tricky,	Comfort	Team	URL
159	Coop PvE provides a way for casual players to engage in the experience they love after completing all single player content. Better yet, they can do it with their friends, making their experience more fun, and extending the life of your game.	Comfort	Team	URL
160	Having to micromanage a lot stresses me out :(.	Skill	Hard	URL
161	Also having to micro manage 5 things at once like in SC2 just hurts my brain. Manage your bases, manage your production, manage your main army, manage your drop.	Skill	Hard	URL
162	You would think having a computer console for this supposed war you would be able to set things like "auto un-idle my workers", " auto build housing when approaching space limits" or "auto build army mode" on and off with parameters like 30% tanks, 30% army 30% specials 10% epics....but no. You have to micromanage the f- out of a war.	Skill	Hard	URL
163	Now this is my opinion because I like to play competitive games as well as enjoy the rewarding feeling of improving at them.	Variety	Casual/competitive	URL
164	You may prefer being able to do that by adjusting sliders or something. For me, that would feel like losing all of the real time aspect as well as not feeling rewarded for improving.	Skill	Skill	URL
165	That was an issue that I had with Starcraft 2. I wanted to play more so that I could practice, but after one or two games I'd be mentally exhausted.	Skill	Hard	URL

Continued on next page

Table A.1 – continued from previous page

Id	Data	Core	Category	Link
166	Yeah, as casual as I'm aware it makes me, I just can't be bothered with trying so hard at a game genre that I'm not already into. Keeping up with MH, DaS and Dota is enough already!	Skill	Hard	URL
167	Grey Goo's issue was that it streamlined both the macromanagement and micromanagement. There were no areas left to have any depth to them. Macromanagement boiled down to building refineries, micromanagement boiled down to sending units to the fight. There were bushes and stuff but in the grand scheme of things, all tools at your disposal are letting your units charge in or fall back.	Skill	Decision	URL
168	SC2 is build around fast paced play with lots of MM.	Skill	Hard	URL
169	I am in the same spot. I love COH/COH2 so much. complex unit interactions > managing ingame economies	Skill	Decision	URL
170	Exploring worlds that interest me and moving pieces around in an expansive lore filled universe is super fun for me, with emphasis on strategy instead of action.	Variety	Casual/competitive	URL
171	it's fun to kill shit and fight in fast battles and you get that with Ensemble games, but there's a lot of build up around it and the people were interesting.	Skill	Progression	URL
172	RTS doesn't need to be complicated, strategy games are fun for their simplicity of mechanics but breadth of possibility. For the same reason Chess is fun. it gives you enough diversity with simple mechanics that you can do so many things with it.	Variety	Variety	URL
173	SC2 is going the wrong way, trying to be more exciting and physically challenging by adding more spells and actives that do flashy things but end up making the units harder to balance and more complicated to use.	Variety	Variety	URL
174	The reason, in my opinion, is that competitive real-time strategies have a much higher entry barrier. And if you're interested in the esports scene, it'd take a year of hard training minimum – just to start.	Variety	Learning	URL
175	I remember meeting my fans who told me their hands shake in fear when they're playing even on bronze or silver level. People tend to view competitions very seriously and no one wants to lose – the pressure is tremendous.	Comfort	Win/lose	URL
176	You have to choose what to focus on at first: micro- or macro-control, scouting, timings, map control, taking strategic positions, multitasking, improving technologies or rushing. It's vital to anticipate the enemy's actions and use tricks. You couldn't possibly master everything at once. It's a long journey where you focus on each element and learn step by step.	Variety	Learning	URL
177	MOBAs have a lot in common with RTS games, but they're drastically different in terms of the gameplay experience. MOBAs too have different game phases, strategies and map control, but the genre relies much heavier on micro-control.	Skill	Decision	URL
178	In RTS you can lose units and quickly restore them. You need to deal with large armies and the economy. Your troops can simultaneously fight in different parts of the map.	Skill	Decision	URL
179	While in MOBAs you usually control a single unit – and if it dies, you're out of the game for a while. During that time you're just a spectator and can't help your teammates.	Skill	Decision	URL
180	Another significant difference is that Dota 2, League of Legends, HotS, and others are team-based games – and team skills almost always are more important than individual ones. In RTS games you're on your own, while in MOBAs you can always blame your teammates or the coach for the defeat :)	Comfort	Win/lose	URL
181	Sure, MOBAs have their own deep tactical features. You have to consider the character combinations in your and enemy teams, decide when to buy artifacts, etc. But in general, I feel they put a lot less pressure on the individual player. Maybe it's one of the reasons new players are more interested in MOBAs, and the AAA games industry is turning away from RTS games.	Comfort	Win/lose	URL
182	Video games in general nowadays tend to be less hardcore (not every game, sure!) to attract new audiences. These new players don't have time to spend hours and hours to master their skills. And it's perfectly fine, you don't have to be that dedicated to a game to enjoy it – and I'm glad that more and more people can appreciate what a great medium video games have become. But I still feel that a good game needs to have a room for a more skilled player to make a difference, to execute a comeback by the sheer power of experience.	Skill	Skill	URL
183	What's become quite interesting to me is the modern RTS that seek to merge the multi-unit management, base expansion, and/or harvesting of real-time strategy games with some combination of heroes, creep camps, itemization, map design, or in-match leveling found in MOBA games.	Skill	Decision	URL
184	I believe that RTS have a lot to learn from other genres, MOBAs amongst them. I believe in the beauty of real-time strategy game systems, and that games such as Offworld Trading Company are clear indications that the genre can experiment, test its bounds, and grow in exciting ways.	Variety	Variety	URL
185	Resources were spent on upgrades – a seemingly endless series of upgrades that took the players' focus off of the action and felt entirely too fiddly for their own good.	Skill	Decision	URL
186	While I did not get a chance to play much of the game, my impression was that units served little purpose unless kept in reasonable proximity to a given player's hero. There were few points of contention on the map, and little for units to do aside from kill enemy units or creep camps. This, in spite of the choice offered by unit loadouts, really served to make the game feel sadly shallow.	Skill	Decision	URL
187	The hero is the cornerstone of the MOBA. In essence though: heroes are divided, loosely, into roles and support their team in its goal in a unique way. Fundamentally, real-time strategy armies don't function the same as heroes.	Variety	Role	URL
188	Even with units having unique roles within an army, it is inescapable that units can occupy unique points in space and time within a match. Armies can be subdivided to contest, harass, decoy, zone/control or capture various points on the map. Individual units can be killed, multiple units can act independently from one another.	Skill	Decision	URL
189	In MOBAs, virtually all heroes are a single thing that impacts a single discrete area of a map at a single point in time. There are some few heroes that can teleport across a map, or cast map-wide abilities, or in some way contest, observe, or otherwise impact multiple areas of the map.	Skill	Decision	URL

Continued on next page

A. Appendix 1

Table A.1 – continued from previous page

Id	Data	Core	Category	Link
190	Bottom line: geographic dispersal of HP, damage, abilities, and innate characteristics is fundamentally incompatible with MOBA-style hero roles. RTS dynamics of expanding and producing structures is fundamentally incompatible with MOBA-style interaction dynamics.	Skill	Decision	URL
191	Porting heroes into an RTS can cause more challenges than that, of course. It's all too easy for heroes to be so powerful that units don't matter, or heroes so weak that they aren't particularly important.	Variety	Balance	URL
192	Itemization, in essence, is a spin on RTS progression systems: research, mostly. Items and leveling are the primary forms of progression in MOBAs.	Skill	Progression	URL
193	Virtually all progress made in MOBAs is irreversible. Experience learned (in most games) is experience kept. Money spent on in-match items can virtually never be lost. Money earned, in most cases, can never be lost	Skill	Progression	URL
194	A major difference here is that in RTS, virtually every advantage gained can be lost. Structures can be destroyed (and rebuilt – something again that most MOBAs eschew) and their conferred advantages erased. Units can be killed, et cetera et cetera. Not so in MOBAs. MOBAs are all about team momentum, all about the rate of gains. There are, in many cases, much more limited opportunities for a reversal of fortune.	Skill	Progression	URL
195	That being said, I do think in general that RTS can have too many points of failure. Too many advantages conferred that can be lost or squandered. I think there's a middle ground here. But importing flawed itemization/scaling models into strategy frameworks aren't solving any problems.	Skill	Progression	URL
196	In terms of map designs, let's face it. MOBAs, aside from Heroes of the Storm, tend to not be very inspired. Most of them, the vast majority, are spinoffs and slight modifications of the original DOTA map.	Variety	Variety	URL
197	MOBA maps are divided and constrained.	Variety	Variety	URL
198	RTS maps are never, or virtually never, like this. They're open fields of possibility, waiting to be contested and won.	Variety	Variety	URL
199	There may be resource nodes, or objectives, or neutral structures that block movement and line of sight, garrisonable buildings, or whatever. But almost never will they specifically and intentionally limit access to the majority of the map area.	Skill	Decision	URL
200	RTS and MOBAs are, at their core, in pursuit of vastly different ends. This is why the surface mechanics of either are so difficult to shoehorn into the other, or to meld peacefully into one.	Variety	Objectives	URL
201	In MOBAs, while the other team is the primary obstacle in the way to victory, they're not, really, the objective of the game. They can certainly feel that way, and I'll freely admit to reaching just a smidge here, but the real objective is the other team's Ancient/Base/what have you.	Variety	Objectives	URL
202	Teams that focus on map objectives tend to do better in MOBAs, all else being equal. Towers, inhibitors, barracks, etc – these are all objectives that players are really aiming for.	Variety	Objectives	URL
203	A major stumbling block for RTS players psychologically, tends to be that the main and entire focus is on destroying your enemy. And an RTS loss can be a death of a thousand cuts: lost workers must be replaced, a cost of resources and time and harvest rate/income. Destroyed structures make for a less effective army build/rebuild cycle. Inefficiently traded battles mean further losses down the line to infrastructure, compounded with the enemy's lowered repair and replacement rates. This snowballs into a mental slugfest where losing just makes you feel stupid. The other player was smarter than you, at least this time.	Comfort	Win/lose	URL
204	Adding objectives other than “kill the other player” opens up a lot of avenues in a game.	Variety	Objectives	URL
205	Suddenly, the other person's stuff isn't quite as important. It's an obstacle that must be overcome in pursuit of your higher goal.	Variety	Objectives	URL
206	Objectives make room for different skillsets (like heroes in MOBAs that are good at taking down towers, vs heroes that are good at farming the jungle, vs heroes that become wrecking balls in the later game) to be successful. Then, if a player prefers turtling up and holding territory, they can contribute in a meaningful, obvious way to a victory.	Variety	Objectives	URL
207	Giving players different things they're allowed to be good at, allowing different play styles to be successful, is a recipe to bring players into a game and keep them.	Variety	Role	URL
208	RTS tend to force players to be good at a wide range of skills simultaneously.	Skill	Hard	URL
209	One place where there's definite room for improvement is keeping players engaged and challenged while still allowing them to fall into a comfortable niche.	Variety	Role	URL
210	Ways to consider doing this that don't fall into the camp of “hero” might include things like Company of Heroes 2's Commander model, where players can pick specialized units and abilities to bring into combat. Alternately, some type of unit loadout or deck, as in the Wargame titles or the upcoming ARTS Tooth and Tail.	Variety	Role	URL
211	The bottom lines here are that MOBAs demonstrate the value of having both player and map be high value targets: this produces a more cadenced pacing naturally, with focus seesawing between map objectives and in fighting the enemy.	Variety	Objectives	URL
212	It allows for different types of success to be measured, and opens up the possibility for different types of unit with specializations not seen in mainline RTS.	Variety	Role	URL
213	It also opens up opportunities for players to specialize within a team, something at which MOBAs excel and RTS do not.	Variety	Role	URL
214	In RTS-style games, a player will always be more of a generalist than in games where they only have 1 character to manage.	Variety	Role	URL
215	Support players had all of the air units and support powers, defense players had infantry, turrets and artillery, and offense players had mainline combat units. And it felt wrong. As a player and game designer, I didn't like feeling crippled, especially as an offense player.	Variety	Variety	URL
216	All classes got a mix of support powers, turrets, and various class of unit. There were options all across the board, even if one class' turrets might be innately stronger or another class' support powers might feel broadly a bit more potent, they all had the same basic categories of tool.	Variety	Variety	URL

Continued on next page

Table A.1 – continued from previous page

Id	Data	Core	Category	Link
217	In games where you control, build, harvest and produce with multiple moving pieces, you cannot be as pigeon-holed within a single role. And any game with that many moving pieces needs to allow the player to take advantage of that fact – this was one of the hard lessons of Guardians of Atlas. Armies as an extension of a hero are much less interesting than heroes as an extension of an army.	Variety	Role	URL
218	Hopefully, I’ve made the case well enough that “role specialization” and “role specialization as seen in MOBA” games are actually pretty different things, and worthy of the distinction.	Variety	Variety	URL
219	As mentioned above, it can be anywhere from humbling to downright humiliating to lose a match in StarCraft or Company of Heroes.	Comfort	Win/lose	URL
220	It’s simply not as bad to lose if you can blame it on your friends/fellow players. And it’s still basically just as good to win if you do it with a group.	Comfort	Win/lose	URL
221	Now, most RTS support team play, but virtually none of them design or balance around it specifically.	Comfort	Team	URL
222	Team dynamics really impact unit, map, economical, balance and pacing design choices in various and sundry ways that can’t fully be accounted for in games designed intentionally to support 1v1 as its default format.	Comfort	Team	URL
223	The inherent problem here is, of course, that virtually no RTS is designed from the ground up as a team game.	Comfort	Team	URL
224	Having some degree of role specialization is a way to encourage team play, but very few games have tackled the idea of team play where each member of each team controls 20+ moving parts at once.	Comfort	Team	URL
225	There are a number of essential challenges to solve, but making each player more autonomous while still being able to contribute to the greater whole in a unique way (per my example above) feels like a good first step.	Comfort	Team	URL
226	And, again, not to harp too much, but map objectives separate from player infrastructure/economy/base can help here too.	Variety	Objectives	URL
227	More things for players to contest means more things for units to do, and more types of way for players to contribute and succeed.	Variety	Variety	URL
228	The MOBA is currently a largely fixed system, with many immutable elements and assumptions tangled within. RTS are better served at discerning the foundational ideas of MOBAs and adapting them than they are by aping surface traits like heroes or map towers.	Skill	Decision	URL
229	Despite the genre’s pretty intimidating reputation, real-time strategy (RTS) games are essentially just a few simple concepts (like making more stuff and trying to not die) crafted into an action-filled but surprisingly approachable package.	Skill	Hard	URL
230	The single-player campaign is a great starting point if you’re looking to test the RTS waters.	Variety	Learning	URL
231	Experience a rich story at a comfortable pace (thanks to difficulty settings ranging from Easy to Very Hard) before deciding if you’d like to delve into the skill-matched PvP modes or cooperative game modes.	Variety	Learning	URL
232	The various ways to play an RTS, including a wildly diverse pool of user-generated content, allow everyone to live out the fantasy of exploring faraway worlds blanketed in a menacing fog, constructing sprawling bases of other-worldly tech, and commanding massive fantastical armies in a variety of unique ways.	Variety	Casual/competitive	URL
233	Despite the genre’s reputation, sitting down with an RTS doesn’t mean you’re entering an esports training ground.	Comfort	Win/lose	URL
234	It’s more like embarking on an exploration of a digital sandbox that offers a wide variety of creative and critical decision-making challenges, regardless of your experience level.	Variety	Variety	URL
235	RTS really isn’t for everyone, but those who enjoy them tend to form some of the more dedicated and passionate gaming communities. RTS games require a significant investment of time and effort, but what you get out in return can be the most rewarding experience gaming can offer.	Skill	Hard	URL
236	RTS games and MOBAs share the same camera system, but MOBAs have the individual hero that players embody to serve as an anchor into the game. Finding ways to anchor players and contextualise the gameplay of RTS is a technique that helps a new player comprehend and immerse themselves.	Variety	Learning	URL
237	Always remember that while the games are called real time strategy most of them emphasize tactics.	Skill	Decision	URL
238	While some experts argue that strategic thinking can’t be taught, others believe that disciplined development and facilitated experiences can help to teach strategic thinking skills.	Variety	Learning	URL
239	In its simplest form, strategic thinking is an ability to plan for the future. It’s the capacity to prepare strategies and conjure ideas that will both cope with changing environments and consider the various challenges that lie ahead.	Skill	Decision	URL
240	RTS, to me at least, are more than idle ways to pass the time, ways to blow off steam, or a means of escapism; they’re playgrounds for exercising the mind, and they do so in ways that I contest few other genres can.	Comfort	Win/lose	URL
241	Not being in direct control of the pacing of game events put pressure on the player to make fast, accurate decisions based on limited information.	Skill	Decision	URL
242	Anyone can make a good decision given enough time, but RTS enforce critical thinking by forcing all participants to constantly evaluate the quality of their decisions and the efficiency of these same decisions.	Skill	Decision	URL
243	The root of RTS is not hordes of units duking it out in spectacular fashion, but is instead rooted around the acquisition and expenditure of stores of value (resources).	Skill	Decision	URL
244	RTS cannot exist in my view, without each player being given not only limited resources with which to act on the game, but a broad array of options with which to progress down.	Skill	Progression	URL
245	Progress in RTS is often represented with “upgrades” and “buildings” and “units” etc.	Skill	Progression	URL
246	The main point is, the player must be asked to invest limited (though not necessarily scarce) resources into progressing and expanding, capitalizing on their past actions towards future goals.	Skill	Progression	URL
247	This has typically been realized through the production of structures and workers to harvest and build more structures to increase the size and power of a player’s military force, but my definition doesn’t preclude other methods	Skill	Progression	URL

Continued on next page

A. Appendix 1

Table A.1 – continued from previous page

Id	Data	Core	Category	Link
248	Another cornerstone of this is the necessity that players be able to actually lose their investments. Units must be able to be killed, structures razed, territory taken. Players must be able to both gain, and lose what they've gained.	Skill	Progression	URL
249	A key differentiator between real-time strategy games and MOBAs is that in a MOBA, almost all of a player's progress cannot be lost once attained.	Skill	Progression	URL
250	Once a player gains a level for their hero, or a piece of gear, or in many cases wealth, it is impossible for them to lose it (some exceptions exist, as in DOTA where players lose gold when they die). This is a marked difference from RTS where virtually every single advantage a player has can be taken from them.	Skill	Progression	URL
251	This further reinforces the concept of "pressure" and the need to make good decisions, as well as testing and improving a player's ability to multi-task, as they must defend their own investments and use them as wisely as they are able.	Skill	Decision	URL
252	RTS are not just games about economics, they are games of competitive economics, or competing economies (a subtle but important distinction, since in very few RTS are players actually engaged in direct economic competition over the same pool of scarce resources).	Variety	Objectives	URL
253	In RTS, there is almost always one or more 'critical elements' that a player is seeking to wrest control over to achieve ultimate victory. [...] In Supreme Commander, the player must protect a critical piece, analogous to the King in Chess. In Company of Heroes, players are competing over control of a system that provides a resource: Victory Points. The first player to gain the requisite amount of points is the winner. However, in both cases, the win condition is binary: whoever doesn't have a Commander, loses. Whoever gets to 500 Victory Points, wins. And importantly, only one player can gain Victory Points at a time: whoever controls more Victory Point territories, gains the Victory Points resource.	Variety	Objectives	URL
254	An RTS must require the player to simultaneously manage multiple game pieces or elements.	Skill	Decision	URL
255	Though the player is not ordering tanks around a battlefield, they are being forced to simultaneously consider their opponent's game state, as represented by what resources they're producing, and their own game state, as represented both by the resources they themselves are producing, and the rates at which they are consuming and stockpiling all of the game's various resources.	Skill	Skill	URL
256	Time and attention are limited resources the player themselves has, and multitasking requires the player to spend them wisely.	Skill	Decision	URL
257	It also enables the much-lauded mind-games that all of the best RTS enable. Without stretching a player's time and attention to their limit, RTS would not be so compelling nor valuable.	Skill	Decision	URL
258	While I do not consider Fog of War itself to be a required element of real-time strategy games, I do consider uncertainty of other player's actions to be incredibly important. Economics, time pressure, and competition are all intensified if all players are forced to proactively seek out information on the actions, strengths and vulnerabilities of their opponents, and to defend against their opponents learning the details of their own actions, strengths and vulnerabilities.	Skill	Decision	URL
259	In short, a real-time strategy game is a game where multiple participants engage in competitive economics, managing limited resources to expand multiple game elements in order to gain an advantage and ultimately wrest control of one or more critical systems to attain a concrete victory.	Variety	Objectives	URL
260	One of the primary things you learn when beginning to play RTS is that they are hard. So difficult are they, in fact, that in virtually every case new players turn to watching gameplay analysis of better players, reading how-tos and strategy guides and memorizing popular build orders to get ahead.	Skill	Hard	URL
261	It's very difficult for the average player to craft winning strategies without the support of a larger community contributing to a common pool of knowledge of how to play the game (this is often called the game's 'meta').	Variety	Learning	URL
262	One paragon tool for improvement is the player's own gameplay, recorded in most major RTS in the form of replays of past matches they've played.	Variety	Learning	URL
263	Many RTS, from Grey Goo to Company of Heroes 2, to StarCraft 2 and Supreme Commander, have options to automatically save all of a players' past games into a replays repository for review upon demand. Supreme Commander innovated with GPGNet, and Blizzard with Battle.net, simple ways to share replays with others, and services like gamereplays.org exist as places for players to seek advice from game communities via their replays on how to improve at any given title.	Variety	Learning	URL
264	In the StarCraft 2 community in particular (as well as in the Supreme Commander community during its heyday) it is very common to see players spend almost as much time going over their replays, both of victories and defeats, as they do actually playing; they want to see what both they and their opponent did well and did poorly.	Variety	Learning	URL
265	What this all exemplifies and reinforces in the RTS player is critical self-analysis, a skill most all of us could use polishing up on. Both in RTS and in life, it is an invaluable skill to be able to review one's past performance clinically, not to agonize over past mistakes but to learn real lessons on how to avoid future mistakes.	Skill	Skill	URL
266	The journey, as it turns out, is the reward: learning from one's mistakes, being able to view a defeat as a learning opportunity instead of a setback, a chance to grow instead of an ego-crushing validation of one's own negative thoughts about themselves.	Variety	Learning	URL
267	I've seen RTS players advocate eschewing a focus on one's win-loss ratio or win percentage, intentionally 'throwing' tens or dozens of matches so there's nowhere to go but up.	Comfort	Win/lose	URL
268	Ladder anxiety can be combated by the right mindset, one where the player is constantly seeking to learn, to improve, and to enjoy the competition. Sure, losing sucks, but the good players will incorporate the lessons from their losses to turn future encounters into wins.	Comfort	Win/lose	URL
269	In RTS and in life, if you're not learning, you're losing, and even if you've had a defeat or setback, as long as you've learned from it you haven't lost. RTS is an excellent arena for this, as are most competitive games.	Comfort	Win/lose	URL

Continued on next page

Table A.1 – continued from previous page

Id	Data	Core	Category	Link
270	I've said it before, and I'll say it again: RTS are difficult! They ask more of their players than virtually any other genre of game, with the possible exception of the fighting game genre.	Skill	Hard	URL
271	And, most importantly, they have you do all of these things with limited resources. In most RTS, there will be 1, 2 or more concrete resources to acquire, manage, and spend as well as implicit resources like time, attention, and knowledge of what one's enemy is up to.	Skill	Skill	URL
272	RTS intentionally put pressure on their players to make effective decisions quickly and with limited information. This, ultimately, is a training ground for critical thinking.	Skill	Decision	URL
273	RTS players are intended to have a broad knowledge of the options available to them and their opponents, including but not limited to the functions and rough timings for enemy units and strategies, the implications of play for any given terrain features in use on the particular play area [...] or a build order that gets a player to a certain game state as efficiently as possible.	Skill	Skill	URL
274	To win, players must spend both their in-game resources and their implicit resources wisely, and make accurate, quick decisions based on incomplete or potentially inaccurate evidence	Skill	Decision	URL
275	To win, players must think critically both in the short term and long term. In the short term, misplaced armies, mismanaged units, and mistimed abilities (assuming the game contains active abilities of some sort, either on units or in the form of global effects like superweapons) can cost a player a match outright. In the long term, inefficient economy growth, passivity, and misreading of an opponent's strategy can leave a player in an unwinnable position	Skill	Decision	URL
276	And players are unable to do everything they might want, all at once. this is core to the RTS genre, and the reason for build orders, army compositions and the like.	Skill	Decision	URL
277	Unlike in virtually all 4X or Grand Strategy, players aren't in control of the pacing of the game, and are (as mentioned above) asked to do quite a lot of things at once, while meaningfully planning and executing on a strategy that can take upwards of 20 minutes to put together.	Skill	Decision	URL
278	However, it's seldom that players are asked to create a plan and asked to build and protect a complex system to execute it within the course of 30 or so minutes. To do this takes intense concentration, mental endurance, and adaptability.	Skill	Skill	URL
279	... and even MOBAs, which tend to last significantly longer than RTS matches, have downtime, a decreased burden of overall awareness of the game state (since each player is only one fifth of the effort being put into winning the match) and, arguably if not definitively, have fewer types of progression that must be monitored and planned to effectively advance into the latter stages of play.	Skill	Hard	URL
280	Well, ultimately, it means "RTS are hard!" I told you I'd say it again. practically, RTS require constant high level mental engagement from players, exercising planning and concentration in ways that are not seen in FPS, RPG, MOBA etc, broadly speaking.	Skill	Hard	URL
281	It's immensely satisfying to outwit, outplan, and outmaneuver another human person, especially if you can be reasonably assured that the other human person is roughly about as good at the game as you are	Skill	Skill	URL
282	RTS gamers tend to get a rush from, well, feeling superior.	Skill	Skill	URL
283	The planning isn't enough, the multitasking and micro themselves aren't enough, though there is a high degree of satisfaction in artistic or novel play and execution	Variety	Variety	URL
284	The existence of a form of RTS anxiety known as "ladder anxiety" is acknowledged by Blizzard, the makers of the RTS StarCraft and StarCraft 2. They discuss how this comes from nervousness about the ranked matches and going up or down in rank from gold to silver to bronze.	Comfort	Anxiety	URL
285	Yet during the teamspeak I sought out the answer to who had played this game before and found myself ashamed to be asking how to do things others who were new to the game figured out quickly.	Comfort	Negative emotions	URL
286	As I started to play I kept freezing in confusion and desperately clicking the keys or the mouse without achieving the effect I desired.	Comfort	Anxiety	URL
287	The map displayed clearly how my teammates were progressing and I could hear that they were already in battle while I had barely started figuring out how to build properly or gather resources. I found myself experiencing regret that I was a handicap to have on a team during a game of 3 vs 3 or even 3 vs 2 and one AI.	Comfort	Negative emotions	URL
288	When looking at the game statistics at the end clearly placing me toward the bottom I also felt as though I was less of a game player and perhaps even less of an intelligent person.	Comfort	Negative emotions	URL
289	Math anxiety seems to produce similar feelings of frustration and helplessness to what I experienced, as well as those who have experienced ladder anxiety during an RTS.	Comfort	Anxiety	URL
290	What I find interesting is that the suggested method of coping with ladder anxiety involves something that can be considered the cause of math anxiety – learning through repetition. Admittedly, these methods of coping are likely similar to the math coping strategies of accomplishing goals, including lecture taking, homework and exams.	Comfort	Anxiety	URL
291	But, according to Blizzard, just as many fans of the real-time strategy game suffer from what it dubs "ladder anxiety" - that is, they want to play competitively against other players online but are intimidated by the prospect and so don't.	Comfort	Anxiety	URL
292	Ladder anxiety is something that's come from the community. They say, 'every time I go into the game I'm so nervous about whether I'm going to go up or down in bronze or silver or gold.'	Comfort	Anxiety	URL
293	The real fun in StarCraft 2 is realising it's a game about personal self-improvement. If you look back to where you were, when you didn't even know how to block off the ramp to your base or get enough workers to get you enough income to build, to you progressing past that, that doesn't have to happen on a ladder with everyone seeing your ranking.	Comfort	Anxiety	URL

Continued on next page

A. Appendix 1

Table A.1 – continued from previous page

Id	Data	Core	Category	Link
294	To combat this Blizzard has introduced a raft of new features designed to encourage players to give ranked a shot. Chief among them is the new training mode, the first option under the matchmaking button. Training is divided up into multiple stages for each race, each harder than the last, that task players with performing actions essential to successful online play.	Comfort	Anxiety	URL
295	From AI Challenge the next step is the new Unranked Play mode, which lets you play against other human players free from the fear of the ladder system. Layered on top of all this is a new levelling system that players climb throughout the entire experience, including Training and AI Challenge.	Comfort	Anxiety	URL
296	That's what I think is the most fun part of StarCraft. It's that incremental improvement. I don't need the world to know what particular ladder ranking I have. So it is a lot more about, 'wow, I'm starting to be able to pull off this build or use these units more effectively.'	Comfort	Anxiety	URL
297	I am of course talking about solo/ranked games in SC2. If there's anything that can set my teeth on edge and make me sweat like a pig, it's that.	Comfort	Anxiety	URL
298	It's the uncertainty that makes these situations extremely uncomfortable for me at least. It's almost as if the body is pumping adrenalin into the body, trying to help you survive a dire situation. It's .. accelerating to say the least when you come out ontop of another human being.	Comfort	Anxiety	URL
299	In short (haha), I have a really weird anxiety now when I play SC. When I play with friends or a team it's not as bad, but 1v1's is just really stressful on me, even though it wasn't in the past. I've been playing a lot of DoTA/HoN recently as well, so I'm still active competitively, but for some reason RTS just gets the best of me.	Comfort	Anxiety	URL
300	For those who don't know, ladder anxiety is basically the fear or anxiety in playing a quick match, despite wholeheartedly wanting to play. In a nutshell, people with ladder anxiety are scared to play.	Comfort	Anxiety	URL
301	Starcraft 2 is particularly stressful. It's the epitome of a hard game, with one mistake often being your last. The body responds to a stressful situation by avoiding it in the future and if it's stressing out when playing a match of SC2, then it makes sense that the body subconsciously avoid it.	Comfort	Negative emotions	URL
302	Some believe that it's the ladder itself. SC2 is a 1v1 game (for the most part) and having no team mates to take the blame for losses means that every loss is on the player. It's a psychological blow to the ego.	Comfort	Win/lose	URL
303	What ever it is that triggers ladder anxiety, it's one of the main things that drive people away from SC2. People who have no desire to improve and increase their ranks are scared off and they don't even know why.	Comfort	Anxiety	URL
304	When you go into the matchmaking menu, you're immediately greeted with your league badge and your rank. Ranked mode is the default multiplayer mode. Even the quick match option, Unranked mode mirrors this. The name Unranked itself seems like the mode is only secondary to Ranked, making you feel like you should be playing Ranked.	Comfort	Anxiety	URL
305	While great for its target audience, I think that this focus on competitive multiplayer leads to a few problems particularly in drawing in casual or non-competitive multiplayer crowd.	Variety	Casual/competitive	URL
306	Focusing the multiplayer solely on Ranked places an unnecessary expectation on the player to do well, contributing to the feelings of stress in an already stressful game.	Comfort	Negative emotions	URL
307	In DotA 2, matchmaking is divided into Normal Matchmaking and Ranked. Ranked is regarded as a special mode wherein you try your hardest to do well and be graded based on your win and losses through MMR	Comfort	Anxiety	URL
308	Leagues should not be shown in the loading screen, instead be shown after the match. [...] I think it also does reduce stress during gameplay by hiding the true skill of your opponents.	Comfort	Negative emotions	URL
309	Provide motivation for players to play aside from ranks. I think Blizzard should take the Daily Quest system of Heroes and Hearthstone and implement it into SC2. In a perfect world, we'd see skins as rewards for these daily quests but seeing as the engine isn't built for custom skins, other rewards for this system should be considered.	Variety	Variety	URL
310	Have other modes besides Ranked. This is in part, going to be a reality with Archon mode (which is amazing if I say so myself. All the complexity of 1v1 and literally half the effort). Blizzard needs to push Archon mode and I think they know it too.	Variety	Variety	URL