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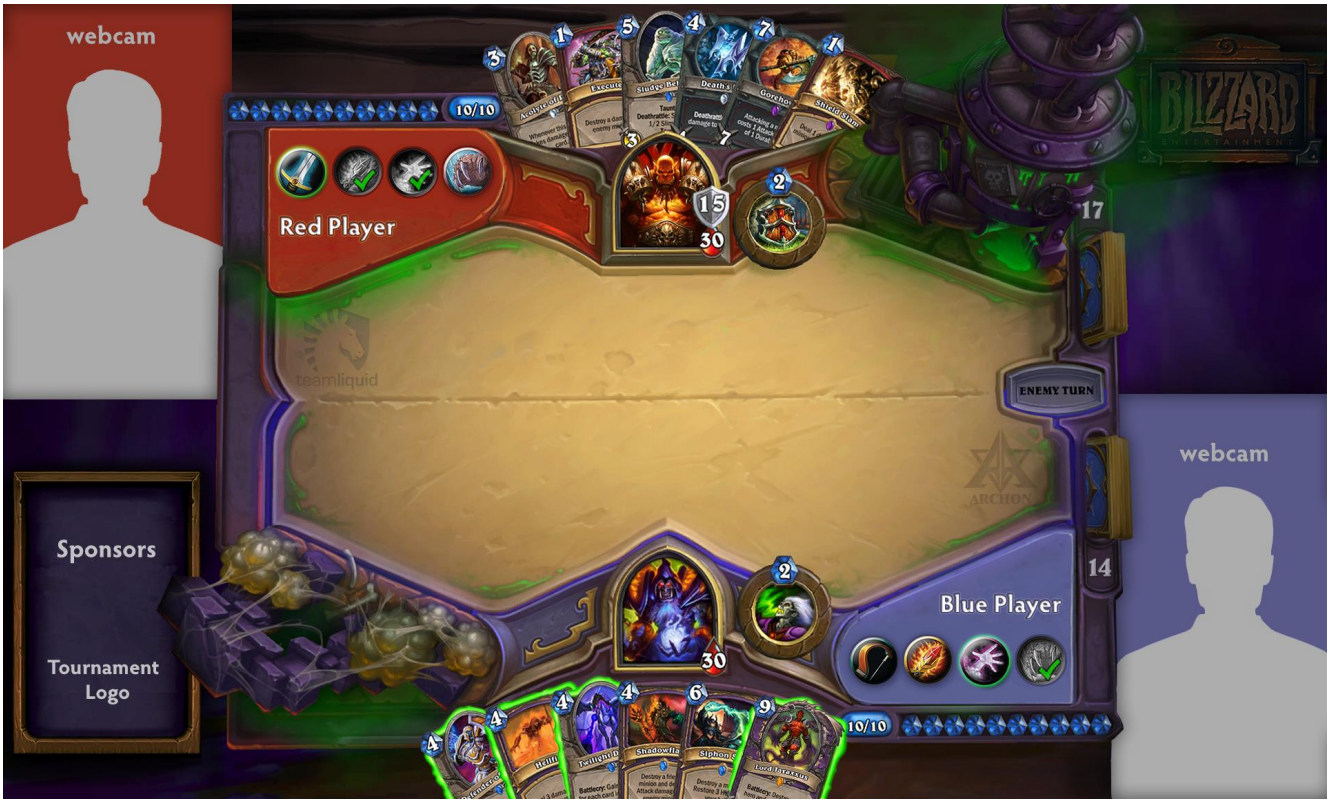

Designing Spectator Interfaces for Competitive Video Games

Master's thesis in the Interaction Design and Technologies Program

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Department of Applied Information Technology
CHALMERS UNIVERSITY OF TECHNOLOGY
Gothenburg, Sweden 2015
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Master Thesis at Chalmers University of Technology
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Cover:
Final redesign of the Hearthstone spectator interface, see page 73.

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Abstract

E-sports is an emerging trend in the video game industry. The amount of spectators and prize pools rise every year. Although a lot of game developers have started looking at having an e-sports scene for their game, many use it is a buzzword for marketing purposes. Having a dedicated spectator interface is an important part of becoming a popular e-sports game. This master thesis aims to produce guidelines on what to consider when designing the spectator interface of an e-sports game. This will be done by analyzing the spectator interfaces of popular e-sports games, regular sports and their video game equivalents, and making redesigned interfaces for four of the games; Starcraft 2, Hearthstone, Dota 2 and Counter-Strike: Global Offensive. Spectatorship and interface theory will also be considered in order to produce satisfactory redesigns and guidelines.

The redesigns will be exposed to the communities of each game in order to gather feedback, both through questionnaires, interviews and comments in an iterative process. The guidelines will be based on the lessons we learn from the redesigns, feedback and theory.

Acknowledgement

We would like to express our gratitude to our supervisor Staffan Björk who helped us throughout the report with well thought comments, remarks and support. Furthermore we would like to thank the users of Reddit for taking the time to give us feedback and thoughts on the work that was done. Also, we would like to thank Ryan T. Schutter for doing an interview with us concerning his work at Blizzard Entertainment. Finally, we would like to thank Hanna Frank and our loved ones for their support and input throughout the whole process.

Table of Contents

1. Introduction

E-sports is an emerging trend in the video game industry. The term e-sports means electronic sports, and can be described as competitive video gaming (Taylor, 2012) (Jonasson and Thiborg, 2010). There are some similarities to regular sports where teams or individual players are competing to be the best. Professional gamers earn prize money and salaries as in any other professional sport. E-sports has been around since the emergence of online gaming over the Internet, but prize money and viewership numbers have soared in the past few years. SuperData Research states that 71 million people worldwide watched e-sports in 2013, doubling the numbers from the year before (SuperData Research, 2014). To put this in perspective, the FIFA 2014 finals had 350 million viewers (Statista, 2015).

Figure 1.1: *The TV spectator view from the broadcaster BBC between Brazil and Germany in the FIFA World Cup 2014 (BBC, 2014).*

Many of the most popular regular sports have one primary point of focus, the ball is what drives the action in a game of football, for example. Some competitive video games share this aspect, and this is something we will investigate. However, in many competitive video games there can be multiple points of focus, where each point can be crucial in determining the outcome of the game.

Figure 1.2: *The spectator view of a Starcraft 2 match, MajOr vs Bunny in the 2015 WCS Season 1 Premier League (WCS, 2015).*

With its many points of focus, it can often be hard to keep up with what is happening in a video game. Many aspects of the game can only be understood by having played the game yourself. This limits the numbers of spectators to basically the amount of players that have played the game. Adding to that, there is also a lot of extra information, crucial to the game, displayed to the spectator of a competitive game. We believe by making the games more spectator-focused with good user interfaces there will be more individuals getting inspired to spectate and maybe even try out the games themselves.

1.1 Games and Genres

Four games will be described and analyzed in this report. We selected games from various genres to be able to get a broader perspective and investigate how game interfaces differentiate from one another. The most popular e-sports genres right now are Multiplayer Online Battle Arena (MOBA), First Person Shooter (FPS), and Real Time Strategy (RTS). Digital Collectible Card Games (CCG) are also on the rise (e-Sports Earnings B, 2015) and therefore we want to investigate how a traditionally physical card game transitions into a digital space. The games chosen for this project were Dota 2 (MOBA), Starcraft 2 (RTS), Counter-Strike: Global Offensive (FPS) and Hearthstone: Heroes of Warcraft (CCG). One of the reasons for picking these games is that they are some of the most popular e-sports games within the chosen genres. They are also the games that we have the most personal experience with. We will further describe these games in the Background chapter.

Some honorable mentions, that will not be looked at in-depth, are League of Legends, Heroes of Newerth and Smite (MOBA games), Quake Live, the Call of Duty and Halo series (FPS games), the Command & Conquer series and Warcraft 3 (RTS games). Some other genres that will not be looked at, but deserve a mention, are Fighting, Racing and Sports games. As we have no experience with these genres we feel that we would do an inadequate job analyzing them.

1.2 Purpose and Research Question

We think the spectator interfaces of e-sports games can benefit from information visualization, user interface and behaviorism of spectator theory in order to make it more accessible and expand their audiences. In Dota 2, for example, every character has their own set of abilities, and with a roster of 109 characters in the game it is quite obvious that it will be hard for new spectators to understand what is happening, even if they have experience in other games. Most spectator interfaces in e-sports titles have this problem with "assumed knowledge", knowledge that the spectator is assumed to have when watching. We want to find out if it is possible to somehow help new and current spectators to understand the game better and improve the viewing experience.

We aim to answer the research question:
What is important to consider when designing a spectator interface for competitive video games?

This thesis aims to present guidelines on how to create a spectator friendly game and use these guidelines to redesign the spectator interfaces of the four games chosen above. The guidelines will be created in an iterative process by analyzing and comparing some of the interfaces in the most popular e-sports titles and gathering feedback from spectators. Furthermore, we will look at other areas such as information visualization, general graphical interfaces and regular sports.

1.3 Delimitations

This report will only focus on interfaces for tournaments, from a spectator's point of view. We will not look at the interfaces on personal streams, which are most often the in-game interface. It is the e-sports and spectator's side we want to focus on for this report.

One of the big issues in e-sports and in online games in general are the so called trolls. It is easy for someone to say rude, sexist and mean things on the Internet due to anonymity, and that discourages new people to want to be part of the community. While this issue may impact the spectator experience of an e-sports game, researching and looking at solutions for it would take up too much time and could probably make up a master thesis on its own. Therefore issues with toxicity in the community and in-game chat will not be considered.

Another issue is the debate whether e-sports are real sports or not. A lot of the people, mostly the fans who play and watch e-sports games, say they are real sports and a lot of people say they are not. We will not discuss this in this thesis as we are only interested in the spectator interfaces.

1.4 Stakeholders

Four stakeholders have been identified for the project. The biggest and most apparent one is the spectators. E-sports spectators usually play the game they watch on a non-professional level. Mike Sepso, one of the co-founder of Major League Gaming (MLG) said in an interview that the typical viewers are active gamers, between 16-24 years old, maybe a bit older, American guys (CBS News, 2014). This could be true for America, but according to Taylor (2012), Dreamhack - a big Swedish tournament - has a lot of girls spectating as well.

Another stakeholder is the game developers who can get inspiration from our report to develop their games to be more spectator-friendly. Having an e-sports scene for your game is popular among developers these days and is sometimes used as a buzzword to generate hype in order to sell more copies, Battlefield 3 (EA, 2011) (Trevor, 2013) and ShootMania Storm (Valdes, 2013) are examples of this.

The last major one is tournament organizers. The organizers make their money with advertisements and sponsors. It is in their interest that as many people as possible watch their tournaments, as more spectators mean bigger advertisements and sponsor contracts. In this stakeholder we include everyone who contribute to put tournaments together, from casters and observers to studio managers.

Lastly, a minor stakeholder are the pro gamers themselves. The pro gamers also want as many people as possible to watch the tournaments they compete in. Without spectators, their team sponsors and organizers will not pay them to play. More spectators mean more fans and more money through advertisements and sponsors.

2. Terminology

This chapter describes the terminology that is used throughout the thesis.

Maps
A map (sometimes called level) is a digital space where games can be played. It is the equivalent of the board in chess or the pitch in football.

Fog of War
In many strategy games, the player's vision reduced to the vision of his units. The parts of a map where the player does not have vision is called the fog of war (Gameplay Design Pattern Collection A, 2014).

Stream
As movies, music, texts are converted to digitized form, streaming become the dominant form of delivery. YouTube for example is a well-known streaming service that helps users broadcast themselves by uploading videos. There are also other forms of video streaming. Video games has become a popular media to broadcast, where players (often professional players) can stream when they are playing (Dixon, 2013).

Hit Points (HP)
This constitutes the health of characters in many games. When the characters hit points reaches zero, the character dies (Gameplay Design Pattern Collection B, 2014).

Experience Points (XP)
A common attribute to Roll Playing Games are experience points abbreviated XP. Experience points are often gained by defeating enemies in combat or doing contextual achievements. By earning a certain amount of XP, a character's level is raised which unlocks more abilities (Adams and Rollings, 2010).

Statistics or Stats
Statistics or stats for short is a character development tool, it defines how powerful the character is. In some games, when the characters gets a level up, the general statistics of a character is increased.

Meta or Metagame
Metagame is the external planning on how the current trends are in a video game. It goes beyond knowing the mechanics of the game but rather about gaining advantage through outside the game, studying and exploiting the current trends in order to get an advantage. Metagame is a crucial element when playing video games at a competitive level (Liquipedia A, 2015).

Real Time Strategy (RTS)
In RTS games, the player controls a whole faction, nation or race. The game is played on large maps, where each player can build up their bases, train armies and then attack. The player has a bird's eye view of the battlefield. The objective is to eliminate the opponent's buildings and army (Blizzard Entertainment A, n.d.).

First Person Shooter (FPS)
In FPS games, the player only controls one single character. The player sees through their character's eyes, in first person, hence the name. FPS games traditionally feature a map with enemies to shoot and objectives to complete (Adams and Rollings, 2010).

Multiplayer Online Battle Arena (MOBA)
In MOBA games, the player also only controls a single character, working in a team with others. Like in RTS games, MOBAs are played on a large map. There's usually two computer controlled factions fighting each other, with one team playing on the side of one faction. The objective is to destroy opposing faction's base.

Digital Collectible Card Games (CCG)
CCGs are turn-based games played with cards, where the objective is usually to reduce the opponent's hit points to zero. Collectible card games are traditionally played with physical cards, but have become increasingly popular to play in a digital format lately, especially with the release of Hearthstone: Heroes of Warcraft. CCGs are usually played one versus one, with the two players competing by playing cards from their pre-picked decks. They are not played on a map that can be traversed by the players, but is instead played on a virtual game board.

3. Background

This section goes through a brief history of e-sports and describes the four chosen games in detail. It also quickly covers some of the largest e-sports tournaments and how they are played out.

3.1 The History of E-sports

As capabilities for playing multiplayer games over the Internet grew, more and more people started to organize small leagues and tournaments. In 1997, the Red Annihilation tournament for the FPS game Quake was played. It is considered by many to be the first "real" big-scale e-sports tournament. Over 2000 people participated, the winner received a Ferrari previously owned by John Carmack, the game's lead developer (Edwards, 2013) (Taylor, 2012).

In the early stages of e-sports, games were often not built to allow live spectators. Sometimes the developers saw the demand for spectating and added it. This was the case in the original Counter-Strike, with spectator mode being added in the first major patch, just months after release (Steampowered, 2005). To spectate a game though, you had to know the IP address and password of the server the game was played on. In order to make the process less cumbersome, HLTV was added. Spectators could connect to the HLTV client instead and have full spectating control. This would also lessen the connection strain of the server, with just one spectator client instead of hundreds (Slipgate, n.d.).

Other games worked around not having a spectator mode in other ways. For example, Starcraft 1 did not have live spectating supported by the game, it only had a replay system. To fix this, users would mod the maps instead, adding another player - the spectator player - who would have no units or buildings but had shared vision with both competitors, to allow them to see from a spectator's view (Battlenet, n.d.). This view could then be used to stream the game to other people. Most competitive games since then have had a spectator mode. Notably, Hearthstone did not launch with a dedicated spectator mode (Shea, 2014), the only game this report will analyze that did not have a spectator mode on release.

You cannot really discuss e-sports without mentioning Twitch. Twitch is a streaming site, a spinoff of its predecessor Justin.tv. In January 2015, Twitch reached 100 million viewers a month (Needleman, 2015). Twitch lets gamers stream any game they want, directly from their point of view. Some pro gamers stream their practice games, explaining their decisions and interacting with viewers (Kaytoue et al., 2012). Twitch has also established itself as the premier tournament streaming site, eliminating most of their competition and helped going from spectating in-game with HLTV and replays to allow spectators to watch over their browsers (van Ditmarsch, 2013). You can still spectate in-game in CS:GO and Dota 2 if you prefer to control the camera yourself, though.

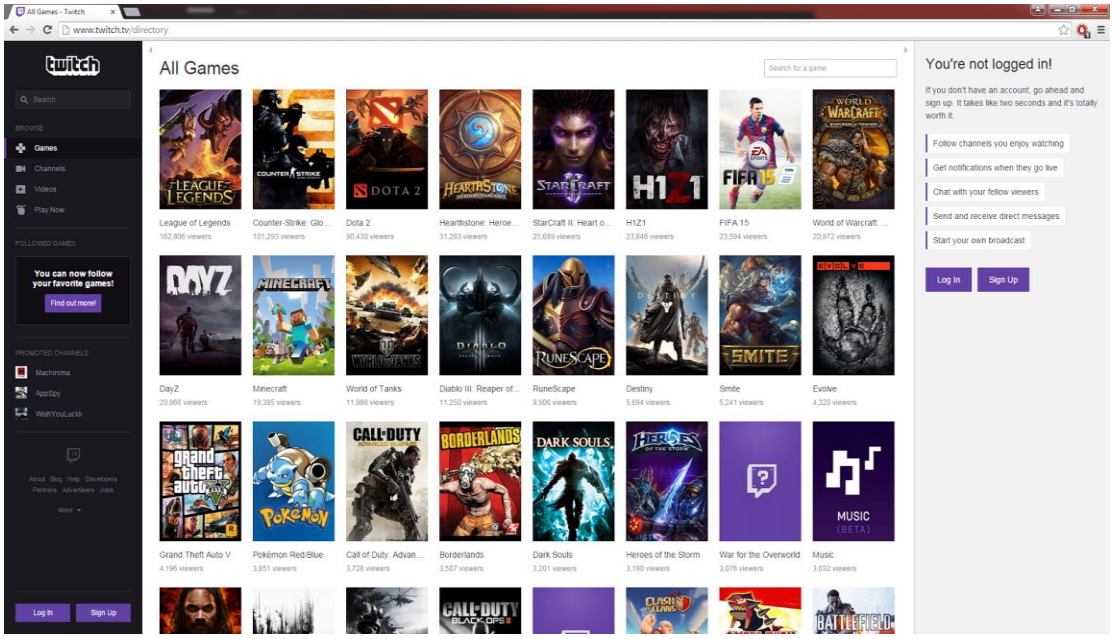

Figure 3.1: *Twitch's 24 most popular streamed games February 18 2015.*

The games are sorted by viewing numbers.

3.2 Descriptions of the Games

The following sections describe the four games that will be analyzed throughout the report. How tournaments are played in the games will also be described. There are certain terminology and tournament setups that are true for all of the games; Tournament matches are composed of a set of games. “A set of games” in this context does not mean a set of different games, like Starcraft and Counter-Strike, but a set of game sessions of the same game. A game session is the whole activity of a player playing one game (Bjork and Holopainen, 2006). It works similar to sets in tennis. A match is won when one side wins the majority of the games. The number of games varies, depending on how deep in the tournament the match is played, but is usually best of one (BO1), best of three (BO3) or best of five (BO5) games. Starcraft 2 often uses best of seven (BO7) games for the grand finals of a tournament.

3.2.1 StarCraft 2

Starcraft 2 is a real-time strategy game made by Blizzard Entertainment. It is being released in a trilogy format, the second and current installment is called Heart of the Swarm, with the third and last expansion Legacy of the Void is in development at the time of writing. Starcraft 2 is the sequel to Starcraft, one of the most popular RTS games of all time. Starcraft with its Brood War expansion was considered one of the front runners for e-sports for a long time, especially in South Korea. With Starcraft 2, Blizzard Entertainment gave the e-sports scene a considerable boost in popularity.

Starcraft 2 has three races; the Terrans, the Zerg and the Protoss. Each race has their own set of unique units and buildings. The Terrans are a humanoid race with machines, spaceships and robots, with units like the Marine and Siege Tank. The Zerg are an insecticide race, who favor

overwhelming opponents with swarms of units. The Protoss are an alien race with advanced technology. Their units are usually stronger but more expensive than the other races' units. In order to build units and buildings, players have to gather two types of resources; minerals and vespene gas. The players always start with a set amount of available minerals and gas to mine placed on the starting positions on the map. They can then expand to other sites on the map, with more minerals. A third resource, called supply, also has to be maintained throughout the game. Each unit takes up a certain amount of supply, the amount varies depending on how strong the unit is. The three races have their own method of increasing their maximum supply. A player cannot build units if he does not have the required supply for the unit, this is called being supply blocked. To win the game players have to destroy all of the opponent's buildings. This is done by building a large enough army, then attacking their base (Blizzard Entertainment B, n.d.). Most of the time though, the losing player concedes the game once he realizes he has been beaten.

Starcraft 2 is primarily played one versus one, but allows up to eight players to compete in teams or free for all. There are also custom maps made by the community (Blizzard Entertainment A, n.d.). Only one versus one is played on a competitive level. The maps that are played in tournaments are called the map pool and is rotated every few months, with new maps replacing old ones. The map pool usually consists of around seven maps, players are generally allowed to veto and vote on which maps to play for each match. As the metagame shifts, certain strategies favor certain maps. On large, open maps, it might be hard to defend against a Zerg that spreads its forces out and attacks on multiple fronts, for example. Some maps have watchtowers that the players can control in order to get increased vision around it.

Figure 3.2: *A game of Starcraft 2 viewed from the player's perspective.*

Two terms that are often used in Starcraft 2 are micro and macro. They are short for micromanagement and macromanagement, respectively. Micro concerns the control of units, things like unit movements, positioning, unit special abilities and how players use them (Liquipedia B, 2014). Macro on the other hand, is the control of buildings and economy, spending resources and preventing supply blocks (Liquipedia C, 2014) Even though macro is sometimes considered more important (Liquipedia D, 2015), micro has its entertainment value with players trying to make the most out of each unit.

3.2.2 Dota 2

Dota 2 is a sequel to the widely popular Warcraft III mod Defense of the Ancients. It is now developed by Valve Corporation with one of the original lead designers, "IceFrog".

Dota 2 consists of two teams with five heroes each fighting to destroy the opponent's Ancient. The Ancients are placed at the far ends of the map surrounded by buildings and towers (Yin-Poole, 2011). Each hero is controlled by one player and their focus is to gain experience points, collect gold, and kill enemy heroes. When experience is gained in combat, more and more abilities are unlocked and the general statistics of the hero are increased as well. Heroes are divided into certain roles depending on the primary statistic which includes; strength, intelligence and agility. Strength heroes grows stronger by getting more hit points, making them harder to kill, which results in that they are good at taking damage. Intelligence heroes are more reliant on casting their spells from afar, making them more suitable for a supportive role. The last ones are agility heroes which are the serious damage dealers as agility increases the attack speed. In order to have a good balanced team, it is advised to mix heroes according to their statistics and their spells (Kolan, 2011). There are computer controlled creatures on the map that can be killed for extra gold and experience. The toughest of these creatures is Roshan, who drops the aegis when killed. The aegis brings the hero that carries it back to life when they die. It is consumed when it is used.

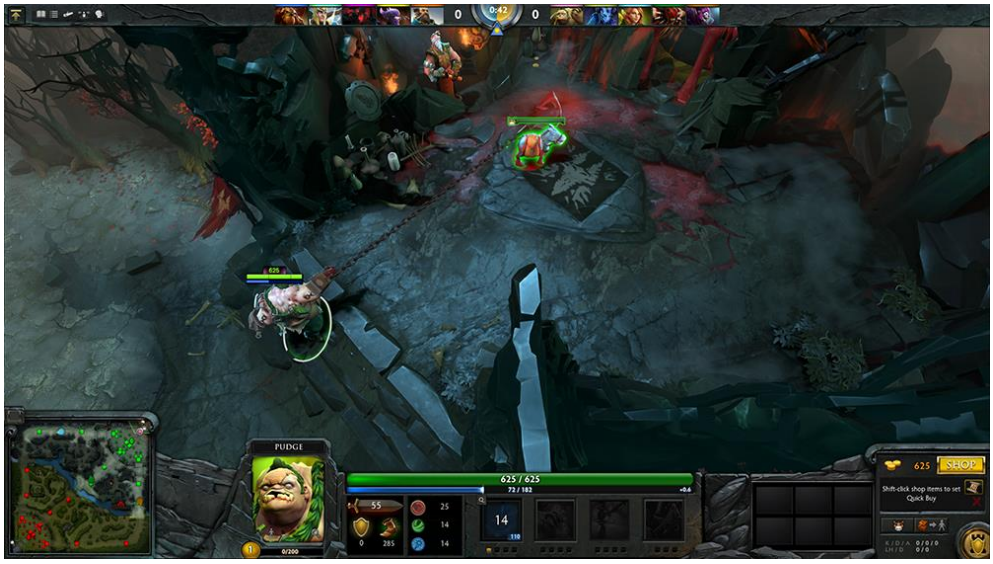

Figure 3.3: *A game of Dota 2 viewed from the player's perspective.*

An important aspect about the competitiveness in Dota 2 is the drafting. For each game of competitive Dota 2 there is a drafting sequence where the captain of the team has to choose what heroes that should be played in the game. The drafting is turn-based with the teams alternating between picking and banning heroes. A hero that is banned cannot be picked for the game nor can a hero be picked multiple times in the same game to make the games more interesting and variant. During the draft the captain of the team is choosing a combination of heroes that his team has practiced. In some cases the captain can try and counteract the heroes picked by the opposing team by banning heroes they think the opponents want and picking suitable counter heroes. This is almost a game itself as it decides on how the teams will play and how the metagame looks like at the time (Gamepedia A, 2015).

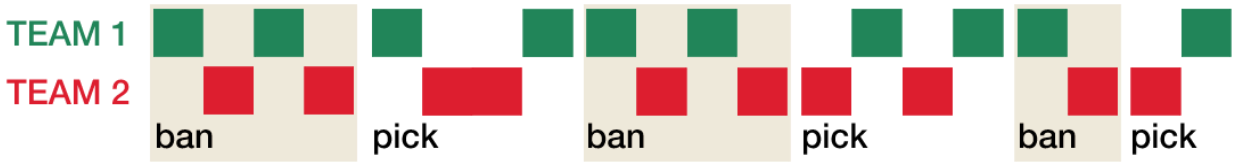

Figure 3.4: *The sequence of banning and picking heroes for Captain's mode in Dota 2.*

The competitive scene started back in 2005 with its first tournament in the original game (Gamepedia B, 2015). Since then more tournaments, players, teams have increased and Dota has the most prize money ever in a video game (e-Sports Earnings A, 2015). The International is an annual tournament hosted by Valve themselves where the prize money is breaking records every year.

What makes Dota 2 a competitive game is that the game is team based relying on how good the team chemistry is. In order to improve teamwork, teams have to play a lot with each other. In some teams, players are living together prior to a tournament to boost their training regimen and some teams live at their team houses all year round.

3.2.3 Counter-Strike: Global Offensive

Counter-Strike: Global Offensive (abbreviated CS:GO) is the latest and third installment of the popular FPS franchise Counter-Strike. It was originally created as a mod for the single-player game Half-Life, a game made by Valve in 1999. Skyrocketing in popularity, the mod was picked up by Valve and has been developed by them ever since. CS:GO features two teams, Terrorists and Counter-Terrorists and has five game modes; Classic: Competitive, Classic; Casual, Demolition, Deathmatch and Arms Race (Counter-Strike: Global Offensive, n.d.).

Only the Classic: Competitive mode is used for e-sports. It is a round-based game mode, with five players on each team. For each round, the Terrorists' objective is to successfully plant and blow up a bomb on one of the two bomb sites before the time runs out. The Counter-Terrorists' objective is to protect the bomb sites, defuse the bomb if the Terrorists manage to plant it or survive until the round is over. Either side can also win by eliminating the whole enemy team. Every round starts with 15 seconds of buy time, where players use in game money to buy the weapons and equipment they will use for the round. If a player survived the previous round, their

weapons and equipment are kept. On top of the standard income players receive each round, they can also earn extra money by killing enemies, planting/defusing the bomb and winning the round. Losing multiple rounds in a row also gives bonus money, to allow teams to buy weapons even if they are on a losing streak (Counter-Strike: Global Offensive, n.d.). Understanding how the economy works is crucial to playing the game well at a higher level.

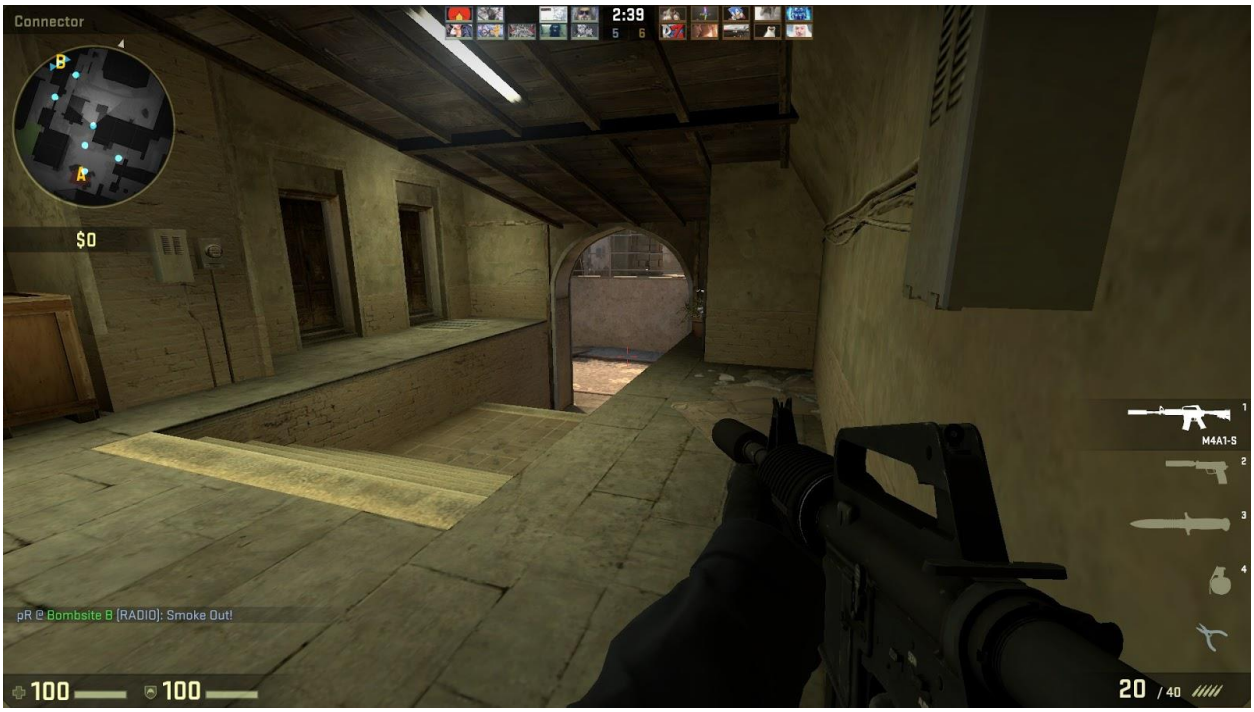

Figure 3.5: *A game of Counter-Strike viewed from the player's perspective.*

A game of CS:GO is played in two halves, one team starts by playing as Terrorists and the other team as Counter-Terrorists. Each half is 15 rounds, at which point they switch sides. This means that there is a total of 30 rounds in one game. In tournaments, one round is usually 1 minute and 45 seconds. To win the game, a team needs to win more rounds than their opponents, meaning when one team have won 16 rounds, they have won the game. If the teams tie at 15-15 round each, an extra three rounds on each side per team is played. If the overtime is tied, another one is played until a winner has been determined (Dreamhack CS:GO Rules n.d.) (ESWC Gamescom, n.d.) (ESL Pro League Rulebook, n.d.) (After Hours Gaming League, n.d.).

Like Starcraft 2, competitive CS:GO is played on maps from a set map pool. The teams veto and vote on which maps to play. However, unlike Starcraft 2, the map pool is not changed very regularly. In fact, at the time of writing all but one map is a remake of a map from one of the older iterations of the game (Counter-Strike Wiki, n.d.).

3.2.4 Hearthstone: Heroes of Warcraft

Hearthstone: Heroes of Warcraft is a collectible card game created by Blizzard Entertainment. Hearthstone is a digital CCG that is similar to the well-known Magic: the Gathering. The biggest differences is that Hearthstone is played on virtual devices while Magic is mainly a physical game.

The game is set up with each player having one hero out of 9 to choose from (Hearthstone, n.d.) (Shea, 2014). A game of Hearthstone is won by reducing the opponent's hero's hit points from 30 to 0. The heroes are different from one another because each of them have their own signature spell called hero power. For example, the priest has a healing spell, the hunter has a hero damage spell. Some cards are also restricted to a certain class.

In the start of a match, players will go into a card selection phase called the mulligan (Hearthstone Wiki, 2015). During the mulligan phase, players gets three or four random cards from their decks depending on if the player is playing first or second. The players then gets to choose which ones they want to keep and redraw. If two of the cards are redrawn for example, two new cards will take their place. Mulligan is an important phase as it pretty much sets off how game will turn out and a good mulligan can result in a high chance of winning.

Hearthstone has three different card types; creatures, spells and weapons (Shea, 2014). Creature cards can be placed on the game board and are either used to attack other creatures or the enemy hero. Likewise, spells are used the same way but in addition to the attributes the creature cards has, spells can power up creatures as well. Spells are not placed on the board but are played directly from the hand. A subtype of spells are secrets. The effects of a secret card is delayed until your opponent makes a move that activates it. An inactivated secret is displayed on the hero portrait. The last type are weapons which some heroes can equip in order for the heroes themselves to attack.

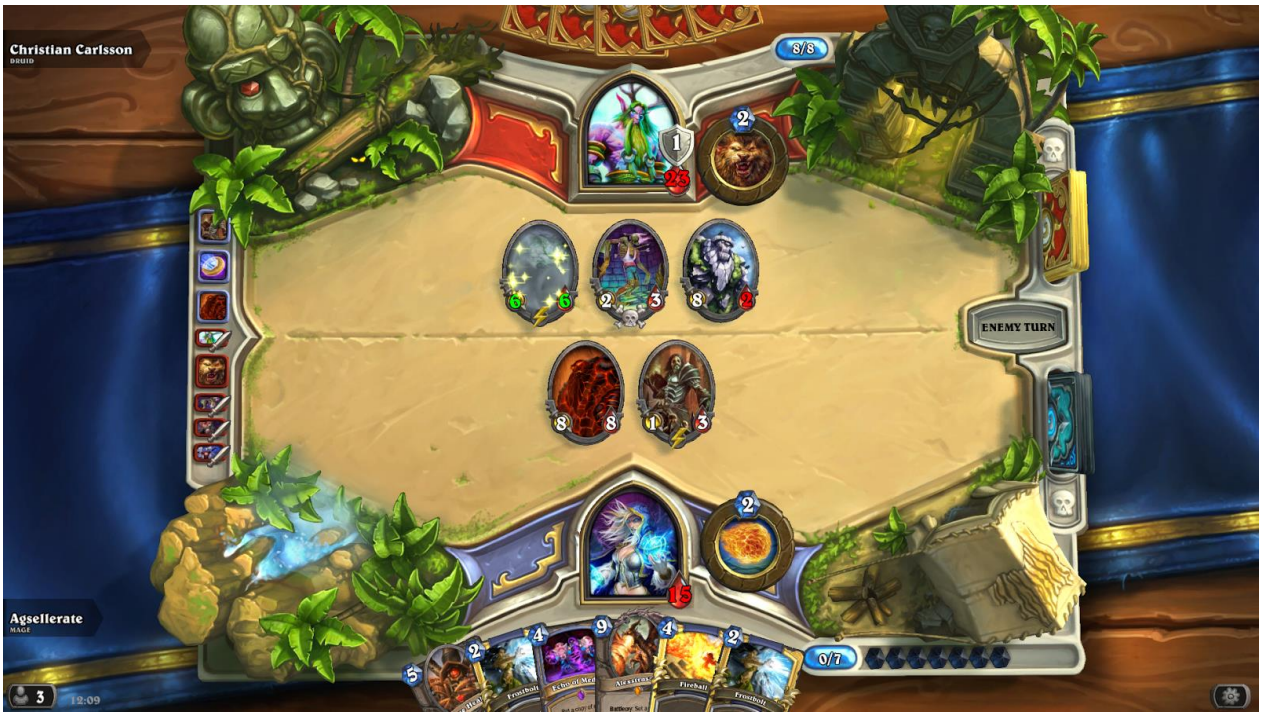

Figure 3.6: *A game of Hearthstone viewed from the player's perspective.*

The creature cards have four attributes to them; amount of attack power, hit points, mana crystals required to place it on the game board and a descriptive text (Shea, 2014). Mana crystals is a kind of resource similar to minerals in Starcraft 2, meaning that in order to place a creature card on the game board, players must have the available amounts of many crystals . At the start of the game both players start with one available mana crystal and it's increased by one every round. For example, at the start of turn four, the player has 4 mana crystals, and is allowed to put down one 4-mana creature, or two 2-mana creatures on the board and in the next round the player will have five mana crystals available to spend.

The depth of Hearthstone comes from deck building. Players can build their own decks of cards to create powerful synergies and tactics. This is where tournament play divides the lesser players from the pro players. In tournaments, the best players know how the current meta looks, and how to counter certain powerful decks. Tournaments in Hearthstone are played a bit different from the other games. Each player gets to choose one, three or five decks that they will compete with depending on how deep in the tournament the player is. Normally the winning deck will be played again in the next game while the losing player gets to choose one of the other decks that was brought to the tournament. However in 2015, the World Championship changed the rules so each player has to win with each of their decks in order to win the match.

3.3 Tournaments

As mentioned previously, The International is an annual Dota 2 tournament, where 16 top teams compete over the largest prize pool e-sports has to offer (e-Sports Earnings A, 2015). The tournament is hosted by Valve and draws huge crowds. In 2014, players were allowed to buy compendiums to access in game cosmetic items for $10, $2.5 of which were added to The International 2014 prize pool (Dota2.com, 2014). Because of this, the prize pool grew to dwarf any previous event (e-Sports Earnings A, 2015).

In both Hearthstone and Starcraft 2 there are leagues spanning over the whole year called World Championship Series (WCS) where players have to gain points in order to compete in the final tournament at Blizzcon (Blizzard Entertainment C, 2014)(Blizzard Entertainment D, 2015). Blizzcon is an event hosted by Blizzard Entertainment where they promote their major franchises. In Starcraft 2, the WCS leagues are hosted by official broadcaster partners; ESL, GOMeXP and SPOTV. Both GOMeXP and SPOTV cover the South Korean competitions, while ESL covers rest of the world. In Hearthstone, the regional tournaments are divided in a different way, meaning that 4 players from Europe, America, Asia-Pacific and China will compete in the finals.

ESL is not only Blizzard's broadcasting partner for Starcraft 2, it is also arranges both professional tournaments and amateur leagues for a multitude of games. ESL One and IEM are its two major tournaments, featuring Counter-Strike: Global Offensive, Dota 2, Starcraft 2 and League of Legends (ESL, 2015).

Dreamhack is the largest Local Area Network (LAN) party in the world, it is arranged twice a year in Jönköping, Sweden (Guinness World Records, 2013). It has also grown to be one of the biggest tournament organizers in the e-sports scene, not only hosting tournaments during their

LAN parties, but also organizing Dreamhack Open - a Starcraft 2 tournament with grand finals at Dreamhack Winter - throughout the year, with events all over Europe (Dreamhack, 2015). In 2015, Counter-Strike: Global Offensive will be included in the Dreamhack Open events (Dreamhack, 2015). The games that are played at the Dreamhack LAN tournaments varies, at Dreamhack Winter 2014 for example, Counter-Strike: Global Offensive, Starcraft 2, Hearthstone, Dota 2, League of Legends and Ultra Street Fighter IV were played (Dreamhack, 2015).

Figure 3.7: *Spectators watching a Dota 2 match at Dreamhack Bucharest 2014 with rapt attention (Söderberg, 2014).*

There are a lot of e-sports tournaments around and they cannot all be covered, in Starcraft 2 alone there were 176 tournaments in 2014. Some tournaments we still want to mention are Major League Gaming (MLG) and World Cyber Games (WCG). Both tournament organizers have had a big impact in the e-sports scene (Arora, 2014). WCG was considered as one of pillars in competitive gaming since 2000. In 2014 though, they announced that all tournaments were cancelled probably due to lack of sponsorship. MLG is mainly holding North American tournaments with a focus on both PC games and console games (Majorleaguegaming, n.d.).

4. Theory

This chapter describes the theory that was found and used in the thesis. Spectatorship, information visualization and graphical interface theory were the three main areas of interest.

4.1 Casters and observers

In regular sports, the commentators are usually in the same place as where the match is played and commentate according to what they see. This does not affect how the TV is representing the match. In video games, there is usually one observer and one to three casters. The observer's job is to manipulate the virtual camera in the game, making sure that nothing important is missed and that the spectators understand what is happening in the game (Cheung and Huang, 2011). They are the equivalent of the camera man in regular sports (Stackoverflow, 2013). Sometimes the role of observing falls on the casters and sometimes the in-game camera does not have to move at all, like in Hearthstone, for instance. Nevertheless, the observer is often crucial for a well-produced tournament, as casters are often too busy commentating the game to do a proper observing job at the same time. Imagine what would happen if the commentators of a football game would have to control the camera as well.

Figure 4.1: *Two American Football commentators discussing (ESPN, 2015).*

The casters have the role of the commentators in regular sports. They usually have two monitors, one that follows the observer's camera, to coordinate the commentary with what the spectator sees, and one where they are free to look around themselves, to be able to give extra information to the spectators. Just like in regular sports, the casters have in-depth knowledge of both game and players. Their job is to describe the play-by-play, explain the tactics deployed by the players and engage the crowd. As Dustin Browder, the lead designer of Starcraft 2, puts it:

“In a game like StarCraft, the actions of a player are not always clear. A good caster can identify what players are doing, what players are planning to do and how the entire match will pan out based on these actions.” (Lien, 2013).

Figure 4.2: *Casters spectating and commentating a game with computers in front of them (Sznajder, 2014).*

4.2 Spectators

Trail et al. (2003) proposed nine motives that explain why people like to spectate sports; vicarious achievement, acquisition of knowledge, aesthetics, social interaction, drama/excitement, escape, family, physical attractiveness of participants and quality of physical skill of the participants. Melnick (1993) notes that spectators feel that they are crucial to the event taking place, that without them there would be no competition. He also argues that sports arenas and stadiums are a venue for casual sociability in an otherwise lonely and isolated urban environment. Cheung and Huang (2011) conducted a study to identify who spectates Starcraft. They found that spectators watched Starcraft for many of the same reasons as the reasons proposed by Trail et al. (2003) and Melnick (1993). Cheung and Huang (2011) identified nine personas who watch Starcraft. A spectator can be a mix of multiple personas:

- *The Bystander* is the least engaged spectator. They are uninformed or uninvested. The uninformed can be someone who has no understanding of the mechanics of the game while the uninvested has stumbled upon the game, but may have prior experience, giving them some understanding of the game from before.
- *The Curious* focus their attention on knowledge gaps about the game. The fascination lies in the depth of the game and how new strategies can develop.
- *The Inspired* is inspired to play by spectating. The experience of watching is a catalyst to want to play the game themselves.

- *The Pupil* watches to learn and to translate what they are seeing other people do, to try to incorporate strategies into their own play.
- *The Unsatisfied* sees the act of spectating as a weaker substitute for playing the game.
- *The Entertained* spectates for entertainment, like they would watch a movie or read a book.
- *The Assistant* spectates from an over-the-shoulder perspective and gives tips and advice to the player.
- *The Commentator* (or caster) provides commentary for the other spectators.
- *The Crowd* and its communal aspect to spectating matches the behavior for regular sporting events.

Figure 4.3: *Spectators watching pro gamers practice during a tournament (Kristiansson, 2013).*

Cheung and Huang (2011) also discuss information asymmetry, the fact that the spectator and player have access to different kinds of information about the game. While the spectator has vision of both teams units and can predict where engagements will happen, only the players know exactly what they will do next, what they are thinking about and what strategies to deploy to counter their opponent. Part of what is interesting for the spectator is guessing what will happen, and then seeing it unfold. This kind of tension is similar to spectating poker, as Henderson notes, poker is an excellent spectator sport, because you (the spectator) know and they (the players) do not (Henderson, n.d.). The spectator can see the cards of the players, but has to see the play unfold based on the information that the players have. Henderson also notes that it is important to know the basics of poker to appreciate all the small things and watching people play can be an excellent learning tool. This echoes back to some of the nine Starcraft watching personas.

4.3 Information Visualization

Information Visualization is a subject that concerns visual representations of abstract data. Looking at games, enormous amount of data has to be cognitively absorbed when spectating a video game (Bowman et al., 2012). It can be data from players, teams, strategies but also in-game data like player movements on a map, army amount et cetera.

4.3.1 The Gestalt laws

To understand how to make interfaces better you need to have a good understanding of how perception works (Ware, 2012). The Gestalt laws describes the basics of how we perceive patterns which could relate to the components in game interfaces. Game interfaces has a lot of components that needs to be placed at the most natural place for the user and therefore it is important to know how to group objects, what colors that should be applied, shapes et cetera. The following text describes the most relevant Gestalt laws in-depth:

The Gestalt law of Proximity or spatial proximity can be a powerful tool to group components together. Things that are close together are considered as a group in our eyes. As seen in Figure 4.4, the spatial differences can create columns or rows (Tidwell, 2011).

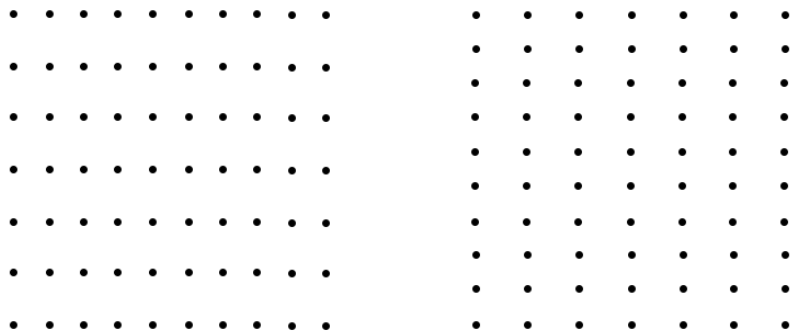

Figure 4.4: *Gestalt law of Proximity or Spatial Proximity. Left figure shows rows which are grouped together and the right figure shows columns that are grouped together.*

The Gestalt law of Similarity can help in determining how things should be grouped. If similar shapes are next to each other they will be seen as a group while different shapes will be seen as two individual shapes. Colors can also be used as a way to differentiate shapes. Highly saturated colors can be perceived as groups and vice-versa.

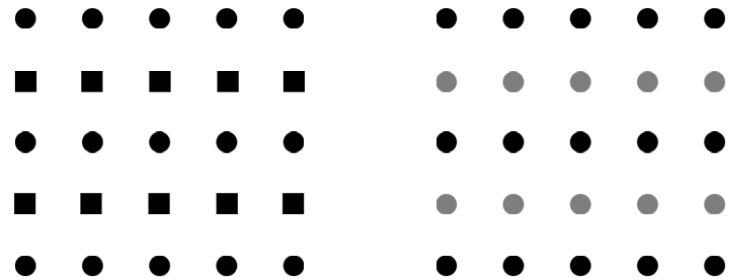

Figure 4.5: *Gestalt law of Similarity. Left figure shows that shapes can be seen as groups and the right figure shows how saturation can be for grouping objects.*

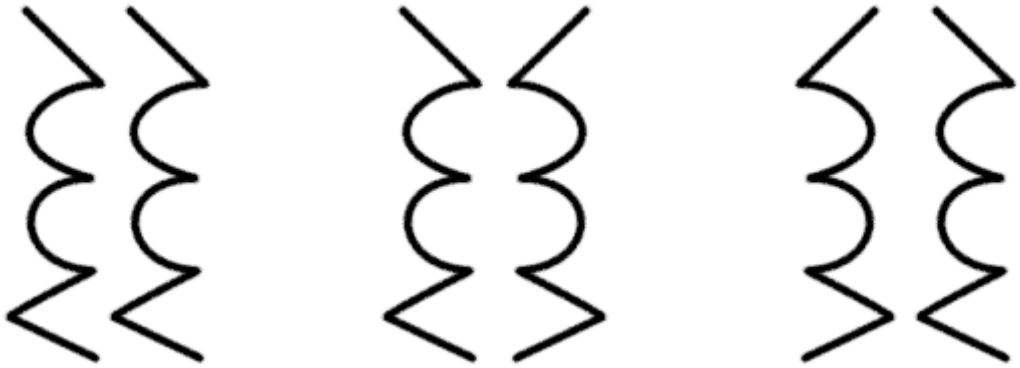

Figure 4.6: *Gestalt law of Symmetry. Left figure is harder to perceive as a whole while the middle and right figure are symmetric - making it easy to perceive as a whole.*

The Gestalt law of Symmetry can help making components easier to read or make object perceived as a whole when they are aligned either vertically or horizontally. Pairing lines for example as shown in left figure in Figure 4.6 makes the information harder to perceive in contrast to the middle and the right one. Dakin and Herbert did research saying that we are the most sensitive to small differences in symmetrical patterns.

4.3.2 Fonts and Colors

Fonts and colors should be used carefully as too many variations of fonts and colors can make the interface feel cluttered and harder to get familiar with. In the book “Game Development Essentials: Game Interface Design”, Saunders and Novak (2013) claim certain rules that should be applied for colors and fonts:

- Fonts in interfaces should be sans serif type as they have better readability
- Use as few font styles as possible
- Bright and warm colors are easier to read on dark background that are common in games, blue for example is hard to read and should not be used in an interface

- Colors should be used with high contrast differences, making them distinguishable
- The color palette should be adhering to the colors inside the game world to create a consistent atmosphere
- Use warm colors like orange, yellow or red to get the attention of the player

4.4 Basics of Interface Design for Games

User interfaces (UIs) are a fundamental part of games that connects the core game to the user (Ye, 2000). Ye describes the relation between the players, the user interface and the game core. The game core is the central part of a game, meaning the mechanics that are used, which is similar to rules. Starcraft, for example, has units with different hit points that can attack or gather resources for the player. In order for the user to control these units in Starcraft, there has to be an interaction. This is where the user interface is applied, which can be describes as the connection between the user and the game core. The user interface includes both the hardware (mouse, keyboard, gamepad) and the software (buttons, menus, sliders) components. In addition to the graphical interface components, there are feedback components. These components gives the player a hint in the interface or in the game world when an action is done (Adams and Rollings, 2010). It can be a sound or a visual element that is appearing in the game or the state of a certain unit.

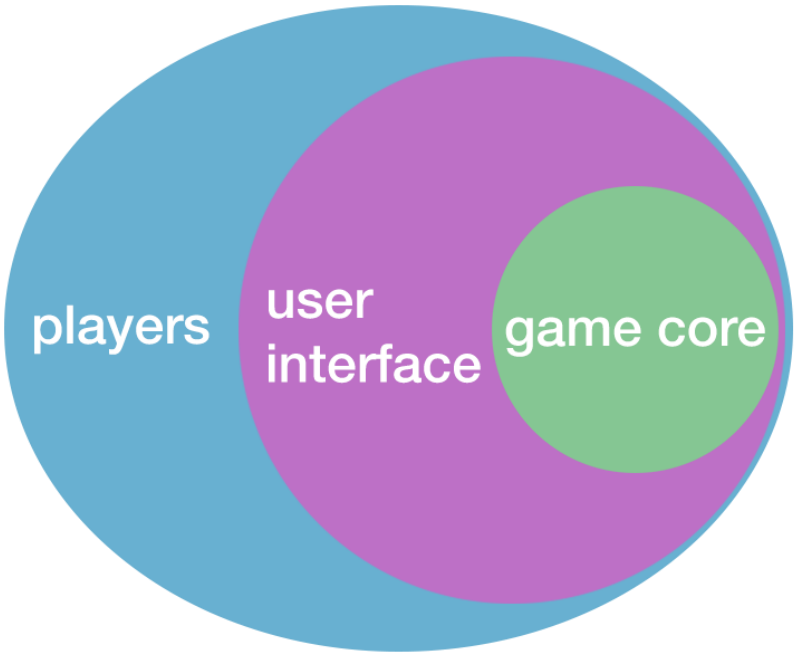

Figure 4.7: *Illustration of how players are connected to the game core through the user interface.*

4.4.1 Interface elements

Interface elements on screen are grouped into categories (Fagerholt and Lorentzon, 2009). Fagerholt and Lorentzon name the elements as following: Diegetic, non-diegetic, meta and spatial.

Diegetic interface elements are elements that exists inside the game world. In some games, the game character pulls up a map inside the game so the player sees it or the player can see the amount of ammunition left in weapon by just looking at the display on the weapon itself (Stonehouse, 2014). These diegetic elements can create a more immersive experience for the player. The opposite of the diegetic interfaces are the non-diegetic. These interface elements are the graphics that are stuck to the screen, for example the action bar in World of Warcraft or the amount of hit points and armor a player has in Counter-Strike: Global Offensive.

Figure 4.8: *Examples of diegetic and non-diegetic components. To the left, the oxygen clock from Metro 2033 and to the right, parts of the user interface in World of Warcraft.*

When elements do not fit to exist inside the game world, nor on the screen, they are called meta. The meta elements gives the player feedback through 2D, but tries to be more immersive than non-diegetic elements. Examples of this is the blood splatter on the screen when a player is being attacked or is low on hit points in FPS games.

Figure 4.9: *Game examples of meta and spatial elements. On the left, the blood on the screen shown when killed in Battlefield 4 and to the right, interaction possibilities from Dragon Age: Inquisition.*

If game developers want to give the player information in a way that is not breaking the experience or the immersion of the game, then spatial information can be used. Spatial elements are hints or feedbacks that can be put in the environment like a text on a wall or a line on the floor indicating where to go next. As seen in figure 18 there is a text coming up when the player is able to interact with a game object.

4.5 Interface Minimalism, Transparency and Consistency

Looking at a bigger scope, when it comes to the information that is provided, it is not always good to show all the information provided in the game all the time, because a lot of interface components can create confusion or frustration (Saunders and Novak, 2013). Information that is unneeded should be hidden but it should be available to be seen by toggling or going into menus. The interface in "The Chronicles of Riddick: Escape from Butcher Bay" is an example of a minimalistic interface, removing the health bar when the character is full of health.

Another way to reduce the interface clutter is to use transparency in the non-diegetic components. Transparency creates immersion because the game world can be seen through the components. In addition to that, translucent components can also help spectators see that more content is available to the sides (Apple, 2015). It should be noted though that this can make the information less readable if the game world changes a lot (Saunders and Novak, 2013).

When designing a good user interface there are some general rules that should be applied. Trying to innovate an interface by changing it radically is not always a good thing (Adams and Rollings, 2010). FPS games for example are almost always controlled with a "W" key press on the keyboard for walking forward. Being consistent through the whole interface is important and it

goes for everything like colors, position on elements, typefaces etc. Placing visual elements in the right places can make the learning curve less steep when interacting with a new interface. Users have a mental model of how an interface should function and where the elements should be placed because of previous knowledge. When placing non-diegetic and feedback elements on the screen it is advised to keep the game world as the largest visual component, but the sizes of the other elements are up for personal preferences. The most important non-diegetic elements should be shown at all times while the lesser ones should only be shown when it's relevant to see them.

5. Methodology

This chapter describes and argues for the methods that were used in the thesis.

5.1 Design process

Evaluative research is a process that is largely based around feedback from users (Martin and Hanington, 2012). The process is iterative meaning that redesigns of prototypes or interfaces are done multiple time reviewed through user feedback. It is an established process that is popular in the design field as the iterative model is good for improvements from aesthetics or emotional responses from users.

User tests can also be conducted to test performance or accuracy of certain tasks during the development. It is advised to perform user tests during the earlier stages as it becomes more expensive do redesigns further into the development.

Rogers et al. (2011) state three principles that are crucial to a user-centered approach to development; focus on users and tasks, empirical measurement and iterative design. This means involving the users and their needs from an early point, empirically evaluating at regular stages in development and iterating and refining the design based on the feedback from evaluations.

5.2 Questionnaire

An effective way to get quantitative data is using questionnaires (Martin & Hanington, 2012). Questionnaires consists of questions about characteristics, thoughts, feelings, perceptions, behaviors or attitudes that is sent out to a large amount of people. There are a lot of online resources for creating questionnaires and in order to secure a good response rate the questions should be short and concise as the attention span online is usually short. Rogers et al. (2011) also point out that questions in questionnaires have to be easy to understand, specific and to the point. Users should always be able to find an answer that suits them. The necessity to be as clear as possible comes from the fact that the researcher is not actually there to clarify any ambiguities or misunderstandings.

The way questions are asked has a big influence on what answers will be gathered (Martin & Hanington, 2012). Open-ended questions are a good way to get more in-depth information while close-ended questions will rather give more statistical results. Both have their drawbacks though, open-ended questions will take the user more time to answer while close-ended will not give much information. The close-ended can be improved by having a five point scale instead of “yes” or “no”.

5.3 Interviews

Interviews are used to gather first-hand accounts of experience, opinions, attitudes and perceptions (Martin & Hanington, 2012). Ideally, interviews are conducted in person, but they can also be conducted by phone or by other communication devices. Interviews can be conducted in a structured or unstructured format. Structured interviews follow a script of questions and can therefore be perceived as formal and impersonal, but it also means that they are easier to control

and analyze. Unstructured interviews also follow some sort of script, but it is much less strict. The script is used to guide the general direction of the interview. Instead of formally asking one question after another, the researcher can ask the interviewee to elaborate or ask follow-up questions. The unstructured format are more explorative in nature and may make interviewees more comfortable and willing to talk than structured, but they rely on the researcher conducting the interview to extract the right information and ask the right questions (Rogers et al., 2011).

If the interview is conducted for exploratory purposes, the unstructured format with diversions and follow-up questions are fine. In order to elicit more formal feedback, with consistency across multiple interviews, a structured format is more suitable, to avoid bias and altered interpretations of the questions (Martin & Hanington, 2012).

Interviews with stakeholders focus on information from people with an interest in the topic, while key informant interviews concentrate on people with specialized or expert knowledge. Schoormans et al. (1995) found that experienced users were more likely to give useful feedback when evaluating a concept, due to their ability to understand the product faster, fill in missing information and learn more easily.

Interviews can be conducted one-to-one or in focus groups (Martin & Hanington, 2012). Focus groups often encourages natural conversation, with participants able to build on each other's ideas. However, the researcher has to moderate the group, to stop one of the participants to influence the others too much, to encourage and allow everyone to speak their mind. Schirr (2012) argues that focus groups are not effective for uncovering user needs, generating new product ideas and evaluating ideas, due to people in groups not working as hard as they would individually, the desire of group members to fit in and be accepted, thereby leading them to conform to traditional ideas, the group falling to the standard of the least productive member and the participants do not enjoy an interrupted flow of thought, having to wait their turn.

5.4 Prototyping

A prototype is a translation of studies or ideation transformed into a tangible form or a visual representation (Martin & Hanington, 2012). Tangible representations of a product or a rendered interface is a good way to test ideas within a design team or with clients. Prototypes are grouped into levels of fidelity. A low fidelity prototype is more common in the ideation part of the design process and consists of sketch concepts, storyboards and sketch models. A common way of doing low fidelity interfaces is to create paper representations of screens and then replace papers to simulate the responses of the interface.

High fidelity prototypes are more refined and is a better representation of how the final product will look like. The high fidelity prototypes for software can have functionality to them which provides the users feedback, making user tests feasible. Both low and high fidelity prototypes are in the far ends of the spectrum, but there are also prototypes that exists in between. In software design, presentations of screens can be shown without any interactive functionality.

5.5 The KJ Method

The KJ method (sometimes called affinity diagram) is a brainstorming technique used to generate ideas (Spool, 2004). It is named after its inventor, Jiro Kawakita. It boils down to focusing on a single question and individually writing down ideas to solve the question on sticky notes. The sticky notes are then put on a wall and grouped according to similarity. The groups are then given a name that summarize its contents and then their importance is voted on by the brainstormers. Finally, the most important groups are ranked, again according to importance. The method allows a group to find the most important priorities when solving a problem or question.

6. Project Plan

The thesis will span over 20 weeks and will be divided into 6 phases: 1) preliminary study 2) Iteration 1 with prototyping 3) Gather and analyze feedback 4) Iteration 2 with a redesign of the prototypes 5) Gather and analyze feedback from the second iteration 6) Presentation, opposition and writing report. During this whole thesis though, we will document our findings and write on the report.

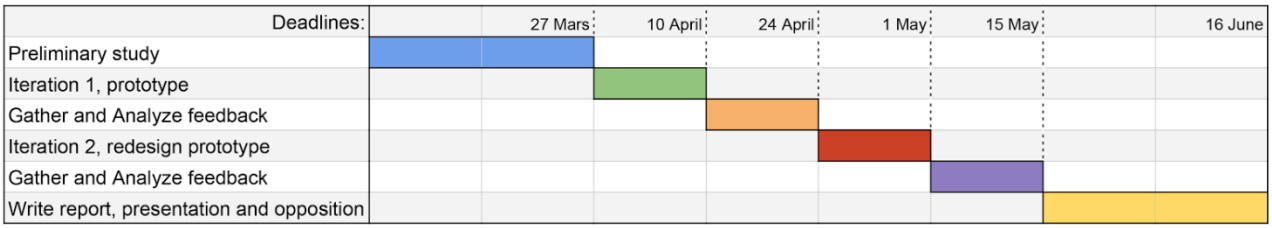

Figure 6.1: *Time schedule and deadlines for the project.*

The largest amount of time will be spent on the preliminary study as it is the basis of our research. During this time we will look at:

- Literature concerning interface design for general purposes and games
- Spectatorship theory
- Observing streams and matches
- Game interfaces of current games
- Regular sports

During the second phase, we will create the first iteration of guidelines and then apply them to a non-interactive prototype. The non-interactive prototype will then be published on a big online community called Reddit (Reddit A, n.d.) along with a questionnaire. Furthermore, we would like to contact companies in order to get feedback or insights on how to further develop the guidelines.

The third phase consists of analyzing the feedback from questionnaires and companies. Answers from the questionnaires will be put together to give a statistical overview of the proposed prototype.

In phase four we will make a second iteration of the guidelines and prototypes, based on the feedback from interviews and questionnaires.

In the fifth phase we will again gather feedback, and see what users think about the changes we made in phase four.

The sixth and last phase is devoted to writing the final report, making the presentation and preparing the opposition.

7. Execution

This chapter describes the process of the thesis. After the preliminary study is described, we describe the UI components we named which are used as a vocabulary throughout the thesis. We then describe the result of the study of the spectator interfaces. The study included our games, other games in the same genres and regular sports. We then briefly describe the first iteration of the guidelines and redesigns, moving on to the feedback from the questionnaires. Finally, we describe the second iteration and its feedback.

7.1 Preliminary study

This section describes the process of the preliminary study, where we gather theory about spectatorship, interfaces and the games.

7.1.1 Theory and Background

In order to get to know what is already existing in the field and what does not, a large literature study was conducted. The study consisted of reading books, scientific papers, websites, and comments in forums and observing UIs in other fields. Looking more specifically at the books, most of the books content was theory about how to design UI for software as there was not a whole lot about game interfaces. Most game UI information were taken from game design books with small chapters in this field. Because of the small amount of information about game UIs, the focus went more towards looking at comments in forums. The forums provided more focus on specific UI components and details that could be added into the games.

The scientific papers consisted mostly of research about spectators and spectating. Spectating is a widespread phenomenon that exists in a lot of video games, but more extensively exists in regular sports such as football or even concerts. One focus when reading the papers was finding theory about what is making spectating interesting and what kind of performance does the spectators want to see. We also looked at papers and books covering information visualization. It is a field that states how information should be displayed and how humans interpret certain information.

7.1.2 Methodology

When investigating methods for the project, the wanted results of the project were analyzed. The project has a large focus on feedback which resulted in an evaluative design process. An evaluative process has a big focus on feedback from users in order to create improvements which fits good with the wanted results of the project.

For the feedback methods, we thought that in order to get the most out of our ideas, questionnaires and interviews seemed to give the desired results. Questionnaires is a method that can reach out to a lot of people, but gives mostly quantitative data. Qualitative data is wanted as well and that is why we choose to have interviews.

7.1.3 Ethical Issues

An ethical issue we have identified for the project is how far you can go when displaying information involving players. Most pro players use their own customized hotkeys, mouse sensitivity and settings. When competing at a high level, these settings are considered valuable as it can give the player a small edge over other players. Is displaying this information in the interface by going too far? And are those settings relevant for the spectators? In some cases yes, looking at "*The Pupil*" persona from the theory chapter it would be highly relevant for these people to try and mimic the professional players to become better at the game.

Another issue might be tactics and strategies used by pro players. Pro players and teams usually try to hide their strategies during practice, to surprise their opponents by breaking the meta. For big tournaments, we do not think this is a big issue since that's the prime time for the strategies to be used, but for smaller tournaments and practice play, this might be a problem. If you allow for easy accessible, very detailed spectating of practice for example, teams might be able to scout their opponents' tactics and strategies.

New players that have not been competing before in tournaments usually have an edge as well as no one really knows their style of play. When going up against well-known players it is easy for them to find information about the players and learn how to exploit their certain style. In this project we do not want to encourage this to happen as players should play on equal standings.

7.2 Naming UI Components

This section will start by introducing names for certain UI components that exist in spectator interfaces which will be used throughout the thesis. To help describe the UI, we divided the UI components into three categories; player components, spectator components and overlay components. The components will be written in italics throughout the thesis.

Player components are components that the player sees whereas spectator components are only seen by the spectators. Player and spectator components are both in-game components, many player components can also be seen by the spectators. What separates them is the amount of information they give as spectator components are usually information that helps the spectator to understand what is happening in the game.

Overlays are other components that the broadcast outside of the game itself are using for complementing the in-game components if the game lacks important panels. Furthermore, the tournament organizers often use overlays to convey sponsorships or logos of the tournament.

7.2.1 Player Components

Player components are UI components that are shown to players. These vary from game to game, depending on the type of game and its needs. Games played on a map typically need a *minimap*, for example. If some kind of score (like number of rounds in CS:GO or kills in Dota 2) is relevant, a *score panel* is usually shown. Similarly, a *game time panel* is usually only shown if it is relevant. In CS:GO, showing the time left in a round is crucial, while in Dota 2 and Starcraft 2, it shows the total time elapsed in a game session.

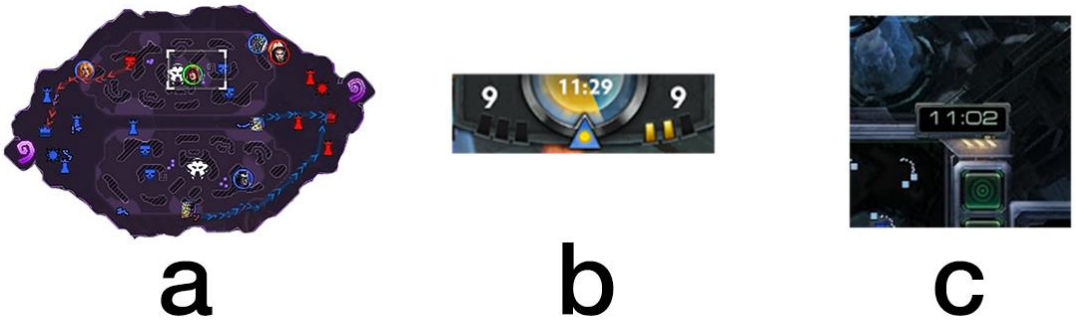

Figure 7.1: *a) Shows a minimap from Heroes of the Storm, b) Score panel from Dota 2, c) Game timer panel from Starcraft 2.*

Games played in teams have a *team information panel*, where players can get information on their own team and sometimes limited information on the opposing team. An example of this is CS:GO, where players can see how many is alive on both teams, but do not have access to what weapons and equipment the opponent team is carrying. If the game allows players to command or target different units (like Starcraft 2), the currently *selected unit panel* is usually shown on a panel. In CS:GO and Dota 2 this is the *selected player panel* instead. Finally, multiplayer games typically have a *chat panel* as well, where players can interact with each other.

Figure 7.2: *a) shows a score panel from CS:GO, b) a chat panel from League of Legends, c) Currently selected unit panel.*

The examples above are all non-diegetic UI components. There are some diegetic and spatial components as well, particularly in Hearthstone. Most of the Hearthstone UI is diegetic, as it is simulating the board of a board game. The mana crystals and cards in a player's hand are examples of the *team information panels* in this case.

Figure 7.3: *a) shows a character outline in CS:GO, b) heath/mana bar in Dota 2.*

Examples of spatial components are the *health/mana bars* and *character outlines*. Starcraft 2 and Dota 2 both have health and mana bars hovering above the characters in the game world. These can be seen by both teams at all times and are toggled on/off. In CS:GO, when a dead player is waiting for the next round, they can see their teammates through the wall as character outlines.

7.2.2 Spectator Components

Spectator components are UI components that are shown only to spectators. The player components are often shown to spectators as well, the difference is that the spectators are allowed to see all information concerning both teams. On the *minimap,* for example, while players only get to see the parts of the map where their teams have vision, spectators have the vision of both teams. In CS:GO, while players only see their own team's *character outlines*, the spectators can see both teams. The spectator can see both players' cards in Hearthstone and so on.

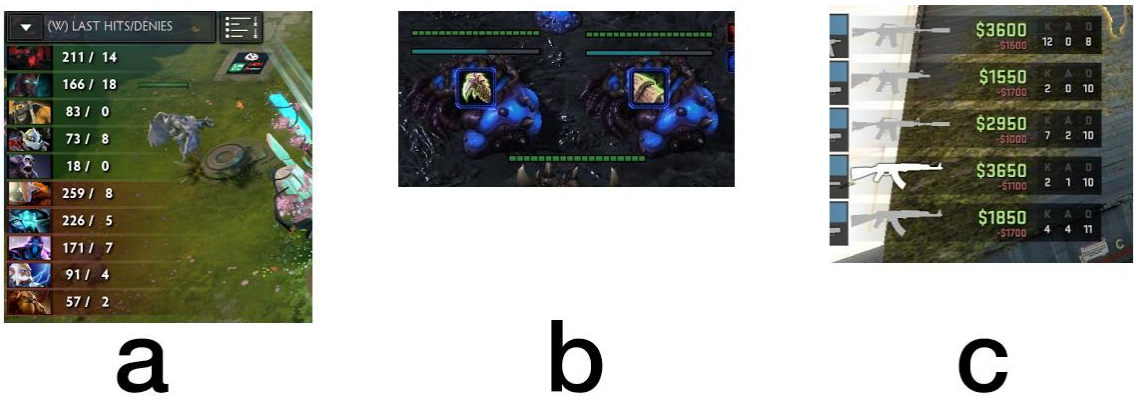

Figure 7.4: *a) Shows a tabs panel in Dota 2, b) Upgrades researching in Starcraft 2, c) Pop-up showing money and stats in the start of a round in CS:GO.*

Tabs panel are non-diegetic components that can hold different categories of information, with the option to switch between them. Dota 2's *tabs panel* can give info on last hits, gold income and so on, for example. *Information icons* are spatial components, placed in the game world itself. In Starcraft 2, for example, when an upgrade is being researched in a building, an icon of the upgrade is shown on top of the building. *Pop-ups* usually give timely information,

information that is not crucial to show all of the time, but at certain points in the game. During the beginning of a round in CS:GO, when the money and statistics are shown for every player is an example of this. The *fullscreen overlay* is another non-diegetic component. Like the name suggests, it is an overlay covering most of the screen. It can be used to shown graphs or a bigger version of the *minimap.*

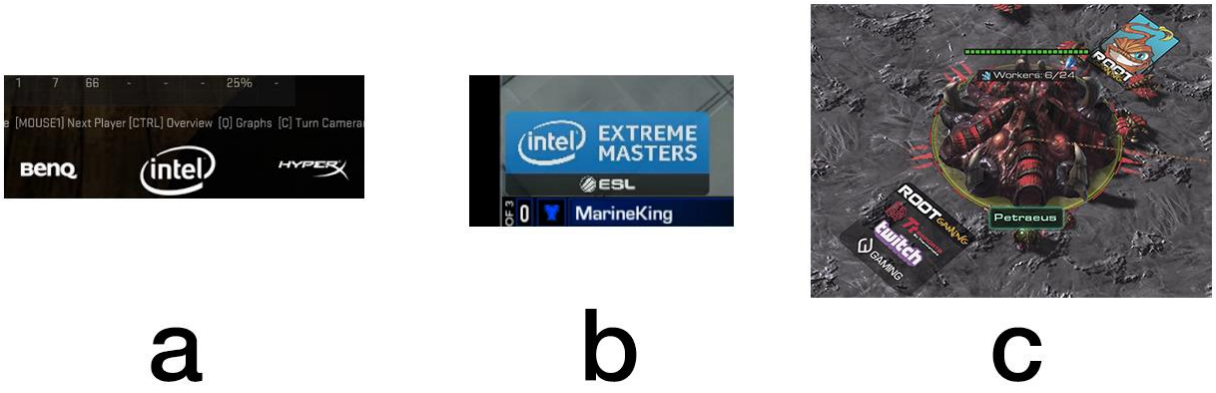

Figure 7.5: *a) Shows sponsors that are visible in the spectator interface during tournaments in CS:GO, b) A typical tournament logo as an overlay in Starcraft 2, c) Diegetic logos that are only shown to the spectators in Starcraft 2.*

The spectators are also shown extra information and panels that are not necessarily important to the actual game, but to the tournament as a whole. Examples of these are *sponsor, tournament* and *team logos,* tournament information and map score.

7.2.3 Overlay Components

Overlay components are added to the broadcast outside of the game itself and are typically used to complement the in-game components if the game lacks important panels. Not all e-sports games have added the ability to show *sponsor*, *tournament* and *team logos* in the actual game, for example. These are then added with overlays. The more features missing from the in-game spectator interface, the more tournament organizers have to add themselves.

A popular component to add using overlays are *webcams* featuring the players. Seeing how the players react and respond to events happening in-game is a bit like seeing the faces of football players during a game. Interesting player or team trivia are sometimes shown with *trivia panels*. These can range from how well a player has been playing lately to what their favorite meal is. Some tournaments have also used Twitter and other social media sites as a means to gather comments and match predictions to show with *trivia panels.*

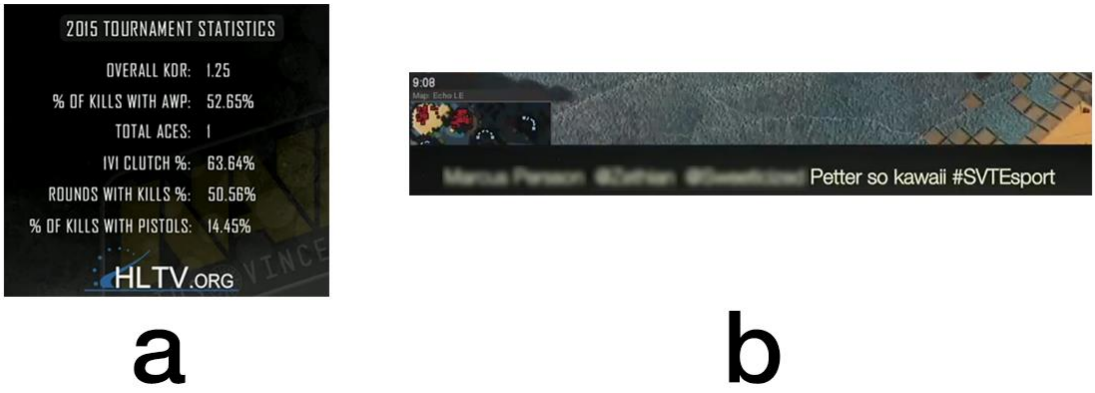

Figure 7.6: *a) A trivia panel in CS:GO, showing statistics for a player, b) An instance where twitter is being used in during a stream.*

Some games (Dota 2 and CS:GO, for example) allow spectators to watch directly in the game client itself, meaning they will not see the any of the tournament organizer's production (camera shots, overlays, analyst desks etc.). They will however be able to hear the casters, as that is built into the client.

7.3 Study of the Spectator Interfaces

This section describes the spectator interface of the four games, their tournaments and a brief look into other games and regular sports. After having looked at the four games, we compiled a matrix with the different UI elements we found. This was then made into the UI Components described previously. The UI Components Matrix can be found in Appendix E.

7.3.1 Description of the Dota 2 Spectator Interface

Dota 2 has the most UI components out of the games we analyzed, which could be because of the complexity of the game. When it comes to the basics of Dota 2, most of the learning actually comes from getting the basics down on each hero, what items are needed, laning combinations, abbreviations and a lot of teamwork (Godec, 2015). Most of the information shown in the spectator interface is shown in the player interface.

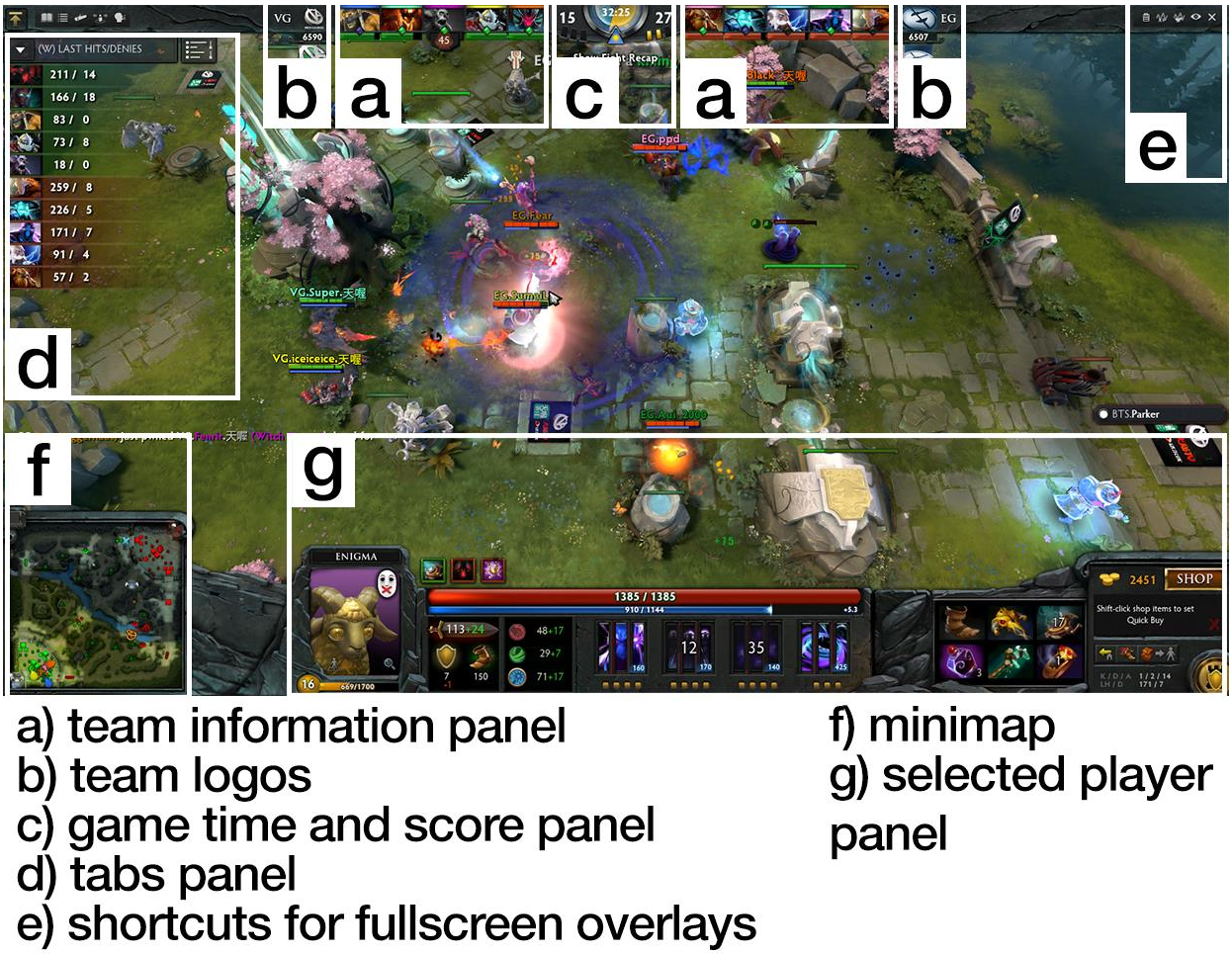

Figure 7.8: *Various panels and UI components in Dota 2*

Starting at the top of Figure 7.8; it shows a *team information panel*, showing the health bars, hero picture, ultimate icon and colors. The *team logos* are shown next to each teams' *information panel*. In the middle, a *game time panel* shows the in-game time and the day and night cycle. The small icons to the left and right are shortcuts to *tabs panel* and *fullscreen overlays*. The *tabs panel* can show information of how many last hits or denies on creeps that have been done by each hero, how much experience and gold each player is gaining each minute, the current gold, hero level, net worth, buyback status and fantasy points (Gamepedia C, 2015). The *fullscreen overlays* shows graphs with the experience or gold difference between the teams. This is a feature that has not been seen in the other games we have analyzed and it should be taken into account that it could maybe be added in other games.

When playing the game the *tabs panel* and *fullscreen overlays* are not visible for the players, which can be understandable as they would give them too much information. The *team information panel* is visible to players, but only shows the hero icon and colors, not the health.

The bottom of the screen is dedicated to the *minimap* and the *selected player panel*. The *minimap* is positioned in the bottom left corner. It has large icons for the heroes, which are colored after each hero's personal color. In order to further differentiate the teams, the icon of one team has round circles with a pointed edge, while the other team's icon is a cross.

The *selected player panel* takes up the space to the right of the *minimap*. Starting from the right of the panel, there is a shop button where players can buy items, a glyph button that makes buildings invulnerable for a short amount of time, gold of the currently selected player, last hits, denies, kills, deaths and shortcuts for the courier. To the left of this section are the inventory slots followed by the spells and the yellow squares underneath the spells shows which level that have been obtained for the spell. Above the spells are the health and mana bars and to the left are hero statistics like movement speed, armor, strength etc. Underneath the hero portrait is the level of the hero.
In addition to the non-diegetic *team logos* at the top of the interface, there are also diegetic *team* and *sponsor logos* on banners in the entrances to the each team's base and on the ground in the game world.

Comparing the spectator interface between tournaments in Dota 2 is not really applicable as it basically looks the same for all of the tournaments. Valve has not given out tools to help tournaments change the UI. What can be spotted though is that some tournaments places their logos and sponsor overlays in places that hides the game information, but most of the time it's just hiding the quick buy bar in the bottom right.

Dota 2 uses green and red to distinguish teams which is not good for colorblind people as both are seen as yellow. There is a colorblind mode for Dota 2, but it is not used a lot in events, the reason could be that the blue color for mana is hard to differentiate from the blue team color when using color blindness mode.

7.3.2 Description of the Starcraft 2 Spectator Interface

The spectator interface in Starcraft 2 during the last two years has changed a lot from when the game was released in 2010. Even though there are changes, crucial information components are still present. Figure 7.9 shows the original spectator interface with the various components. The *tabs panel* in the top left corner has additional available information that can be accessed through hotkeys. The *tabs panel* can show the units that are on the field, how many units that have been lost, the income of each player, army composition, actions per minute (APM) or the production tab, arguably the most important one. It shows the units, buildings and upgrades that are being produced.

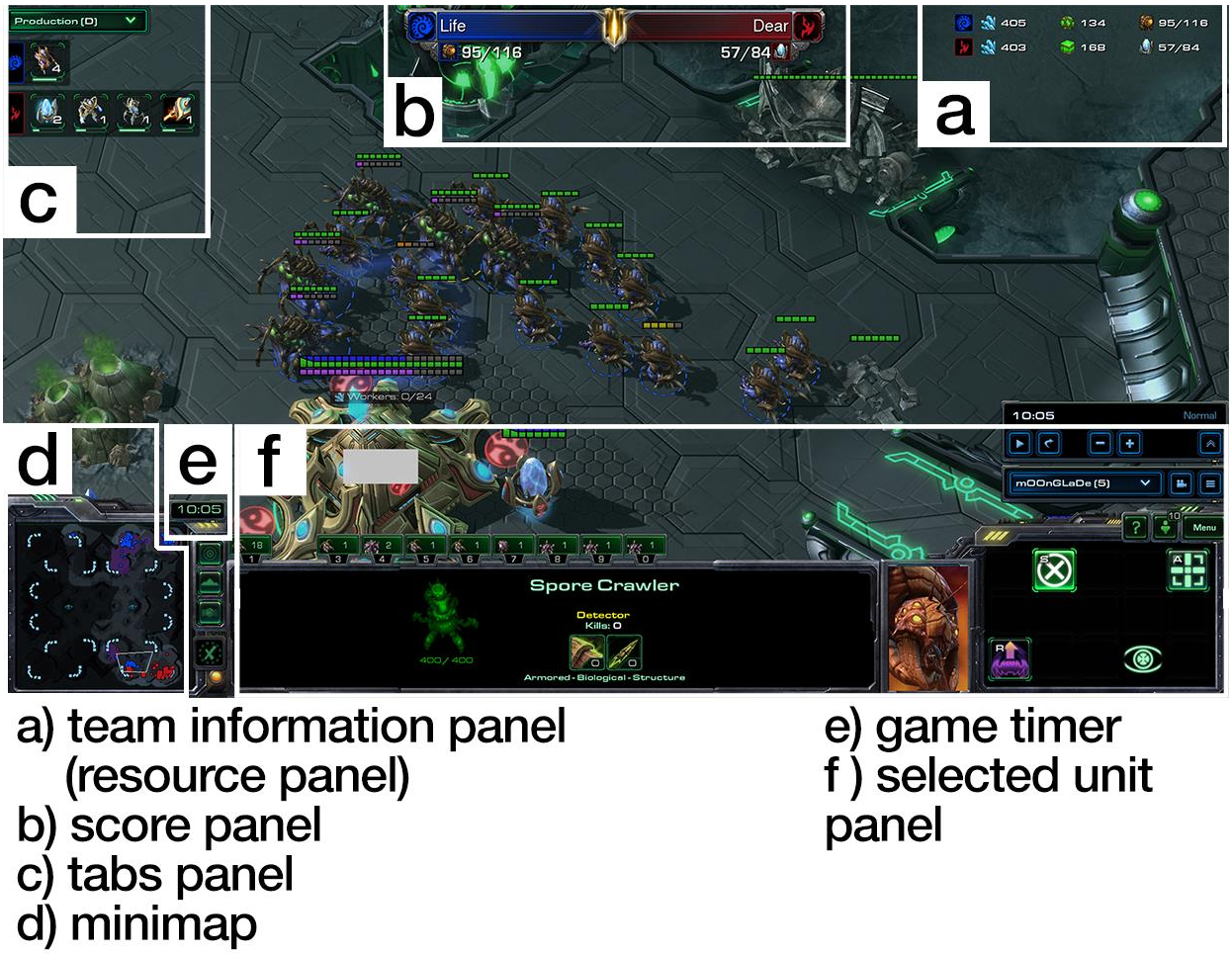

Figure 7.9: *Various panels and UI components in Starcraft 2.*

A *team information panel* in the top right corner displays the minerals, gas and supply of both players. This is often called the *resource panel* in Starcraft 2. Some interfaces show the current income of resources as well as the army and worker supply difference. A *score panel* is shown between the *resource panel* and the *tabs panel*, at the top of the screen.

In the spectator interface there are also *pop-up* windows that can be accessed when the observer wants to explicitly tell something to the spectators. The windows are large and is placed at the center of the screen to gain attention and they show pretty much the same information as the tabs panel on the left side. One component that is present in many RTS games is the *minimap* which shows army movements, proxy buildings, fog of war, map layout, amount of bases and more. In Starcraft 2, the *minimap* shows units and buildings as colored square geometries. The hard part with this representation is distinguishing the units from the buildings as they have the same color. Keeping an eye on the *minimap* is critical for providing game awareness and knowing where both your own and the opponent's armies are positioned (Liquipedia E, 2015). The standard player colors to use are red and blue, which is good for people who are colorblind.

The Starcraft 2 spectator mode has the ability to completely hide the interface during large engagements, allowing the spectator to have a bigger and clearer view of the battle. Another functionality of Starcraft 2 is strong team colors and effects. Not only are the units clearly colored according to their team color, but the units' spells and abilities are also marked with their team colors as well. This can be very important in Starcraft 2, especially in mirror matchups, when both sides have access to the same units.

Community driven projects are being developed trying to improve the spectator interface of Starcraft 2. For example, the MIT Game Lab has developed a *pop-up* notification system for when upgrades are being completed and how many workers were killed during a worker harassment. GameHeart is another project that makes it possible for tournament organizers to add information to the game, like *information icons* for buildings and *team, sponsor* and *tournament logos* in the game world, for example. Making the interface customizable has its drawbacks, though. Blizzard does not provide standards or guidelines on how the interface should be designed to create the best spectator experience.

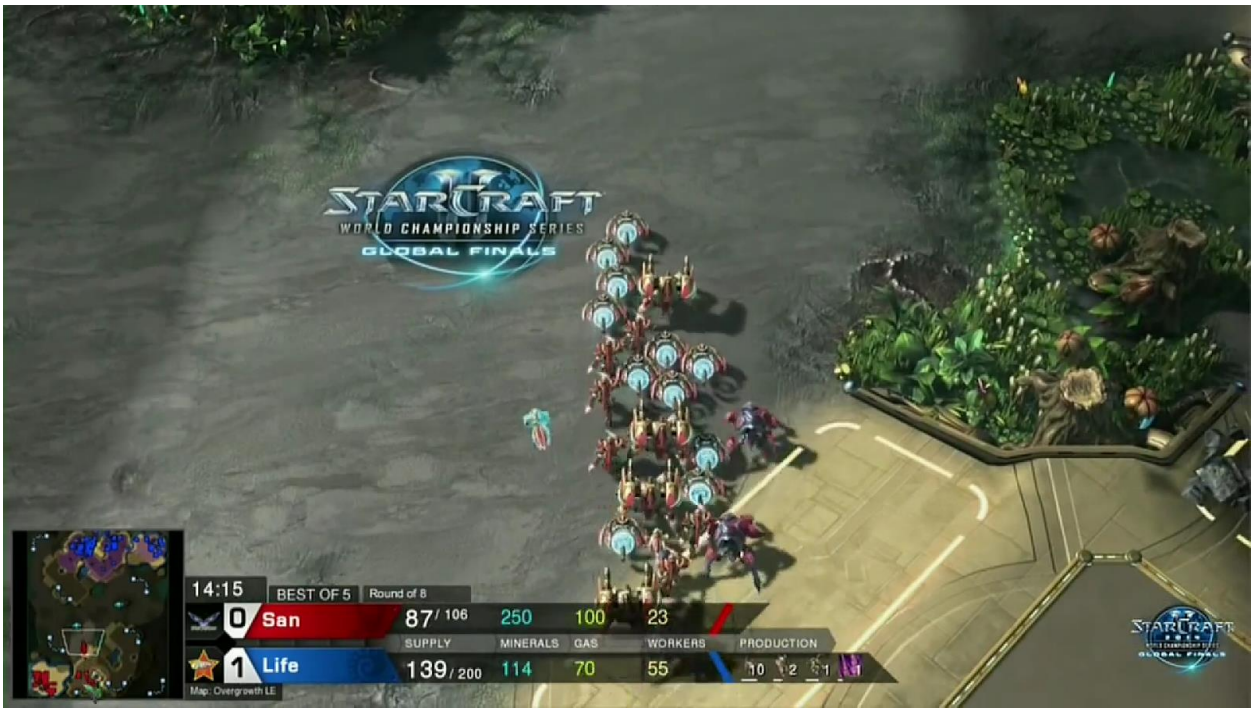

Figure 7.10: *The WCS GameHeart interface of Blizzcon 2014 finals with interface components on the bottom.*

WCS GameHeart, shown in Figure 7.10 has moved the *tabs panel* and *resource panel* down to the bottom of the screen. The argument for putting all the visual components at the bottom is because Starcraft 2 has a bird's eye perspective on the game which results in that more units can be shown at the top of the screen (Schutter, 2014).

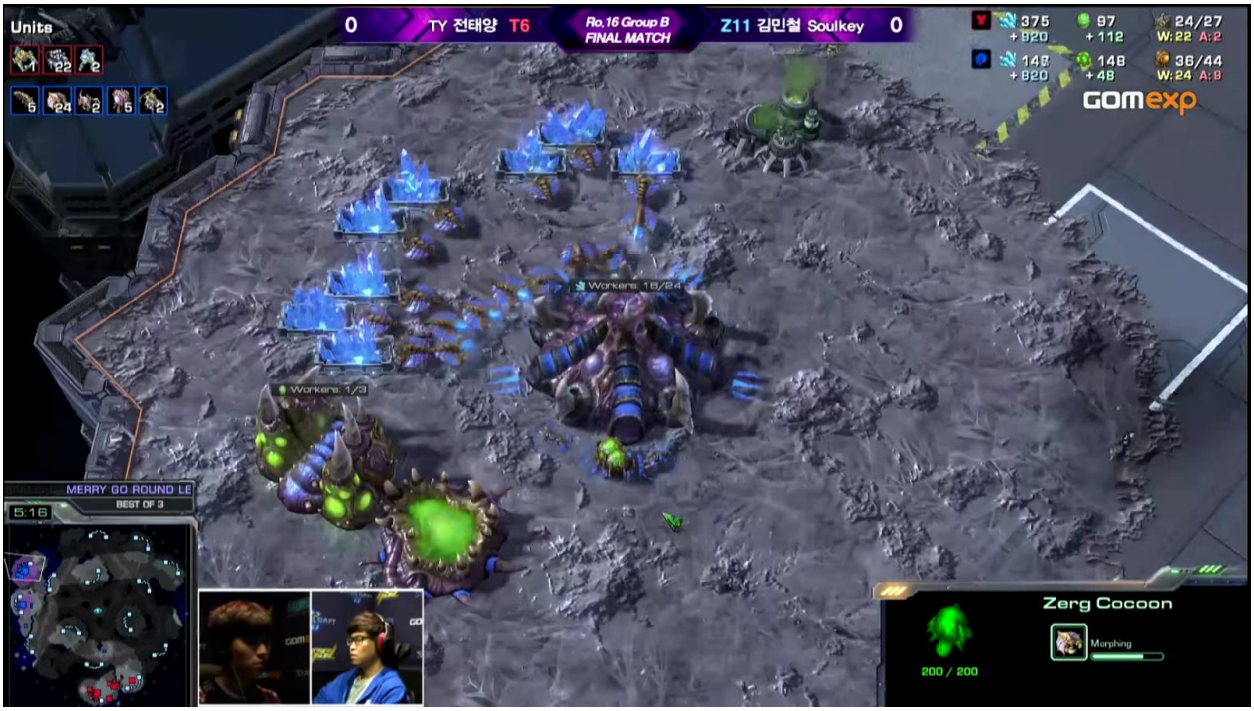

Figure 7.11: *The spectator interface in GSL which looks similar to the default interface.*

GSL has an interface that is different from the one at Blizzcon 2014. This interface has the resources at the top right which is the same as the original spectating interface. Most components have been moved to the sides, which gives more space at the center. The *tabs panel* is placed in the top left and the player names and score standings in the top center. What is special for GSL are the player cameras next to the *minimap* and the *selected unit panel* on the bottom right that is shown when the observer has selected a unit, building or an army.

7.3.3 Description of the Counter-Strike: Global Offensive Spectator Interface

Watching CS:GO in the game client itself is done by using GOTV. This is the successor of SourceTV (Counter-Strike: Source) and HLTV (original Counter-Strike). It allows spectators to watch both live games and recorded replays. GOTV also has an auto director, which can be enabled if the spectator does not want to control the observation themselves. GOTV has three main modes, first person mode, third person mode and free roam. In the first two, the spectator is bound to a player and follows that player around. In first person, the spectator sees from the same view as the player, in third person, the spectator sees from an over-the-shoulder perspective, but is free to watch the player from different angles. Free roaming allows the spectator to detach themselves from players and move around freely. There is also a map overview, a *fullscreen overlay*, which enlarges the *minimap* and shows the position of each player as a small dot. The map overview can be drawn on to show plays and tactics. When spectating via Twitch, the Twitch broadcaster is using GOTV to spectate the game and then broadcasting the game from their observer's perspective with their casters commentating.

Overall, GOTV's interface is pretty similar to the in-game player interface. The teams use the same color coding as in game (Terrorists are bronze colored and Counter-Terrorists are blue). But there are a few key differences. First and foremost, the spectator has access to information of both teams instead of just their own; weapons, equipment, money etc. There is also the x-ray system. It is a *character outline* system that allows the spectator to see colored outlines of all players, even through walls as seen in Figure 7.12. When the currently selected player is flash banged, a *pop-up* icon is displayed in the middle of the screen, showing how long the player is at a disabled state. When other players are flashbanged, *information icons* are placed above the player's head in the game world as seen in Figure 7.12. Spectators see the trajectories of thrown grenades and can also follow a thrown grenade in the air, which is often used to highlight impressive and seemingly impossible grenade throws.

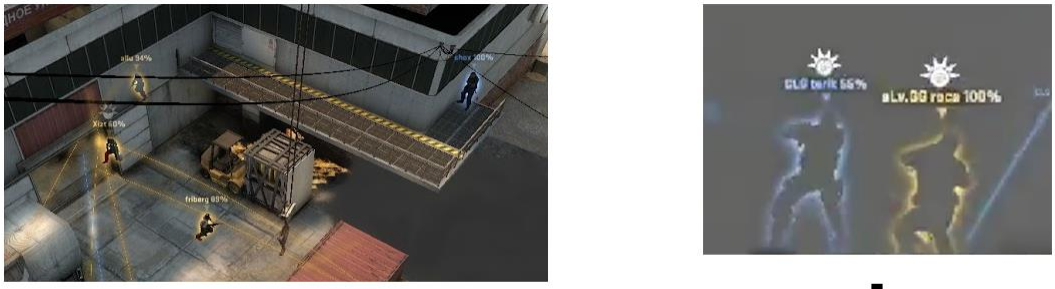

Figure 7.12: *a) X-ray shot over a bomb site where the character outlines of both teams can be seen, b) Information icons above their heads when being flashed.*

Of the games we looked at, CS:GO is probably the easiest to understand if you do not play the game yourself. Each round boils down to two teams eliminating each other or completing a straightforward objective. The primary focus of action are engagements between the teams and how those engagements are set up by the players. One of the biggest problems with spectating team first person shooters is that you only see the point of view of one player at the time. It falls to the observer to find the players that will be most impactful each round. This requires knowledge of the game and the player's tactics. The observer usually switches between different player views to show the game from their various perspectives. The free roam mode in GOTV also lets the observer set up bird's eye views of important positions on the map, the bomb sites, for example. This can be used in combination with the grenade perspective to show how teams set up takeovers of bomb sites.

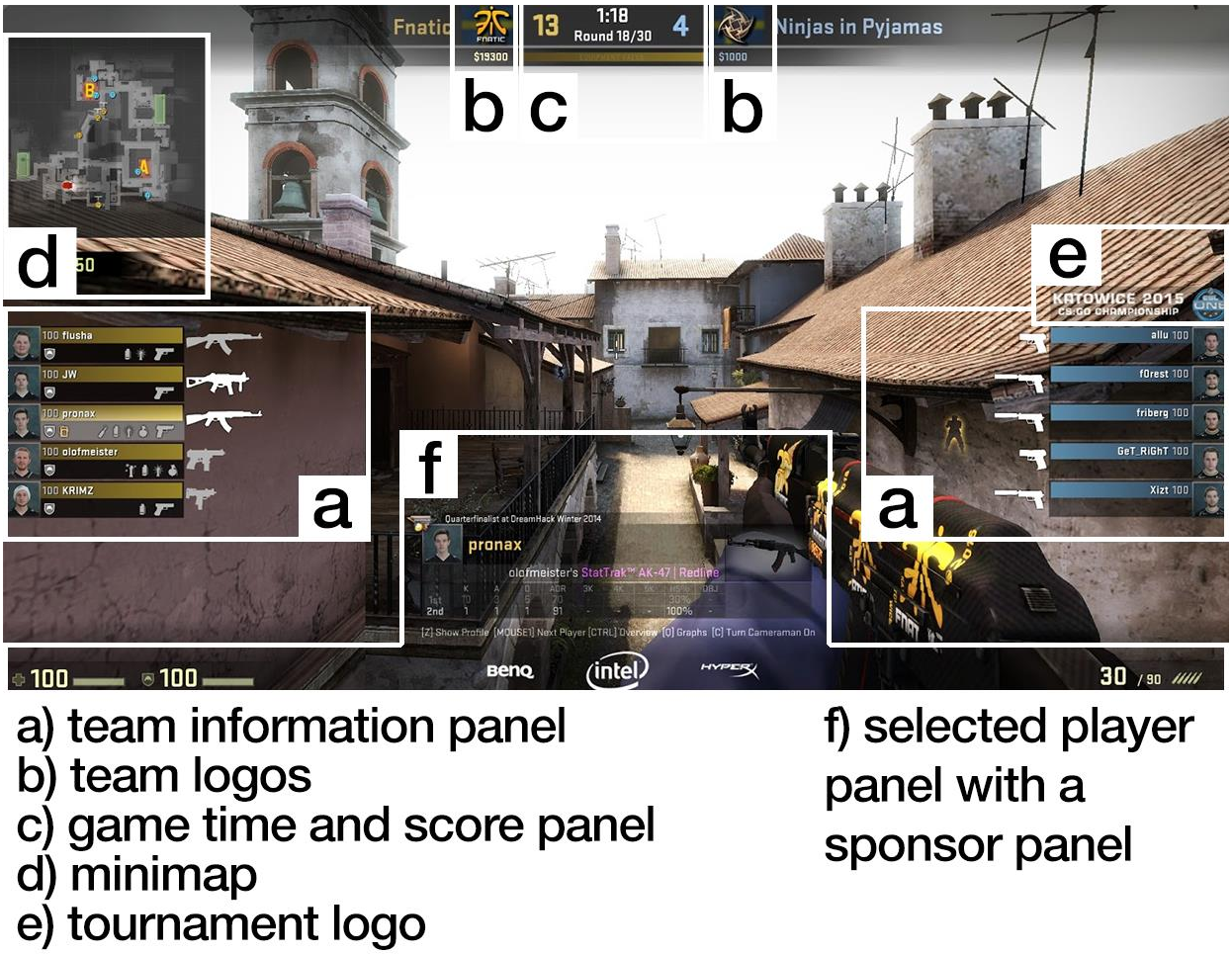

Figure 7.13: *Various panels and UI components in CS:GO.*

What is most important is which players are alive and which player you are currently spectating. GOTV displays the names, health, equipment and weapons of players to the right and left of the screen (one team on the right, the other on the left) in *team information panels*. The *selected player panel* at the bottom has the name and current weapon of the currently spectated player. Extra player stats can be toggled to be shown or hidden for this panel. The stats are number of kills, deaths and assists, average damage per round, killing streaks, headshot percentage and the number of times the player completed an objective (planting or defusing the bomb).

The *minimap* is similar to the one used when playing, except that both teams positions are shown to spectators. Together with the *character outlines*, this gives the spectator a better sense of the players' positions on the map. Following the themes of the team colors, the Counter-Terrorists are blue dots and the Terrorists are bronze dots. Additionally, the dots have numbers in them, ranging from 0-9, designating each player with a number that can be seen in the *team information panels.* The currently selected player has an extra white circle and a visible cone in the direction they are facing on the *minimap.*

Since all off the tournaments rely on GOTV, their interfaces are very similar to each other. The differences between tournaments lie mainly in the tournaments' own overlays. This is shown mostly through *tournament logos* and *sponsor panels*. Some use overlays to box in parts of the standard game interface as well. Digital stickers with *team logos* can be bought in advance of major tournaments. The stickers can be placed diegetically on weapons to show support for a team. The teams themselves earn a part of the profit in the sale of these stickers. Many of the bigger tournaments also have the ability to show instant replays. This is most often used in the beginning of rounds, when there is no other action to show. During ESL One Katowice, ESL used a special view for 1 versus 1 situations as seen in Figure 7.14.

Figure 7.14: *A view of 1 versus 1 in CS:GO.*

7.3.4 Description of the Hearthstone Spectator Interface

Hearthstone differentiates itself from the other games we have looked at by the fact that there is no need for a dedicated in-game observer, since there are only two players and everything can be shown on one screen without any movement. This means that the caster can do the observing as they do not have to interact with the game, just watch and commentate. Hearthstone did not have a spectator mode until recently (spec mode hearthstone reference). This did not stop tournament organizers and players to hold tournaments though. Even Blizzard themselves held a World Champion Series for the game. What is interesting though, is that so far tournaments have been hesitant to use the spectator mode, instead relying on the methods they used before.

The reason for this is probably because the spectator mode leaves much to be desired. There is no pre-game lobby, forcing the organizer to set up each game separately. To see both players' cards, the caster that does the observing needs to be on both players' friends lists inside the

game. Finally, the caster will see the game from the perspective of one of the players, meaning one of the players will have the top position, with their cards upside down as seen in Figure 7.15.

Figure 7.15: *Shows how the spectator view of the top players' cards looks like in the official in-game version Hearthstone.*

The spectator interface itself is the same as the in-game interface. Since it consists of diegetic components there are no panels, but what can be called the *team information 'panels'* are at the top and bottom of the screen. They hold each player's cards and mana crystals. To the right are the players' decks. Hovering over a deck makes a *pop-up* appear with the number of cards left in the deck. On the left side of the game board is a stack-based *tabs panel*. Hovering over the icons in the panel displays the previous cards that the players have played. As more cards are played the icons are scrolled down the panel.

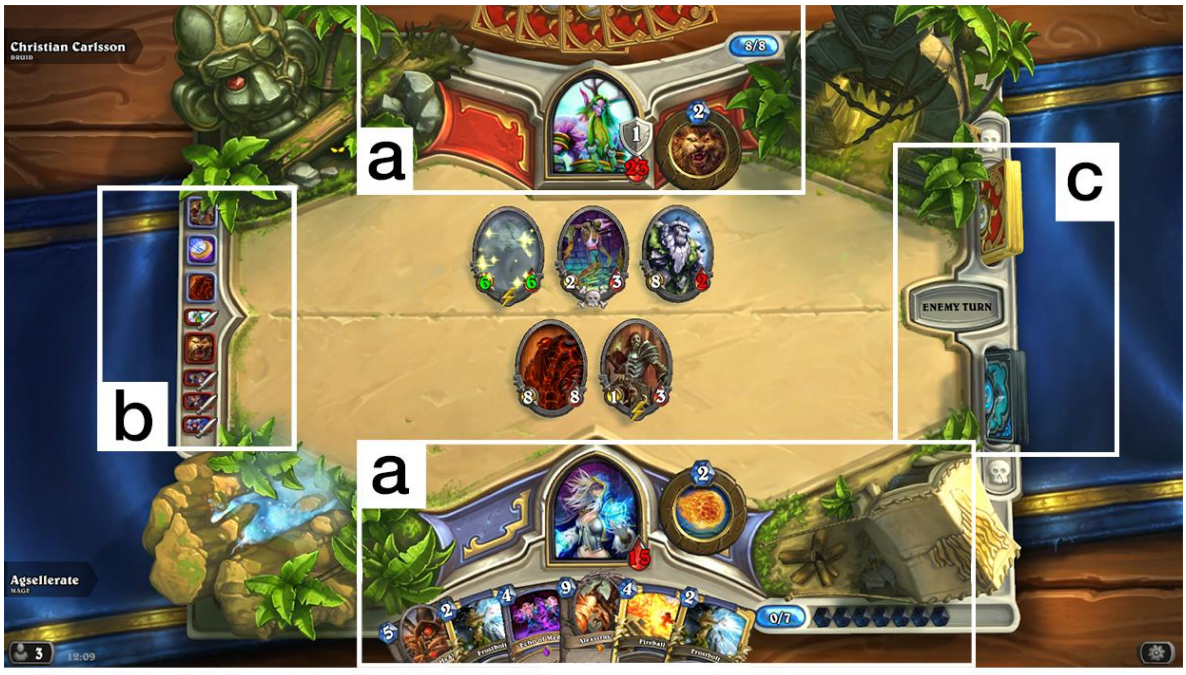

Figure 7.16: *Various interface panels and components in Hearthstone.*

The way tournaments handled not having a spectator mode for so long was with overlays and switching the sides of the players. One of the earliest tournaments was the 2013 Innkeeper's Invitational, organized by Blizzard. To show both players' cards, the view was switched each turn. This technique has been done by many tournaments since. Switching views allows the spectator to see both the card draw of both players, and their thought process when they are hovering over and selecting cards. The drawbacks of constantly switching views is that it will be confusing for newer players and spectators to understand the perspective has changed if there is no extra indication that view has been switched. Webcams of the players are often used to do this, the active player's webcam overlay is usually highlighted in some way. Another drawback of the switching technique is that if the view is switched too early, the spectator will see the same card effect twice, once from the perspective of the player who played the card and once from the perspective of the opponent.

In early 2014, tournaments started experimenting with overlays to show both players' cards at the same time. We have found three variants of using this overlay technique. The first uses an overlay at the top of the screen, where the top player's card are. This overlay keeps the most consistency between playing and spectating as the cards are at the same position, but the overlay usually covers parts of the top player's hero portrait. The second variant shows both players' cards at the bottom of the screen. This variant requires extra thought on how to show whose turn it is. The third variant shows the players' cards in the upper right and lower left corners. This requires extra overlays to hide the normal cards positions in-game.

Figure 7.17: *a) Both player's cards are shown at the bottom, b) The top player have an overlay with their cards c) The player's cards are now in the bottom right and top left with overlays blocking the original positions.*

All of the actions in Hearthstone are focused on the in-game board itself, which is a square. With a widescreen monitor, this leaves areas on both sides of the board empty. Tournaments have been good about using this space, using it for *webcams* of the players, decklists, names of players, the *game score panel, sponsor panel, tournament logo*. This is also done using overlays, and cannot be done in the actual in-game spectator mode.

Hearthstone uses red and blue to differentiate the top and bottom players. Though it is not consistent with colors, as the player's perspective is always blue and the opponent is red. Tournaments that use the technique of switching between the players' views can cause confusion when the players who is playing is always blue. What is good with red and blue is that these colors are distinguishable for colorblind spectators.

7.4 Other games

We looked at the spectator interfaces of other games in the same genres in order to get inspiration on how they solved issues and if something could be borrowed from their interfaces.

Starting with the MOBA genre, League of Legends (LoL), Heroes of Newerth (HoN), Smite and Heroes of the Storm (HotS) were analyzed. Both LoL and HoN have similar spectator UIs with *team information panels* on the sides of the screens which can be seen in CS:GO. In HoN, most player specific information like the spell cooldown, gold and items for each player are displayed on the sides. In the middle bottom there are additional player specific information with gold per minute, experience per minute and the current kills, deaths and assists. Furthermore, gold per minute and experience per minute for each team can be seen at the top of the screen.

League of Legends is similar to Heroes of Newerth in most aspects. The overall layout is similar, with differences being the minimap and player panel position. The minimap itself have big contrast differences between hero, towers and building positions and the environment to maintain good readability. Furthermore, the colors for the teams are purple and teal to give good readability for people with colorblindness. Other differences to HoN are gold per minute and experience per minute whereas gold per minute is only displayed for each team and experience per minute is not displayed at all. LoL's interface gives more focus on last hits instead.

A game that can be argued for not being a MOBA is Heroes of the Storm by Blizzard Entertainment. Blizzard themselves have said that HotS is not a MOBA but a hero brawler (Gaston, 2013). Some game mechanics that define a MOBA game are removed or modified like the presence of items, player levels are replaced by team levels, different maps instead of just one are some examples. The UI is also different from HoN and LoL in that the team panels are displayed at the top. Because of the fact that teams gain experience together, only the experience of each team is needed. The only choice players have to make inside the game is choosing talents, which are shown in the bottom of the screen.

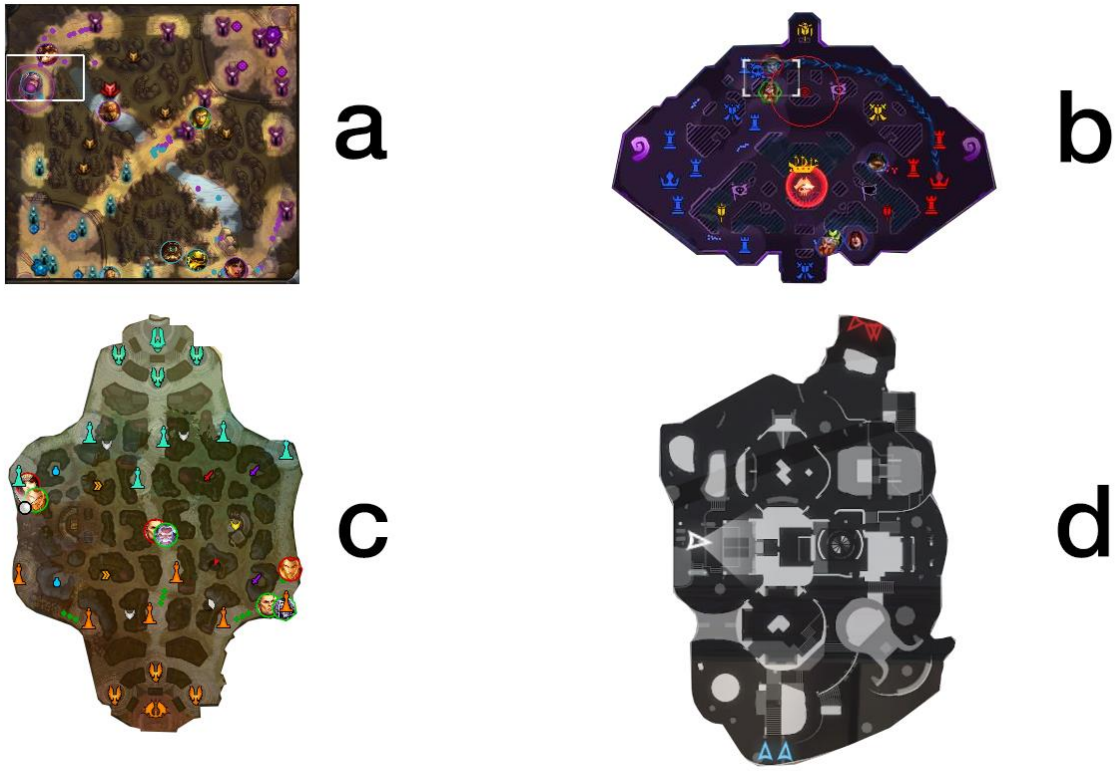

Figure 7.18: *a) League of Legends minimap, b) Heroes of the Storm minimap, c) Smite minimap, d) Call of Duty: Advanced Warfare minimap.*

Looking at specific UI components, the *minimap* is different from other MOBAs as the maps in HotS are not square, but have shapes to them. In order to get additional game world space, the *minimap* does not have a square panel behind it, but it is stand-alone with a distinguishable border. A feature HotS has that other MOBAs do not have is colored circles underneath the heroes to further distinguish the teams. This applies to spells as well, where certain spells are colored in either blue or red to signify to the spectator of which team that casted the spell. This feature can also be seen in Starcraft 2 with certain mods.

A game that has big differences between playing and spectating is Smite which switches between a third person view while playing and a bird's eye view when spectating as it gives a better overview. The UI itself is relatively similar to LoL with *team information panels* on the sides and a bottom panel for the statistics of each player. The statistics panel can be changed to Another UI component that has similarities with LoL is the minimap which has the beige ground and outlined hero portraits. The beige ground does not comply with how the environment itself looks like as the environment is mostly green.

In order to get inspiration for CS:GO, we looked at other FPS games, specifically Quake Live and Call of Duty: Advanced Warfare. Quake Live is an old game that have been around for many years. The game mechanics in this arena based shooter are largely based on getting armor and weapons at the right times when they spawn and keeping track of the cooldowns. In order for the

spectator to get a hold of these timings, there are countdown timers on the sides that shows how many seconds there are left till the weapon or armor spawns.

Another FPS game we looked at is Call of Duty: Advanced Warfare. We looked specifically on the *minimap* for this game as it is substantially different from the one in CS:GO. The CoD:AW *minimap* only consist of three colors, black, white and grey with black being the outside ground, while grey are walkable areas inside a building or bridges between buildings and white are unreachable areas. A notable feature in the *minimap* are the player arrows that shows where the players are aiming and walking but also shows when someone is shooting with adding a flashing animation in the front of the arrow.

The last genre that is not as widespread as the other ones as a digital platform are CCGs. We had to investigate thoroughly to find games that is similar to Hearthstone. One game that used interesting visual cues is a CCG called Hex. This game uses the board to indicate whose turn it is by glowing certain parts of the board.

We also looked at a non-digital CCG called Magic: The Gathering. Spectating MTG is different as the game is tangible, so the spectating is mainly done from the side of the table. In some cases, the tournament organizers shows important cards in the overlays of the stream.

7.5 Analysis of the Spectator Interface

This following section describes what we found out when spectating the games.

7.5.1 Streaming Quality and mobile phones

When we analyzed streams and videos of past tournaments, one problem that occurred was the quality of these videos. Most videos were shown with the best resolution being 720p, resulting in that certain visual components were hard to tell apart. A notable one is the CS:GO minimap where the numbers inside the player circle was only visible when closing up on the screen.

Another important aspect about videos and streaming is that there are a number of people watching from smartphones and tablets. These devices have small screens which makes it harder to spectate as the small details are not visible.

7.5.2 Exciting the Spectator

The most crucial thing in e-sports is showcasing the level of skill and tactics that go into the games. The pro players put in hours of training every day in order to compete at the highest level, and showing that off is what's important. This is what engages some of the personas described by (Starcraft from the stands). For *The Curious* and *The Pupil*, who spectates in order to learn more about the game and its tactics, showing not only what happens, but also how the players did it is crucial. To a lesser extent, this can also be true for *The Entertained*, who simply watches to be entertained.

In CS:GO, for example, showing the Terrorist team set up a takeover of a bombsite in CS:GO, following the perspective of thrown smoke grenades that cut off the defenders from seeing

clearly and pushing them out of position, then using a bird's eye view to show the Terrorists taking the bombsite over. These smoke grenades and pushes are practiced to a detail by teams and are therefore highly coordinated.

One of the most important things in CS:GO is eliminating the opposing team. Since the spectator usually follows one of the players' view, they often get to see exactly how fast the players can react and shoot. This has led to a discussion of the x-ray system in the community. Some prefer it to be off when engagements happen, since they feel the x-ray outline is distracting and they don't get to see exactly how the player sees the situation, since the x-ray outline can be seen through walls. The upside to using the x-ray system is it helps to show where the players are heading, and their reaction to kills and callouts. Some observers and spectators advocate using a combination of both, leave x-ray on for most of the round, but when engagements are about to take place, switch it off to show the game from the players' perspective.

A common example in Dota 2 is the way players often stick around team fights, even when they are very low on hit points, counting on their own ability to avoid getting caught by the opponent's attacks and spells. This requires coordination with teammates, knowledge of the opposing team's heroes and what to avoid. Big team fights can often turn games around and are often the center of attention.

In Starcraft 2, the ability to attack in multiple places simultaneously requires rapid fingers and decision making. Attacking an opponent's expansion while dropping units in their main base at the same time, for example. Some Starcraft 2 tournaments have cameras that are pointed at the players' keyboards to show the agility of players. APM (actions per minute) meters are an in-game way of indicating the speed required to play at the highest level.

In Hearthstone, a perfect use of the mana crystals and cards at the given turn and making optimal plays have to take not only your own hand and deck into account, but also what you think your opponent has on their hand and in their deck. Recognizing what deck the opponent is playing and thinking ahead, what kind of cards can be expected to be played two rounds from now, calculating how likely it is the opponent has the cards they need to counter and so on.

7.5.3 Instant Replay

Instant replays are heavily used in regular sports, especially in fast paced sports. They are often used to highlight something, a skillful sequence or a questionable play. Replays often show the action from a different point of view and are usually shown when there is nothing else going on. In hockey, for example, a goal might be shown from the standard camera view first, then from the opposite side of the rink, if it is hard to see exactly what happened from the standard view. A replay in hockey are most commonly shown between plays, i.e. after a goal or an icing call. Replays in e-sports games are used in a similar fashion. In CS:GO, replays are often used to show how the outcome of a round was decided. In Dota 2, replaying a team fight sequence can show which team came out better from it, and show momentum swings in the game. Just like in regular sports, replays are most often played during lulls in the action. For example, during the beginning of a round in CS:GO, when players are buying weapons and just moving out of spawn, or in Dota 2, in lulls in the action as heroes are just farming. From what we have seen, Starcraft 2

and Hearthstone have not used instant replays. Tournaments in Starcraft 2 has used replays to show highlights after a game is complete, though. We think the reason for the lack of instant replays in the two games is that the action is more or less continuous, there are seldom lulls in the action, leaving only time between games to show highlights.

7.5.4 Webcams

Webcams on players are often used in tournaments. Showing how players react to what happens in-game is a good way of showing the emotion that they put into the game. Some Starcraft 2 tournaments have also had cameras on the players' keyboard and fingers, to show the speed of which they play. Reeves et al. (2005) argues that showing the movements and gestures that the performers (the players in our case) make can impact the spectator experience, comparing it to a pianist playing their piano and how the pianist's gestures influence the spectator's appreciation of the skill and emotion involved in the performance.

7.5.5 Player Trivia and Social Media Integration

Regular sports games often have player and team trivia displayed during matches. Things like recent performances and statistics are usually shown. This is something that e-sports games have started to pick up as well. ESL One Katowice used small info boxes with player stats, number of kills with a particular weapon, for example.

Make the audience more engaged with having bets on who wins, a small text that is scrolling showing tweets et cetera.

7.5.6 Team Jerseys In-game

Taking team colors to another level, the Championship Gaming Series changed the skin models of the teams in Counter-Strike: Source to customized team jerseys, complete with names and jersey number on the back. This was an attempt to connect e-sports to regular sports and make it easier for spectators to identify and cheer for their teams. ESL did something similar in Counter-Strike 1.6, with Counter-Terrorists having blue upper bodies and Terrorists having red, with an ESL logo on the chest and back. From what we have gathered, only the spectator could see the modified skins, the players themselves saw the normal skins so it did not impact the gameplay. The idea has been brought up again for CS:GO (Larsson, 2014), with mixed reactions.

In Dota 2, players can buy custom skins for the heroes in the game. Custom skins could be made to have team logos and jerseys. However, since each hero is different in Dota 2, this might have a negative effect, if the spectator cannot see which hero is which.

7.6 Regular Sports

This section describes our experience watching Super Bowl 2015 as well as a comparison between regular sports and their game equivalents. This was done to study and find inspiration for our redesign and guidelines.

7.6.1 Super Bowl 2015

This was the first time either of us had watched a proper game of American football. The only knowledge we had of the sport was from watching movies and TV series involving it. We purposefully tuned into the American broadcast as we suspected the Swedish broadcast would explain the rules and we wanted get the genuine Super Bowl experience as newcomers to the sport. From the pre-game show, we understood we would have to pick up the basic rules ourselves, as the commentators were discussing very detailed aspects of the game and its players.

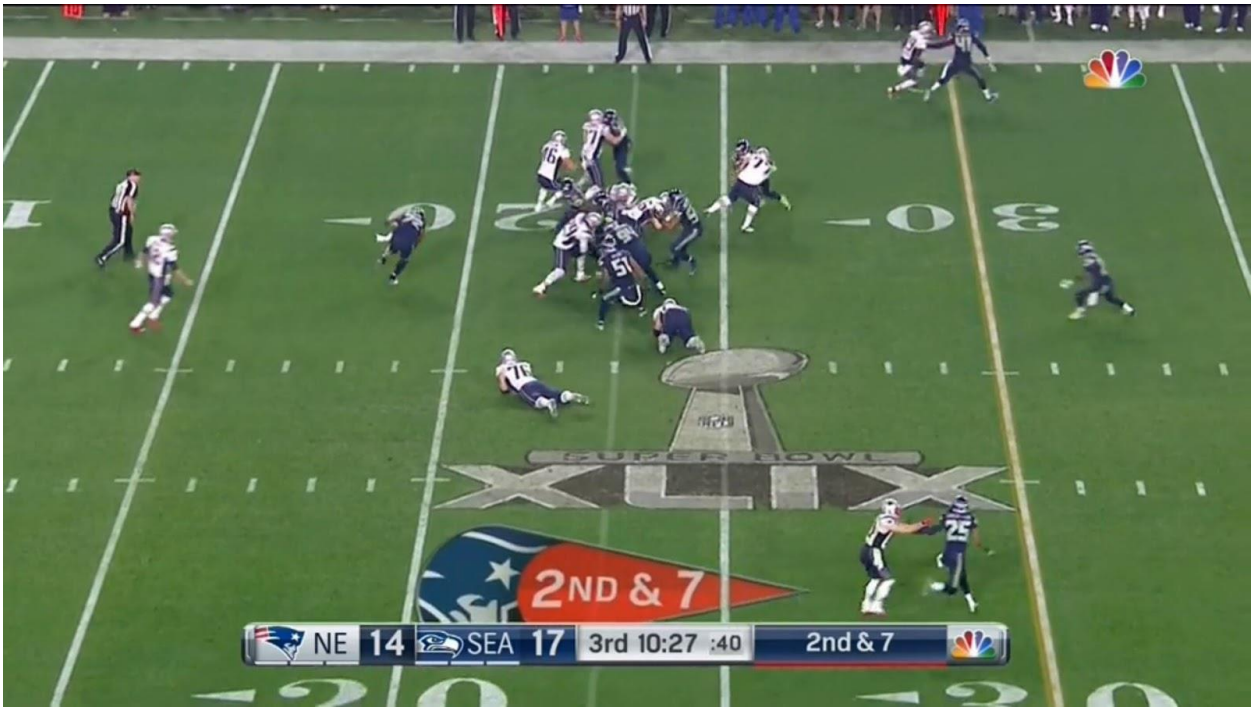

Figure 7.19: *Super Bowl 2015, American Football.*

At the beginning of the game we were a bit lost but it did not take too long to understand the basic rules. Having the current down and yard distance displayed both on the scoreboard and digitally overlaid on the pitch made us understand it was important to the game, even before understanding what it meant. There was also a yellow line indicating how far the team would have to push to reset the downs, which was one of the first things we noticed and discussed the use of. We caught on pretty quickly that the three things all correlate.

Something else that helped was the commentators and referees. Even if the commentators did not go into much detail about the basics, they still mentioned the downs and distance and what those implied. During replays, they highlighted and explained plays so that even we could understand. Something that helped here was that the commentators could draw on the screen to help show what the players would do, so you knew what to look for. The referees were good about announcing penalties very clearly and explicitly, something that helps someone who does not really know the rules.

Every now and then, detailed information on a player's or a team's stats on the season would be shown. This did not tell us very much, but to someone who follows the sport would probably be more interesting. During one of the replays, the commentators mentioned a similar play earlier in the season. During the next intermission, both replays were shown, so the audience could remember the play as well. Things like this helps to create storylines for the fans to follow, which we thought was great.

We found three interesting points when analyzing the event afterwards. First; understanding the basics of something new is not an insurmountable obstacle. New spectators do not necessarily need to understand every little detail, as long as they get the basics quickly enough. Second; only show the most important details at all times. The Super Bowl broadcast scoreboard only showed the score of the two teams, the time and period, and the current down and yards to go. This helps a new spectator to focus on understanding how those things correlate first and worry about specifics later. There is no need to overwhelm the spectators with loads of information that they will not have any use for. Which leads us to the last point; detailed information can be shown with pop-ups at the sides of the screen or during downtime. In the Super Bowl broadcast this was mostly used during downtime, probably because there is a lot of it in American football. The more experienced spectators are the ones who will benefit the most, but it might serve to introduce newer spectators to the more detailed aspects of the sport as well.

To compare this to e-sports and our four games, learning the basics of them is relatively straight forward. In simple terms, the goal of all four games is to defeat the opponent by eliminating them (in game, of course). It is obviously more complicated than that, just as American football is more complicated than two teams trying to bring a ball to their opponent's goal area, but it serves as a basic understanding. The amount of information shown in our games compared to the Super Bowl is harder to compare as it varies a lot between the games. For example, we felt that the CS:GO interface had some unnecessary information, while Hearthstone did not have enough. There is also the complexity of the games to take into consideration. The rounds in CS:GO, the kills in Dota 2 or the hit points of the heroes in Hearthstone can somewhat be compared to the score in American football, but what about Starcraft 2? The closest to a score in Starcraft 2 is probably the mineral, gas and supply count. The amount of extra information that should be shown varies between the games, depending on the game's needs. Lastly, some e-sports games utilize downtime or lulls in the action to show extra information or stats. Replays, player or hero stats screens or overlays showing the map or more detailed stats is shown between rounds, after team fights and so on. Most often though, the stats come from the current game or tournament. As e-sports keep growing, the depth of stats will probably grow. For example, if two Starcraft 2 players have played thirty games over the last two years, looking at who won most times, what tactics were deployed and so on might be interesting.

7.6.2 Regular Sports and their Video Game Equivalents

While American football was the only regular sport we looked at extensively, we also did a small comparison between real sports and their video game counterpart. The games we looked at were FIFA 15 (association football), NHL 15 (ice hockey) and Virtua Tennis 4 (tennis).

FIFA 15's camera view is the same as when you are watching a real football game. The game also shows match stats like ball possession and so on, like a real football game. The scoreboard is very similar as well, showing only the teams, their score and the time. It does a good job of simulating a real football game from a spectator standpoint and even as a player you see the game from the spectator view. FIFA 15 has the currently controlled players in the bottom corners, a small *minimap* at the bottom with dots representing all of the players and a yellow cross that represents the ball. When the ball is in the air, a yellow cross is also shown on the pitch where the ball will land. These three things do not exist in the real game. Perhaps they will be added as technology is more and more adapted into the sport, having recently started using Goal Line Technology (FIFA, 2014).

In contrast to FIFA 15, the standard NHL 15 camera view is not same camera view used when watching a real hockey game. Instead it the camera follows along the long side of the rink. This can be changed in the settings though. NHL 15 uses the same NBC scoreboard as the real NBC uses for their NHL games, they even use same commentators. The puck has a shade around it to make it more visible. This was something that was actually tried in the real version of the sport, in the 1990s. The puck would have a blue glow around it and when it was shot over a certain velocity, a red streak would indicate the shot. The popularity of this invention is controversial, according to a Fox survey, 7 out of 10 liked the glowing puck (Keri, 2006). But at the same time, it was voted the sixth worst innovation in sports by ESPN readers (EPSN Page 2, 2002).

Figure 7.20: *a) A red glow from the puck when it is shot to a high velocity, b) A blue glow around the puck during normal play.*

Virtua Tennis 4 has a similar feature, the ball leaves a trail behind it, making it easier to see. Though we are not tennis experts by any means, our guess is a glowing ball with a trail would receive similar welcome in real tennis as the glowing puck received in ice hockey. Something that could be interesting though, is showing the serve speed, which is something else Virtua Tennis 4 does.

These games emulate spectator sports, and the result is somewhere in between the act of spectating and the act of playing yourself. The games are played from a bird's eye view, just like

when you are spectating the sport, they also use similar overlays when showing scores and stats, but use the digital aspect to introduce changes in how the game looks and the information available. Even if the adaptation of the real version of the sport is slow, perhaps they will incorporate more and more of the digital aspects in the future. However, there will always be purists who think the 'soul' of the game will be damaged by changing too much. This is something to keep in mind when designing the spectator interfaces for e-sports titles as well.

7.7 Guidelines, first version

The aim of the thesis was to find guidelines that gives directions on what to think about when designing spectator interfaces for e-sports. The spectator interface study and the interface theory in the preliminary study resulted in the first version of these guidelines. They were no more than a couple of keywords or a sentence for each guideline, like an alpha version of the guidelines. Just general opinions and quick thoughts from the analysis of what some of the games did well and what we thought was missing.

Alpha Version of the Guidelines:

1. Consistency between playing and spectating
2. Color blindness - 10 % of men are color blind
3. Team colors
4. Pre-game lobby setup
5. Utilize downtime
6. Points of focus, know your game, are there any lulls in action where you can show replays, or is there continuous action?
7. Promote teams through team logos etc, not only does it make the sponsors happy but the beginners can see a difference between the teams.
8. Visual Clarity, Due to lesser stream quality and mobile streaming, the elements should be big and visible.
9. Minimap, try to relate the players and team colors with the minimap
10. Toggle to hide/show information and statistics
11. Player's skill should be displayed and not hidden
12. Giving too much information to the spectator can take away the suspense
13. Involve social media in the game
14. Different spectator for different personas

7.8 Brainstorming

Besides looking at what other games and genres have done, we also wanted to explore new ideas and what could be added specifically to each game. In order to do this we conducted four KJ technique inspired brainstorming sessions, one for each game. The question we wanted to answer was, is there anything missing that specifically adds to the experience of spectating this game? Having both played and spectated all of the four games, the point of the session was to come up with new interface features that have yet to be implemented or even thought of. We did not follow the KJ technique fully, but devoted about 30 minutes to each game, sitting separately and

writing down things we thought could be added to the game, which has not yet been seen. Sticky notes with the ideas were put up on a wall, sorted by game, and discussed. Some of the ideas were too farfetched, made no sense or gave too much information to the spectator, but a couple made it into the redesigned interfaces.

***Figure 7.21**: A wall with sticky notes from the brainstorming session.*

7.9 First iteration redesign

The first iteration of redesigns are based on the studied theory, the brainstorming session, our perception of the existing UI and how it could be improved. Higher resolution figures of the redesigns can be seen in Appendix A.

The redesign of the interfaces were made by using screenshots of the games in paused mode in replays with the UI and with the UI removed. The UI in CS:GO, Starcraft 2 and Dota 2 could be removed by entering a command line inside the game while for Hearthstone, we used a picture published by Blizzard which did not have any cards in the hands nor creatures on the board. The screenshots were then imported into Adobe Photoshop. Most of the UI components were then cut and pasted into the picture with no UI as layers, in order for us to easily manipulate the components position and their looks.

Because of the fact that Hearthstone has most components as diegetic most work went down on this interface. We wanted good results on the questionnaires and therefore the manipulation of the UI had to be done in a way that would not disregard the overall look of the game. The alpha guidelines are mentioned where they are used, but some of the existing spectator interfaces already follow the some of the guidelines, which is natural since the existing spectator interfaces helped inspire the guidelines. In the following sections we only describe our changes and therefore do not mention when the guidelines are followed by the existing spectator interface.

7.9.1 Counter-Strike: Global Offensive

The main changes to the spectator UI were done to the *minimap*, the *team information panels* at the sides and the currently spectated player info. The current *minimap* is done in a grey scale to separate the walls, boxes and rooftops with the ground. It was arguably hard to read the map when spectating in lower resolutions as things tended to blend together. In order to make the *minimap* more readable in line with alpha guideline 8 and 9, the redesigned *minimap* has yellow lines on the walls to help spectators show exactly where players are able to go and not go. Additionally, the parts of the map that were not reachable inside the game were removed as well, such as the rooftops. This change has been seen in other games like Heroes of the Storm and Call of Duty: Advanced Warfare.

Figure 7.22: *The first iteration of the CS:GO redesign.*

The player icons on the *minimap* were also changed to show the player number more clearly as well as a trail behind the icons to represent where they have walked. This was one of the ideas that came from the brainstorming session. Finally, subtle circles for gas grenades and molotovs were also added to the minimap to make the spectator able to understand what is happening on the other side of the map.

CS:GO already follows alpha guideline 2 and 3 relatively well with the sides being colored with the color blind friendly bronze and blue colors. On the *minimap* though, the team spawn locations are green and the bomb sites are red. To fix this, we changed the spawn locations' colors to match their respective team. This change will not only be good for color blind people but it also gives spectators a reference point on where the respective teams are spawning.

The equipment value slider under the team round scores was removed in accordance with alpha guideline 8. The information did not add much relevant information, since this information (the difference in the value of the two teams' weapons and equipment) could be gauged by looking at the weapons bought by the players, something that we think spectators do anyway. It is also hard to read in smaller devices and at lower stream qualities. The slider would be somewhat more useful if it instead showed the total money of each team, this way the spectators could quickly get an understanding of the economy of both teams. We were not sure it needed to be shown all of the time though, so it was left out for the first iteration.

The *team information panels* were moved down to the corners and simplified. Instead of showing the grenades for each player, the team's total count of grenades are shown. This change was mostly done due to alpha guideline 8 in order for spectators watching from tablets or phones to be able to see the grenades as they are small in the default UI. In a similar vein, we did not think the players' sidearm was relevant enough to show at all times, considering they should be using their main weapons in almost all situations. The sidearm and personal grenades can still be seen in the *selected player panel* by spectating the player directly. With these changes, we had room to move the position of the main weapon into the overlay itself, whereas in the existing interface, it sticks out, obstructing the view on the sides.

The hit points and ammunition was moved to the center bottom of the screen, together with what weapons and equipment the currently spectated player has. This was an attempt to gather the relevant information of the player in one *selected player panel*, but still not moving it too far away from their original positions. This also forced us to move the *sponsor logos* slightly. It could be argued that alpha guideline 1 regarding consistency is broken by moving hit points and ammunition to the center, but we believe that the tradeoff for having all player information in one place is greater than keeping the consistency.

The *selected player panel* was also made smaller and some of the information about the player's stats were removed (3K, 4K, 5K, objectives and what skin his weapon has). This extra information can be shown through a toggle command instead as per alpha guideline 10. The reasoning behind this change was to reduce the size of the panel (as it had a lot of unused space) and remove what we thought was uninteresting information. The statistics were shown under the center panel before, but it was moved to the right of the player name to be able to have more space below for sponsors and equipment.

Smoke grenades and molotovs are often used as tools to deny opponents access to certain areas. Players running through a smoke grenade are at a disadvantage compared to players waiting on the other side and molotovs will damage players who stand in them. This means that the time that smoke grenades and molotovs takes to dissipate can be crucial in determining the outcome of a round. Therefore we added an *information icon* to smoke grenades and molotov, once they have landed on the ground. The icon shows the grenade type in the middle of the area of effect that indicates how much time there is left before the grenade dissipates. Where pro players throw grenades and how they fully utilize their effects is something we want to exaggerate in accordance with alpha guideline 11.

7.9.2 Hearthstone: Heroes of Warcraft

One of the biggest problems we identified when spectating Hearthstone is how the top player's cards are shown. The cards are usually shown with a square overlay making it stand out from the game world, making the game less immersive. It is apparent that Blizzard wants the game to have as much diegetic components as possible as everything except the player names and main menu button is diegetic. The redesign tackles the problem by zooming out the game world, creating more space for the top player's cards. The cards are fanned out in the same way as the normal interface, but the cards are turned 180 degrees to show the texts and icons in the right way. Having the cards fanning out this way was negative in one way in that the mana crystals of the some of the top player's cards were cut off by the screen edge.

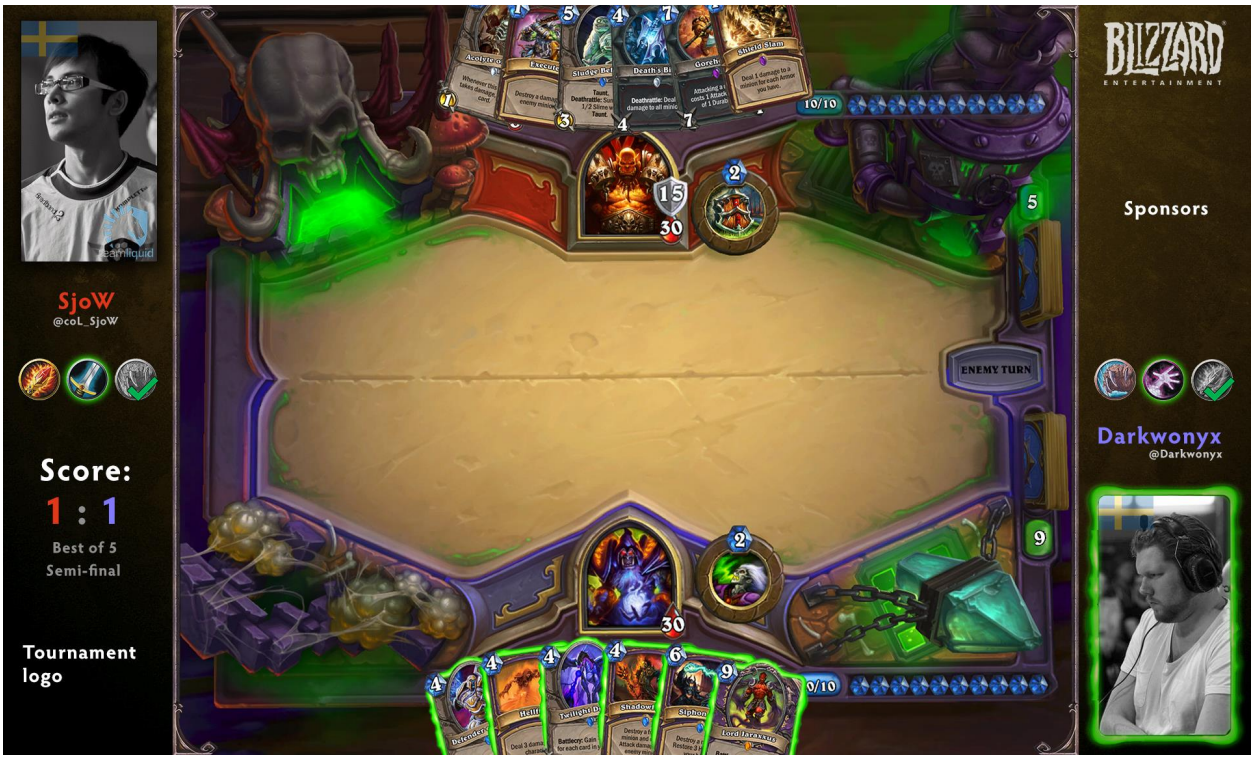

***Figure 7.23**: The first iteration of the Hearthstone redesign*

Hearthstone's game board is already colored by top and bottom player, the top player has a red panel next to their hero and the bottom player has a blue panel. In accordance with alpha guideline 3 to have team colors, we wanted to take this one step further and use the players' colors to indicate whose turn it is. The sides of the game board would glow with the color of the player showing whose turn it is, making it more apparent than just having the cards glow for the playing player.

Figure 7.24: *Glow is shown to indicate whose turn it is*

Going another step in this direction, we decided to change the mana crystals of the top player to red, to further cement the two difference between the two sides. This was one of the ideas that we felt was not a particularly good change, because it was quite a big departure from the existing interface, but we wanted to know what the response of players and spectators would be.

Figure 7.25*: On the left is a card where the default blue mana crystal in the top left was replaced by a red one to further differentiate the players. The right image shows a cardback for a team.*

Another idea we had that we mainly wanted some general feedback on, was team cardbacks. The idea came from alpha guideline 7, which in turn was inspired by the other three games, where team logos can be displayed in-game. We think this could be a discrete way of indicating who is on what team. Cardbacks are already something that exist in the game, which can be earned by players. This would be similar to the stickers in CS:GO where teams gets a small sum of money for each sticker that is bought.

A big focus for the redesigned interface was to make information that is only seen by hovering the mouse shown at all times. Hearthstone is relatively bad in this regard as the history bar on the left for example can only be viewed when hovered. Another example is the number of cards left in the deck. In the redesign we added a number next to the decks to show the remaining cards without the need of the observer hovering over the decks. In order to make the number stand out, we added a highly saturated green gem underneath. Another change we did that is similar to the cards left addition was to have text for secrets. Figure 7.26 shows how the question mark is replaced with a card text. These are not examples of breaking alpha guideline 11, since this information is available to players, but requires interaction (hovering) to be seen. As the spectator interfaces can only be viewed and not interacted with, we decided to provide this information in other means.

Figure 7.26: *Text reveals to the spectator of what secret that is played.*

One of the biggest differences between the top and bottom player when playing and spectating Hearthstone, is how the mana crystals are shown. The top player's mana crystals are often hidden behind the cosmetic graphic in the top right of the game board. One of the things we wanted to know was if players thought the mana crystal icons were important, or if it was enough to only show the number of mana crystals. In order to get an indication of how it would look like, the mana crystals from the bottom player was pasted in the top players' field.

7.9.3 Starcraft 2

The proposed redesign is more towards a traditional Starcraft 2 UI compared to WCS GameHeart, which has UI components gathered in the bottom of the screen. The playing view for Starcraft 2 uses the bottom for most of the UI. While this is true, the *resource panel* has always been in the top right position. If the spectators have played the game, we think that moving something as crucial as the *resource panel* intervenes with the spectator's mental model. Following alpha guideline 1, we think it is important to not stray too far away from the playing

interface. Similarly, the *tabs panel* and the names of the players are positioned in the top of the screen in the original Starcraft 2 spectator interface. The changes to the panel positioning was mainly done to start a discussion and to know the general consensus of what the spectators think of these changes.

Another issue is screen sizes, most monitors these days are widescreen monitors with aspect ratios of 16:9 or 16:10. They are wide, but not tall in height, making the available center screen space limited. By putting most UI components to the sides and corners of the screen, there's more screen left over to show the gameplay action. Additionally, looking at the current map pool (as of May 2015) the map layouts have most spawn positions in either top and down positions or top corner to bottom corner positions which causes most battles and action to occur from a top to bottom perspective. It should be noted that there are times on certain four player maps that players are spawning at bottom left to bottom right which creates most action from left to right but it has a low probability.

Figure 7.27*: The first iteration of the Starcraft 2 redesign.*

One of the quickest way to understand who is in the lead in a Starcraft 2 game is looking at the minerals, gas and supply count in the *resource panel*. A lot of interfaces add to this information by also showing the income per minute of minerals and gas, and break up the supply in army and workers. This makes it even easier for the spectator to see who is leading, since they have quick access to the army supply, which influences the player's ability to attack or defend against their opponents and they have access to the resource count and income, which influences the player's ability to quickly rebuild their army if it is lost. This is something we think ads to the experience of spectating and is important enough to be shown at all times.

Looking at the interfaces of GSL, ESL and other events, our idea was to make our interface a bit more symmetric and have a good balance between the sides. One change that makes the redesigned interface more symmetric is the production tab which is now aligned with the resources. This was done by moving the "production" text below the *tabs panel*. Another change to make the UI more symmetrical was to make the unit card the same size as the minimap and to put it in the bottom right corner. Additionally, we kept the worker killed and upgrade notifications *pop-ups* made by MIT Game Lab, which are used by many of the popular spectator interfaces.

With the new expansion, Blizzard have decided to revisit the *minimap* to give it another look (Blizzard Entertainment E, 2015). This made us think about the possibilities of a modified *minimap*. The current *minimap* have black borders around units and buildings which we thought could be altered. As the buildings are stationary most of the time, the idea was to remove the black border and make the buildings translucent. This would result in that the units would stand out more because of the contrast between the *minimap* objects with borders and the ones without. We identified that in the current version of the *minimap*, the buildings and the units would blend together making it impossible to distinguish the two. To further distinguish the players, the corners of the *minimap* to have the color of the player that spawns there. The idea was also that the colored corners would expand as the players expanded on the map.

Figure 7.28: *To the left is the current expansions' (Heart of the Swarm) minimap, Middle figure shows the new expansions' minimap and the right one shows our proposed minimap.*

One of the identified major issues with current interfaces is targeting units and the currently *selected unit panel*. Some interfaces use the standard style from when playing the game with one unit icon for each unit selected, other interfaces hide the panel. One of the problems with it is that the info it shows does not really add much that cannot be seen on the screen already. We wanted a more concise way of showing it and therefore our solution was to bunch all the units of the same type together and display the number of each type in the corner, similar to how the production looks like. The drawbacks for this change is that some information is lost like the health points for each unit, but this can already be seen better with the health bars anyway. If the units are numbered in this way, the spectators can easily see exactly how many units are in the engagements on the screen. This can be good in some cases where two players with the same races fight each other because then it pretty much comes down to who has the most units. In addition to this, we added a way to quickly see how many spells that are available to the selected

group of units. In Starcraft 2, the spell casters use energy to cast spells, the spells themselves vary in energy cost. Starcraft 2 automatically selects the spell casters first, so that players can cast spells with them, even if they have selected a bunch of other units as well. We calculate how many spells each of the spell casting unit could afford and add that number in the lower right of the spell icon. This was one of the ideas that came from the brainstorming session.

Figure 7.29: *Unit grouping idea for Starcraft 2.*

7.9.4 Dota 2

The redesign of Dota 2 is mostly about removing unnecessary UI components that does not bring much when spectating. One example is the quick buy and courier information. These components are good when playing because it gives shortcuts when buying items and seeing the courier status, but for spectating it does not give much information except for specific occasions.

Figure 7.30: *The first iteration of the Dota 2 redesign.*

The *selected player panel* was condensed by removing some of the stats and moving the hero inventory to take its place. The stats that were removed are attack damage, movement speed, armor, strength, agility and intelligence as their values can be gauged from looking at the hero's items anyway.

Figure 7.31: *The selected player panel with the toggable statistics.*

We thought that the statistics could be good in some occasions so it can be toggled to be shown/hidden by the observer following alpha guideline 10. The exception is attack damage, which was discussed whether to be kept or removed. The argument to keep it was that it is a quick way to show how strong a hero is, the argument to remove it was that it is only interesting to show for carry heroes, since they are the ones that are supposed to deal a lot of damage. We also added a colored border on the hero portrait, with a color that matches that player's color, which is assigned in the picking phase of the game. This is to make it easier for spectators to connect the different heroes with players and which hero is selected.

One feature that has been featured in several games are the colored *character outlines*. This can be seen in CS:GO when the outline of players is seen through walls to get a sense of where they are positioned. We thought this feature could be implemented in Dota 2 as well which could help differentiate the teams more and make the heroes distinguishable when behind buildings or trees.

Figure 7.32: *There is a red glow around the character. A green one is applied for the other team's heroes.*

Looking at the current *minimap*, it does not have any big drawbacks. One thing that could be changed are the player icons. As of now, players have either a cross or a circle to indicate position on the *minimap*. These shapes have colors that corresponds with the player color, so in our redesign the shapes now have the team color glow around them to further separate the teams in accordance with alpha guideline 3 and 9.

One of the major issues with the default Dota 2 UI is the use of green and red as team colors going against alpha guideline 2. The game has a color blind mode though, which changes the team colors to more suitable colors. In the redesign, we assume that all of the changes are applicable to the color blind mode as well, meaning a color blind person could safely use color blind mode and our changes would work for them as well.

7.10 Questionnaire general

In order to gather feedback on our redesigns we prepared questionnaires for each of the four games, to be posted on the Internet forum Reddit. Reddit hosts a set of sub forums (subreddits), which are often focused on a subject matter, a game or a TV show, for example. It so happens that each of the four games have an active subreddit, dedicated to discussing each respective game.

The start of the questionnaire consisted of questions which aimed to provide background information on the people who answered the questionnaires. Therefore we started by asking how long they played the game and how often they watched e-sports events and tournaments. As mentioned in the Methodology, Schoormans et al. (1995) found that experienced users were more likely to give useful feedback when evaluating a concept, and if the respondents had played

for a long time and watched a lot of e-sports, it could be assumed that their responses and comments were meaningful.

In accordance with Martin & Hanington (2012), we purposely made the questions short and concise, with images in the questionnaire itself to remind the respondents of the redesign and make sure the questions were easy to understand and quick to answer. Since the main purpose of the questionnaires was to get general feedback of each of the redesign changes we made, most of the questions were close-ended, asking if they were an improvement or not. However, the questionnaires ended in an open-ended question where testers could add their own thoughts. It was also encouraged to ask questions in the Reddit thread, where we could answer and explain our thoughts. A lot of useful comments were given this way. The full questionnaires and their responses can be found in Appendix B.

The questionnaires were prepared simultaneously as the final touches were made on the redesigns and focused on getting a general view of what respondents thought of the changes made to the interfaces. They were made in Google Forms, which has no limit to the number of questions or respondents, something other free questionnaire creators have. Google Forms also automatically creates a spreadsheet with all responses as well as creating a summary of the responses using pie charts.

We received 35 responses for CS:GO, 646 responses for Hearthstone, 359 responses for Starcraft 2 and 108 responses for Dota 2. The heavy fluctuations in number of responses are mainly due to the way Reddit functions. If a post gets enough traction and is upvoted in the beginning, they reach the subreddit front page, and from there a lot more people see it. If your post fails to gather the interest of the first few people who see it, it might not take off. It has also to do with when the post was posted. If you post when there are not a lot of users online, the chance of getting enough traction is lower. This is something we did not realize before posting, and is one of the reasons CS:GO got so few responses. For the following posts we used a tool (Redditlater, 2015) to try to post when we had most chance at being seen by the most users.

7.10.1 Feedback and Data Analysis from the Questionnaires

The responses from the two first questions were pretty similar. Hearthstone stood out in both questions, though. Since the game is relatively new, people cannot have played it very long yet. If they played since the alpha version, they would still only have played for a bit over two years. While counting the predecessors of the other games, someone could have played them for over ten years. We decided to include the predecessors because they are similar enough to the newer games and people might be able to find things from the older games that they miss in the new ones. The ranges varied a bit, but most respondents had played between three and five years. The responses to the second question surprised us a bit. Again, Hearthstone stood out, but for the other games, more than 30% said they watch e-sport events or tournaments every day and more than 30% said they watch more than once a week. For Hearthstone, 12% of respondents watch every day and 29% watch more than once a week. We knew e-sports are growing and a big part of this means we came to the right place to ask about e-sports.

7.10.2 CS:GO Feedback

The feedback received on the interface varied. For many of the questions the answers were distributed almost fifty-fifty, which makes it hard to draw solid conclusions. The *minimap* change and moving the currently *selected player panel* information gathered the most positive feedback, with 60% saying the *minimap* was more readable than before and 65% liking the moved selected player information. 70% wanted to know which grenades each player has and did therefore not like the changes about grouping the grenades according to teams. 50% though it was important to show the players' pistols and 44% thought it was not important. Likewise, 46% thought the new center *selected player panel* displayed sufficient information, and 54% thought some information was missing. The comments we received solidified the survey results, with people wanting to know what player has what grenades, but preferring our *minimap* over the original. People were okay with removing the equipment value slider though, agreeing that it did not add any relevant information.

7.10.3 Hearthstone Feedback

We wanted to find out what the spectators thought about switching the board around each turn. The response for this move resulted in that 56% did not like the practice of switching the board each turn, with comments saying that it is confusing when the switching either goes fast or when both players are playing the same class. The respondents who liked board switching commented that it was interesting to have it look like in the same way as when playing to get a feeling of playing themselves.

The second question resulted in that 82% liked our idea of showing the upper player's cards in the way it is shown in the redesign. Some comments we got were saying that the idea is good but the way the cards are fanning out makes it feel a bit weird. The cards should rather be fanning out the other way around, making it possible to see the mana crystals in favour to seeing the card texts.

The question about showing how many cards are left in the deck also got a positive number in our favor. Again here, the results showed that the feature itself is good but the way we presented it was bad. The green background underneath the number is getting too much attention and the color itself is bad as it represents the glow around the cards when playing. A feature that could be added to the remaining cards counter is when a player is getting into fatigue. Fatigue in Hearthstone is an effect when a player has run out of cards in the deck and therefore takes damage instead for every card draw. This damage is added upon every card draw so the 31st card that is drawn will damage the hero by one and the 32nd card that is drawn will damage the hero with two damage and so on. In order to see the current fatigue damage that will be taken, the cards left number could be replaced with the fatigue damage.

For the question concerning the mana crystals for the top player, 59% thought that the mana crystal number is only needed, while 33% thought all of the ten mana crystals need to be shown. This question could have resulted in less valid answers as some respondents commented on that the way it looked in the redesign rather than the functionality itself. Distinguishing players with colors, similar to Starcraft 2, got a positive response with 76% wanted to have it. This question concerned the glow we added to the redesign, so some of the respondents could have thought

that the question was about the glow. Some respondents said that the glowing part was unnecessary and others said that the coloring of the glow does not have to be either red or blue, it could also be green to signify the playing player.

A question we were not certain would get a favorable response was the mana crystal coloring. The idea was that mana crystals would have different color for the red player, making the players more distinguishable. Most respondents did not like the colored mana crystals, 57% in fact. Team card backs got 59% in its favor with problems being that in a spectated game, most of the time the card backs will not be shown for the spectator.

We also got some general comments and thoughts about the UI. One of them being the secrets text. The respondents were concerned about the text would make the interface too cluttered if there were more than three secrets at the same time. Another comment were saying that a feature which could be added is how many cards that are currently in the hands. When pro players are playing certain decks, it can be hard to see if the player has eight, nine or ten cards in their hand. Finally, a respondent gave an idea of having *team logos* and *tournament logos* watermarked on the board which can be seen in some Starcraft 2 maps.

7.10.4 Starcraft 2 Feedback

Starcraft 2 had the second highest response rate. According to the respondents, the mineral and gas income as well as the worker and army difference in supply is important. About 72% said both are important and 21% said only worker/army difference is important. Only 3% said they were not important. There were comments saying worker and army difference is the single most important thing to show and wanted it to be even bigger than it is now. The position of the *resource panel* is a bit more split, with 68% of respondents agreeing they should be in the top right, like it is in-game and in many other interfaces, and liked our redesign proposes. 18% of respondents said they preferred the position WCS GameHeart uses, 12% did not know which they preferred and 2% preferred another position. We think this strengthens our argument that it is important to be consistent between the playing and spectating interfaces. Most people prefer the way they are used to, since it is engraved in their memory that resources and supply is located top right. However, we also had comments saying that they prefer the WCS solution, because it is convenient to have all information about the overall state of the game in one position, making the UI cleaner. Perhaps more and more people will get used to moving the position of components compared to the in-game interface in the future, when the act of playing and spectating is further apart than it is now.

Our proposals for the *selected unit panel* seemed to be very well appreciated, as around 88% liked both of the proposals made. Something that was brought up by a couple of respondents was, what would happen if armies from both players were selected by the observer, which is something that happens often during games. As the game already has clear team colors, using those colors to indicate which unit belongs to which player could be one solution. There were some comments stating they would like to have the spell counter when playing the game as well, as it is useful to know how many times you can cast a certain spell.

Regarding the *minimap*, 60% of respondents liked our proposed *minimap* change, 28% liked the currently used version and 4% liked the way Blizzard has redone it for the next expansion, Legacy of the Void. Someone suggested that we should swap the colors used on our *minimap*, meaning the units should have the lighter color and buildings the darker. Both units and buildings would have black borders as well. The reason was they thought the light colors stand out more and it is more important that the units are more clearly visible than buildings. There was also a suggestion to change the color of the unit or building depending on whether it is selected or not. A selected unit or building would be a darker shade than the other ones. There were also suggestions to make the *minimap* a bit bigger, in order to see it more clearly, since it plays a crucial part of the game. Finally, there was a suggestion to have a *fullscreen overlay* to show the *minimap* and the movements on it in more detail.

Quite a few people wanted to know the upgrade levels at all times. This is another feature that really helps the spectator to quickly get an understanding on the state of the game, since upgrade levels play a big part in deciding who wins an engagement. We have no clear way where to put it though, and will have to think about it. There was a suggestion to have it next to the *resource panel*, but we are not sure if there will be enough room there.

A couple of the respondents commented that they missed an APM (actions per minute) counter, an indicator that shows how fast the players are playing. Some interfaces show this all the time, but we think it is more suitable to show it occasionally, perhaps when the player is forced to control units at different locations on the map on the same time. When there is not that much going on, during a lull in the action, APM drops since there is not that much to do for the players.

One comment suggested that in the maps that feature watchtowers, the vision granted by the watchtowers on the *minimap* should be colored according to the player that controls it. Another suggestion was to show important tech structures finishing the same way upgrades levels are shown when finishing. There were also some minor fixes suggested, like swap the position of unit upgrades when selecting a unit, as they are the wrong way around compared to how they are described (‘2-1’ means 2 in attack upgrade and 1 in defense upgrade) and how they are positioned in the upgrade building (where attack upgrade is to the left and defense to the right). Another minor fix was removing the ‘1’ from the upgrade icon in the production tab. When producing a type of building or unit, the number indicates the number of buildings or units of said type being produced at the time, but as a player cannot upgrade the same upgrade twice (the icon always changes between upgrade levels), the ‘1’ does not mean anything and can be removed.

Showing the number of units killed by a selected unit have been in the game since Starcraft 1, but in order to keep track of a group’s total kills, you would have to select them one by one and count yourself. We got a suggestion to show a group’s total kills. This is more of a flavor change and although it is not important for the outcome of the game, it is a fun little side feature that casters and observers can point out. Finally, it was suggested to add a background to the *tabs panel*, in order to distinguish it more from the game world.

7.10.5 Interview with Ryan T. Schutter

Through the post in the Starcraft 2 subreddit, we came into contact with Ryan T. Schutter, the main creator behind GameHeart, a popular custom Starcraft 2 spectator interface. His work with GameHeart caught the eye of Blizzard Entertainment and after some contract work to create an official WCS GameHeart version he was hired in January of 2015 as an associate technical designer. We got the opportunity to interview him about his thoughts on creating his UIs. The full interview can be found in Appendix C

The WCS GameHeart interface is one of the interfaces that has changed the most compared to the in-game interface of Starcraft 2. One of the main questions we had for Ryan was how he valued consistency between playing and spectating, since that is something we believe is important. Though he agrees there is a problem with the variety of the interfaces that are being used, there is not much he can do about it but keep developing his interface that he believes provides the best viewing experience, hoping that tournaments will use it. That being said, he has no issue at all with moving things around on the screen and being inconsistent with the in-game UI. He acknowledges that moving the resources was going to be jarring at first, but states it only takes a game or two to get used to and provides a much better viewing experience in the long term.

Showing the upgrade levels was something included in one of his early versions of GameHeart was first in doing and he does find value in showing them, just like many of the respondents in the questionnaire. However, there were design considerations that took precedent over keeping them on screen all the time in his latest versions. He has been looking at showing them alternatively by sneaking them into a couple of places where they can be shown accidentally from time to time without requiring the observer to actually think of displaying them. Similarly, he and MIT Game Lab are both looking for ways to automate relevant information, like the upgrade notifications. In their GDC talk, both Ryan and Philip Tan (from MIT Game Lab) talked about timely information, showing information only when it is relevant and not always keeping it on screen (Schutter and Tan, 2015).

Another thing that is not shown all of the time in the latest version of WCS GameHeart is the selected unit panel. It is instead toggled to be shown or hidden by the observer. The reason is to make room for the rest of the information panels at the bottom of the screen and that when the selected unit panel is always on the screen, it becomes trivial. Observers constantly select things, most of the times with no intention of actually showing the viewer anything relevant on the panel. By making it toggleable the observer is given a better tool for wordless communication with the viewer. Now you know when the observer brings it up they are really trying to show you something.

“The main reason interfaces are getting simple is because it just feels like a better viewing experience overall, not because we think we need to dumb it down for new people.” The focus lies on trying to appeal to everyone, even though Ryan’s interfaces are sometimes critiqued for being designed to appeal to casual players new spectators. But the only specific change to appeal to new or casual viewers were the switch from an icon to show resources and supply to text

descriptions. This was so new viewers could make connections between the words that they hear from the commentators and what they see on the UI.

While most League of Legends or Dota 2 players still play the game, Starcraft 2 probably has more viewers who do not play anymore but continue to watch, as it makes for a great spectator sport. Spectators of different games will always have different needs, depending on the nature of the game. Ryan says he is not sure what the games 'need' to show and while he thinks the Dota 2 UI works well, he would make a lot of changes. And he guesses the community would hate it, at least at first.

We also learned that our changes to the *selected unit panel* and *minimap* are not possible to do with the default observer system, but would require a custom observer solution which is not a simple task. Ryan, having made the original GameHeart extension mod, says our proposals would be hard to implement and would require a system as complex and cumbersome as the original GameHeart.

7.10.6 Dota 2 Feedback

The general consensus from the questionnaire is that the ideas we had for the redesign are not needed or make the interface worse. Looking at the first question in the questionnaire concerning the hero statistics, 71% thought that all of the information that we made toggleable should be put back and a merely 12% thought that it was not needed. One comment stated that this information was needed as it can give valuable information for more experienced spectators.

The second question regards the courier interface where the current status of the speed boost ability is shown. 46% answered that we should keep it this way while 32% thought it should be brought back. One comment said that the courier timer could be good to see when an important item is being sent to a player. For the third question, 51% of the respondents thought that the quick buy component is not needed in most cases while 33% thought it was needed. A respondent commented on that it could be interesting in some cases as some pro players add the items they are aiming to buy in the quick buy component.

The last question concerned the *character outline* glow that was proposed in order to further distinguish the heroes. 70% liked the idea while 21% disliked it. Some comments were saying that the glow is just visual clutter as the team is distinguished by the health and mana bars above the heroes. Another respondent stated that the glow will interfere with some of the abilities as they are indicated through graphics around the heroes.

Most of the comments in the posts involved new features more than the interface itself. One respondent commented on removing all of the UI during a big fight to have a more clear view of the fight, which would be good, but it does not help improving the default interface. Some respondents wanted to have more visual clarity with black borders around certain parts in the interface while others said that our interface does not have the visual cues from Dota 2. There were some features though that felt reasonable and would create a better spectator experience. One of them was to show tower range in some way, by using a circle around the tower as the

towers does a lot of damage and it can be risky to get close to it. Another feature was timers, similar to Quake Live by showing the countdown on the aegis as it expires after a certain time.

There were comments that discussed some of the problems they were having when spectating. One problem that was stated was to know which player is playing which hero. The colors of the players is usually not the same for every game which can create confusion if one player is playing blue and the next game that player is playing teal.

There is a lot of information that the respondents thought could be put inside the UI like gold per minute, experience per minute, buyback status, net worth for each team or hero are some examples. The information can already be toggled in the *tabs panel*. Other were saying that if we are going to remove unnecessary components, we should have gone the whole way with removing even more or even build the UI from the ground up.

7.11 Second iteration of guidelines

The overall feedback from the questionnaire was positive. For the second version of the guidelines, we combined, removed and added guidelines based on the response of questionnaires and the insights of the interview with Ryan T. Schutter. This was done by discussing and ranking them. When two guidelines had similar points, we decided to combine them. For example, the guideline to use team colors and to relate players to the *minimap* were combined, since the overall goal of the two guidelines were the same; quickly determining the two competing sides and relating to the players on the sides.

The first iteration of the guidelines had a few guidelines not strictly relating to the spectator interface, but to the overall structure of games or tournament broadcasts. We decided to remove these as our focus is on the spectator interface itself, not the surrounding infrastructure. The following four guidelines were removed because of this.

- Pre-game lobby setup
- Utilize downtime
- Points of focus, know your game, are there any lulls in action where you can show replays, or is there continuous action?
- Involve social media in the game

While we think these can help improve the overall structure and help make of e-sports a smoother spectator experience, but the goal was to provide guidelines for the interface specifically.

We also added the following three guidelines;

- Timely information, show info only when it is relevant, know your game and automate relevant information.

Through interviewing Ryan T Schutter and watching two GDC talks he recommended, we changed one guideline and made a new one. The guideline we changed was “toggle to hide/show

information and statistics". It was amended to "Timely information, show info only when it's relevant, know your game and automate relevant information." For example, when a player buys an expensive item in Dota 2, there is a small popup on the side, similar to the upgrade notifications in Starcraft 2. This change was inspired by Ryan Schutter and Philip Tan's GDC talk.

- If possible, incorporate the game's design language into the spectator interface

The other GDC talk was by the Senior UI designer of Hearthstone, Derek Sakamoto. He discussed the overall development of Hearthstone's UI and how it was allowed to influence the game, along with gameplay design and engineering (Sakamoto, 2015). This inspired us to add a guidelines to make sure the spectator interface follows the design language of the game. In his example, Hearthstone has a lot of diegetic and spatial components. This was something we think should be preserved and the second iteration of the redesign of Hearthstone is influenced by this guideline. In more general terms, if your game is an RTS set in a medieval setting, you probably do not want the UI to have a futuristic look.

- When spectators are taking a glance at the UI, it should quickly be apparent who is leading and what the status of the game is.

This was added due to feedback in the Reddit comments and questionnaire responses. The respondents wanted a quick way of determining who is in the lead. A prime example of this is the worker and army difference in supply for Starcraft 2. Supply alone does not give enough information as both army and workers are incorporated in it. Another obvious example is the number of rounds won by each team in CS:GO. Overall, the second version of the guidelines are mostly still keywords, but are a bit more fleshed out and are on the way to the final version. The full list can be found in Appendix D.

Beta Version of the Guidelines:

1. Visual Clarity, Due to lesser stream quality and mobile streaming, the elements should be big and visible.
2. Consistency between playing and spectating
3. Team colors, Minimap, try to relate the players and team colors with the minimap
4. Color blindness - 10 % of men are color blind, 1 % women
5. Promote teams through team logos etc, not only does it make the sponsors happy but the beginners can see a difference between the teams.
6. Timely information, show info only when it's relevant, know your game. Automate relevant information like when a hero in Dota 2 buys an expensive item.
7. Different spectator for different personas, know you spectators
8. Giving too much information to the spectator can take away the suspense, CS:GO bomb timer example
9. If possible, incorporate the game's design language into the spectator interface.
10. When spectators are taking a glance at the UI, it should be apparent on who is leading and what is the status of the game

7.12 Second redesign

The following sections describe the second iteration of redesigns that are based on the respondent's feedback. Higher resolution images can be found in Appendix A.

7.12.1 Hearthstone:

Beta guideline 9 says that the general design language should be followed and when it comes to Hearthstone, one of the biggest design goals with this game was to have almost every component diegetic. The biggest change to the second iteration of redesign was the changes to the board where cosmetic environments got replaced with flat surfaces that could be used for UI components. Hearthstone has a mobile version where Blizzard did just that and in the redesign, we decided on copying this panel. This resulted in that components, like the player name and class icons could be placed in this area in order to avoid the "overlay look" of the first iteration.

Figure 7.33: *The second iteration of the Hearthstone redesign.*

Other components that were changed was the Blizzard, *sponsor* and *tournament logos*. These were just pasted on the overlay of the first redesign. In this redesign we wanted to change them in a way that they would fit inside the game. Therefore the logos were put on the table outside the board to still be visible but seem more as if someone put wooden logos on the table. There was feedback on the coloring decisions for the remaining cards component. In this redesign we removed the green gem underneath the number and changed the colors and opacity to make it fit better with the board and stand out less.

Looking at the red player's cards, we changed how they are fanning out to give more space for mana crystal costs. However, this change has a drawback where the card text cannot always be seen anymore, but according to the feedback it was a well needed compromise. Another change to the red player are the mana crystals as they are now on the left side of the board. The feedback stated that the mana crystals on the first iteration are: "As it stands I think the red player's mana just looks way too sloppy laid over the background like that." So, it was in our interest to create better results this time.

One major part with the second redesign was creating distinction between the red and blue player in accordance with beta guideline 3. Therefore most of the UI components for each player are placed in the top left and the bottom right corner. It works well with the *webcams* of the players as well. A detail we added in this iteration are the *team logos* to the board in order to further promote teams as said in beta guideline 5 and in the feedback provided from the first iteration.

As the tournament rules have changed in 2015; with players having to win with every class in order to win a match, the redesign now incorporates that. More focus has been put on the class icons by having them placed more in the center. The look of the gems have been changed as well to fit more with the background.

Some changes has also been done in the secrets graphics. In the first redesign, a lot of respondents commented that the texts will be cluttered when multiple secrets are in the game. So we took the feedback we got and tried to create a viable alternative for the texts. The solution was to incorporate the artwork in the secrets cards into the circles. The results is shown in Figure 7.33.

Figure 7.34: *Iteration two of the secret design with the left figure showing artwork to indicate which secret it is and to the right, our proposed idea from the first iteration.*

7.12.2 Counter-Strike: Global Offensive

In contrast to Hearthstone, CS:GO did not have many changes. Most changes were minor like the positioning of UI components. The *team information panels*, for example, were moved up to the default positioning, mostly because of beta guideline 2 and of feedback saying that it can be

interesting to see the chat in some cases, as it was blocked in the first iteration. Another change that was not liked was showing the grenades of the team, so these are now placed in the default state.

Figure 7.35: *The second iteration of the CS:GO redesign.*

The biggest change in the second redesign is the *minimap*. Resizing the *minimap* created opportunities for us to add more things to it. When players die, the positioning of their death will be displayed on the *minimap* as a skull with a colored outline to signify which team the player was on. This was done to further relate the players to the *minimap* as supported by beta guideline 3. Other changes to the *minimap* was the high and low ground. The higher ground has a more saturated white while the low ground is darker. Between the high and low ground there are gradients that creates transitions between the altitudes.

Looking at the *selected player panel*, some of the information that was removed in the first iteration are now back in this one. The respondents thought it was in interesting to see killing streaks, so the player panel now have 3K, 4K and 5K. One feature that was not commented on was the *information icons* for the smoke and molotov timers. In the first iteration there was a molotov timer, but it was not shown enough so the respondents did not give feedback about it, so in this one we added the timers to another picture to showcase this feature.

Figure 7.36: *An information icon was added inside the smokes to indicate the time left before the smoke fades away.*

7.12.3 Dota 2:

Dota 2 is probably the hardest game to redesign as a lot of information is already on the screen. Looking at the feedback for the first iteration, some people thought that making the interface more minimalistic is not really doing anything other than removing information that some want to have. For this iteration we are more looking to add functionality to the UI rather than redesign it.

There has been some functionality in other games that could be implemented in Dota 2. Heroes of the Storm uses a *character outline* in order to see players through walls and other environmental obstacles. The same feature could be implemented in this game as it would be a good feature when players are fighting in the forest as it can be hard to see what is happening.

Another feature that was suggested from the comments of the respondent was a *pop-up* timer for the aegis. This could be an example of beta guideline 6. It is certainly not a new feature as it exists in Quake Live and other games. A timer like this provides good information for the spectators as the certain time for aegis can only be seen when looking in the player's inventory. Other timely information that is added to the redesign is timely information for who picks up the gem of true sight, droppable items like divine rapier.

7.12.4 Starcraft 2:

According to beta guideline 1, the game should consider mobile devices, thus all of the panels are now resized to be bigger. The panels were relatively small in the last iteration and the resizing enhanced the readability.

One of the most frequent comments we got from the questionnaire was regarding upgrades and suggested that they should be displayed at all times. This was a challenge as it was hard to find a place for them that would not intervene with the overall layout balance. The solution we came up with, was having this information at the bottom right where the *selected unit panel* is positioned. When the observer is not selecting a unit, the upgrades will "accidentally" be shown to the spectators.

Figure 7.37: *The second iteration of the Starcraft 2 redesign.*

Another feature that was added in this iteration was to show when important technology buildings are completed. In Starcraft 2, there are some units that can only be produced when certain buildings are done, so in this iteration we added a feature to show when important technology buildings are completed using the same sort of notification *pop-up* as the MIT Game Lab uses. This is another example of beta guideline 6, giving information to the spectator when it is relevant.

Figure 7.38: *A pop-up is shown when an important building is near completion.*

The suggestion to recolor the *minimap* vision granted by the watchtowers was also added, as was some of the minor fixes, like swapping the position of the upgrade icons on the *selected unit panel* and removing the '1' from the upgrades in the production tab.

7.13 Feedback and Analysis from the Second Posts

We planned to post the second iteration of redesigns to all four subreddits again. This time we were not looking for questionnaire-based feedback as we knew we would not have time to go through the whole questionnaire process again. We were instead looking for comment-based feedback and general opinions on our redesign and the spectator interface in general. Sadly, there was not enough time to fully complete the second iteration of the Dota 2 and Starcraft 2 redesigns and subsequently we did not post them on Reddit. The CS:GO and Hearthstone were posted though, giving us further feedback for those redesigns.

7.13.1 Hearthstone

The feedback for the second iteration was mainly positive. Much of the discussion focused on secrets and how to display them. Some people preferred icons to text, saying that it would be cluttered if someone had a lot of active secrets. Most said they preferred the text though, with some suggestions to abbreviate some of the words in the text.

Another suggestion was to change the "your/enemy turn" button, as it should better reflect whose turn it is when you are spectating. There might not be enough room to fit the players' names on the button but perhaps it could say "red's/blue's turn" instead. Since the spectator cannot interact with it anyway it does not even have to be a button, it could be part of the game board instead, a gem that switches between blue and red, for example.

7.13.2 Counter-Strike: Global Offensive

The feedback for CS:GO was mainly positive with most comments saying positive things about the interface. One specific feature that was liked was the smoke and molotov grenade timers. The minimap was also praised for being big and informative. One respondent proposed a new feature by having a flash icon on the portraits on the sides, so when a player becomes flashed, an icon will pop up and fade away as the effect from the grenade fades away on the player.

8. Results

This section presents redesigns of the four games that was analyzed; Counter-Strike: Global Offensive, Hearthstone, Starcraft 2 and Dota 2. The redesigns are aiming to improve the current spectator UI in order to give the spectators a better experience. Furthermore, they are also a way for us to showcase and give examples for the guidelines that will be presented in the latter part of this chapter.

8.1 Final Redesigns

The redesigns were done in an evaluative, iterative design process where the spectator is the center of the design decisions. We proposed the first iterations of redesign along with a questionnaire to a big community site called Reddit. The feedback we got from the community was then analyzed and some of the feedback was translated to a second redesign which is similar or the same as the ones that will be presented here. High resolution images can be found in Appendix A.

8.1.1 Counter-Strike: Global Offensive

CS:GO is a special game in the FPS genre as it incorporates money, rounds as well as highly tactical gameplay. Looking at the spectator UI, it is a rather special interface that is tailor made for the game mechanics. Grenades and weapons are examples of what is shown in the spectator UI at all times which is not always present in other FPS games.

Figure 8.1: *The final version of the CS:GO redesign.*

In our redesign we try to give the spectators a similar experience as in the original one but also try improving some of the parts. The most apparent changes are done to the *selected player panel*, the equipment and the removal of money. Starting with the money, we realized that this information is not necessary to be visible at all times, so all the money related panels and graphics were removed, but they will be seen during the start of each round when it matters the most. This follows beta guideline 6.

In the original interface the currently spectated player has their health and ammunition in the corners just like when playing, but in the redesign, we put all the player specific information in the center in order to make the spectator not having to focus on many places at once. This is a violation of beta guideline 2, but is in accordance with beta guidelines 1 and 10. We valued giving the spectator all player information in the same place over consistency in this case. Continuing with the *selected player panel*, statistics and player name are changed to be more minimalistic with some information removed in order to promote the more informative statistics. *Sponsor logos* are in the same area as the *selected player panel* as there is some needed spacing between the player statistics and the player health, ammunition and equipment. We also added grenades, weapon and sidearm to the equipment with bigger icons in order to be more readable.

The *team information panel* position is still in the same position as in the original UI, but the visuals themselves are changed. Most notable change are the primary weapons which have been moved from the sides of the team panels to inside to reduce clutter as encouraged by Saunders and Novak (2013) and beta guideline 1. The sidearms are removed due to feedback from the questionnaire. Looking at the player pictures in the team panel, the numbers for each player and team are changed and more visible with a background related to the color of the team. A reason for this change is shown in the *minimap*. The *minimap* incorporates the player positions with the same graphics as the numbers in the portraits. This was done in order for the spectator to relate the positions with the player and is based on beta guideline 3.

Figure 8.2: *Left figure shows the default minimap for CS:GO while the right one shows our redesigned minimap.*

The biggest change for the *minimap* was the removal of the square around it which has been seen in Heroes of the Storm and Call of Duty: Advanced Warfare. In order to compensate for the removal of the background, the outer walls are now in a saturated yellow. With this change, we could make the *minimap* bigger without allocating too much space and concentration for it. This change also boosted readability as the greyscale is now in a bigger spectrum than the original one and the walkable paths are now more outlined. The brightness of the greyscale is also now a functionality as the higher ground has higher brightness while the lower ground has lower brightness. Other added features are skulls where players have been eliminated, trails behind the players to see where they have walked from, miniatures of smokes and molotovs, as well as colored spawn positions with blue or bronze in favor of the green as the green coloring with the red colored bomb positions made it worse for colorblind people.

Figure 8.3: *An information icon was added inside the smokes to indicate the time left before the smoke fades away.*

A feature that was also valued in the second iteration of feedback was the smoke and molotov timers. In order for the spectators to see the remaining time for the smoke and molotov grenades that are lying on the ground, we added an *information icon* inside them. The *information icon* works similarly to an hour glass, so when the opaque icon has faded out, the smoke will then recede.

8.1.2 Hearthstone

Hearthstone is a game that is vastly different from the other games that were analyzed. Due to the fact that the game world is not moving, most of the game is static UI. Hearthstone is the game that took the most time to redesign. One of the reason was the amount of feedback we got and another reason was due to the fact that almost everything in the game is diegetic. This was taken into consideration when designing the UI which resulted in that the redesigns of Hearthstone only incorporates diegetic components.

Figure 8.4: *The final version of the Hearthstone redesign.*

One of the biggest changes to the UI is the removal of some of the cosmetic environments that exists on the sides of the board. These were replaced with flat surfaces which are used as *team information panels* for class icons and player names. Because of this change, most of the UI panels are now inside the game instead of overlay components as most tournaments has it. The *tournament* and *sponsor logo* was also put inside the game as wooden pieces on the table. Webcams were put in the bottom right and top left in an attempt to divide the players more. We added more team color specific components like the glow that specifies which player is currently playing. This glow can be seen in the interstices with a blue or red coloring. The team colors changes follow beta guideline 3 and 4. We also added team promotion by adding *team logos* that are engraved into each side of the board in accordance with beta guideline 5.

Figure 8.5: *There is glow on the board to signify whose turn it is.*

It was not only the positioning of things that were added to the redesign but also functionalities. One of them is an *information icon* that shows how many cards that are remaining in each player's deck and is placed next to the decks. Another one are the mana crystals for the top player as they are not only a number now but the same as the bottom player just in opposite direction.

It is popular for some tournaments to switch the board in the end of each turn in order for the active player to be at the bottom by showing the cards in a correct way. The redesign however incorporates the top player's cards to be shown in the right way by having those flipped 180 degrees which removes the need to switch the board every turn. Looking at Figure 8.6, we changed how Hearthstone displays secrets using *information icons*. Secrets can only be shown when the observer is hovering the mouse over it or when the secret gets activated. In the redesign, the question mark is now replaced with a name for the secret. The *information icons* for secrets and cards remaining are not examples of providing too much information described by beta guideline 8, as this information is available to players but requires interaction in the form of hovering to be seen. As the spectator interfaces can only be viewed and not interacted with, we decided to provide this information in other means.

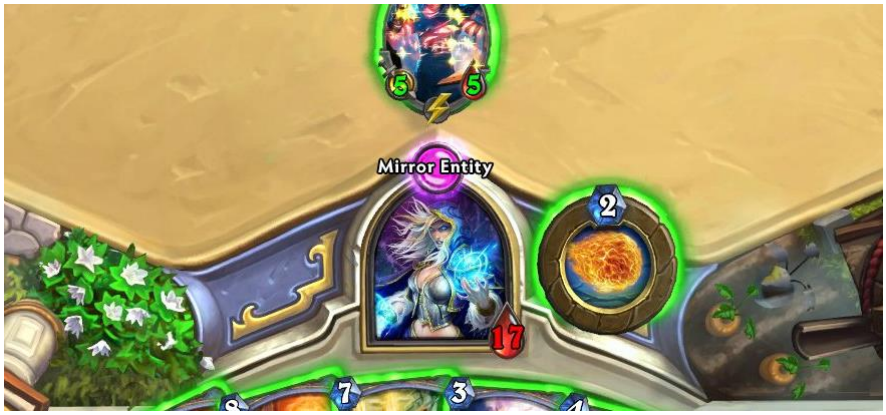

Figure 8.6: *Secrets text are now shown in the UI.*

8.1.3 Starcraft 2

Starcraft 2 is probably the game that we have the most experience spectating, therefore our point of view could be biased towards having an interface that shows a lot of information. The redesign is in many occasions trying to mimic how the game looks like when playing. This point of view has changed in recent years though, with the existence of the WCS interface which takes another direction by having all of the UI panels at the bottom of the screen.

Looking at the general positions of the UI panels in the redesign, we placed the *resource panel* in the top right, the *tab panel* in the top left, *score panel* in the top center, *minimap* in the bottom left and the *selected unit panel* is in the bottom right. Starting with the *resource panel*, most of the functionality that is shown already exist in other UIs like the income underneath the minerals and gas as well as the breakdown of supply into workers and army. The placement of the panels were as consistent between playing and spectating as possible, in accordance with beta guideline 2. Continuing with the *score panel,* it is quite standard with the display of score, best of, names and races. The panel itself though, has transparency to make it stand out less so more of the game world can be shown.

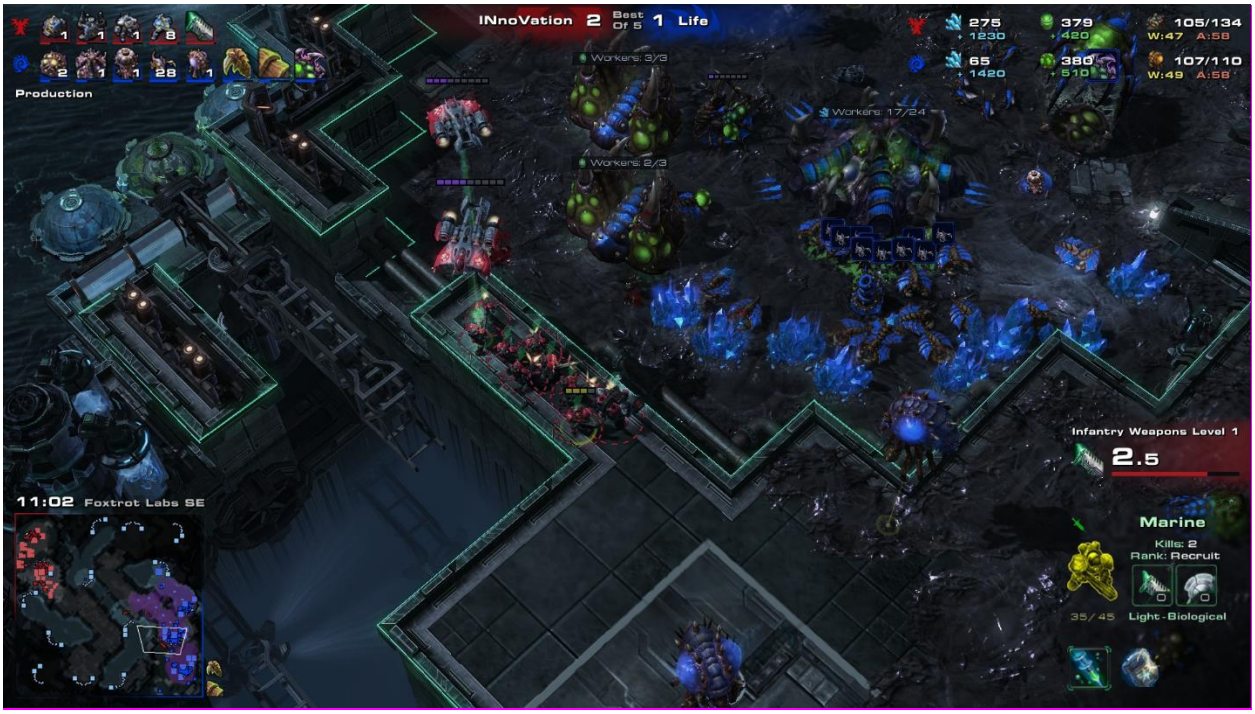

Figure 8.7: *The final version of the Starcraft 2 redesign.*

The *tab panel* has been changed to be more aligned with the resources to create a greater symmetry between the panels, following the Gestalt law of Symmetry (Ware, 2012). Many of the current spectator interfaces have the *tab panel* text at the top which does not align it to the resources. We have used the Gestalt law of Proximity (Ware, 2012) to group the resources so the minerals for example have less space between the teams' minerals and more space between minerals and gas. The same theory is applied to the *tab panel* by creating a bigger space between the teams than between the units that is in production. Looking at the icons in the *tab panels*, they have been changed by removing the black background and replaced with red and blue background to further divide the two players, in accordance with the Gestalt law of Similarity. Feedback from the questionnaire said that the icons should have a black border, which also was added so the icons will be visible in every background.

Another big change is the *minimap* which received positive feedback in the questionnaire. The changes consisted of removing the black border from the buildings as well as making them less opaque. The reasoning behind this change is because buildings are usually static so they do not have to stick out as much as the units which are moving most of the time. Another addition was the red and blue border that are placed where the players are spawning. These changes were done to increase clarity and enforce the team colors to the *minimap*, following beta guideline 1 and 3.

Figure 8.8: *To the left is the current expansions' (Heart of the Swarm) minimap, Middle figure shows the new expansions' minimap and the right one shows our proposed minimap.*

The *selected unit panel* is positioned in the middle in the original spectator interface. In our redesign it is repositioned in the bottom right. In order to create balance between the panels, the *selected unit panel* is now a square to be more similar to the *minimap*. This change creates more space in the middle that can be used for other things such as a *tournament logo*, *webcams* etcetera. The graphics for the *selected unit panel* itself is transparent to give hints about what is happening behind it (Saunders and Novak, 2013) (Apple, 2015).

Figure 8.9: *Unit grouping idea for Starcraft 2.*

Most of the changes in the redesign concerned the graphical parts and their positioning, but we also added features that could be good when spectating. One of them is grouping units together. Grouping units in the original UI shows every single unit as an icon. This is most of the times not needed, so in the redesign we group the units together according to types to save space and get a better overview of how many units that are selected. Additionally the total spells for the specific unit type that are available is shown as well as seen in Figure 8.9.

8.1.4 Dota 2

For the Dota 2 redesign, we did not have time to do a second iteration. We got some feedback from the first iteration, but the results showed that most respondents did not like it so in order to give it another try, we had to start the redesign from the beginning which was not in our time plan. Therefore, this redesign summary will consist of the first iteration as well as features that could be added into another redesign.

Figure 8.10: *The "final" redesign of Dota 2.*

Starting with the overall look and positioning, Dota 2 has a lot of space for their UI as it covers most of the bottom part. Even the places where there is no interactive UI, there are cosmetic graphics such as rocks that covers the transitioning between the UI panels. In our redesign we wanted to get rid of cosmetics as they do not give much for the spectators other than looks and it gives the spectators a larger view of the game world. The results can be seen in Figure 8.10 where most of the UI graphics have been removed or stripped away.

The *selected player panel* components that are useful when playing have been stripped away or changed like the quick buy panel where players can put items in order to quickly buy items. This feature did not bring much to the spectator experience and was confirmed in the questionnaire as well. In the place of these components, we made the right panel smaller and increase the size of the components containing more important information, like the current gold.

Looking at the *selected player panel*, the most apparent change is the removal of statistics. The removal was done following beta guidelines 1 and 6. This component would be put back into the interface in a second iteration as it was important according to the feedback. The spells and inventory were put in the middle to further utilize space. Another feature to the *selected player panel* is the colored border around the hero portrait which creates a relation between the player and the player position icon on the *minimap* in accordance with beta guideline 3.

Figure 8.11: *There is a red glow around the character. A green one is applied for the other team's heroes.*

One problem we encountered when spectating was differentiating the teams during big fights. In order to further differentiate the teams we added a glow around the heroes, similarly to CS:GO which can be seen in Figure 8.11. Additionally, the glow would have different colors for each team and also be applied to the player positions on the *minimap* to further increase the difference. The glow will also be utilized when the heroes are walking behind cosmetic environments like a tree as the glow will shine through the environment to give visual cues on the positioning of the hero. These changes were also done due to beta guideline 3.

As mentioned before, the feedback we got was mainly against our proposed redesign. On the other hand, the respondents also gave some hints on what could be added into the game. The best ones were the timers for aegis which would be similar to the *pop-up panel* in Starcraft 2 when an upgrade is near completion, and showing the range of the tower by using a circle around them. These suggestions are examples of beta guideline 6.

8.2 Final Guidelines

This part of the thesis presents the final guidelines that can hopefully aid game developers when designing a spectator interface. The guidelines are based on what has been observed in numerous games as well as feedback from questionnaires that were sent out together with the redesigns complemented with comments and an interview.

1. **Maintain Visual Clarity for Better Readability**

   The devices which are used to spectate e-sports come in many forms. Some are watched from a close distance, like computer monitors, tablets and mobile phones, while TVs and watching live events are usually done from a greater distance. There is also stream quality to take into consideration here. Consider making the most important UI components big enough to be at least discernible at all distances, screen sizes and at lower resolution streaming quality.

   For example, the team information panel and round counter in CS:GO are both big and clear. Though the team information panel has smaller icons and text, it is easy to see the most important thing, whether the player is alive or not. Similarly, Dota 2's team information panel and kill counter are also easy to see.

   The WCS GameHeart interface for Starcraft 2 uses bigger text size for resources and supply, which are important indicators in the game. Our redesigned interface has also made these components bigger for this reason. The minions on the Hearthstone game board are big and visible, making it easy for the spectator to see who has the control of the board.

2. **Consider the Trade-offs in Keeping Consistency between the Spectator and the In-Game Interface**

   Many of the spectators are drawn to watching through playing the game. These playing spectators have a mental model of how the UI looks when they are playing and expect a similar UI when they spectate. There is a balance to find here, of course. Sometimes you cannot keep everything the same and that is fine, but moving crucial components around too much may confuse the spectators. Adams and Rollings (2010) stated that trying to innovate by changing an interface radically is not always a good thing.

   The WCS GameHeart interface is controversial for this reason. There are people who like it and people who dislike it. In our questionnaire, WCS GameHeart was the second most popular interface, after the interface GSL uses. Most of the respondents said they did not know which interface they preferred, though. Still, almost 68% of respondents said they prefer to keep the resources and supply in the upper right corner, the in-game position, than where WCS GameHeart has positioned it.

   The spectator interfaces of CS:GO and Dota 2 are consistent with the in-game interface, the difference is in how much information is given to the spectators compared to players. The Hearthstone spectator interfaces are a bit different, as they vary from tournament to tournament, some being consistent, some not. Our redesigned interfaces are fairly

consistent as well, trying to provide the most useful information and hide the non-essentials. The redesigned CS:GO interface moves some components, but does so in an attempt to centralize the information without moving it too much.

3. **Designate Colors to Distinguish the Teams and Players**
   Just like in regular sports, it should be easy to distinguish who plays for what side. Using colors is a straightforward and easy way of designating the sides. Similarly, using the same colors to relate the players' location on the map to the minimap version of the map can help the spectator's understanding the positioning of the players.

   Starcraft 2, Dota 2 and CS:GO all have designated colors for both sides, which we kept for our redesigns. Hearthstone kind of had a color thing going on, but since many tournaments switch around the board, they are meaningless. Our redesign of the Hearthstone interface has more distinct color designation, with blue at the bottom and red at the top.

   Be careful when choosing the colors, as around 10% of men and 1% of women have some form of color vision deficiency (Ware, 2012) and it is easier to use color blind friendly colors from the start rather than implement a color blind mode later. Dota 2 suffers from this problem, as the two computer controlled teams are red and green, one of the most common colors affected by color blindness.

4. **Promote and Support Teams Through In-Game Features**
   As Trail et al. (2003) and Melnick (1993) found, the spectators and fans feel like they are crucial to the event taking place and feel good when their favorite team or players does well. Promoting teams and team fandom can help enforce the sense of belonging as a fan. This also helps the point made in guideline number 3; easily distinguishing the sides. Making it easy to add team logos into the actual game world itself, helps the teams get out there and get the attention of spectators and fans.

   There are many ways of doing this. Dota 2 has banners with the team logos in the team's base, CS:GO has stickers that are put on weapons and Starcraft 2 has logos on the ground next to the main base of each player. Our redesigned version of the Hearthstone interface has logos engraved on the playing board. We also had the idea of team cardbacks. This could work similarly to the stickers in CS:GO, fans could be able to obtain their favorite team's cardbacks by buying or earning the team cardbacks in some way. Some part of the profit could then be given to the teams.

   The focus of regular sports are often on the players and teams themselves, not necessarily on the actual sport. The players and teams are promoted through team jerseys and other apparel. This is also used in e-sports, where players wear their team jerseys to tournaments. These jerseys are often purchasable on team websites. Efforts have been made previously to put team jerseys into the games themselves, but they have been unsuccessful so far.

5. **Hide Abundant Information and Provide Timely Updates when Relevant**
   It is not necessary to show every single piece of information all of the time, as too much information can create confusion or frustration (Saunders and Novak, 2013). Think about what kind of information is important to always show and what information can be hidden and displayed when it is meaningful. Think carefully when considering to remove information all together though, as it might ruin the experience for some spectators.

   When a player completes an expensive item in Dota 2, there is a small pop-up on the side of the screen, stating which hero has completed the item. This updates the spectator on the state of the players' inventories during the game without having to show them all the time.

   In the start of each round in CS:GO, the team information panels are extended, showing the money, kills, assists and deaths of each player. The kills, assists and deaths are indicators on how well the players are doing over the course of the whole game (30 rounds) and they do not affect the outcome of a round. Money can sometimes be important during rounds. Players might want to save their weapons for the next round if their team is low on money, in which case the observer can bring up the scoreboard overlay and show how much money each player has. Most of the time though, it is not necessary to display an individual player's money.

   The upgrade and worker killed notifications made by MIT Game Lab in Starcraft 2 is another example of timely information. When an upgrade is nearing completion a pop-up with appear on the right side of the screen with a countdown timer, counting down the last seconds of the time remaining. When workers are killed, a pop-up will appear on the left side, showing the number of workers killed in the last few seconds. While the production tab shows which upgrades are being produced and their progress, the pop-ups clearly notifies the spectator that the upgrade is about to complete.

6. **Display Player Skill and Highlight Good Performances**
   Trait et al. (2003) states one of the motives behind spectating sports is the quality of physical skill of the participants. Chuang and Huang (2011) found that spectators watch Starcraft for the same reasons as they watch regular sports. Playing games at the highest level demands high physical skill and coordination of players. In every genre, games usually require some form of skill element, which casual players can improve over time and spectators can understand how much skill the pro players possess. This skill should be brought into the limelight, not hidden away. Many of the personas described by Chuang and Huang (2011) are motivated to spectate because of the skill of the players. Whether you are *The Curious, The Inspired, The Pupil, The Entertained* or a mix, watching and learning from better players is a driving force to spectating e-sports and the skill of the players should therefore be highlighted.

   There are many examples of this in our four games. First and foremost; instant replays. We have seen them used in Starcraft 2, CS:GO and Dota 2 tournaments. The replays are shown to highlight critical moments that happened in the game, usually an engagement

that decided the outcome. Instant replays are used in most regular sports as well. In the Super Bowl 2015 replays, the commentators were able to draw on the screen, highlighting the performances of the players. Drawing on the screen is possible in Dota 2 and on the map overlay in CS:GO. This is most often used to point out things that the players have done and their thought process.

Showing the game from the player's own perspective is another way of showing their skill. In CS:GO, the game is viewed from the perspective of one of the players most of the time, but the spectators can see *character outlines* of the other players on the map. Some people think that this ruins the spectating experience as the spectator knows exactly when an enemy will be seen and therefore cannot appreciate how fast the player reacts. In Starcraft 2, the spectator camera is not locked to players, but is free to move around the map. Sometimes though, the observer will lock into a player's perspective in order to see just how fast they are playing. The APM counter is another way of showing how fast Starcraft 2 players are.

Another way is showing multiple perspectives. Some CS:GO tournaments show both players' perspective when there are only one player left on each team. In Starcraft 2, when there are multiple engagements at the same time, they are sometimes shown in a picture in picture format. You have to be careful with multiple perspectives though. If the screens end up too small, it will be hard to see anything at all.

7. Find Suspenseful Game Mechanics and Maintain the Tension

There is a balance between showing useful information and showing too much information, giving away too much. Chuang and Huang (2011) discuss information asymmetry, the fact that the spectator and player have access to different kinds of information about the game. As in poker (Henderson, n.d.), tension can come from the spectator knowing and the player not knowing. But the spectators should not be given too much, as it would ruin their experience.

A parallel between poker and Hearthstone can be drawn here. Both feature deck of cards which are shuffled in a random order. The order is not known to the players or spectators. The spectators have more information than the players, but if you were to give the spectators the order of which the cards will be drawn from the decks, the whole point of watching the game would be lost, there would be no suspense since the spectators would be able to calculate who would win from the start.

Our redesign of Hearthstone shows the exact number of cards that are left in each deck, but not the card order. This information is readily available to players by hovering the decks, but as spectators cannot do this, we added the number next to the decks.

In CS:GO, after the bomb has been armed it takes 35 seconds before it explodes. During this time the Terrorists must defend it while the Counter-Terrorists attempt to retake the bomb site and defuse it. When the bomb is armed, the round timer disappears and is replaced by a ticking bomb icon, but there is no actual timer that counts down. The bomb

beeps at an increasing frequency as the timer winds down. Experienced players and spectators can approximate the time left, but it is hard to be 100% sure in the moment. Adding to the fact that it takes either five or ten seconds to defuse, depending on if you have a defuse kit or not, and that this is the ultimate decider who will win each round, this is a major opportunity for excitement. An exact timer with the countdown of the bomb would take away from this, as you would know from the start if there is enough time left.

As mentioned in guideline 6, some spectators think the *character outlines* in CS:GO ruin the spectator experience. They argue that if they can see that an enemy is approaching with the outline on, it is hard to see exactly when they come into the vision of the spectated player and it is therefore hard to see exactly how fast they react. This has led to some observers turning off the overlays when an engagement is about to happen, to give the spectators the exact view of the player. However, the player outlines lets the spectator have another perspective than the players, they are allowed to see in what direction the players are moving and their position on the map. Earlier versions of Counter-Strike did not have the player outlines or the minimap when spectating, making it hard to understand the positioning of players on the map. This forced the observers to keep switching perspectives to try and see where the actions was taking place, often missing critical moments.

8. Make the State of the Game Quickly Comprehensible

Some spectators might tune in the middle of a game, do something else while watching or otherwise be distracted. It could be a mix of *The Bystander* and *The Entertained* personas, someone who is interested in watching, but wants do something else at the same time. Perhaps they use their second monitor to show the game while doing something else on their main monitor or watch the game on their tablet while doing the dishes and so on.

Quickly and easily assessing the state of the game is important not just for those spectators, but for regular spectators as well. It should be easy to judge who is in the lead by a glance at the interface. Just like in many regular sports, games often have some sort of score to keep track of this. Examples are the round counter in CS:GO, kill counter in Dota 2, health and board presence in Hearthstone and resource, supply and worker-army differences in Starcraft 2.

9. Discussion

We start by discussing the methodology we used and the appropriateness of using Reddit to gather feedback. We then discuss our results, the generalization of the results and future work.

9.1 Methodology Discussion

The general consensus from the methodology is that most of the choices we made were right in this case. The evaluative design process gave us a chance to give our ideas and then further develop them, incorporating the feedback we got from the respondents. What an evaluative design process does not take into account, is the amount of time it takes to create an iteration and then further improve it with another iteration. If we would have skipped iterating the designs, the results would probably have been more polished in the end. The question is though if the results would have been better.

9.1.1 Questionnaires

Looking at the questionnaires, by submitting them to the subforums of Reddit, it turned out to be much better than anticipated. With a total of around 1000 responses to the questionnaires it is hard to say if another method would have given us the same amount feedback. As our goal is to reach out to as many people as possible, it seems to have been the right decision.

The questionnaires were not strong in all points though. One reason could have been that we used questions that are not recommended in a questionnaire. Most of the questions were misleading to our favor, which could have changed the outcome. Furthermore, the answers to each question were basically a “yes”, “no” or “Don’t know” which do not give the respondents a way to give a more definite answer. Instead the answers should have been based on a scale from one to five in order for the respondents to be either very positive, moderate or against it. This could also be a reason why we got a lot of “Don’t know”, maybe some respondents thought that our redesigns are neither good or bad and therefore answered with a “Don’t know”. However, we did have a trick question in the Hearthstone questionnaire for example where we had a redesign idea that neither of us was particularly fond of but put in there to know if the respondents were authentic. The question was about using red mana crystals for the red player. The results showed that most of the respondents were against it, which made the questionnaire more authentic.

Another dilemma with questionnaires on the Internet is knowing who is answering the questionnaires. The ones who are answering are maybe biased towards us because they like the ideas we brought and want to support us by answering the questionnaire, but this could go in either direction. Looking at the amount of views we got for the image albums of the redesigns and the amount of respondents, there is about 10% who answered the questionnaires and looked at the redesign. This is probably something that is hard to improve upon when it comes to questionnaires on the Internet.

9.1.2 Interviews

We had initially wanted to perform more than one interview, with people from different parts of the industry, including tournament organizers, casters, pro gamers and more developers.

As it stands, we only had the opportunity to perform one interview, with Ryan T Schutter, an associate technical designer at Blizzard Entertainment. He is the developer of the GameHeart interfaces for Starcraft 2. The interview was performed over text chat in Skype. This was done because of two reasons. Firstly, the time difference between Gothenburg and Blizzard's headquarters in California is nine hours and Ryan was not available during office hours due to work. Secondly, we wanted Ryan to be able to think through his answers thoroughly, so posting the questions and letting him answer in his own time was a good solution for this. In order for us to be able to pose follow-up questions or give feedback on his answers, we only gave three questions at the time. The interaction went; we gave three questions, he answered, we gave feedback and asked follow-up questions, then gave three new questions. The questions ranged from feedback to our redesigned Starcraft 2 interface, to discussing the feedback from the questionnaire, to his opinions and thoughts on designing spectator interfaces. The interview gave us some valuable feedback, in addition to the two links to GDC talks Ryan gave.

We had plans to contact at least one more UI designer from Blizzard and someone from Valve, which would perhaps have given us more balanced feedback, spread between the two developers and Valve's thoughts on the spectator interfaces. Contacting tournaments organizers and casters would have given us the insight of the people actually using these interfaces. Ryan mentioned that the observers were not using some parts of WCS GameHeart to its fullest extent, even if he thought they did a great job. It would have been nice to get the caster's or observer's perspective. An interview with a pro gamer would also have been insightful, do they care about the spectator interface at all and does it impact their ability to play the game? Perhaps we could have had time to perform some more interviews if we planned our time a bit better.

9.1.3 High and Low Fidelity Prototyping

The prototyping phase consisted of low fidelity and high fidelity prototypes. For the low fidelity prototypes, sketching was used as a fast and basic tool to get our ideas down on paper. This method turned out to be good when discussing with each other about possibilities, limitations and the overall layout. When it came down to details though, it was hard to see if the alignments between panels would look legitimate for example.

The high fidelity prototype was nice to work with because Photoshop gave us the customization that made changes to positioning, colors and sizes easy. The problem though with making high fidelity prototypes this way is that all the assets have to be taken from screenshots, which was quite a hassle to get sometimes. Our prototypes were not interactive either, which was wanted from some of the respondents as they wanted to test it out inside the game. The problem is that most of the games we analyzed does not have a fully customizable interface that can be changed inside the game.

9.1.4 Reddit

Getting our feedback from Reddit was not a part of the plan from the start, but when we were doing research on forums about spectator UIs we saw that a lot of posts came from Reddit and the feedback was usually thought through. In order to get the most exposure from our posts we looked at what times were the best to post on which days. Apparently most of the posts that makes it to the front page are posted around 18:00 - 20:00 CET time on weekdays, and it was around the same for all four sub forums. Getting the post to the front page was important as it exponentially gave more album views. This was not the case for the CS:GO redesign which did not reach enough popularity due to not reaching the front page.

The users in the Reddit subforums provided the biggest contribution to our project. It was not always a pleasurable experience though. Because of the anonymity, some of the comments were quite personal and aggressive. For the comments that did not concern the redesign we just ignored, but we did listen to the ones that were giving harsh feedback as it proved this feedback actually gave us something. One example is Hearthstone, where one user aggressively commented on the coloring of the remaining cards component. We listened to the feedback and the results were better in the second iteration, so sometimes it is the best to analyze what feedback was given behind the harsh tone.

One concern we were having with Reddit is that most users are well-grounded fans and players. This was confirmed in the questionnaire with a lot of respondent watching e-sports streams everyday. The results from the questionnaire could therefore be biased towards these fans and not casual players that do not play or watch that often. Another concern we were having is when one respondent is giving feedback on one certain component. Is this something we should have considered or should we only focus on feedback that gets a lot of discussion. The same goes for the questionnaires that resulted in fifty-fifty results and in both of those cases we went for what we as designers were thinking about the feedback. Some of the feedback gave us confidence and was overwhelmingly positive, which is nice at the moment, but it does not give any particular feedback on what could be improved.

9.2 Results Discussion

The section discusses the results of the thesis consisting of redesigns, guidelines and UI components.

9.2.1 Redesigns

We did not go overboard when redesigning the interfaces. There were a couple of reasons for this. First of all; the time issues. The project was planned to be carried out in 20 weeks total. Designing from the ground up takes time. This brings us to the second reason; the fact that we had four games to redesign. If we would only have had one game, perhaps a complete overhaul would have been possible. The choice to redesign four games was the right call, however. It gave us the opportunity to explore the spectator interfaces more thoroughly overall.

Picking the games to analyze and redesign was mainly a personal choice. Looking at the most popular e-sport titles, these were the games that we had most experience with, meaning these are the games that we played the most of and were fans of. It could be argued that League of

Legends should have been included, but as neither of us have actually played or watched the game, it would mean that we would have to allocate a lot of time to learn it. Picking games we already knew allowed us to make a jump start into the project, as we already had some thoughts and ideas on the spectator interfaces. Arguably, the redesigns for Starcraft 2 and Hearthstone proved to be better than the CS:GO and Dota 2 redesigns since they gathered more positive feedback in the questionnaires at least. One of the explanations is probably because we have more experience with those games. However, it might also be because of the nature of the spectator interfaces for those two games. In Starcraft 2, modding the spectator interface has been possible for a couple of years now, they are used to changes being done to it. In contrast, the spectator interfaces of Hearthstone tournaments is a mess of overlays and in dire need of an overhaul. Because of this, the spectators of these games might be more welcoming to changes. Looking back at the glowing puck that was tested in the 1990s, a lot of people prefer things to stay the same and are scared of changes.

9.2.2 Guidelines

The guidelines were continuously worked on throughout the thesis. However, they were not really the focus for most of the time. We thought the redesigns would be the major result and the guidelines were just a means to get to the redesigns. As the guidelines were developed and iterated though, they became more and more prevalent in the result we wanted for the thesis and they took over the focus towards the end.

Some of the guidelines that were put in the beginning were mostly based on our personal experiences when spectating. Even before we started with the thesis we had some ideas of what could be improved and changed. To prove our point we started looking at theory that would establish a ground for the guidelines. This could be a result of that the team promotion guideline is not solely based on the spectating interface, but was considered due to being important to e-sports as a whole. We removed some of these guidelines in the second iteration, but we thought this one was important enough to keep. As fans of e-sports, promoting teams and players is almost a must because they play one of the most integral parts of maintaining spectator interest.

A guideline that was considered in the later stages of the process was “Find Suspenseful Game Mechanics and Maintain the Tension”. During the first parts of the project, most of the ideas for the redesigns were about showing the information that is not shown at all. The CS:GO bomb timer is an example where we considered showing a countdown timer for it. But we later realised that the timers was probably left out intentionally, in order to bring suspense for the audience as the intervals between the bomb beeps gets shorter and shorter.

All in all, our personal opinion of the resulting guidelines are good. We would like to see them being used when developers are considering incorporating a spectator interface to their games as they are things that are not only based on our opinions, but also the fans of some of the biggest e-sports games as well as graphical user interface theory.

9.2.3 UI Components

The UI components were an unexpected result. They were not something we had planned to do from the start, but something that our supervisor proposed we should add during the later half of the project. In order to adequately describe the spectator interfaces in general terms, we named some of the common interface components that existed in the games. As it turned out, it really helped to have a common base when discussing the UI differences between the games. It would have been even better if we would have had them from the very beginning. We decided to add them before we start discussing the spectator interfaces in the report, in order to give the reader the base that we lacked in the beginning.

9.3 Generalization

The results we got in the end is quite close to the ones that we expected from the start if not better. Due to the time constraints, it was a shame that we did not have the time to further explore the games and do more interviews. We feel though that the resulting guidelines does fill a role that in our experience has not been explored before. Perhaps the guidelines can be applied to other entertainment fields than video games such as regular sports. Showing player skill is maybe not something that is shown to the fullest extent when looking at regular sports. The virtual game world creates many opportunities to do this while in reality there are many factors that restraints it. Image looking in a First person mode of a football player running after a ball and dribble. This could change the whole experience for the spectators as they can see the player's skill in a whole new way.

Creating a discussion about the spectator interface was one of our goals from the start. There are always things to improve and the spectators should never be fully satisfied with what they are seeing. One example is the Starcraft 2 interface where many people seemed to have stopped caring about the WCS interface and as Ryan T. Schutter said "Really, the issue was pretty much settled until you guys brought it up again!", is in our opinion not the right mindset to have when designing spectator interfaces. What he does right in our opinion though is that he does not care when making changes he believes will make the experience better in the long run. We think this was a problem when we designed for Dota 2, as we were aware of the harsh community and therefore did not try to change a lot. Dota 2 is a special case as well due to the fact that the game has a lot of UI and if we tried to remove something, the community would give anecdotes on when this information is important. The conclusion is that it is easier to add functionality than removing functionality which should be considered when designing a spectator interface.

9.4 Future Work

More user tests should be performed in order to test the validity of our findings. For example, it would be interesting to find out how many spectators watch e-sports on a secondary monitor, while doing something else on their main screen. Another thing would be to test the findings of being consistent with the in-game interface. Do spectators just need some time to get used to new interfaces or do they, even after an extensive period of time, prefer the old one? It would be interesting to see how the interfaces would look if you were to disregard the consistency guideline and do a complete overhaul from the ground up. This would probably be best if done

on a game which the designer has no experience with, in order to remove any biases. More future work include applying the guidelines and redesigning other games' spectator interfaces. This should be done to further test the validity of the guidelines.

The only game we looked at that allows for customizable spectator interfaces is Starcraft 2. Because of this, there were a lot of questions if the interface was implemented or was going to be implemented for real. Learning the Starcraft 2 Editor was not feasible considering the time frame of the project and is left as potential future work. CS:GO used to have customizable interfaces, but it was removed due to a security vulnerability (Reddit B, 2014). We are not familiar with how extensive the customization was, but perhaps it is possible to implement the redesign for CS:GO if Valve manages to solve the security issue. Both Dota 2 and Hearthstone does not have any customizability which could be a security issue or a justification for having a standard UI for all tournaments. The positive factor by having a customizable UI is that users and tournaments then have the possibilities of making improvements.

9.5 Ethical issues

Something we learned through watching streams and tournaments is that many CS:GO pro players do not mind giving away their configs, which gives away their hotkeys, mouse sensitivity, graphical settings, et cetera. A lot of pro players even have links to their configs on their personal streams. *The Curious* and *The Pupil* personas are often interested in exactly how the players play, going so far as copying their configs. We asked a Starcraft 2 pro player during his stream and he had no issues with giving away his config. Some players might be more secretive though.

We stumbled upon an ethical issue when looking at regular sports; sport hooligans. The hooligans are huge fans of their favorite team and players which sometimes goes as far as involving violence. By promoting teams and players in e-sports, it could result in that fans of certain teams or players can become too invested. Looking at the crowd for e-sports, which usually consists mixed supporters sitting next to each other, it could give a larger chance of involving violence. In regular sport however, the most invested fans are sitting next to each other, which reduces the chances. This sort of hooliganism could be something that will develop in e-sports in the future.

10. Conclusion

The research question this project was set to answer was:

What is important to consider when designing a spectator interface for competitive video games?

The question was to be answered by picking four popular e-sports games, analyzing their current spectator interfaces, comparing the games between themselves and with interface theory. The results consist of guidelines that give examples and recommendations, helping a potential game developer to bring the most of out of their spectator interface. In order to illustrate the points of the guidelines, redesigns of the spectator interfaces of the four games were made. Additionally, several spectator UI components were named in order to make it easier for us to discuss the different components in spectator interfaces.

The four chosen games were Dota 2, Starcraft 2, Hearthstone and Counter-Strike: Global Offensive, all popular e-sport titles in their genre. They were chosen based on our previous experience and knowledge, being the e-sports games we have played and spectated the most. We started with analyzing the current spectator interfaces of the games. Taking into account what they did well and what could be improved, we compared them between themselves and with interface theory, coming up with a first iteration guidelines. Redesigns of the spectator interfaces were made based on the guidelines and knowledge learned from the analysis.

In order to gather feedback, posts were made to the Internet forum Reddit with a questionnaire, getting respondents opinions on the redesigns and other improvements. We also performed an interview with an employee of Blizzard Entertainment, who we came into contact with through one of the feedback posts.

Taking the feedback from the questionnaires and interview into account, we updated the guidelines and the redesigns. The plan was to post all four on Reddit again, but due to time constraints only the Counter-Strike: Global Offensive and Hearthstone redesigns were posted. The second time was done as a follow-up to let the respondents know that we took their input into account and gather some further feedback through comments only.

A final update was made to the guidelines, clearing them up and providing examples both from existing and our redesigned spectator interfaces. The final version consists of eight guidelines;

1. **Maintain Visual Clarity for Better Readability**
2. **Consider the Trade-offs in Keeping Consistency Between the Spectator and the In-Game Interface**
3. **Designate Colors to Distinguish the Teams and Players**
4. **Promote and Support Teams Through In-Game Features**
5. **Hide Abundant Information and Provide Timely Updates when Relevant**
6. **Display Player Skill and Highlight Good Performances**
7. **Find Suspenseful Game Mechanics and Maintain the Tension**
8. **Make the State of the Game Quickly Comprehensible**

These guidelines are not to be considered as best practice, but lists the things we found to be most important. We hope they will help game developers looking to create an e-sports game with designing the interface for their spectators. They do need to be further evaluated and tested as they have not been put into practice.

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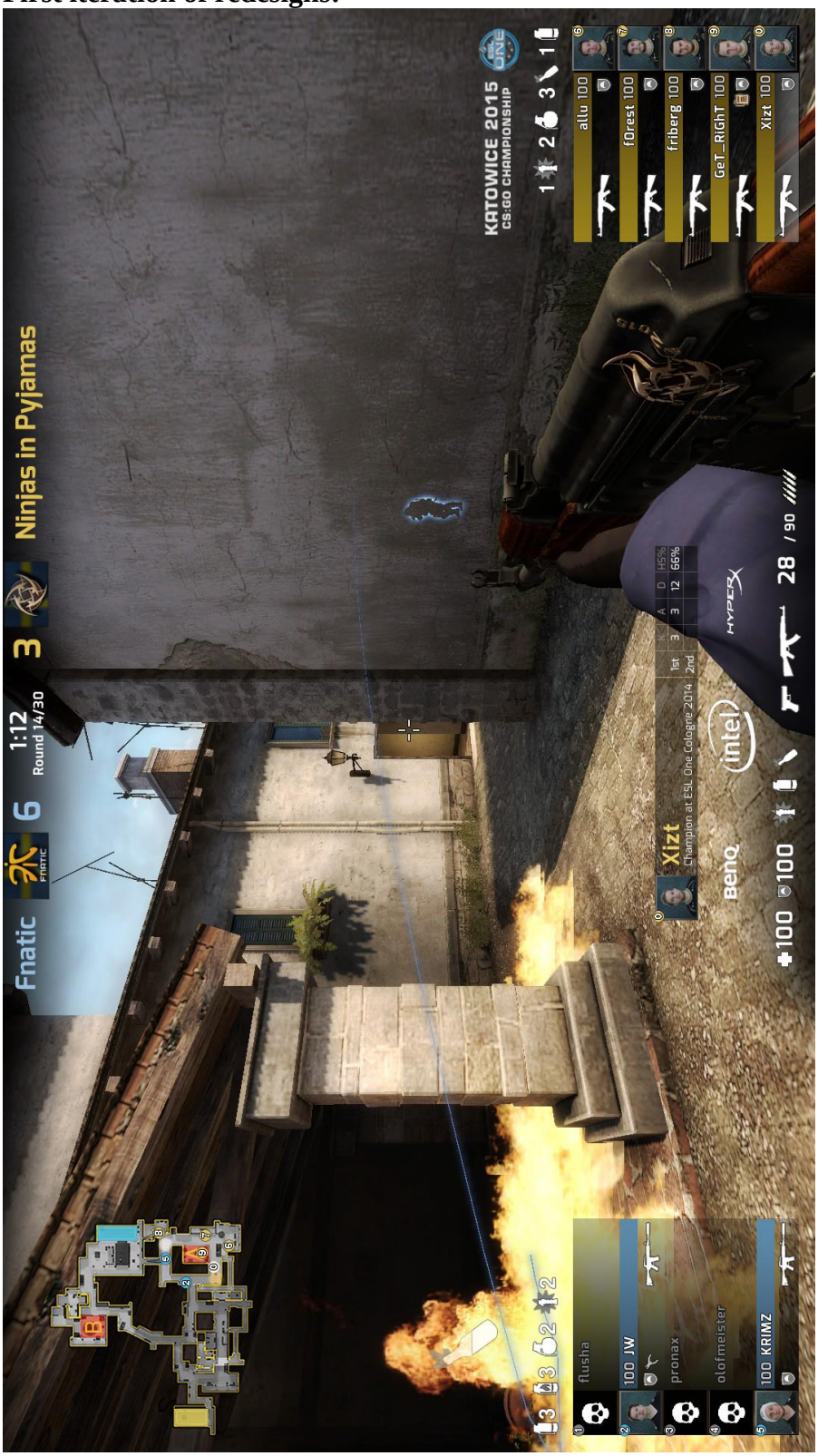
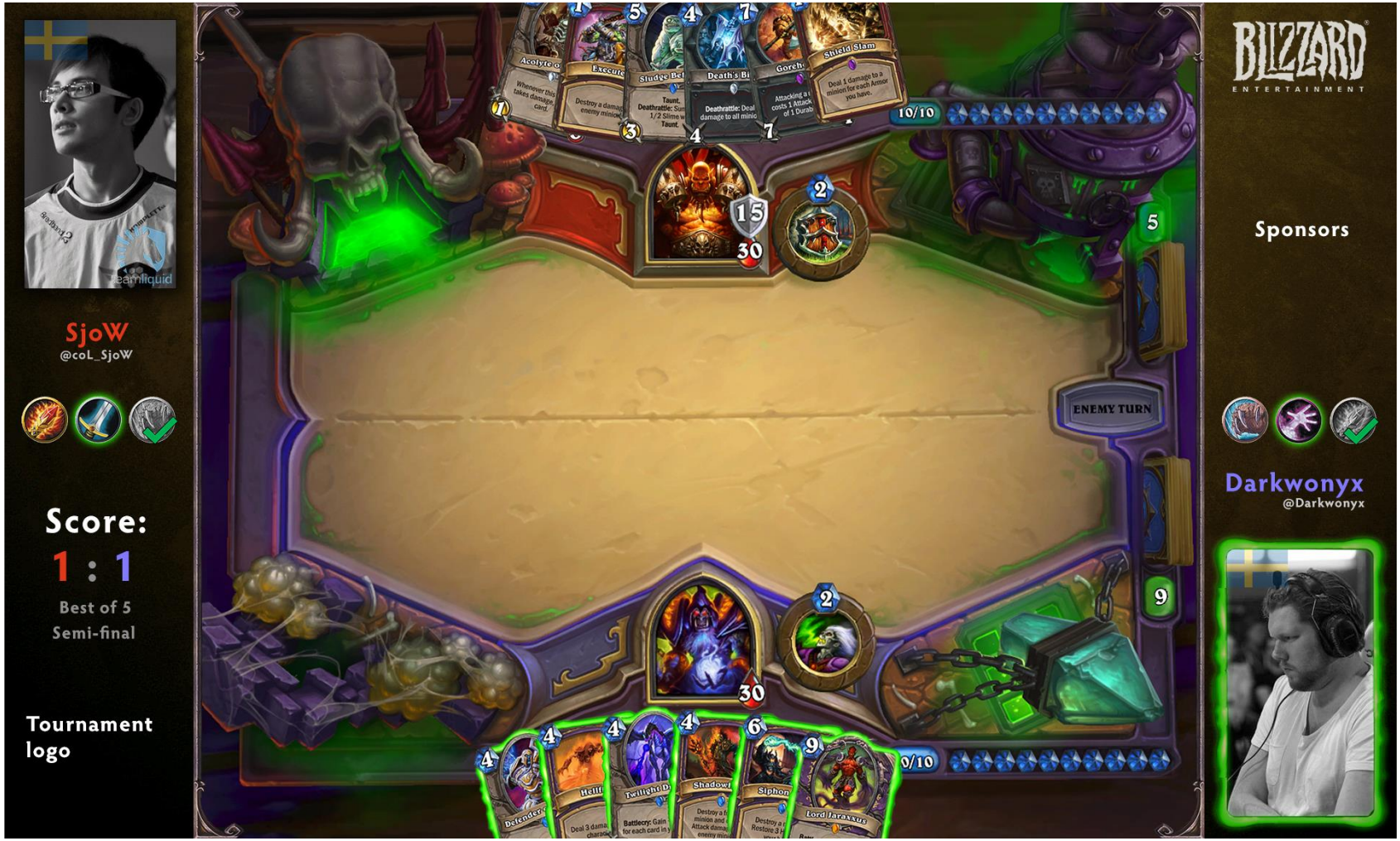
Appendix A: High Resolution Images of Redesigned Interfaces

First iteration of redesigns:

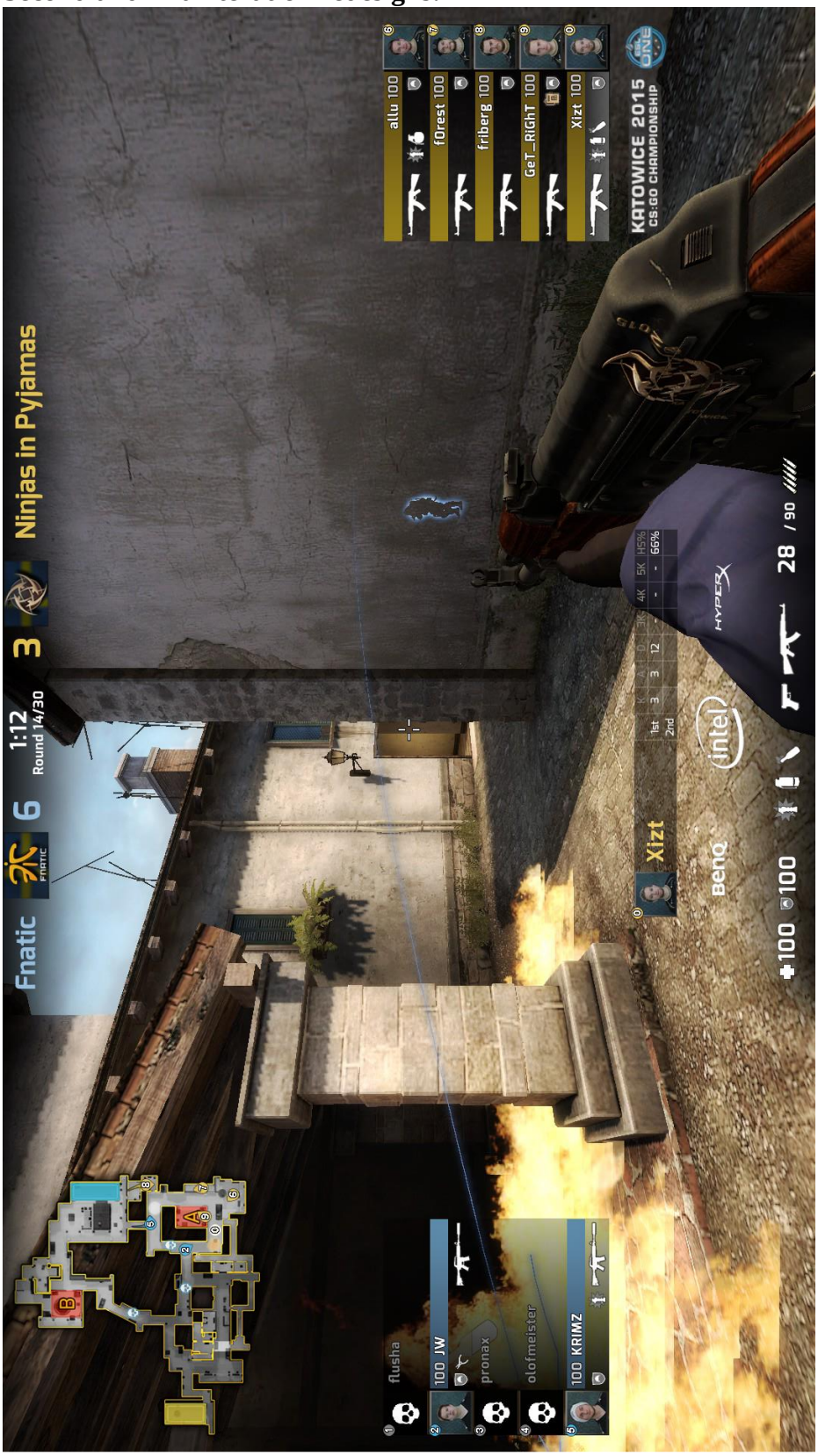



INnoVation 2 Best Of 5 1 Life
Production
Workers: 3/3
Workers: 17/24
Workers: 2/3
275
1230
379
420
105/134
W:47 A:58
65
1420
380
510
107/110
W:49 A:58
Infantry Weapons Level 1
2.5
11:02 Foxtrot Labs SE
Marine
Kills: 2
Rank: Recruit
35/45
Light - Biological

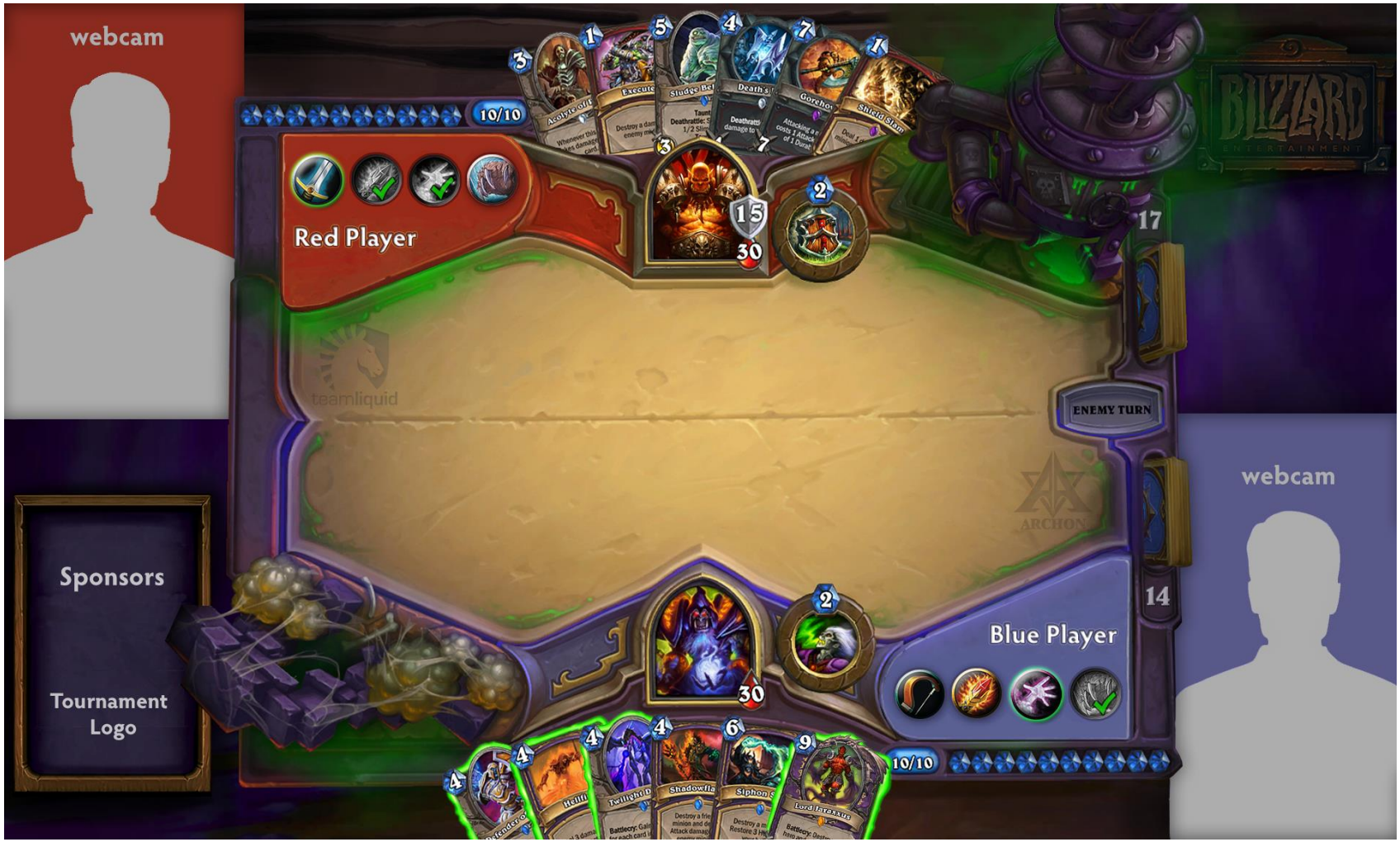

VG
9
11:29
9
EG
GAME STATS
VG.Super.天喔
VG.fy.天喔
+5
Shadow Shaman
6
577/600
37 / 682
176 / 731
+5.1
+2.1
250
+594
K / D / A 1 / 3 / 5
LH / D 15 / 0


SjoW
@coL_SjoW
Score:
1 : 1
Best of 5
Semi-final
Tournament logo
BLIZZARD ENTERTAINMENT
Sponsors
Darkwonyx
@Darkwonyx
ENEMY TURN
10/10
30
15
5
9
Shield Slam
Lord Jaraxxus

Second and final iteration redesigns:




INnoVation 2 Best Of 5 1 Life
Production
Workers: 3/3
Workers: 17/24
Workers: 2/3
275 + 1230
379 + 420
105/134 W:47 A:58
65 + 1420
380 + 510
107/110 W:49 A:58
Infantry Weapons Level 1
2.5
11:02 Foxtrot Labs SE
Marine
Kills: 2
Rank: Recruit
35/45
Light-Biological


webcam
Red Player
10/10
15
30
17
ENEMY TURN
webcam
Sponsors
Tournament Logo
Blue Player
14
30
10/10

Appendix B: Questionnaires and Feedback

Starcraft 2

The questionnaire:

Starcraft 2 Spectator Interface Redesign Survey

How long have you played Starcraft?
Including the original, Brood War and Starcraft 2

- ○ Less than 1 year
- ○ 1-3 years
- ○ 3-5 years
- ○ 5-8 years
- ○ 8 or more years

Do you watch Starcraft 2 e-sports events and tournaments, and if so, how often?

- ○ I don't watch e-sports
- ○ Every day
- ○ More than once a week
- ○ Once a week
- ○ A couple of times a month
- ○ Only watch the biggest tournaments

Which of these interfaces do you prefer?

- ○ WCS
- ○ GSL
- ○ SSL
- ○ IEM
- ○ Proleague
- ○ Dreamhack
- ○ Don't know
- ○ Other:

Do you prefer to have the mineral, gas and supply counts in the upper right corner or the way WCS does it?

- Upper right corner
- WCS position
- Don't know
- Other:

Is showing the mineral and gas income per minute and the division of army and worker supply important?

- Both are important
- Only mineral and gas income is important
- Only army/worker difference is important
- They are not important
- Don't know

What do you think of showing the number of a certain spell a unit has energy for?
For example, if the observer has 8 Sentries selected with a combined energy of 600 energy, a 12 would be displayed in the corner of the Force Field icon, to indicate that the Sentries have energy for 12 Force Fields.

- I like it
- I don't like it
- Don't know

What do you think of our solution of showing the number of a selected unit type instead of showing one icon for each unit?
I.e. showing one Sentry icon with a number 8, indicating 8 selected Sentries, instead of showing 8 seperate Sentry icons. An Immortal icon with a number 3 etc.

- I like it
- I prefer the in-game solution
- Selected group information is not important
- Don't know
- Other:

Which style of minimap do you prefer?

- Heart of the Swarm
- Legacy of the Void
- Our proposed redesign
- Don't know

The comments from the text field in the questionnaire:

I'm not an expert on this stuff by any means, but looks good so far! Keep it up!

I love your work

It's all good to me.

I like the new ideas brought forth in this. If you make it, I'll use it.

Create a slot for PIP, in a game where action occurs in multiple locations simultaneously this is a vastly underused method.

You did it right.

It would be cool if the selected units will be color coded. Spectators are often select both players units and sometimes it's hard to follow which player has that unit. (Of course this problem is non-exist in non-mirror matchups)

Im a caster and youtube analytical commentator. I love this design and would be proud to use it. I really like grouping like units in this way and further I really like itemizing which spells have how many casts. I would like to see some form of scoreboard functionality listing score and best of #. In addition the Gh overlay has a image that can be replaced to display sponsor content. This is covered if a unit is selected. I also really like having the income displayed on the board but that isnt top requirement. Screen space and all that. But one thing that isnt negligible is army vs worker supply. I love having that. I think one major question is: does the production have a dedicated observer? As a one man show or anything short of dedicated observer, having things to remember to use while casting while observing and while handling the streams backend... yeah. All depends on production staff. You can contact me on Skype at r4nd0m1os3r or email at cheeseyshaft@gmail.com I would love to help moreIin any way I can

I see that you intentionally left the supply/production in the usual places, and I implore you to reconsider. If that's an unshakable design decision on your part then ignore what follows. I've always loved the WCS interface's decision to put most (all?) of the persistent interface elements in one place (i.e. the bottom left). While I understand that it can be disorienting for players, it makes *so* much sense for spectating - all the information about the overall state of the game is centralized and the screen feels *much* cleaner. Compared to the WCS interface, it's claustrophobic looking at e.g. the GSL interface, with literally every corner of the screen vying for my attention. Why are the supply/resources/production/mini-map littered across the screen like as many breadcrumbs, when the
WCS interface demonstrates that it can all fit snugly in one corner?! </rant>

What if buildings are outlined only and units are filled in.

Great ideas here. I would love to have an APM counter aswell, but that's something that might not be that big of a deal.

If possible, create a larger map view. This could be a popup in the center of the screen with the minimap enlarged. It would be great to highlight map events.

I personally prefer the (finished) upgrades being visible the entire time like in the Dreamhack overlay.
Maybe that could fit in the top right hand corner in your design? For me, it's all about being able to get as much information by just looking at the stream or video without having to wait for the casters to point it out. I often do other things while leaving the stream or video running and want to be able to assess the situation of the game quickly and get right back into following the game. That's why I really like having income figures, upgrades and worker/army supplies available at

all times. The different colours for units and buildings are also a nice touch that would help keeping track of army positioning
when units are in their own bases. The changes to the information on the selected army would enable me to gauge the power of armies much faster and more precisely, especially when a big fight is approaching. Additionally, the overlay obviously shouldn't be too big in order to allow as much view of the action as possible. All in all, your design basically meets all my expectations and I would love if someone could actually implement it because I like it much more than some of the currently used overlays. Good luck with your master thesis!

As the author of PeepMode, I'm sensitive to UI designs and I'm really liking what you guys are proposing here.

Recolor watchtower when its owned by a player.

The spells available is fantastic. I feel that with your proposed redesign for the minimap there could still be some clarity issues with the lighter coloured buildings as some of the maps are particularly bad for them blending in. It is decertainly a step in the right direction though.

Moving the current banks of each player out of the upper right like Gameheart and WCS do is jarring
as a player because part of my eye movement cycle as I play is to check the upper right for that info.
So I prefer GSL and yours that keeps that there. I believe WCS and Gameheart also have modes where supply and banks are not visible. This is the worst because supply+banks are as close to the current 'score' of the game as you can get. As a player+spectator, it's very important for the production to be open most of the game so I can go back later and steal builds. This is probably not as important for pure spectators because the announcers will (eventually) mention important tech. But as a player I'm concerned with what exact supply that structure went down. The research finishing in x seconds countdown is neat and I like that from other overlays. What I don't think is included is when tech tree unlocking structures are about to finish. When those finish can be important (when bane nest finishes, when Dark Shrine finishes, for example) so it'd be neat to show those.

I think it is important to put as much information as possible on the lower side of the screen. This has to do with the fact that the top part of a screen has more area of the map covered than the lower part (that's why you see a trapezoid like shape on minimaps). I don't care too much for how many forcefields are available. Also, I prefer a design in which you can see income/workers and army supply at the same time because it shows whether or not an attack needs to do damage (for example). Good luck!

Part of the reason why I like the WCS design is that it allows for as much screen space to be used for viewing the game. The camera angle for SC2 is at a slant to having UI at the top of the screen makes me feel like there is a narrow field of view. Furthermore it feels a lot like other spectator sports UI, look at football where it shows the bare minimum and in only one location. Finally it

also extends and contracts well whereas yours and previous models can just free up screen space but still has the underlying problem of having information all over the screen.

Worker count is EXTREMELY important. Also: a "resources mined" tab will be really useful.

I noticed that when weapon/armor/shield upgrades are listed on production tab, they still have useless "1" indicating amount. I think it should be scrapped or the number should change respectively for upgrade's level. As for the other, non-level upgrades the number should just be deleted.

Great job guys keep t up !

Fantastic work. I love the unit icon change the best. I would love to see this stuff actually implemented.

I really like your redesign! Good well-thought solution for something that is already quite complex!

I really like the redesign, hope it gets implemented.

Remove numbers from the upgrades tab. Of course you will always have only one infantry weapons upgrade researching. The current tab always shows a 1 for all upgrades because there is only one of that kind of upgrade currently researching. That is redundant information.

It's cool , good work

Nothing. Everything you did is not necessary. Change isn't always good and that's certainly the case now. Stop trying because you aren't helping.

Need to see the minimaps in game

This is really well done, big proponent of changing the super high gamma mini map.

I think the redesign image , is brilliant, Keep up the amazing work.

Show completed upgrades for each player similar to the standard enhanced model
Your proposed layout has everything in corners. Being in the corners forces people to constantly move their eyes around the edges of the screen instead of just looking at one spot for the information. It seems to make it take longer to figure out what you want to know. Grouping things together in one spot I believe is better. Some overlays take away what is selected making it so you can't see what is in a medivac or can't see how many units are in a selected group. That is rather annoying. Your way of showing what is selected and the number makes it easier to know exactly what is happening at a glance.

New designs are awlays welcome in my mind. One of my work philosophies within eSports is "efficiency." And I think you guys did everything right in that regards.

Where are the upgrade ? Upgrade state are crutial during all the state of the game and often decide the outcome of a fight (+1 Zealot vs 0 Zergling for exemple). Upgrade state should be visible at anytime, not only when a single unit is selected (that NEVER happens in a game stream) or only when upgrade is finished (you can miss it during action). DreamHack UI (aka old gameheart) is the perfect one for upgrade because at any point of the game you can tell which player is ahead in upgrade.

Very important element which is often overlooked is to show who is casting a game. Also, a very frequent request is to show the total kills a GROUP of units has had. For example, you select 3 high templars and can see how many units they killed.

I like the proposed redesign, but have a couple thoughts - 1) Is it possible to take screen shots of nearly identical game-states so that comparison is easier? I want to be able to look at a specific group of units and see how it looks in all three minimaps. 2) I really like the concept of differentiating between units and buildings - is it possible to make the units more striking, though? Bright units on a dark background perhaps? Great work!

Different colors for units is an interesting idea, but I think movement and size is good enough.

I'd love to see on the minimap the colors of whatever the player had selected vary. For example if they had their hatchery selected the hatchery on the minimap would show up slightly darker or something along those lines.

Basetradetv uses the best UI

Awsome new design. I like it very much. It's clean and very nice to look at.

Screenshots for the third question would help answer better. You guys rock, you basically have it all right, keep on polishing the edges. glhf

If you are an observer, make sure unit healthbars are only on. I can see it shows the life of the selected units in bottom right, but I want to see the health bars of EVERY unit, or at least the damaged ones.I love your spectator overlay and I hope this gets to be used in WCS or something like that. Thanks for all your hard work and #passion.

I'm skeptical of the spell energy idea - Taking the total energy of all the relevant units will likely over estimate the number of spells. If you're counting number of spells per unit and adding that up, it's going to be more accurate.

you fucking kick ass! Go kick that blizz blizz booty!!!

Depending on the audience, all of these changes could be great or crap. For more casual viewers it's
better to show less and let the casters explain what's important. For hardcore starcraft fans you could just show the mini-map and all the stats and they would understand what was going on. Even though I count myself in the latter category, I generally prefer to show less on the screen. Having the option to bring up stats like worker count, army/worker ratio, income rate etc. is a good thing to show at times, but I don't think it needs to be constantly on screen. Same things goes for unit selection, most observers are good about only selecting things that need to be shown, but some aren't.

For your minimap both buildings and units should have the black border but units can be in another color.

Blizzard plz!

I think there should be a spot that shows what important upgrades like 1-1 and 2-2 so you can see clearly who has the upgrade advantage. Maybe even implemented into their names on the bottom of the tile and each time they get an upgrade it will light up showing the current one if that makes sense.

I think gameheart has it set pretty good already. Not sure about this interface yet, maybe I have to watch a few games with this layout.

APM, always show APM. APM is what got me interested, I would be amazed at 300-400 apm and it got me hooked.

Have more info on the layout like army valie worker count and other stats

More information is better than less, but it should be toggable and up to the observer when to show it, just like the current production tab, unit lost tab, etc.

I really enjoy redesign as a whole. It has a nice look to it and gives us the most important information.
Although personally I prefer the resources and production in the bottom, your redesign is really well-made and I have no real issues with it.

Ja

I love the redesign especially including the unit numbers in a selected composition. The only caveat I have with it, is how much more difficult is it to make out the specific number at lower resolutions. Is that an 8 or 9 for the sentry count--mind you this doesn't matter to much because the current system doesn't really account for army compositions in the UI at all.

I do feel that the redisign of the map should be swapped (at least on a dark map as pictured) with the highest contrast as units, and lowest contest transparency buildings.

In the top left, the production tab shows Red on top and Blue on the bottom. In the top right, the income and stuff shows Red on top and Blue on the bottom. Between them shows the players name and match info, which clashes with the corner pieces by having Red on the left and Blue on the right. I would like to see that portion of the UI redesigned to fit with the Red on top and Blue on the bottom.

Maybe switch the colors of buildings and units in the redesign for the minimap since it seems like to me the lighter color stands out more, and I feel that the units should stand out more than the buildings.

I wonder how you differentiate observer and player UI in your thesis. I ask that because some of your idea could be used in player UI, espacially the way to show multiple units.

I'd also like APM counters, but otherwise your proposed interface looks better than anything else I remember seeing.

Permanently show major upgrades +1/+1 etc. somewhere easy to see.

Both the army/workers and the resources per minute shouldn't really be there at all times, it's a good idea to just show them when necessary. Excelent proposals.

Good stuff guys

How the units will be shown when selecting both armies?

I like how clear and nice for the eye it looks. Please get someone to implement this as downloadable observer interface and let people test it in game. I don't know how to do this but I know it's possible (example:
http://www.reddit.com/r/starcraft/comments/29hfpf/observer_user_interface_updated/)

I would suggest presenting this to Basetrade TV. They may be a bit more receptive to try the new design out.

Showing the number instead of more icons only makes it harder to see how much is selected, the selection information is only useful for small groups of units or 1 buildings, at other time it is NOT important, having numbers only makes it harder to see how much is selected, not easier. Showing the amount of spells is also a waste of ui space, no observer will be able/will want to select all relevant spell casters when a fight is going on, showing that will only distract from the action on the screen while not adding anything for 99% of the viewers base and the other 1% will know by just watching energy bars/knowing how many spell casters there are. Gameheart Ui is by far better than anything. for the minimap, the lotv sucks, yours doesn't add anything meaning other than making it anoying to look at, seeing a bit clearer difference between the buildings and units does again add nothing of value since it's when wtahcing a game you won't pay attention to that, the hots one is just fine.
putting stuff in the top edges has one major downside: If you watch a stream from an embedded

player, the twitch logo is right infront of the data and it gets unreadable...

Good stuff. Thanks!

Great mock up. Good luck with your thesis. Peace.

Reddit comments

- -For better visibility, please leave the background of the tab icons. There could be some icon+map tile combination that makes the icon invisible. At least give it a black glow (not a shadow that is moved by some pixels).
- Remove the "1" from all upgrades. Of course all upgrades will only be researched one at a time.
- Swap weapon and armor icons on all units to match it with the upgrading structures. We all say it this way, too. (By "3-1" upgrades we mean "Level 3 Attack and Level 1 Armor, not the other way round") click here
- The unit composition selection is really good, but it only works for viewers, not for players. As a player, you need to be able to select individual units via the selection.
- The spell counter is perfect I think this could actually be implemented in the game to always see how many EMPs are available so you dont just spam that spell but actually try to spread it perfectly.
- I dont see an advantage in your minimap version over the HotS version, what is the point there?
    - -Do you mean something similar to this? I agree it might be hard to distinguish from certain backgrounds, we will think about it.
    - Yes, this makes sense as well. I thought perhaps you could have 1,2,3 respectively for when upgrading the three levels, but that might look like the player is upgrading the upgrade twice or thrice for the higher upgrades.
    - Again, I agree this is a no brainer, really.
    - This interface would be strictly for spectating, not for playing, so this should not be an issue.
    - The point of our minimap is to make it easier to make out what are buildings and what are units on the minimap, even with a quick glance.
        - -Yes, but the space between the icons is too wide, thats what annoyed me with this tab. click here
        - I think the upgrades just dont need more numbers, you always know what happens just with the icon and the loading bar.
        - Now I also see the difference to the HotS version, thanks :) It is something I would like to try, I cant really tell just from looking at this. Just like the other change, I could also see this implemented for the players (I know this is not what you aimed for)

          -Yeah, it's a bit hard to see exactly how interface changes will turn out when you can't see them in action. Thanks for the feedback! :)

-I like to do stuff like this. Contact me if you need more feedback or even new ideas (like the armor/weapon swap). Do you only do this for the master thesis or do you want to make this overlay available for the public and to be used in tournaments?

-This is basically just Photoshop mock ups of the interface and we probably won't have time to do it for real. If you are willing, you are more than welcome to make it into a real thing.

-I am willing but not able because I am also just good with Photoshop, not with the ingame editor. Maybe you'll find someone to realize it :)

-I can edit video, and could definitely put your photoshop into action, however it would not be a working mod, only a video.

If you're interested, PM me :)

Well done, all seem like good changes to me

Being able to see the available abilities is a really good idea! Also, the unit display is very good. I still like the HotS minimap better though, I don't think we need a special MarineKing-patch to separate spines from overlords.

-In this example the 8 selected Sentries have a combined energy of 600

Be careful with how this is implemented because 6 HTs with 50 energy isn't 4 storms.

Unrelated but on a similar note, in the gameheart 2v2 interface the supplies go over 200 because every depot/overlord/pylon is counted in the supply total even beyond the 200 max.

-Yes, the amount of spells ready to cast would have to be calculated with the combined energy of the units, but also taking into account how many times each separate unit can cast the spell. Perhaps the 6 HTs with 300 energy can only cast 1 storm, if only 1 of the HTs actually have enough energy.

-As long as you're aware of it thats good. This is a great addition to the interface and probably my favorite new feature you listed.

-Hey man! There is some cool stuff in here. I wanted to go ahead and post a GDC Vault video for a short talk Philip Tan (from /u/MITGameLab) and I did last month at GDC in case this might help with your thesis at all.

http://www.gdcvault.com/play/1022260/StarCraft-II-and-GameHeart-Evolving

I think its free right now. Anyways its really short but we dive in a little bit to some of the thinking behind what we did for GameHeart. Unfortunately I was unable to show off the newer WCS interface during this talk (the one used at the Season 1 finals spoilers!) because we had not released it yet and you can see some of how we approached the interface changed from what I mention in the talk. The talk is actually a 25 minute version of an hour long talk we had done once before, so it is pretty cut down as well.

If you ever have any questions about something we have done for GameHeart just let me know. Also if you have any questions about what is actually possible to do through interface and extension mods for observers.

-Hey! We will definitely check it out, will be very useful! We have a lot of feedback to go through for our four games (the Dota 2 redesign isn't even 100% ready yet), but we would love to talk to you about the interfaces and their feasibility. Perhaps we could contact you sometime next couple of weeks?

-I've thought about the units being shown like that before, imho i hope blizzard implements it that way. Apart from that nice design look.

-This is slightly off topic, but while looking at the minimap for zerg I was reminded of a thought I had. When you compare the minimap in multiplayer vs HotS campaign. I liked how in the HotS campaign the only tumors you see on the minimap are the active ones. The tumors that aren't active anymore aren't shown on the minimap.

I was wondering why that wasn't implemented in multiplayer. I can see some benefits to that minimap. First, when you're looking to spread creep, it's easier at a glance to know where your active creep tumors are so you can jump to them faster and more accurately. Second, it removes some extra clutter from the minimap allowing you to see your units on creep more clearly.

Again, this was slightly off topic, but it was just a thought that came to mind. Perhaps you could implement that into your minimap redesign.

-Yes, it's a bit weird that they didn't implement this in multiplayer if they had it in singleplayer, I do remember that feature now that you mention it.

-I guess with your design, you could make inactive tumors look like buildings and active ones look like units.

-Meh, that's confusing for viewers. Cool for players tho.

-Wow, that looks incredibly sharp! Good job bortha

-This is a really good design, a lot of things are a lot clearer here and it will definitely make watching games a lot easier.

-Me likey! Good stuff man!

-It looks great! I just have one question: how does it look when multiple units are selected?

-I'm not sure if I understand your question correctly. Do you mean the health bars above the units? or when you select armies from both players?

-Bottom right corner, you can see the info about the Marine that is selected: unit model, rank, number of kills. I wonder how that looks when more than 1 unit is selected.

-The second image on the first link shows what it would look like.

-oh, thanks. That looks good

-I would love to play around with this! Are these just mock-ups right now or is there a finished interface?

-This is just a photoshop, so nothing actually works in the interface. If someone have the knowledge of implementing this into starcraft and if there is enough interest we could consider it :)

-I think it would be great idea to implement this and release as observer UI, even if just for testing. It looks really nice.

-This is awesome, I hope people are gonna use this.

I especially like the minimap changes and the slick looking graphics showing unit type and upgrade timers in the lower right corner

-Ok, so Blizzard really seems to have taken an interest in the resource change brought up on TL recently. Is there any way we can get them to look at this change + survey? Seems like this would be a ton of free work already done for them. I love every change proposed by these guys. The spell counter in particular is an AWESOME change.

For example, watching a 2-base Immortal push in PvZ would have a lot added to it when zerg is baiting out forcefields if you could watch and see exactly how many the protoss has left.

-Is it not possible to make the minimap any bigger? That is the one redesign Id be really keen to see!

-The size of the minimap is a fine balance between too small and too big, but yeah, perhaps it could be a bit bigger.

-If you've ever described to someone how to follow a StarCraft game Ill usually first tell them to look at the minimap to get their barings.

If you dont know the map like the back of your hand the minimap lets you get your bareings and follow the square indictator telling you where the view point currently is.

I think the Minimap is so important and making it bigger in spectator mode would be great.

-The unit rank seems irrelevant to me.

-I am super excited to see the unit type grouping with spells!!! This has been something I have wanted in my regular gameplay and would be very useful for spectating. I hope to see this get finished and get some use.

-This looks pretty fucking awesome, can't wait to see it used in a match. :)

-Very nice! My guess is that you'll have make an extension mod to get the spell counts. I'm not actually sure if it's possible to change the minimap in that fashion, even with mod code, but more power to you.

-It looks great, how the units will be shown when selecting both armies?

- Just units for both players (too simple?)
- Units and army value for each player (i like this one)
- Units and spells for each player (too cramped?)

-We talked about this, while we weren't super happy with any solution we came up with, I think we settled on showing both players' armies without spells.

-I love the proposed Minimap!

-Looks nice. The only thing that caught my attention in a bad way was the font, too bulky. Also cool idea to make the units more visible on the minimap.

-This looks great !

-Would clear up some space if everything was sort of "Sticky" in the corners IMHO.

Looks good though.

-the thing that really stood out to me was the minimap, I can't think of downsides to your suggestion, and in fact I really want to see it happen, you could actually make out units on the map which would be really cool, instead of it all being the same colour

-Blizzard should've hired you! :P

-Very cool. How do you plan to evaluate your final design?

-this looks great!

-One of my favourite things of the new interfaces (i think its the gameheart one?) is the worker kill counter that shows up, its so great for instantly seeing how much a mine hit did and tracking harrass

-I prefer overlay where everything in one place in a bar at the bottom personally. That way your eyes don't have to scan 4 different positions all over the screen to gather the information. It also leaves a large clear space for the camera view.

The unit selection view is interesting but I think that it is important to be able to see each unit's health independently, especially if you choose to disable healthbars in the main view.

Finally I think that the minimap is a very good idea, being able to clearly see units is paramount.

> -I much prefer the "GSL style" like you see here.
>
> Minerals/Gas/Supply are things that you check constantly throughout the game whether you are playing or watching. Having it in an entirely different section of the screen than when you play has always been frustrating to me.
>
> -That's totally a fair opinion to have, we're fans of the current WCS interface as well, mainly for the reason you said. The reason we changed it is we feel it's important to be consistent between playing and spectating the game. Another reason is most monitors are 16:9 or 16:10 nowadays, which leaves plenty of room to the sides (since they are wide), but not a whole lot of room in height. We felt the bottom bar took up a lot of that space, which could sometimes cover up the gameplay behind it.
>
> Regarding the unit health, most tournaments use healthbars for selected units, no? In any case, it's a valid concern and we will try to think about it. Thanks for the feedback!
>
> -2nd

-I would consider moving the player name and match score display. There are times when players are producing so many things that the farthest right icons overlap (usually going behind) the player name / match score display. Perhaps it could be moved to the bottom or fitted into the supply / resources display on the top right.

-Only thing I would say is that the worker/army count needs to be bigger somewhere. This is the easiest "hey where is this game at" indicator. As a viewer, this is what I want to see when people play aggressive vs greedy games. It's the indicator of "did he do enough damage?!" Or "did he survive without losing too much?!". I'd love to see this information without having to focus entirely on the top right.

It looks beautiful though. That's just my .02

-Saw your post (and did the survey) in /r/hearthstone the other day and I've been waiting for this to show up here. Good work and good luck!!

-I don't like the supply data block top right, because if you watch a stream from an embedded player (say from TeamLiquid.net), the twitch logo is right infront of the data :(

The general idea of the bottom right block is pretty cool though :)

-Love it! ♥

Cool minimap too!

-I love both ideas

-Grouped units could work on play mode, not only spectator I think.

-I'd love to see on the minimap the colors of whatever the player had selected vary. For example if they had their hatchery selected the hatchery on the minimap would show up slightly darker or something along those lines.

-They actually let you do that for a masters thesis? Your school must be pretty desperate if they're letting you get away with that.

> -Why wouldn't they let us? Interaction design and UX are getting pretty big nowadays and there are tons of research being done in the subject. Studying spectator interfaces falls into that research category :)
>
> > -You're watching StarCraft games and talking about the UI. That isn't research, that's procrastinating.
> >
> > -Yeah, and Tasteless and Artosis watch Starcraft games and talk about what's happening on them for a fuckton of money. But I guess that's not work, that's procrastinating.
> >
> > OP is getting his Master's. Do you really think you should criticize what he's doing with his life? Maybe he should quit writing about Starcraft UI for a Master's degree and go wait tables?
> >
> > > -He'd probably be more successful in life if he did that, good idea!

Dota 2

The questionnaire:

Dota 2 Spectator Interface Redesign Survey

How long have you played Dota?
Including Dota 1

- Less than 1 year
- 1-3 years
- 3-5 years
- 5-8 years
- 8 or more years

Do you watch Dota 2 e-sports events and tournaments, and if so, how often?

- I don't watch e-sports
- Every day
- More than once a week
- Once a week
- A couple of times a month
- Only watch the biggest tournaments

How important is showing the hero stats (strength, agility, intelligence, attack damage, movement speed and armor) at all times?
If you think just some of the stats are important click other and specify which ones.

- All are important
- None are important
- Don't know
- Other:

Do you miss the courier interface we removed in the redesign?

- Yes, bring it back
- No, keep it like this
- Don't know
- Other:

Do you miss the quick buy inventory that our redesign removed?

- Yes, bring it back
- No, keep it like this
- Don't know
- Other:

What do you think of the outlines of the heroes?
Radiant heroes have a green outline, the dire a red outline to help differentiate the sides.

- I like it

- I don't like it
- Don't know

The comments from the text field in the questionnaire:
NEVER do a Red-Green color coding unless you want to give a middle finger to 8% of the male and 1% of the female population. Elect to instead use a Red-Blue color coding.

Outlines of heroes is probably unnecessary, as more information is given by the health bar - it seems like change for the sake of change, rather than from necessity. Maybe have it as a mouseover effect? Removing interface elements like courier control would make the game substantially more difficult for newer players who don't yet know the hotkeys. Even after playing for 2.5 years I can't remember all the courier hotkeys yet. There seems to be some inconsistency in your design; why remove the courier interface but keep the spectator controls through the drop down menu? The hero stats information is vital to more experienced players, who often want to check their opponent's stats quickly. Having this toggled seems like it would make the information more difficult to access. The transparency is good, but bear in mind that in certain situations this will make the text (e.g. health and mana levels) more difficult to read. Perhaps outline it in black so that it's not overwhelmed by bright backgrounds?

I think the minimap itself needs a redesign, especially including making it larger and easier to understand for newbies. Anything that can make the game more intuitive for newbies, like removing random numbers that have no labels or just putting labels on things that don't have them, would be awesome.

good idea

A full team fight? I want to show every little bit of action except HP bars, skills and maybe items

I love the full redesign, one suggestion would be to find some sort of way to be the players name in the interface. When games are being cast sometimes in can be difficult to see who is playing the hero.

A lot of these come down to getting used to the interface. Whatever the design, once you learn to read it and live with it, it becomes second nature. Probably more interesting would be to show un-initiated various designs and ask them to tell you what information they can make out, as that could be really interesting in terms of deciding how the interface could be improved for mainstream broadcast legibility and intuitiveness. Such an interface might be a nice optional choice if it were included in the client in that it could be enabled when casting for a mainstream television / noob streams.

Your redesign is pretty ugly, no offense. If it's not broke, don't fix it.

Hero outlines don't seem bad but they also do not seem necessary if you are already going to have the color of the health bar indicate which team they are on.

the best part is the hero outlines, the other things looks very off with the change from the standard interface it's also harder to read

all of this is unnecessary

The items must be shown all time if you ask me

Any way to display tower ranges and neutral spawn boxes?

A spectator HUD would be applied to casters (and their streams) as well, so all the information needs to be readily available. The least accessed data could be toggled with a hotkey, but almost everything else needs to be on screen. The second image on Reddit showed that you condensed the skill/item bars to make space for the data. I think that shift would be visually unpleasant as I would be toggling that data every couple of minutes, at least.

Hero glow is obnoxious, they are already identified by their health bar and the glow wraps to the character model so it's uneven and looks awkward. You would do better with some sort of shader-based outline but that's probably not possible. Something that outlines the character visible to the player from a 2d perspective. Cutting out entire vital parts of the HUD just for a few scraps of vision nobody is going to use to see things they would've missed otherwise is a terrible idea. Putting the stats stretched out makes people have to move their eyes a great deal more to get the full story of a player's stats - it's compact and simple in the vanilla client for a reason. You very simply obfuscated something for no reason. This sounds very cruel and targeted but I don't see a single change as part of this spectator mod that provides anything positive.

Look a little bit not dota, but I guess thats the effect of it being new. I could get used to it! Any in-game viewing option?

Nice works!

dota 2 UI isnt a design decision, you cant just remove something off it because its literally impossible. in the places you want to remove, there's no screen. theres no game there.

Nah

Your design looks much cleaner, I like it :)

really like the simplistic design and the effort to try and maximize use of space however i feel that having all the information is still a must, as nerds that love looking at stats like me it is important however if there was a way to make it so that the stats came up in a pop up bar or

something this would then give the best of both worlds. But apart from that i really like the design. GJ

I think some key information is missing, also for casters e.g. As i said above damage armour and ms should be shown. Gj tough, brings fresh air into the HUD if that makes sense (bad english sorry) ALSO: we need the option to choose between classic and modern HUD :)

I don't think this "minimal" interface changes anything, it's marginally smaller than the original. I think if you want a minimal interface you need to go even further, the kda/fortify and the menus in both top corners should be only optional, for example. You don't need any of that to spectate. Also, I think getting rid of all ui is pretty important, of course, only optional

Simplification for it's own sake. Especially dislike the hero outlines, adds unnecessary visual clutter and makes well designed heroes harder to see.

Hero outlines would definitely help make team fights easier to follow.

Hero portreshould be circle not square,looks to sharp.

make the hero's bar more spacious and easier to read at a glance

Possibly add in gold advantage near the gold in general

as usual noone thought of the colourblind people.

why make game look like leage o leaghoes

Str/Agi/Int could be removed, as their effects are visible in the other stats.

Reddit comments

-I don't think this "minimal" interface changes anything, it's marginally smaller than the original.

I think if you want a minimal interface you need to go even further, the kda/fortify and the menus in both top corners should be only optional, for example. You don't need any of that to spectate.

Also, I think getting rid of all ui for teamfights, tense moments etc is pretty important. Of course, only optional

> - Yeah, we had some thoughts about changing it more, one idea was moving the whole hero info card to the right corner instead, to free up the space in the middle. We wanted to keep it somewhat close the in-game interface though, as we suspected most Dota 2 players would want it that way. Perhaps that was a mistake on our part? That is also why we're here to gather feedback, so thanks for the input :)

> -I think people who commented on making it similar to the regular one were thinking about spectating a game to learn things or to see the players vision. In that case, indeed, the regular ui is the best.
>
> But what I'm talking about it's not that, it's an UI for watching dota as sport, I suppose that's what a "spectator UI" is. This distinction is important

-Not gonna lie, I am no fan of the standard ui itself, especially the screen space being used up.

What I would like to see is the approach you guys have with a very simplistic and minimal UI, designed from the bottom up with the idea to hide anything you want.

A full team fight? I want to show every little bit of action except HP bars, skills and maybe items. More time to show stuff? I want to maybe have more windows open at once than just one.

It's a incredibly hard task, but looking at the SC2 Gameheart UI this could be a major step forward.

Still, great work by you guys!

-Idk, not a fan of this at all. Might not cause too much trouble for a veteran that's already familiar with the general layout, but I don't think it's an intuitive UI at all.

I mean, Dota is a game with tons and tons of relevant data on display at any time, it's not something like a shooter where you only have to worry about a handful of numbers + minimap at worst. Dota's heavy on information. Lightweight, minimalist designs go best with light info, but they clash horribly with heavy info.

The easiest way of distinguishing what's ingame and what's metagame is to establish a frame of information that's clearly separated from the action instead of bleeding with it wherever possible. When looking for meta-information or -tools, most people will instinctively search for visually distinguished bars on the top and bottom of their screens because they're used to looking for the taskbar or top bar of a window for such things. That's what makes it appealing to adhere to a basic structure of "top bar, main action, bottom bar" when you have too much information to package it into a handful of easily digestible little boxes containing 1-2 variables each.

Not exactly a fan of the aura effect either. There's already a lot of visual clutter surrounding heroes at any given time from cosmetics to attack modifiers (like MoM) to auras (like Pipe), so it's important to cut as much further information from the heroes as possible to keep the confusing lightshows that erupt during teamfights somewhat manageable. Since teams are already clearly established by the health bar colors and that UI element is clearly distinguished from ingame effects, and his feature would conflict with first person views and the visual vocabulary these auras have during actual gameplay, I think it's a very easy feature to cut. It doesn't provide new information like it does in L4D or CSGO for example, it just reinforces it.

Not a fan of removing the courier info either, players might be interested in the contents it is carrying (especially if it's just died or in an unusual position, waiting at the edges of the map for example) or whether its Sprint is on CD when it's being chased down, and manually selecting the courier for that purpose seems like an unnecessary inconvenience to me. It's kinda like the Glyph button, uninteresting most of the time but crucial to identify at a glance during the action or anticipation of it.

I don't really have an opinion on toggle-able elements (since they put the responsibility into the spectator's hands) other than why you'd limit it to what you've thought of.

Idk, all in all this UI seems really form over function to me, created for the sake of creating minimalism rather than suiting the needs of spectators. Not even sure if I like it as a form-over-function UI since it doesn't manage to incorporate any of Dota2's visual character or cues.

And I'm not just trying to kiss Valve's ass here or anything, Hearthstone's UI for example uses the same exact rules: Don't use the same aura twice, cut game action into 3 info slices (slim top slice of meta information, main action, broad bottom slice of information), and keep the metagame slices very clearly boxed off from the main action window to keep the viewer's look focused. Don't even give them a chance to get confused about whether some floating number is part of the actual game or metagame. No mercy!

- Cool ideas actually, gj

- You don't want the UI to differ too greatly from the playing UI. Having the two UIs be so different can lead to a cognitive disconnect between the playing and spectating experiences. In a game like DotA, you want to try to keep things as similar as possible when viewing and playing, as it allows the user to not only be able to accurately see what a player is seeing when in "Player Perspective", but also allows them to more easily recognize what's going on using everything they've learned while playing.

Watching people play is one of the best ways to become better at the game when first starting out. By making the viewing/playing experience so different your reducing one of the biggest values that watching provides.

> -You say that but LoL does just fine with a completely different UI.
>
> > -Just fine isn't good. I think the current spectator interface is great, but the controls themselves could use a bit of love.
> >
> > Also, League doesn't allow Player Perspective as far as I know, which is one of the big selling points of the DotA2 spectator/replay system. Having a disconnect in UI that big between player perspective/others without significant reason would be foolish to have.

-That's true due to the fact that you can almost hide whole UI in LoL.

In Dota you can't, you're stuck with what you get, so changing it to something smaller while spectating can get you to hate the game UI and to feel like it's too big even if you were used to it.

Same thing with zoom. If you watch too many games zoomed out, and you start playing with default zoom, you'll feel as if camera is to close.

-LoL is also a much less complex game, that type of issue would be much less of a problem. It may not be a big problem for either, but just because it's not a problem for LoL doesn't mean that it wouldn't be for dota.

-In terms of what's in the interface, not really. Items, abilities, shop, mipmap.

-In terms of interface, no. You're not wrong there, but that's not the complexity that I'm referring to.

Visual clutter isn't the same as gameplay complexity, however certain elements of the dota hud are arguably more integral to the game itself. AFAIK Dota 2 has more spells with long cooldowns that are good to keep track of. Dota 2 definitely has more active effect items than league, keeping track of those cd's is a much larger part of the complexity of the game as well. Other smaller nuances of the game can come into play as well, such as courier inventory, the day/night cycle etc.

Like I said, in the end it may not actually matter at all, but I would definitely say that it would be a larger impact to dota than it is for league.

-Presumably this would be a toggle option in the menu. If someone is watching to try and improve, it'd be much better to watch through the client rather than watch a tournament on Twitch since the client gives mouse movements/player perspective.

As it stands right now it's really hard to figure out what items/skills players have or leveled unless they use them or the casters specifically decide to click on your hero. There's also a lot of dead space that just isn't needed when spectating a game.

-I completed the survey but didn't write anything else, but I now think of some important things:

1- Show who got aegis and cheese. Just like we have cooldowns indicators (available, out of mana, unavailable)

2- The same thing for buyback status - just if it's up

3- skilled stats count. You know the 4 yellow dots that indicate if a player skilled a skill? Why don't we have those for stats?

-1 & 2 - Interesting, we will look into how this can be displayed.

3 - I'm not quite sure what you mean, how would the dots be used for the stats?

- Like the yellow marks to show how high a skill is leveled could be used to indicate how much someone has leveled up their stats (As opposed to spending the points on skills.)

-Nice work so far!

-I understand that it is for a thesis, but I have seen already a couple of proposal for the spectator UI, and still don't see the point for the redesign.

The current spectator UI is the same they are used to see while playing anyway.

Still, opinions. I like the transparency you added in some places. However, the removal of things actually made me feel that I was missing things, without replacing with info that might be more relevant to the spectator, like networth of team/hero, or buyback status, without the need of going to the global stat window

-I think that it would be interesting to have something like old Hon spectator interface which allows you to see a ton of information about every player in the game without selecting each one and examining it independently.

Link to a screenshot of the old hon interface

There are obvious flaws with the old interface like taking up an inordinate amount of space which could also house drop down menus with additional info. (you might also be able to pack this sort of layout tighter together to cram more information into the provided space and allow you to sort each side based on gpm, xpm, last hits...etc.

What you are doing seems to be pretty interesting and I encourage you to keep up the good work.

I would also be interested to hear what you are pursuing your masters in if that's not too invasive.

-how about keeping lego legos out of this.

-it doesnt look or even feel like dota then. the spectator UI/UI is fine in-game

-We LoL now

-We Hon now

-Here's the problem with your changes. The people spectating these games usually play the games themselves. So when they spectate, they will naturally look to where the information

could be found while playing. So you don't want to change where this information is displayed in relation to the rest of the information. The wasted space; however, can be filled with other relevant information that you wouldn't normally see on the HUD. Honestly, if you really want to improve the Spectator HUD, you should leave everything that you could see while playing alone, and move information you can't see while playing into the empty space. It would be nice if there was a GPM/XP graph in the bottom HUD for instance.

The colored outlines aren't great. It doesn't look like Dota 2, and adding auras to heroes will just make spell effects and heroes harder to differentiate. The heroes already have colored hit bars anyway. If you really need to add something to make them easier to see, use those little green circles you see when selecting multiple multiple units, but make the dire circles red.

Edit: I'm just acknowledging that I typed multiple multiples.

Counter-Strike: Global Offensive:

The questionnaire:

CS:GO Spectator Interface Redesign Survey

How long have you played Counter-Strike?
Including all versions (GO, 1.6, Source etc.)

- Less than 1 year
- 1-3 years
- 3-5 years
- 5-8 years
- 8 or more years

Do you watch CS:GO e-sports events and tournaments, and if so, how often?

- I don't watch e-sports
- Every day
- More than once a week
- Once a week
- A couple of times a month
- Only watch the biggest tournaments

Is the redesigned minimap more readable than the current one?

- Yes
- No
- Don't know

Do you prefer the minimap to have a square overlay(current minimap) or be standalone(redesigned minimap)?

- Square overlay
- Standalone
- Don't know

Do you miss the information we removed from the currently spectated player?
Removed info: Current weapon skin, ADR, 3K, 4K, 5K and objective

- Yes, bring back all of the information
- Yes, bring back some (click other and write which ones you miss)
- No, keep it like this
- No, remove more
- Don't know
- Other:

What do you think of having the spectated player's equipment, ammo and health in the center bottom of the screen?

- I like it
- I don't like it
- Don't know
- Other:

What do you think of having the team's total grenades instead of showing each player's grenades separately?

- I like it
- I don't like it
- Don't know
- Other:

Is it important to show each player's pistol at all times?
You can still see the currently spectated player's pistol.

- Yes
- No
- Don't know
- Other:

We thought about having x-ray less visible when players are closer in distance, would this be a good compromise instead of switching it on and off?

- Yes
- No
- Don't know
- Other:

The comments from the text field in the questionnaire:
For the X-Ray idea, it's good in theory, but in my opinion it would look distracting as it places emphasis on players further away from the action the spectator camera is catching.

I Like The Clean Up And Improvement Of Spacing Between Displays. Although, The Player Info (Weapons, Stats, ETC) Should Stay The Same But Put In A Better Environment. (Don't Take Anything Out, Just Move It And Change Size)

Reddit Comments, First Post

- Its a very nice redesign, but you can't tell who has what grenades.
    - You can spec the individual player and see their inventory at the bottom. But yeah I agree, and nor can you see sidearms.
        -We didn't think it was crucial to see who has what grenades and side arms at all times, but this is the reason for doing the survey. We want to know what people think about it and your feedback will definitely be taken into account!
-Nicely done, but two concerns for me - You block chat, which is sometimes interesting, and you can no longer see which players have the nades, which is also quite helpful at times.
-The map and top of the it is really nice and i would love that - but the rest seems annoying to be honest
-I like the radar from your redesign and also the removal of the "t spent x$ and ct y$", looks more clean this way and it was useless anyway.

The player info position (middle) and the bottom line should stay like the orginal. The chat is funny from time to time and with your redesign it wouldn't be possible to show it.

Reddit Comments, Second Post

- looks very nice , readable and clean , +1

- This looks way better than the standard spectator UI! Especially that smoke timer, it should be added right away!
- **http://puu.sh/gA9jD/fa04e97107.gif** maybe add something similar to this to flashed players.
- Would like the radar to be bigger. That is like the most interesting thing when spectating a game.

- You make CSGO awesome. CSGO needs more people like you.

Hearthstone:
The questionnaire:

Hearthstone Spectator Interface Redesign Survey

How long have you played Hearthstone?

- Less than 6 months
- 6 months to 1 year
- 1 to 2 years
- 2 or more years

Do you watch Hearthstone e-sports events and tournaments, and if so, how often?

- I don't watch e-sports
- Every day
- More than once a week
- Once a week
- A couple of times a month
- Only watch the biggest tournaments

What do you think of the current practice of some tournaments switching the board around each turn?

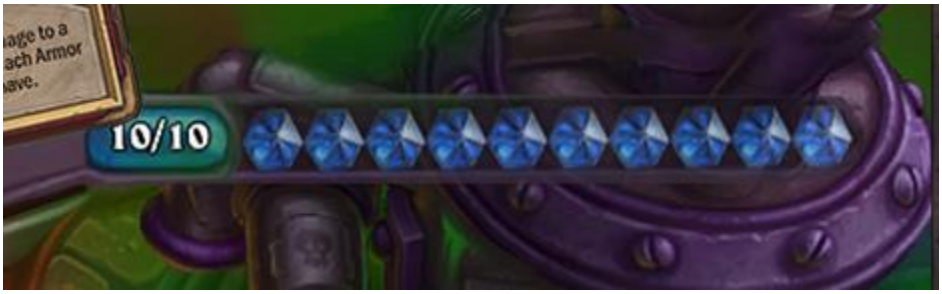
- I like it
- I don't like it
- Don't know

What do you think of our solution of showing both players' hands at the same time, without using overlays?
Showing the cards the right way around, with no board switching each turn.

- I like it
- I don't like it
- Don't know

What do you think of showing the number of cards remaining for each player next to the decks?

- I like it
- I don't like it
- Don't know



Is it enough to see the number of the opposing player's mana crystals or do you want to see all 10 icons?

- Enough to see mana crystal number
- Want to see all 10 icons
- Don't know

What do you think of distinguishing the board with red and blue between the two players?
Similar team colors in other games and jersey colors in regular sports.

- I like it
- I don't like it
- Don't know

What do you think of going further and changing the color of the one of the player's mana crystals to red?

- I like it
- I don't like it
- Don't know

Would you be interested in team cardbacks?
I.e. Team Archon card back, TSM card back and so on.

- Yes
- No
- Don't know

The comments from the text field in the questionnaire:
Great job so far! I love the remaining card count near the decks. The mana crystals look very awkward with the entire row there since it does go through the on board scenery. I think you should just include the (10/10) counter where it is and not bother to show the opponents entire mana count. For the red mana on the cards, I would have to agree with most of the comments (unnecessary). The glow on the board to demonstrate who is who and whose turn it is is a great idea. My opinion on that, would be to have one person's portrait be highlighted in green along with there side of the board be green. While the player whose turn it is not is glowed with blue. The zoomed out view of the board is a good idea for it does enable you to better show the top players cards. I think it would be better to show them in a linear way, as opposed to the current fanned out way. And by linear I mean you would see a portion of the left of the card, which satisfies it being easier to see the mana cost and a decent part of the name/picture so the viewers would be able to identify the rest of the card. I am sure that a bunch of these ideas were said already and if they are add me to another count that supports them. Great job! Can't wait to see this in live action on an event!

You should definitely solve world hunger while you're doing all the things I've ever wanted. Great job guys, I'm a huge fan of the interface.

Can highlight the active player even more - brighter colors, for example. It's one of the coolest features of this design. Can also highlight player's nickname when he's active.

Don't like the card back idea since you would barely see them in a spectated game (only half of it while resting in deck slot.

A smooth draw animation: no jerky flip for the spectator to view deal.

With the whole spectator mode showing the name of the secret, when there are 3 secrets up the words might overlap I think that is a problem you would have to overcome. Personally I only support players instead of teams and I think hearthstone is an individual sport rather than a team (I think its a cool idea and they look good but I personally don't see the idea of support a hearthstone team). I like the idea of showing both players cards without an overlay however in your picture I don't really like the top players (red team) card positioning and how they are tilted.

deck tracker?

use the same curved-shape for both hand players coz se need to see the card pic not the text

Dont see why change color of mana crystals; board may seem less space efficient(the board interactables have purpose when theyre interactable: they serve no purpose when spectating and can thus be gotten rid of)

"Is it enough to see the number of the opposing player's mana crystals or do you want to see all 10 icons? " It's not exactly that I want to see all 10 icons for the sake of seeing just the icons. I want to know things like Overload as well, and if a crystal is temporary or not(e.g. does it dissapear after being used because it's from a coin)

Card back idea is great! I don't think it's necessary to change mana colors, and highlighting cards in green seems like enough to clarify who's turn it is. Great work!

Really like + of cards remaining in deck.

I absolutely love the idea of Team cardbacks

The suggestions shown here would be a great improvement on the current tournament spectator client. The main reason I don't watch Hearthstone competitive is because the layout they have is sloppy an painful to look at

enable caster (therefore spectator) to Highlight specific crads in the Hands of the Players to increase watching value and tactical discussions during the turns making it also easier for newer Player/watcher to understand whats going on or could be going on

There needs to be a difference between tournament spectating and friend spectating. In a tournament, your interface would be great (we wouldn't need the board flip every turn, shows everything all at once). When spectating a friend, this would not be good because it would allow to you to give information about your opponents hands and secrets to your friend while he is playing. The current spectating interface is meant to be used as the second option. Tournament casters spectate both players and join them together using screencasting software (hence the board-flip to switch between players).

I like team card backs, but teams come and go and card backs are supposed to be special(ish). It would suck if our libraries over time were filled up with subpar card backs that you'd rather not have and that might become completely irrelevant.

dont change anything, hearthstone is good the way it is

I would like if there was somehow you could copy a code of the ip of the match and join as a spectator to watch the match from your hearthstone without having a friend both of the players

TS cardback plz

You should edit the first question, Hearthstone hasn't been a game for that long. The display of the opponent's hand is strange because cards aren't held that way. The cards are recognizable enough when viewed upside down like the current overlays.

I love these idea's. I don't know that the team cardbacks would become a thing because it would require some special permission from the teams and how you would acquire them would also be interesting…

possible to show how many cards in hand?

A really ambitious, possibly too difficult, but extremely nice idea would be to redesign the spectator board entirely, to have one player on the LEFT and one on the RIGHT, with minions lined up vertically and both player's hands beneath the board. This would remove a lot of the awkward association like "the bottom player is ME".

I don't think the top players cards should be aligned the way they are, generally speaking, Tournaments like Pinnacle have got their spectator interface right.

Maybe add timer for the rope or something

I believe instead of having blue/red for different players it would be simpler to have 'bright/highlighted' against 'greyed out'. Also, the bad UI is 80% of what keeps me away from watching competitive hearthstone.

Top "fan" of cards (opponent) should be shown the same as bottom players card's.
show a movement transition of the player portraits when the board flips, so that the bottom player has the current turn

PLEASE FOR THE LOVE OF GOD ADD A CARD COUNTER TO OUR OWN HAND ITS SO CLUNKY HAVING TO COUNT THEM !!! thank you....

it still needs some work but the fact that you don't switch the board is great

I think the currently popular method of showing both cards at the same time (box at the top of the screen showing) works fine. The text of the cards are often difficult to read, so there is very little gained by showing more than the card art, name, and mana cost. I enjoy tournaments that switch the bottom player each turn, because it makes it easier to see what he/she is doing.

kuck fripp

show number of next fatigue damage where cards would be shown find somewhere to put the number of cards in each players hand

As pictured, the red/blue mana crystals and board highlight aren't noticeable enough (I watch streams on low quality; you need something bright to stand out!). I'd recommend the bright green

outline, like how cards currently light up when they're playable. I can barely see the blue, and I'm not colorblind. Another problem would be weapons. If someone plays Blingtron 3000, I'd like to immediately know what weapon each player got, so showing weapons on both sides of the board, not just the active player, could help with that (so long as it doesn't confuse whose turn it is). The secret label idea is good, but the text is likely too small to read. I'd recommend secrets in a sidebar area of some sort. Thanks! Good luck on your thesis.

Sweet idea, would love to see this, would really streamline things.

I think your ideas are verd interesting and would improve viewer's experience by a lot. But Blizzard should probably think about fixing the bugs before adding all these cool features :) Anyway, good luck for your thesis!

I don't think the board needs to change between Red or Blue, but simply a White glow in the same vein would be nice.

The Secrets idea is nice, but looks relatively ugly and takes up too much space considering the amount of secrets that can be up at once. Overall much better than the current layouts.

The whole design could look cleaner but I guess it's just a beta at the moment. (F.e. the "blue" looks more like violett to me than actual blue) What you should really focus on is to make it clear which players turn it is and what side on the board he is on. I almost always need a few turns to figure that out when I open a stream with a game in progress, who is who. The highlighting you have in the first image is already quite nice, but I would probably lighten the whole right bar to symbolize it's Darkwonyx turn than just making his profile pic frame green.

Great job mate, hope something like this will get implemented soon. :)

Nice work, these are some great ideas!

beside the thin lines, you should also make the end turn button red/blue depending on whose turn it is

I don't like the top players cards fanned upwards. I like the overlay better than this solution. I like screen swap in LAN tournaments where they're doing screen capture, so you can see the actual player's cursor. Otherwise, I don't like screen swapping.

Red Mana Crystals for the opponent

Changing the color of the mana crystals seems a bit unnecessary; as long as it's made clear who's turn it is is some way or other, I don't think a Red vs Blue is necessarily helpful. One suggestion I would make: Space out the cards in hand better, using the empty space to the left of both hands. I would even go so far as to align them square rather then hold them in a fan. While the analogy to holding a hand of cards is nice, thematically, a spectator doesn't have the luxury of hovering over a card for a better look at it, so it would be best to display as much of the card as possible

(within reason, of course). In line with the previous suggestion, consider 'holding' the last card played on the left edge of the screen, where the history scroller normally is. While the history scroll is a useful function, without the ability to hover over individual items, it doesn't add much for spectators. A large view (similar to the in-hand size) of the last played card or two that slowly fades away over 10 or 15 seconds (or is pushed off if more cards are played) would let spectators quickly catch up on any cards they missed.
As for Team Cardbacks- as a local-only 'mod' a tournament could use to add a bit of flavor, I think that would be a nice change to so along with the other spectator enhancements; to make it clear which teams are competing, without just putting the team name under the player's name. But purchasable team card backs for just anyone to use? Not interested.

I think, that the team card backs should be only availible for people in that team, so it would feel more special.

Most of your designs are terrible. It's clear you just know design and don't know much about games. Love the number of cards showing idea though.

Make a option to set on/off showing enemy hand cards

nope, but well done

The opponents card should swing the other way

I've got a couple items, so bear with me. The team colored mana crystals aren't a bad idea, per se, but I don't think they're necessary. Viewers should still be able to keep track of who is playing which cards by simply knowing whose turn it is. I don't think it would be a detriment to implement it, though. Coloring the board for each player's turn is an excellent idea. The colors in the screenshots presented look nice with the board, but I worry that they might not stand out from the board enough to be easily noticable. Perhaps you might make them brighter? Or, if you could implement animations, they could have a slight glow or pulse. Not enough to be distracting, but enough to catch the eye. The mana crystals on the far side of the board, the red side, would look better is part of the board, like the ones on the closer side. Overlaying them on the widgets on the board (plahue furnace, Stormwind inn, etc.) might make them difficult to distinguish. I do recognize that this is just your mockup and I don't expect you to create a new art assest, but I did want to mention it. I think identifying currently played secrets is a good idea. I saw a few people in the Reddit thread suggest the text might overlap for multiple secrets. If you can't find a way to prevent that from happening, I think some other means of showing us what secrets are active would be warranted. On a similar note, showing the order in which secrets were played might be useful. It would let viewers know which secrets would activate first. Same for deathrattles. This might eat up a bit too much of real estate on the UI though. Lastly, I think you might better serve the audience by spreading each player's cards out horizontally along their side of the board. Bunching them up simulates holding and actual hand of cards, but I don't see a need for that in tournament spectating. I think viewers could instead use as clear a view of the information on each player's cards as you can provide them. This is especially true for the far side of the board, where bunching the cards at the top risks obscuring mana costs.

The question "What do you think of distinguishing the board with red and blue between the two players?" doesn't have the response I would like to give indicated. This question should have been two questions IMO. I love the idea of distinguishing the board to indicate current turn. I dislike the idea of using separate colors for each player. I think the highlight shown in picture 1 of the album shows the current player well enough without obfuscating the information with separate colors. I think if you felt the need to clearly highlight a change in player's turn a subtle animation could take place with the highlight. First the current player's highlight would empty towards the "end turn" button, then the new curren't player's highlight could 'fill up' towards his hand of cards. (maybe taking ~2-3 seconds total)

Having red and blue can make players think of a "good" and "evil" player. As the game stands, It is pretty distinguishable witch player is which. This is true as long as the board does not switch. You may need to recognize another solution to the current problem. Besides that, all looks good.

I'm not sure about the curve of the top players cards in your setup when they have 10 cards it could be awkward, but I don't know

Good redesign :)

more than 9 deck slots blizzard babyrage

not like zoom-out

I think the information about off turn play is nice, but not always as necessary. I really enjoy the switch back and forth since it givers the viewer a feeling like theyre playing in the match.

Having a place to upload Player's photos so that it's automatically shown?

https://www.youtube.com/watch?v=QjXtshQeVEk This is the best spectator mode I've seen in tournaments. Simple, easily recognizable and least buggy (unlike the in-game spectator mode atm). Only thing is maybe zoom out a little to see the opponent's secret. Don't go too crazy with the opponent's cards, just do it like this. Very nice additions would indeed be the name of an active secret and remaining number of cards in each deck. Also, depending on the tournament rules, you could show decklists, fading out the cards when they're drawn. If you want to talk more my reddit username is gellemans.

keep it simple, too much clutter to a base spectator display will complicate personalized streams and tournaments

I would curve the top player's hand downward similar to normal. It looks awkward with all the cards crushed near the top, and in addition to this, it may be difficult to see a secret and/or which secret it is with the cards curving the way they do now.

There once was a great panel of esports (starcraft) personalities I watched, one of them talked a lot about how Poker/Texas Hold 'em became popular. One thing you must have for spectators to enjoy a show is to give them all the information. (This is stuff I'm sure you already know, but there's a lot about broadcast poker that should be applied to Hearthstone). The biggest problem with tournaments switching the board around every turn (changing cameras) is that it always gets messed up somewhere along the way (too many switches, too few, starts showing wrong person). Having a static screen showing both sides is ideal to keep the viewer oriented and not having to guess which side he's looking at. this will especially be helpful with overlays (with webcams/profile info) that can be more correct positioning wise. The color coding you've suggested should extend to the overlays as well. In your mock up it has Darkwonyx with a green glow, meaning it's his turn. that should be blue to match the coloration of the board. I like the idea of showing all 10 mana crystals, but the mock up that was done make it look horrible. Assuming a better job could be done to integrate the 10 crystals into the board or background, then I'd be all for this. Because a glance at the bar gives you general info faster than reading a number. (I can see they're about 5 mana faster than I can read 3/5, this is useful if you just turned on the game, a quick frame of reference)

You forgot to include on the survey a question about the change in secrets. It's the only change I'm not a fan of.

The cards remaining idea is interesting but the choice of colour makes it stand out too much and it's really distracting. I assume you chose green to match the Naxx theme but it really draws too much attention from the eye; on the enemy side the icon pops up out of the sludge and it overlaps with the sludge pump, while the green out in the middle of nowhere on the player side doesn't fit at all. If the numbers are going to be there, I would personally rather they just be there without anything more graphically. Also, the number doesn't at all match up with the visual representation of cards left in the deck. The team colour flow is nice and it also helps show whose turn it is to someone who is just tuning in at a glance, and the method of showing both hands is much less choppy than most tournaments I've seen.

If all cards are shown, having exclusive card backs would be mostly wasted effort, even if a neat idea. And in a survey like this, I think that rating each idea from 1 to 5 (really dislike/really like) would be much better.

As far as I'm aware, there's no delay on the in game spectator mode, so it's important not to see both players' hands at once(so you can't spectate a friend's game and cheat for them). This is the reason tournaments have to switch between players' perspectives. I like the switching perspectives in the same way that I like turning a chessboard to look from behind each side's pieces. Your idea is cool though, and I could see it being useful (on a delay) if there's ever a proper in game tournament system.
The ability to see both players cards would be nice, however it could provide an advantage by allowing players to give information on the opponents hand. Even with a delay, knowing a single card is being held as removal or a finisher could change a whole process of decision making.

Very impressive.

The layout of the opponents cards bothers me. I think it would be better to show them with the same arc that the lower player has. So that the lower players cards are unchanged (convex towards the board) while the opponents cards are switched (concave towards the board). Though still keep them right side up so we can read them.

board red and blue lights indicating player's turn was the most awesome idea

Class themed card backs please.

Maybe let the cards of the top player curve the same as the bottom player?

find a better spot for the opponent's mana crystal icons, they look out of place

I think you need only display the number of mana crystals the opponent has rather than both the number & icons. Besides that I like everything else, so long as the player perspective we see from is always the current player as it feel more natural.

I don't see the point in making one player red and one blue. Just use a neutral green to indicate whose turn it is. Please keep the mana crystals blue.. Just stay away from "side colors," as they're unimportant and will only induce favoritism because of the psychology of color. The current red/blue format of the game is because you actually only play as one side, not to mention it's negligible... The reverse fan of the top player's hand is weird. I prefer the switching, as it feels more like you're playing from both perspectives. Again, seeing things from only one player's perspective will only serve to induce favoritism... This isn't LoL/DotA/HotS/etc, where there is only the one isometric view available. This is HS, where you can easily change back and forth between viewpoints.

I wouldn't pay for the team cardbacks but I would love another way of acquiring them.

Will we have a problem seeing all cards in reds hand when he has 10 cards? It seems like the angle will cover the picture almost completely. Reds manacrystals do not fit well in the current layout aesthetically.

This will never happen.

For competitive events, I'd like to be able to have team logos watermarked on the board, like in Stacraft2. Make the mouse invisible or unable to interact with objects after some idle time; Spectators often forget and leave the mouse hovered over cards, blocking the view. A very welcome addition would be an inbuilt deck tracker which can be toggled on and off. Since the two sides of the board are usually occupied by the overlay, moving the players' names above and below the board would make them visible during tournaments, which would help avoid overlay related confusion as to who is who.

I like having the board switch positions when I am watching eSports. Probably something to do with being used to seing that way from playing, I just don't seem to be able to read their board state correctly unless is switches - at least not as instinctively. But having said that - I think it is also important to be able to see both players cards at all times - and have the top players cards displayed the correct way around. I do not like the inverted fanning effect you have given these cards though, it just seems wrong. Would there be a way of having them fan the same as the bottom players cards - and perhaps have the bottom edges of the cards disappear underneath the game board. That way it would not need to take up too much space above the actual board. I hope some of these comments are useful - and wish you well in your project.

I wish I could do my master on HS. :P

Cool thesis choice bro, im a fellow game production student as well haha. Hope you go on and do well!

In regards to Team Cardbacks: I would find this more interesting if there was more opportunity to see them. Sitting in the card shoe seems like a waste. Perhaps if the opponents hand was not visible (only showing the cardback) this would be nice. But for a tournament, it is preferable to show the actual cards in hand. I find events much easier to watch when a board is not switching between players each turn. This is even harder to watch when both players are playing as the same class. It would also be useful to have a name toggle option for each player (especially in those cases when both players are the same class). Some overlays do not distinguish the different players very clearly. Giving the event organizers another way to ID each player would be very nice.

It would certainly make watching tournament matches easier

I know that this would take quite a bit of extra work in the software (being a software engineer myself). But taking a hint from most chess interfaces, the ability to draw arrows and emulate plays could be very useful for the viewers. For example when they say "He could play Card X, then trade Y into Z and clear board with W" it would be neat if they could show it with arrows. Just YouTube search for any decent chess analysis to see an example of what I mean.

Reddit Comments, First Post

- Excellent work! The only change my inner designer disagrees with is changing the color of the "red" player's mana crystals to red. My reasoning:

The resource "mana" is generally identified with the color blue, in the same way that "health" is generally identified with the color red. Changing the "red" player's mana crystals results in them having "red" as a prominent feature of both their health indicator and their mana indicators.

The mana crystal as a visual element of a card (top left corner, prominently placed) does not need to be visually linked to the player taking the action (in this case, by a color change) if their turn is already being highlighted by the board. The position of the card on the board or on a

character portrait, the motion of the card from a player's hand, and the change in the appearance of a player's mana crystals are all clear visual indicators that a specific card is being played by a specific player.

Also, the font chosen for the names of secrets could get pretty cluttered with numerous secrets or on small (read: phone) screens.

Edit: The highlight on the board's edge to denote which player's turn it is is my favorite change. The specific colors are a little hard to see on that Naxxramas board. Maybe highlight the current player with the same kind of green glow as playable cards?

- Yeah, we had similar concerns with the mana crystals, but thought we would ask what other people thought about it. Thank you for the feedback!

- As it stands I think the red player's mana just looks way too sloppy laid over the background like that. I think a redesign has to take a route similar to what Blizz did for mobile where they removed a corner's items. I really like the shifting colour on each players turn though it seems like a particularly elegant solution. Could also highlight the player's portraits with that colour to show better congruity but that's an overlay issue not with Blizz. Edit: Maybe it's better to be green because it shows what's active I can't decide. The green doesn't look good enough imo even though it denotes being active.

This is a topic that people probably won't want to talk about as much but is vital for the survival of the scene, they have to step up and accept the scene full on to be successful imo. These tools are important.

> - Yeah, obviously this is just a mock up of what we could do without access to Blizzard's proper assets. Naxxramas was the only empty board we could find so we had to use that.
>
> > - Totally not criticising your abilities! I think you just had some great ideas. I just think you shouldn't expect it to not stand out like a sore thumb if you're expecting people to react based off of the design you present. People won't respond whether they like the second player's crystals 'in general' they'll respond whether they like the presentation you gave them...which understandably is very hard to remove elegantly without access to Blizzard's assets to mock up full mana crystal boards.

- My only problem is that the cards at the top look really really off, because they're fanned out as they should be for the bottom player's cards. I have no idea how they could be arranged, but it looks really odd to me in your image. I love the concept, though! Just that little aesthetic thing bothers me.

- I don't like the words on the secrets very much. If there are more than one secret, it looks like the words would overlap with each other or the heropower. Perhaps a picture of the secret's art in the circle or something?

- You should def curve the top cards the same way you do the bottom ones. I know theoretically he's holding them that way but go for practical not "realism"

- I think it should simply be flipped completely, same curve but the image toward the bottom.

- The ideas behind most of your changes are sound, but in my opinion, the execution is poor.

Fanning the top hand so that the bottoms of the cards are prominent is dumb. Nothing is gained from seeing extra (too-small-to-read) text, and no one fans their hand like that in real life. At least the cards are right side up, but everything else is wrong.

Showing the number of cards left in the decks is nice, but... GREEN?? You do realize that green in this game is used to highlight the players' legal moves, right? And on top of that, why make it stand out so much? That's crazy - most of the time, in most games, to most spectators, that number is not important at all. It's completely ignorable. Basically, it should be in a completely gray box - same as the background of the frame - and be an easy-to-gloss-over number that you can read if you feel like it but doesn't otherwise draw attention.

Color-coding players is an OK idea for a tournament, but it's a workaround. What you really want is for the player cam/name/info to be visually grouped together with the in-game position of the player, not for them to be in different places but share color highlights.

The mana crystal colors other people have discussed. It's a bad idea. Mana is blue in hearthstone.

Showing all the mana crystals for the top player would be nice, but you didn't redesign it. You just pasted a picture of 10 mana crystals on top of the board. It looks really dumb for the 3D structure to have this 2D strip of mana crystals sitting on it. You didn't solve the problem.

Showing what the secrets are is a good idea, but doing so by overlaying text over it is not so good. You know, when you play a minion, it doesn't turn into a little circle with the name overlayed. In fact, the name completely disappears and the art of the card takes center stage. There's a reason for that.

Overall you correctly identified problems that people have been complaining about in the layout of tournament displays, but your fixes are mostly bad. It seems to me like you didn't understand the tradeoffs that blizzard made when designing the spectator interface. It's not that they thought people wouldn't like the top player to have mana crystals - the issue is there is limited space and it doesn't fit with their design of the boards, which they think is more important.

Question for you: what good UX principles do you consider your changes to be applying? I can see you value always showing information that required mouseover in blizzard's version, but what else?

- Hi Thanks for the well put feedback! This is the kind of response we were expecting due to the short amount of time we had doing our first prototype. We are doing an iterative process which means that the feedback we are getting right now will be considered and put into another version.
The reason for having the cards fanning out this way was because it took less space than having it fan out in the same way as the bottom player.
That is a good point, we will take it into consideration
We tried to create solutions that would not overhaul the looks of the game. If I'm understanding your question right, you mean that most of the overlay graphics should be put inside the game rather than on top?
Yes, been answered before
It's not our focus to redraw everything to make it look better, but rather the functionality. Maybe we should have considered making the prototype look worse in order to more discuss the placements and functionality.
We will look into this to see if it's easy to recognize the artwork if it's small.

TBH, I think that Blizzard didn't consider how the spectating would work when they first designed the board and that it's too late to modify.

- We tried to create solutions that would not overhaul the looks of the game. If I'm understanding your question right, you mean that most of the overlay graphics should be put inside the game rather than on top?

My main point is that the issue is that spectators can't tell which player goes with which hero when watching a tournament. It actually not an issue in the spectator interface itself necessarily, as the players' names are part of that interface. In a tournament, this almost always gets covered up, and then there's also the additional issue that you want to associate portraits/webcams/match score with the heroes, not just player names.

The main reason that tournaments have trouble with this is that they switch back and forth between the two different player views - often with errors - and then it's just really confusing. More recently though, most tournaments have been retaining a static view, with one player on top and one player on the bottom. Your mockup does this too, of course. And once you have this, there isn't much confusion about which player is which hero - especially if the overlay is designed well to visually group the player portrait with the hero - e.g. by having one portrait above the other and highlighting the player whose turn it is.

I think color coding was necessary back when the view was flipping back and forth constantly, but is no longer important, and instead effort should be put into making the overlay look more integrated with the play board so that spectators trust the top-top bottom-bottom groupings more instinctively.

Regarding the mana crystals, I know this is just a mockup, but I don't see what the plan is for the theoretical real version. The fact remains that the boards as they are don't have room for the top player to have a full mana bar. And the reason blizzard didn't add a mana bar for the top player in spectator mode is because it would be a lot of work to figure out a visual layout that will look OK. I don't see your mockup as addressing the problem of the mana bar, which is that there isn't a good space to put it in a way that harmonizes with the existing game board.

- Dont know if you're still reading responses but here's my 2 cents.

First, it seems there's some clipping of the top player's cards with only 6 cards in hand I am unable to see the mana cost of two of his cards! This could be important information in Handlock matches, or if an emperor has been played. We should have as complete information for the top player as the bottom. (minor nitpick)

Second, and I said this in the form, the highlight of current player is brilliant and well placed imo. However, giving the top player a 'color' is superfluous information in HS. It makes sense in MOBAs and RTSs because it gives the viewer a quicker way to interpret the 'board state'. However, in HS there is a clear disconnect between the players built into the game. I'll never load up a HS stream and wonder "Who's minion is that?", I can already tell who's ahead on board and who owns what etc. Therefore, it's redundant and maybe even obfuscates the information further.

I think using the highlight but with consistent coloring would work well. If in practice it wasn't obvious enough upon a player change a simple animation could take place wherein the highlight "empties" towards the end turn button and then "fills" towards the new player's hand would work well.

- I've been thinking about it lately, a spectator mode like the mobile HS version, the cards on the corner, would be perfect

- We didn't actually think about that, but that sounds like a good idea. The problem with our idea is that the space at the top is extended which could pose a problem when implementing it into the game, but Blizzard already have the assets for the design of the mobile one.

- I'm sure this will be hard to top but here you go! http://i.imgur.com/aKVmu6V.jpg

- I thought about it, this extra space could be used to make things bigger, much better when watching tournaments streams, or when a tournament mode gets into hearthstone, the match score, player's draft..... I hope we see it one day

- That's really nice.

Blizzard, employ this person!

- Love it!

- I feel like the view is rather strange when spectating two players. In my opninion it would make sense to see the board sideways when spectating both players, and possibly just one of the players. This would make more of the space on both sides of the screen more useful, so things might get less akward and it would make it so that you aren't viweing it from one players perspective, meaning the other player will have their stuff weirdly placed on the screen. On top of this, doesn't it make sense to sit on the side of the board when not playing instead of next to one of the players? Of course this is a major overhaul of the spectator interface.

- For spectator mode, I think I'd prefer it if the cards in hand were lined up properly. no matter how you arrange it, it doesn't look right. It'd be harder to see what cards they have when they have a larger hand, but I think i'd be worthwhile.

- What program are you in where a masters is on Us design? I'm a developer borrowing a UX hat so this is really interesting to me.

    - Interaction Design students!

- I left a rather large block of text in the comment box on the survey, apologies. I'm studying interaction design and information architecture currently, so your project excites me. I hope you do well!

- I kinda dont like the upper cards, as they dont show fully - at least the most left card. Maybe needs a bit more twitching there?

- There is a lot of wasted space in the corners of the screen now, due to the zoom and the height of the cards. You could consider splitting the cards to the left and right of the hero portrait.

- Do you perhaps have a usable overlay you can share with us which we can test out?

- I love this so much

- Blizzard definitely can improve on the spectator interface. I've seen the great interfaces they've done for HOTS and SC2 so I know they can do better.

An idea I always had was what if you rotated the game board so it would have the perspective of someone sitting between the players? Instead of having the perspective of one player over another, it'd be the view of someone watching the game.

- This is actually something we discussed early on, when looking at some other CCGs. The reason we never followed through with this particular idea was that we didn't want the spectator interface and the playing interface to be too different. This would also introduce some issues with viewing the cards. You'd have to rotate all of the cards 90 degrees, otherwise you would see them from the side.

- Can you make a Forsenboys cardback?

- The secret design is really terrible. Are people so lazy to even hover over it? If there are more than one secrets it looks cluttered.

    - Its designed for tournaments. where the viewer is not able to interact with the board in any way. thats why he wants the secret to be visible at all times silly. :)

- /u/CM_Zeriyah, hire this guy.

- There is one problem with this. Cheating. The player can talk to the spectator about the opponent's cards, while the player can't see them directly, the spectator would. It's like when you are playing poker and there's always that one guy that walks around the table and whispers everyone's cards. Though I do love the interface, I don't want mech mages to know i'm holding auchenai circle combo.

    - This is for tournament, streamed games, not random ladder stuff.

Edit: I mean the images presented, of course your hand in general won't be visible to someone spectating your opponent.

    - Not quite sure how the modifications differ from the live iteration on that point.

- I think Red crystal for warriors, yellow crystal for rogues.

- Please just show who's turn it is with a simple mark, like an arrow.

Reddit Comments, Second Post

- Text secrets are way more readable. Looks pretty good! Abbreviations are probably okay if you think the full name is busy but you'd need something different for Ice Barrier and Ice Block.

- I thought abbreviations myself, possible even just "Block", "Barrier", "Mirror", "Duplicate" etc. That would make it most readable

- I worry that this will negatively impact the games in other languages and experienced people would recognize the pictures instead, no matter their preferred language. I do think it is a step up from the tiny secret images though.

- I do think that something better than just text should be used, but you could probably design a simplified representation to use for the secrets. For example, you could display a shield with an 8 written on it for Ice Barrier, some kind of blue aura for Ice Block, etc.

- This is a great idea actually. Just a block of ice or an explosion or a snake etc.

- This is certainly a good idea! The only negative thing I can think of is that spectators needs to learn new icons that represents the secrets.

- It looks really cool. Out of curiosity, would you flip the board to have whoever's turn it is at the bottom or are you thinking about leaving it with the same perspective throughout since that might mess up the blue/red color coordination?

- We had a survey in the last post asking this question :). The results showed that most people preferred when the board didn't flip each round, so we'll go with no flipping.

  > We also had comments saying that flipping the board makes it harder to understand who's turn it is, especially if both player's are playing the same class.

- Since we are redesigning things, why not flip the board 90 degrees and keep it that way? Like how Mtg does it.

- Yeah, we have been thinking about this as well as Blizzard have said several times that they would like to keep the game feel like you are playing around a table. The reason we didn't try it out was because we don't have the assets to try and create something like that.

- Well it doesn't have to be super complicated. Something like http://i.imgur.com/EirVAU4.jpg[1] looks fine and I'm sure it can be significantly improved.

  > At this point most people know what the cards are anyway, so most of them should be recognizable from the art. The left and the right space can be filled with more card art, cam, and other random info.

- Wouldn't this look really wierd once minions start attacking and spells fly across the board?

- I guess you could take the left 3/4ths of the screen from one player to avoid this.

- Perhaps replace the "your turn/enemy turn" button with a red or blue gem depending on who's turn it is?

- Make it say red/blue turn and have it as that color

- Words for secrets, it's difficult to see the icon and it wouldn't mean a thing to new players, who can't even look it up if they are curious.

  You can always have them fade into each other if you like the visuals.

  The board looks good as it is.

- Looks incredibly polished. I especially like the focus towards what deck each participant will be bringing

- I really like the idea of team card backs to represent who you support. Just curious how blizzard would implement..would it be pay to get the card backs? Or some random challenge: like lose rng flips 10 times in a match and you unlock tempostorm card backs?

- Haha, yeah something like that! ;) Really though, we have not thought too much about how to earn them, we just thought it was a cool idea. CS:GO has a similar system where players can buy stickers to support their teams.

- They could implement Guilds to stick with the WoW theme.

- Exactly what I was thinking. I come from Lineage but you could have a "guild" card back with some open space for a crest or emblem.

- [deleted]

- A hero's weapon is to the left of the hero. Or do you mean at the edge of the hero portrait?

- I love this, Have your tried testing a running game? Or do you only have the capability to suggest? Keep up the good work :)

- No, this is just a Photoshop mock-up, so only a suggestion to how it could look like.

- Looks really nice, good work :) A few thoughts:

  The "Enemy Turn" text on the button doesn't mean anything. The button can be repurposed or eliminated.

  The text secrets are far more readable, but this is mostly due to the size of the artwork version. But, the upper right and bottom left corners of the screen are unused--lot's of room for a bigger version, possibly with both art and text?

  The team logos on the field are barely there. If it were up to me I'd bring them closer to the middle and make them look more like they've been carved/burned into the ground. If that's the effect you were already going for, make it look deeper.

- The button isn't completely useless, but needs to be either red or blue turn to help distinguish whose turn it really is.

- I think it was really cool if the button would change perspectives. Let's say I am spectating Kripp and he queues against my good friend huffernudes so I go and spactate him as well. Now kripp is at the bottom of my screen and huffernudes at the top. Maybe the end turn button could change just that.

- Very true, what people have suggested, making it turn red/blue or something like that could be done.

  We didn't want to remove all artwork from the board, that's the reason we didn't place anything bottom left and top right. Since secrets are not used in every match, the space would go unused for a long time.
  The reason that the logos are at the sides is they would get covered up by minions if they're centered. Now the players have to have a full board to cover the logos.
  We also want to associate each logo with each player, so we want it close to the webcam.

- This is really amazing work. That being said, we do not NEED any of these changes. If you have trouble spectating, you should stick to finger painting in your free time.

Appendix C: Interview

Us:

Hi!

We thought we could start with a quick introduction on us. We are two students at Chalmers University of Technology in Gothenburg, Sweden studying the Interaction Design master's programme. I (Axel) came from a Computer Science background, while Christian has a Industrial Design Engineering background. Our interest in video games and e-sports (and a willing supervisor) led us to do our master thesis in this area. As there has not been that much research done on e-sports in general, we thought we could attempt to come up with a few general guidelines when designing the spectator interface for video games. If you are interesting in our results we could send our final thesis to you :).

So, we have a bunch of questions and thought it would be best if we gave them a couple at the time in order to not overwhelm you and for you to be able to take your time to answer. We are just interested in the general opinions of someone actually working with this stuff, you can answer in as much detail as you want.

How do you value the trade offs in moving components vs being consistent with the in-game UI?

Ryan T Schutter:

I have no issue at all with moving things around on the screen and being inconsistent with the in-game UI. The one thing I am unlikely to move is the minimap, because there really isn't a good place to move it that makes more sense than where it is by default. Things like the resources being moved from the top right to the bottom of the screen were inevitably going to be jarring to viewers at first but it only takes a game or two to get used to and then provides a much better viewing experience long term. Really, the issue was pretty much settled until you guys brought it up again! But it is unlikely I will ever be moving the resources back to the top of the screen in any of my interfaces designed for broadcast. Hardcore players will always say they want something like that but they do not always consider the intangible things they are trading off to keep everything where it is by default in the game.

Us:

The WCS interface relies on the observer and casters to relay certain information, do you think the observers and casters utilize your UI to the fullest extent?

Ryan T Schutter:

The WCS 2.2 interface only requires minimal extra effort for an observer over something such as the old GameHeart interface. No, observers and casters are not utilizing the UI to its full potential and they are unlikely to ever do so because being perfect is basically an impossible

task. But they are doing a great job and constantly getting better all of the time. Both MIT Game Lab and Blizzard/myself are also constantly looking at ways we can automate relevant information or give them better tools to know when to pull up key information during a broadcast.

Us:

Quite a few people wanted to the upgrade levels to be shown at all times, is this something you have considered implementing?

Ryan T Schutter:

This is something I was the first to actually implement with the original GameHeart so I definitely lean towards having it. I do think it has value but there are design considerations that take precedent over keeping the upgrades on screen all the time. As an alternative I have tried to sneak them into a couple of places where they can get shown 'accidentally' from time to time without requiring the observer to actually think to show them. But I am still looking at ways to improve that. All in all I didn't feel like my experience watching the Season 1 finals was hampered by not having them there 100% of the time.

Us:

Thanks for the well put answers! It's interesting that you say you have no issues with moving things around, our supervisor said something similar to us, that we as designers have to be able to stand up and change things, even if people might not like it to begin with. We think one of the main problems with Starcraft 2 right now is the fact that there are so many interfaces out there, and every tournament uses a different one. That's one of the reasons we thought consistency was important. OK, onto more questions! :)

Ryan T Schutter:

There is a problem with the variety of interfaces out there but there is not much I can do about that, all I can do is develop interfaces that I think create the best viewing experiences and hope that most tournaments adopt them.

Us:

Blizzards approach with the spectator UI seems to go more towards regular sports. Is this a good thing to reach casuals or what is the reasoning behind it? Notably we watched a bit from Heroes of the Dorm where the UI was very stripped down and placed in the bottom center just like the WCS interface.

Ryan T Schutter:

I don't think Blizzard really has a set approach to spectator UI at the moment. The vision for the StarCraft spectator UI is largely driven by a handful of people who have some interest in it, there is not some company-wide guideline telling us how to approach these UIs. That isn't to say there won't be in the future. Clearly with the direction we have been going with the StarCraft II and the Heroes of the Dorm UI is to lean on simple (at least deceptively) UIs that focus on displaying information as it becomes relevant instead of just throwing it on screen all the time. But that could easily change in a moment. I would say the main guiding idea behind my approach to these designs is to move information and UI elements to the bottom of the screen, I think that is the most critical thing for StarCraft specifically.

I believe the Heroes of the Dorm interface was guided more by the restrictions that cable television and FCC broadcast rules impose upon how you display information on the screen (since it was going to be on TV). There were a lot of other considerations as well, but you would be better off listening to Matt Schembari talk about these things as he was the main guy working on the Heroes of the Dorm UI, I am pretty much focused on StarCraft, but I sat a couple of desks away from him at the time so I would give input every now and then. Here is an episode of Town Hall Heroes where he talks about the Heroes of the Dorm UI fairly in-depth: https://www.youtube.com/watch?v=fMKbaoISLFI

I commonly see people posting online that my UIs are designed to appeal to casual players or people who have never seen StarCraft before. That is not entirely wrong because I am trying to appeal to everyone to the best of my ability. But I have made very few changes that specifically target new or casual viewers. In fact the only one I can think of is to switch to using actual text instead of icons for things like minerals, gas etc. The reason I use text descriptors for these instead of icons is so that someone who has never seen StarCraft before can make connections between the words he or she is hearing the commentators use and the words he or she sees on the UI. I have never seen someone comment on this change at all, and it is the only one specifically targeting new viewers.

The main reason the interfaces are getting simple is because it just feels like a better viewing experience overall, not because we think we need to dumb it down for new people. And for the most part our interfaces display pretty much the same stuff as everybody else. There were some problems with the original WCS 2.0 interface where it was never actually used quite the way it was supposed to be, and the community backlash against it was so great that I just gave up on it without ever actually seeing it in action the way it was designed to be. WCS 2.2 is much closer to my original GameHeart design but with some of the strongest elements of WCS 2.0 brought over into it. The main difference between the WCS 2.2 UI and the normal GameHeart UI (which is still extremely popular) is that the unit info panel is not on screen all the time. It has to be intentionally brought up by the observer. This was a decision I made for two reasons, first so we could move the leader panel onto the same bar as the rest of the information and finally completely clear the top of the screen and really open up the game space. And second, because when it is always on screen it becomes almost trivial. Observers are selecting things constantly, most of the time with no intention of actually showing the viewer anything on the unit info panel. This is a problem because it trains viewers to mostly ignore that panel. By making it activatable

we give the observer a better tool for wordless communication with the viewer. Now you know when the observer brings it up they are really trying to show you something.

Us:

Looking at Valve or Riot for example, they have a lot of information on the screen in Dota 2 and League of Legends and they are the most spectated video games right now. Our hypothesis is that Starcraft is in another league because of some people rather watches Starcraft than plays it. Would you say that the spectators between those games have different needs?

Ryan T Schutter:

The spectators between all games will always have different needs. I think there is definitely an element where the vast majority of people watching League of Legends and DotA 2 esports are actual players of the game. In StarCraft, I would say most viewers have probably played the game, but there is probably a substantial number who do not play it anymore but continue to watch. It really does make for a great spectator sport. It pretty commonly has actual feats of physical prowess you don't really get as often in DotA style games. There is a lot of really interesting and fantastic decision making gameplay and fast reaction times happening in those games, but in StarCraft watching players split against banelings or make drops all over the map or do some crazy warp prism micro, things that I just physically cannot do very well because I am too slow adds an element to watching the game that appeals to even people who don't play it. There is also a lot more obvious contextual information happening in StarCraft. Like when you see a zergling it is really tiny, so it is easy to assume it is weak. And when you see an ultralisk it is very large so it is easy to assume it is strong. So a lot of information is getting conveyed even to new viewers just based on how the units look. In moba games things are not so clear cut. Small units can be some of the tankiest (like Muradin in Heroes of the Storm or Poppy in League of Legends). There is a lot of counterintuitiveness for new people in how the units are presented.

As far as what these games really "need" to show, I am not sure. I know if I were to take a crack at a League of Legends or DotA 2 spectator UI the community would absolutely hate it, at least at first. I actually think the DotA 2 UI works pretty well for spectating though, I would still make a lot of changes if it were in my hands but I don't have huge complaints about it. It's just the default game UI for the most part, and doesn't fall into a trap of showing you every piece of information available all at once just because it can. It just shows you the info for the player or unit you have selected, and that is pretty much it.

Us:

Do you think there are any cultural differences between America and the rest of the world? For example, GSL and Dreamhack uses a more consistent in-game vs spectator UI.

Ryan T Schutter:

GSL and Dreamhack were the two earliest major organizations to adopt GameHeart when I first made it actually.

In my experience European and Korean organizations are more willing to try something different, but also more likely to give up on it if they get player complaints. In North America organizations are less likely to adopt something new and different, but once they do they are more likely to stick with it and try to make it work even in the face of negativity from the community. But I think it is difficult to attribute this to any kind of cultural difference, there are only a handful of major organizations out there so its not exactly a large sample size. It could just as easily be organizational differences. And really I think it takes both caution and persistence in unison to really drive us to find the best possible solutions. I honestly think we are getting pretty close with WCS 2.2

Us:

It's true what you said about observers casually selecting units that may not be relevant to what's going on on the screen at the time. This was actually one of the reasons we wanted to change it, to give observers a better reason to target units involved in fights.

Regarding different spectators, one of the things we were thinking about was the "Newcomer's stream" that Valve set up for The International 2014, where the commentators would explain things in more detail and avoid using Dota abbreviations and terms. This is something we think Starcraft 2 could also benefit from, since there are a lot of terms that would make no sense to a new spectator, that's why we wondered if the WCS interface had something like that in mind. Would you change anything with WCS 2.2 if Starcraft 2 was to be shown on ESPN like Heroes of the Storm? Assuming it would be reaching a whole new viewer base who are used to regular sports.

Ryan T Schutter:

The interface would have to change to accommodate TV regulations but as far as the layout is concerns or what information I am showing I probably wouldn't change too much unless I really had to.

Us:

We thought about trying out the SC2 map editor to try to actually implement our interface. Are the changes we proposed to the minimap, grouping units and spell counter doable?

Ryan T Schutter:

Most things are possible with the editor but what you want to do is not possible using the default observer system. You would have to construct a custom observer solution which is not a simple task. I think it would be unrealistic to attempt it as it would require a system as complex and

cumbersome as the original GameHeart had to be, which people are unlikely to use these days with so many lightweight and easy to use alternatives.

Us:

Do you have any useful resources or links for starting up creating extension mods, so that we can learn the limitations and possibilities?

Ryan T Schutter:

SC2Mapster is really the only place to go for SC2 modding info.

Us:

Finally, we were interested on how you came about working with what you do. We know the quick version that you started with GameHeart and eventually got hired by Blizzard, but what is your background in design? What does a typical work day look like for you?

Ryan T Schutter:

My background is in fine art and illustration, you can see my website here: www.rtschutter.com

The real start to GameHeart was during some charity events some friends and I ran for Child's Play called "Rumble in the Bronze" where I was tasked with figuring out our overlay solution to display all of the information we wanted during a game of StarCraft. From there my ambitions for the spectator interface grew. We create a showmatch organization called GameHeart and my part of the project was to design the UI/spectator interface. Unfortunately the rest of the showmatch project fell through, and GameHeart basically just became the name for my interface project. From there I just pushed tournaments to use it until basically everyone was except Blizzard, and they finally brought me on contract to create an official version of the UI for them. A couple of months after my contract ended I applied for a job they had posted and got it.

I cannot really talk about what I work on but my primary task is to implement UI using their XML layout system. I work with the artists, designers and engineers to make sure the UI actually makes it into the game.

Us:

Alright, that’s about it from us. You gave us a lot of thoughts and we can really see that you have spent a lot of time creating GameHeart and thinking about spectator UIs. It really is an interesting subject as the e-sports scene is growing tremendously and in the future we could see this subject being even more in focus when designing games for e-sports. Unless you have anything else to add we want to thank you very much for the opportunity and for your answers.

Finally, we are actually doing a spectator interface for Hearthstone as well, and we found someone in the Hearthstone team called Derek Sakamoto. Do you have a clue if this is the person we should contact or if there is another one that is more into the UI stuff?

Ryan T Schutter:

Derek is definitely the main Hearthstone UI guy, I went to his talk at GDC while I was there in March

Appendix D: Alpha and Beta Version of Guidelines

Alpha Version

1. Consistency between playing and spectating
2. Color blindness - 10 % of men are color blind
3. Team colors
4. Pre-game lobby setup
5. Utilize downtime
6. Points of focus, know your game, are there any lulls in action where you can show replays, or is there continuous action?
7. Promote teams through team logos etc, not only does it make the sponsors happy but the beginners can see a difference between the teams.
8. Visual Clarity, Due to lesser stream quality and mobile streaming, the elements should be big and visible.
9. Minimap, try to relate the players and team colors with the minimap
10. Toggle to hide/show information and statistics
11. Player's skill should be displayed and not hidden
12. Giving too much information to the spectator can take away the suspense
13. Involve social media in the game
14. Different spectator for different personas

Beta Version

11. Visual Clarity, Due to lesser stream quality and mobile streaming, the elements should be big and visible.
12. Consistency between playing and spectating
13. Team colors, Minimap, try to relate the players and team colors with the minimap
14. Color blindness - 10 % of men are color blind, 1 % women
15. Promote teams through team logos etc, not only does it make the sponsors happy but the beginners can see a difference between the teams.
16. Timely information, show info only when it's relevant, know your game. Automate relevant information like when a hero in Dota 2 buys an expensive item.
17. Different spectator for different personas, know you spectators
18. Giving too much information to the spectator can take away the suspense, CS:GO bomb timer example
19. If possible, incorporate the game's design language into the spectator interface.
20. When spectators are taking a glance at the UI, it should be apparent on who is leading and what is the status of the game

Appendix E: The UI Component Matrix

	Starcraft 2	Dota 2	Hearthstone	Counter-Strike: Global Offensive	Comments
Consistency in Team Colors	x	x	-	x	
Team colored spells & effects	x	-	-	-	
Team Colors for Color Blindness	x	-	x	x	
Color Blindness mode	x	x	-	-	
Tournament logo and sponsors	x	x	x	x	
Diegetic Tournament, team and sponsor logos	x	x	-	/	tournament stickers on weapons, but no sponsor logos
Non-Diegetic Tournament, team and sponsor logos	x	x	x	x	
Cameras on players	x	x	x	x	
Cameras on keyboards	x	-	-	-	
Stats graph	-	x	-	x	
Fully customizable UI	x	-	-	-	
Consistency in UI between spectating and playing	-	x	/	x	
Font size and style consistency	-	x	x	x	
Built-in instant replay	-	x	-	x	
Game stats info pop-up	x	x	-	x	
Diegetic drawing	x	x	-	-	
Can utilize zoom	x	x	-	-	

Large map overview	-	-	-	x	
Hide the whole UI	x	/	-	/	Cs and Dota require console commands
Heavy reliance on icon knowledge	x	x	x	-	Counting hearthstone cards as icons
Player trivia notification	-	x	-	-	