

Lappeenranta University of Technology  
School of Business and Management  
Degree Program in Computer Science

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**DEVELOPING ADVERTISING TOOL FOR ESPORTS  
BROADCASTING AND PRODUCTION**

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# TIIVISTELMÄ

Lappeenrannan teknillinen yliopisto  
School of Business and Management  
Tietotekniikan koulutusohjelma

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## **Mainostustyökalun kehittäminen esports-lähetysiin ja -tuotantoon**

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Esportsista eli kilpapelamisesta on tullut kuluvan vuosikymmenen aikana suosittua niin rahallisesti kuin yleisömäärissä mitattuna. Esports-lähetysten mainostustapojen kaikkea potentiaalia ei ole vielä hyödynnetty. Diplomityön tavoitteena oli luoda uudenlainen mainos hyödyntäen pelin sisäistä tietoa tehden mainoksesta perinteisiä mainostustapoja mielenkiintoisempi. Implementaatio tehtiin Counter-Strike: Global Offensive -videopelin lähetysiin varten ja sen toimivuutta mitattiin kyselytutkimuksella. Implementaatio toimii lähetysten aikana itsenäisesti ilman toimenpiteitä lähettäjältä. Implementaatio sai kyselytutkimuksessa hyvää palautetta, mutta mainosta ei muistettu paremmin kuin perinteisen mainostavan staattisia mainoksia. Kyselyn toteutuksessa oli paljon parannettavaa, mutta implementaatiota voidaan kehittää sen pohjalta eteenpäin.

## **ABSTRACT**

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### **Developing advertising tool for esports broadcasting and production**

Master's Thesis

2019

47 pages, 8 figures, 9 tables, 2 appendixes

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During this decade, esports has become popular both financially and by the viewer count. Advertising in esports broadcasts have not yet reached their full potential. The goal for the Thesis was to develop a new kind of advertisement using game data to have more interesting advertisement comparing to the traditional advertising methods. The implementation was made for the broadcasts of video game Counter-Strike: Global Offensive and its effectiveness was measured by a survey. Implementation runs automatically with no actions needed by the broadcaster. According to the survey, the implementation was liked by the respondents, but its advertisement was not remembered any better than traditional static advertisements. The survey could have been planned and executed better, but implementation can still be developed further using the data given by the survey.

## **ACKNOWLEDGEMENTS**

It was fun and now it's over. As a wise man once said: "I'm feeling thank you". Eight years is almost one third of my life. It wasn't all fun and games but hopefully the bad things will be forgotten, and the good things will be remembered. I also hope that the good things will be exaggerated a lot. Hopefully I got everything I needed from Lappeenranta and didn't do anything that could destroy me later. I mean, I already lost my ACL and EPL there.

This thesis could have been so much more, but let's just say that esports life and hand surgery did not exactly help with the lack of motivation.

#ykkosketju, Cluster, Ruut, LAG, EI, FV, AHC, NST II. And a certain sports channel too.

And the most important: Elisa.

Thank you.

Kalle

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## **LIST OF SYMBOLS AND ABBREVIATIONS**

CSGO	Counter-Strike: Global Offensive
UI	User Interface
DSR	Design Science Research
GSi	Game State Integration
HUD	Head-up display
OBS	Open Broadcaster Software
JSON	JavaScript Object Notation
HTML	Hypertext Markup Language
CSS	Cascading Style Sheets
IP	Internet Protocol
URL	Uniform Resource Locator
VRP	Viewer Response Profile

# 1 INTRODUCTION

## 1.1 Background

Esports broadcasts are youngsters among traditional sports broadcasts seen in television and radio. Esports have the possibility to develop new advertising methods compared to the traditional sports broadcasts. However, static advertisements which have been seen in traditional sports arenas for decades, are commonly used in the esports broadcasts. The effectiveness of static advertisements in the traditional sports have been questioned even before the first major esports tournaments had emerged in the beginning of the 21st century [1]. Video games provide possibilities to a whole new set of advertising methods, so it is important to study how they could be utilized.

During the last five years the money involved in the esports industry has grown to hundreds of millions of dollars [2]. At the same time streaming services such as Twitch have given opportunities for anyone to find an audience just by sitting in their computer playing video games [3]. Online gaming leagues such as ESEA and FACEIT have provided opportunities for individual players to show their skills to bigger audience and gaming organizations while trying to reach the goal to become professional gamers [4,5].

While amateur teams have different leagues to play, there might not be any exposure for them if their matches are not broadcasted to any streaming services. Broadcasting the games usually requires someone to do the observing and commentating for these broadcasts to get the maximum value out of the broadcasted match similarly to traditional sports. Commentating and observing the games properly require both a good knowledge of the game and the broadcasting equipment. Therefore, it is not an easy task for beginners to jump in and start broadcasting esports matches to streaming services even though it is obviously a lot easier than finding own television channel to broadcast traditional sports.

In the video game Counter-Strike: Global Offensive (CSGO) two teams of five players try to reach 16 round wins to achieve a map win [6]. Rounds can last from 15-20 seconds up to two and a half minutes and it is possible that all the players are involved in the action at the same time. At times, the action might be very chaotic and even the best observers and

commentators might have difficult times to notice all the key plays. In the beginning of every round in the game, there is a so-called “freezetime” when players can make purchases with in-game money before they head towards the action. This is always the time for the commentators to discuss the actions of the previous round and there are not much in-game features to help the commentators define which were the key moments of the round.

By developing a new analyzing tool for commentators using the Game State Integration of CSGO, it is possible to help the commentators with their analysis and provide a new advertising element to the broadcasts. With the tool the broadcasters can provide much more detailed analysis and it helps them to define the key moments of the previous round. Helping the commentators with their analysis helps to create more attractive broadcasts to gain more viewership to both the broadcasting channel and the teams that are playing. When the statistics are shown for the audience, it provides both new information to the viewers and at the same time a possible new spot for advertising the sponsors of the broadcast. After all, advertisement providing information is less irritating for the viewer than a non-informational advertisement [7]. And when the advertisement is not only a static image with no context, it should not be so easy to ignore by the audience.

## **1.2 Goals and objectives**

The main goal for the thesis was to implement a new advertising tool which is also a useful analyzing tool. Implementation will be used for analysis to define the key moments of the round for the viewers. The implementation needs to be presented in an informative and esthetic way, allowing a sponsor logo to be seen at the same time. The User Interface (UI) element of the implementation will be more of a Proof of Concept instead of a real, production-ready element. Logos will be placed in the space that is left unused by the presentation of statistics. Sub-goals consisted of documenting the implementation and measuring the effectiveness of its advertisement and the more common advertising method, static logos.

Objectives for the research:

- **O1:** Implement a statistics tool using game data and make sure its UI has enough

room for a new advertisement.

- **O2:** Document the implementation, how the data is fetched and how the advertisement is printed.
- **O3:** Evaluate implementation to see if it works better than traditional static advertisements which are more common in esports broadcasts.

### **1.3 Research question and limitations**

Design Science Research (DSR) was used in this thesis by developing a new artifact to help to understand the chaotic rounds of CSGO and to provide a new advertising method at the same time. The research process consisted of identifying a problem before designing and developing a new artifact to help with the problem and finally evaluating the artifact [8].

**RQ:** “How to design a more noticeable advertisement for esports broadcasts without making audience more irritated by it?”

Limitations of the implementation consisted mostly of the limitations of the Game State Integration (GSI) of the game, Counter-Strike: Global Offensive (CSGO). It is not possible to make the tool work in all the possible situations all the time. There is a recognition system to find out if it is likely that something went wrong, and statistics should not be shown in the broadcast. It should be noted, that the data and overlay provided by this implementation will not be shown in the game client itself. The designed UI element is presented only in the broadcasting software and browser because the implementation is a website using game data sent by the game client.

Usefulness of the implementation was measured with a survey after the implementation was finished. Survey consisted of questions about the tool in advertising perspective. There were limitations for the survey, such as the length of the video and how much objective data can be gathered. Survey could not be constructed from a live broadcast and it was done by creating a simulation of one instead. Opinions of the respondents might vary a lot depending on their experiences with the game itself and watching esports broadcasts in general.

## **1.4 Structure of the thesis**

In this thesis there are both theoretical and practical parts. Theoretical part is needed to identify the room for improvement. Practical part introduces the implementation and evaluates it.

Theoretical part starts with Chapter 2 presenting advertising concepts in traditional sports, esports and video games in general. Different advertising methods are introduced to demonstrate the similarities and differences between advertising methods across broadcasting channels. Problems and the room of improvement in the advertising methods are acknowledged, which is needed for the design of the artifact.

Chapter 3 starts the practical part of the thesis. The implementation architecture and UI are introduced as well as GSI of CSGO which provides the needed statistics for the implementation. This chapter introduces all the technologies that were used in the implementation. The placement and timing of the implementation advertisement is presented with examples to demonstrate why it should theoretically be more useful than classic static advertisements.

Chapter 4 presents the conduction method of the survey and the results of it. It is the evaluation phase of the software artifact. Survey questions and their answers are introduced to see if objectives and goals of the thesis were met. All the chapters of the survey are broken down to recognize the pros and cons of the implementation and how it could have been better.

Chapter 5, Discussion, debates what could have been done differently about the implementation and the survey. The results are discussed by looking at the implementation and the survey and how specific decisions in terms of both the implementation and the survey might have affected the outcome. Lastly, Chapter 6 is Conclusions which summarizes the whole thesis and its results.

## **2 ADVERTISING IN SPORTS AND VIDEO GAMES**

### **2.1 Advertising in Video Games**

In-game advertisements have emerged as a new platform for companies to advertise their products. There are a lot of different methods that can be used to raise awareness of the brands that are sponsoring game developers. Product Placement in Interactive Games by Dr. Barry Ip lists main types of in-game advertising [9]:

- Real life or movie characters as in-game characters
- Branded in-game assets or tools
- Advertisements in the environment of the game
- Music and commentary by known people such as bands or sports commentators
- Edge cases where advertising happens with the game, not in the game

There are entire gaming franchises based of movie franchises, such as Lego video games for both PC and gaming consoles [10]. Other examples include car games simulating driving with real cars (i.e. Gran Turismo video games) and sports games using huge person brands such as Tiger Woods (Tiger Woods PGA Tour Golf video game) and John Madden (Madden franchise of American football video games). Sports games in general usually purchase licenses to use real life teams and players, for example NHL hockey video game series and FIFA football video game series launches new game every year with the updated team rosters, logos and sponsors [11]. The study of Ip noted that this type of in-game advertising is sometimes not even considered as advertising by players. The product will be noticed whether the player thinks it is an advertisement or not [9].

Branded in-game assets are a way for video games to provide advertising opportunities to their advertisers similarly how product placement can be used in television shows as an advertising method in addition to commercial breaks. For example, if player character drinks something, it can be underlined that he drinks a certain brand of lemonade. Branding of in-game assets is a natural way of advertising something without being too intrusive. Advertising happens along the ongoing playing action that is happening instead of cutting the action to show a commercial like during TV shows. [9]

The rest of the listed advertising methods are even more passive, players might not even notice these types of advertisements since they might be just hanging on the walls such as billboards and other traditional static advertisements. The lack of interaction with the advertisements decreases the likelihood of the player noticing the advertisement and the advertised brand with it. However, it is noted that it is difficult to measure how much these advertisements have subtle effects on player's perceptions of the advertised brands. [9]

## **2.2 Advertising in traditional sports broadcasts**

Research paper Real Time Advertisement Insertion in Baseball Video Based on Advertisement Effect by Yiqun Li, Kong Wah Wan, Xin Yan and Changsheng Xu studied a possibility of adding advertisement automatically to the broadcast [12]. The research listed a few reasons why virtual advertisements are more effective than static billboard advertisements and commercial breaks [12]:

- Billboards might not be seen because other objects could be in front of them in the video.
- Virtual advertisements cannot be avoided because they are inserted in the screen even when there is not a commercial break, therefore audience is less likely switching channels or leave the screen waiting for the commercial break to end.
- Virtual advertisements can be shown without commercial breaks, meaning audience is less likely to feel that advertisement is wasting their time
- The timing and placing of the virtual advertisements can be chosen so that the advertisements are as effective as possible, and advertisements can even be localized if video is broadcasted to different regions.

The insertion of advertisement is usually done manually, and the research tried to automate the advertisement insertion process in terms of timing, location and the content of the advertisement [12]. Automated process reduces the manual workload of human operator and at the same time it naturally reduces the risk of human error with timing and location selection [12]. The following criteria were considered about placing the advertisements:

- Advertisements should not block any foreground objects because that could annoy the audience.
- Advertisement should stay statically for a period of time that it can attract the

attention of audience.

- Advertisement should not destroy any other information on the video. It should be placed on the less-informative region so that it does not collide with any existing elements.

In their research they observed that in baseball matches advertisement placements could be done reliably and accurately with the defined criteria [12].

### **2.3 Advertising in esports broadcasts**

Esports broadcasts are being watched more than six billion hours per year. Despite being a growing spectator sport, it still has a long way to go to convert watched hours to actual ad revenue. Nevertheless, as a clear benefit for the advertising companies, esports broadcasts attract viewers who are more difficult to reach elsewhere. [13]

Esports broadcasts have a clear advantage with virtual advertisements because in terms of gameplay footage, the environment and camera setups are virtual too unlike in traditional sports. When the gameplay is shown in the broadcast, it is always known which areas of the screen are less-informative, meaning they are good spots for advertisements. For example, in the biggest CSGO tournaments in terms of the prize pool, such as Dreamhack Masters Stockholm and ESL Cologne, there are usually static advertisements in a slideshow in the bottom-center of the screen [14,15]. Area is popular for advertisement logos in CSGO because there are no gameplay elements in the area to be obstructed by advertisements. Other common spot for static advertisements is in the right-hand side of the screen between the “killfeed” and head-up display (HUD) elements informing about the state of the players. The common placement of advertisements is demonstrated in Figure 1.



**Figure 1.** Common advertising spots in CSGO broadcasts, adapted from [14,15].

In addition to advertisements in the gameplay video feed, there are physical advertisements in the venue similarly to traditional sports if matches are played in a venue instead of playing them online. During esports events, physical advertisements can be seen in broadcasts during interviews, timeouts and other breaks during matches when there is not as much interesting gameplay action to show. If the broadcasted match is played online instead of players being physically in the same venue, it is common to show only gameplay footage, meaning that static advertisements placed in the less-informative areas get more exposure.

In a study called “Did you see that? In-Game Advertising Retention in Players and Onlookers” it was studied if in-game advertising was more effective for onlookers than players who are familiar with electronic entertainment. The research concluded that viewers who have played the game themselves can be more motivated to focus on the core game mechanics instead of watching the advertisements. In the research it was found that onlookers remembered the in-game billboard advertisements significantly better than players who are more familiar with the game, mainly because onlookers are less motivated to look at the game mechanics, shifting their focus more towards the advertisements. [16]

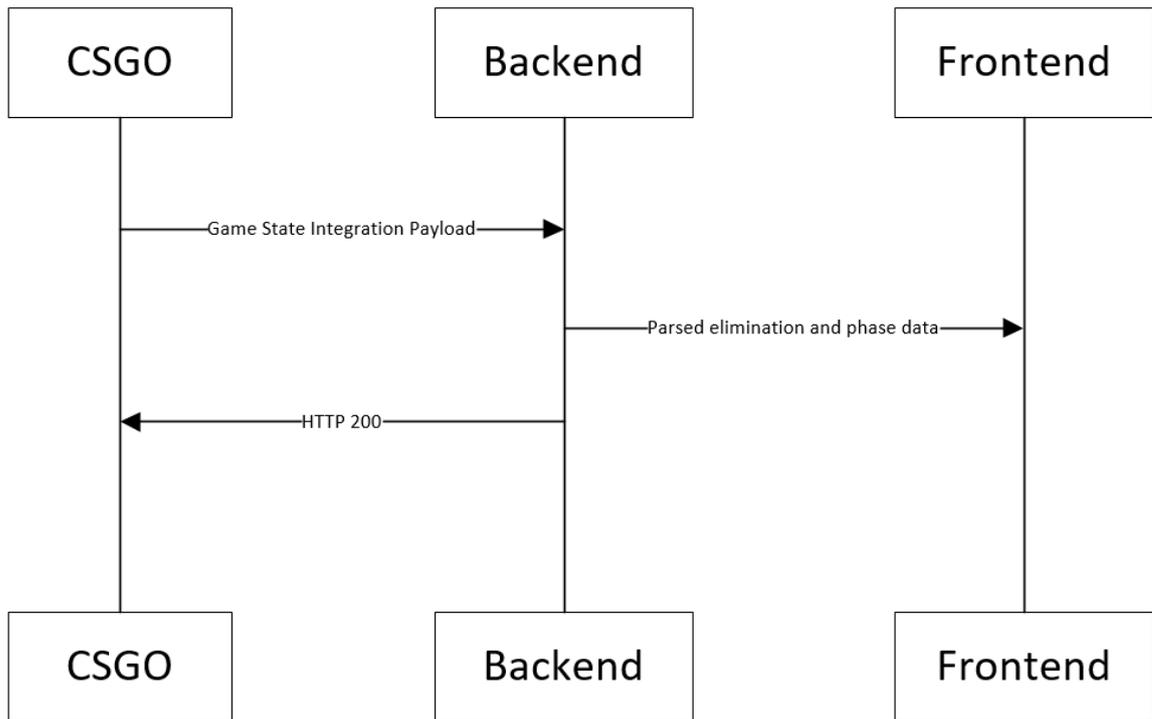
In the Chapter 4 of this study it is tested if static advertisements of CSGO broadcasts have similar features as the billboard advertisements in the in-game advertising retention research. If the game mechanics interest the respondents more than the advertisements, the static advertisements of CSGO broadcast should be similarly unnoticed by respondents.

### **3 IMPLEMENTATION**

The implementation provides a more active advertisement model to use with the static advertisements and logo slideshows. As an additional advertising model, some tournament organizers have used branded replays showing the logo and name of the advertising brand while playing the replays of key moments of the rounds [17]. Forming the replays and showing them on screen is difficult if broadcaster does not have at least one additional person to help with that. Implementation of this thesis informs the viewer about the key moments of the rounds without any actions by the broadcaster. The implementation gathers the data automatically, builds the presentation with the advertised logo and slides it to the broadcast without any actions from the broadcaster.

Implementation is shown to the audience when the current round is over, and it is hidden when the next round starts. Implementation provides both information about the ongoing match and a changing position for the advertised logo. The implementation uses the Game State Integration (GSI) of CSGO which enables the possibility to fetch useful in-game data which cannot be seen in the graphical user interface of the game.

Using the GSI requires a listening server, which catches POST requests made by the game. The data provided in the POST requests needs to be analyzed programmatically to find out if it is valuable or not. After analyzing the data, it needs to be presented with a simple yet attractive way to catch the eye of the viewer towards both the provided statistics and the logo of the sponsor. Figure 2 presents the sequence flow of the implementation.



**Figure 2.** Sequence diagram of the implementation.

**Backend** of Figure 2 represents the Node.js server which picks up POST requests from the game client. **Frontend** represents a web page which can be viewed in a browser or in the streaming software. Node.js server receives JavaScript Object Notation (JSON) formatted payloads from the game, analyzes them and sends parsed data to frontend using a web socket made by socket.io library.

Web page updates itself depending on the data sent by backend. Web page is served by Express web application framework which is useful for serving web pages and files [18]. The web page uses standard Hypertext Markup Language (HTML), Cascading Style Sheets (CSS), JavaScript, Canvas, and a JavaScript library jQuery for drawing the image based on the data which is received using Socket.io module of Node.js. This implementation does not use any kind of relational or non-relational database, the information is stored only in the web browser and the runtime of backend during the time it is opened.

### 3.1 Game State Integration

GSI of CSGO provides data about different actions happening during the matches. The game sends JSON payloads to an address that has been pre-defined by user using a configuration file (presented in Figure 3).

```
"Example"
{
  "uri" "http://127.0.0.1:3001"
  "timeout"      "5.0"
  "buffer"       "0.1"
  "throttle"     "0.1"
  "heartbeat"    "30.0"
  "data"
  {
    "provider"           "1"
    "map"                "1"
    "round"              "1"
    "allgrenades"       "1"
    "allplayers_id"     "1"
    "allplayers_state"  "1"
    "allplayers_match_stats" "1"
    "allplayers_weapons" "1"
    "allplayers_position" "1"
    "phase_countdowns"  "1"
  }
}
```

**Figure 3.** Configuration example of Game State Integration config file.

With the configuration file, user can choose which payloads will be sent and therefore user has some control over what kind of data is presented in the payloads. User can also define how often payloads will be sent and what is the exact Internet Protocol (IP) address or Uniform Resource Locator (URL) to send the data. For example, if user wants to keep track only about match statistics (e.g. kills, deaths, assists, score) of everyone, he can choose to have only “allplayers\_match\_stats” payload. Theoretically it is possible to just fetch all the payloads but the more payloads the game sends, the heavier it is to send and process in the user’s own system. Table 1 introduces all possible payloads and **bolds** payloads that are used in the implementation:

**Table 1.** Payloads provided by Game Sate Integration [19].

Payload	Purpose
<b>provider</b>	General information about game client.
<b>map</b>	Current state of the match, e.g. is the match live or is it still in the warmup phase.
<b>round</b>	Current state of the round, e.g. informs whether the round has started, is the bomb planted, is someone defusing the bomb.
bomb	The state of the bomb, (e.g. dropped, planted, exploded)
player_id	Name, clan tag and observer slot number of the player that is currently being observed.
player_state	State (e.g. health, armor, kills this round) of the player that is currently being observed.
player_weapons	Weapons and ammo of the player that is currently being observed.
player_match_stats	Match statistics (i.e. kills, assists, deaths, score) of the player that is currently being observed.
<b>allplayers_state</b>	Informs the state of every player
<b>allplayers_match_stats</b>	Informs the current match statistics of all the players in the server
<b>allplayers_weapons</b>	Lists all the weapons that players have either in their inventory or equipped in-game
<b>allplayers_position</b>	Lists all the in-game locations of all players using “x,y,z” coordinates
<b>phase_countdowns</b>	Informs which state is currently ongoing from the list of live, bomb, defuse, over, freetime and warmup
<b>allgrenades</b>	Informs the positions and durations of all the grenades that are thrown but not yet exploded (e.g. flash grenade and frag grenade) or depleted (smoke grenade, molotov and fire grenade)

In addition to payloads in Table 1, there is also a payload called “previously” informing which payloads have changed in the current payload in comparison to the previous payload. Having the “previously” payload allows comparison of the current and the

previous states of the game without having to go through all the fields of payloads programmatically to find out if anything has changed in the game since the last payload.

The most important parts to analyze in this implementation are:

1. Checking if kills have happened in the game
2. What is the current state of the round and how much longer it will last

For example, if “kills” field is included for one player in the “allplayers\_match\_stats” payload of “previously” payload, it indicates that he has most likely killed someone after the last payload and as a result his “kills” statistic has changed in the new payload. To find out who has been killed by the aforementioned player, it is checked if “previously” payload includes “deaths” field for some of the players. This is only one example case and it is the most common to use to find out if a player killed another player.

In this implementation all the data sent by CSGO GSI is captured by a Node.js server which analyzes the “previously” payload to see if there are any changes that need to be noted. Payloads of the currently observed player, known as “player” payloads, are not included in this implementation because they do not provide any information that is not already included in “allplayers” payloads. Player payloads are more useful if broadcaster wants to develop own UI to present the current state of the observed player differently than the default UI of the game, this is common for the bigger tournament organizers such as ESL [15].

The “buffer 0.1” in the Figure 3 means that game client sends a new payload every 0.1 seconds if there have been any changes in any of the payloads. Since the positions of all players are included in the payloads (allplayers\_position), it is almost certain that payloads are sent every 0.1 seconds from the game client to the server. The content of the crucial “previously” packages depends on if the game client has received 200 HTTP response from the server from the previous payload after it has processed it. There cannot be any lag to ensure the correct data in previously packages. Therefore, implementation is functioning well enough only on local environments meaning that the Node.js server is running in the same computer as the game client.

## 3.2 Analyzing the data

There is a clear and simple flow to follow when analyzing the received data from GSI:

- Check that the payload contains valid JSON
  - Check if kills have occurred after previous payload
  - Check if round phase has changed after the previous payload

The payload from GSI consists of payloads that are defined in the configuration file and a payload known as “previously”. Payload “previously” contains all the changes that have occurred in the payloads of previous POST request that was sent from game client to Node.js server and server has responded with HTTP 200 response code. Theoretically it is possible to keep track of eliminations and changes between phases without using the “previously” payload but it provides exact information about all the changes that have happened between the current and previous payload. When the specific information about the updates is always there, there is less need for storing data in variables or in a database.

There are some problems and inconsistencies with the provided data. Because the available data is not completely ready for the purposes of the implementation, it needs to be parsed programmatically. The biggest issue with the offered payloads is that there is no clear information about eliminations. Eliminations need to be figured out with the following flow:

- Go through “allplayers\_matchstats” payload in “previously” payload to mark down changes in “kills”, “deaths” and “assists” of “match\_stats” and mark the player with changes in “kills” as killer
- Check if there has been an exploded frag grenade or burning fire in the ground that has been thrown by the killer
- Check which weapon the killer had equipped in the previous payload and which payload he has equipped currently

In addition to the elimination data, backend keeps track of the phase of the ongoing round. A single round of CSGO match consists of 3-4 different phases which are presented in Table 2:

**Table 2.** All the possible values for “phase” in the “round” payload when match is live.

Phase	Duration	Description
freezetime	12-20 seconds	In the beginning of the round players cannot move for a pre-defined number of seconds. During this time, they can discuss the strategy for the round and make purchases such as weapons, kevlar and grenades with in-game money
live	Up to 115 seconds	After the freezetime ends, live phase starts, and it lasts up to 115 seconds unless either the bomb is planted by terrorists or other team eliminates all the players of other team
bomb	Up to 40 seconds	Terrorists have managed to plant the bomb and unless they kill all the Counter-terrorists during this time or Counter-terrorists manage to defuse the bomb, bomb phase lasts 40 seconds
over	5 or 7 seconds	Over phase starts after one of the teams have won the round by either eliminating the other team. When over phase ends, freezetime of the following round begins. Tournament organizers use either 5 or 7 seconds.

Backend parses both elimination and phase data from the payloads and sends it to the frontend using sockets made with socket.io. Sockets are useful especially if both preview and production view are used, because no database is used to synchronize data for different clients.

### **3.3 Presenting the data**

The most important goal of presenting the data is to give both the viewer and the caster automatically a clear recap of the most important moments in the round. Another goal is that the presentation is not seen only as an advertisement but instead more as an informative UI element providing interesting information for the viewer.

The key principles of the implementation are:

1. Provide useful information the game does not provide by default
2. Do not block any existing, relevant information
3. Provide enough space for a sponsor logo

Analyzed data is presented in a timeline presentation which shows the order of key events of the round. The height of the UI elements is defined by the number of possible kills per round while the width depends on the maximum length of a round.

In a round of CSGO match, theoretically a maximum of 10 kills is possible to happen. Practically the maximum is nine kills because most of the time at least one player survives until the end of the round without being killed by another player. Player might be killed by explosion of the bomb, but it is not defined as a kill by the game. However, because the maximum is 10 kills per round, it is taken in account while designing the UI of the implementation. UI element is split vertically in 11 blocks with 10 blocks for possible kills. The first block in the top of the table is a header row which displays indicators of changing phases such as planting the bomb and the end of the round.

The possible maximum length of a CSGO round occurs if terrorists manage to plant the bomb during the last second of the live stage and Counter-terrorists are not eliminated by terrorists before the bomb explodes after 40 seconds. After that the “over” phase lasts for either five or seven seconds depending on the server config. Since kills can happen anytime during these 160-162 seconds, width and placement of UI elements in the timeline need to be designed with the possibility of a 162 second round. There must be enough room in the right-hand side to fit the needed texts in UI if eliminations occur in the last possible seconds. Information that needs to be fitted consists of names of the killer, the victim and the weapon which was used. The known dimensions of the implementation are introduced in Table 3. The dimensions are designed for in-game resolution of 1920x1080 pixels.

**Table 3.** Dimensions for the implementation.

Element	Width (px)	Height (px)	Description
Canvas	520	297	Canvas fits in the upper right-hand side of the broadcast without interrupting any existing UI elements of the game even if observer shows scoreboard.
Header	520	27	Shows changes of phases, e.g. bomb plants and round wins.
Kills	320	270	Every possible kill can be marked with 0.5 second accuracy because two pixels are reserved for every second. 27 pixels vertically for every possible kill. The actual usage of space depends on the number of kills and the leftover space is transparent.
Extra space	200	297	If a kill happens in the last second of a longest possible round, there are 200 pixels of extra space to draw the information of the kill.

The kill feed of the game includes more information by default except in terms of the timestamp. Timeline implementation does not show possible assists, headshots and wallbangs (kills through walls or other objects) which the default killfeed of the game provides. This is mostly because the space for texts is limited so that the whole UI element can be fitted in the space between default HUD elements of the game.

It is important that the UI element does not collide with the default UI elements such as current kills, deaths, assists, weapons and utility of players. If anything is blocked that might be viewed by the spectating audience member, the advertisement might be seen in a negative light and the effect of the advertisement is not beneficial for the advertising brand. Therefore, implementation is shown only when the round is over, and the interesting actions of the following round have not yet begun. Implementation does not collide even if the broadcaster shows the in-game statistics when implementation advertisement is shown.

The implementation builds two views for the HUD element it provides. Both views have identical content but different visibilities. Production view is shown for the audience while broadcasters can use the live preview for their analysis of the previous round even after the production view has gone away from the broadcast.

Live preview of the canvas can be viewed by the broadcasters without showing it for the audience. Preview can be observed using a regular web browser, e.g. Google Chrome. Preview of a single round will be available for the broadcasters to see until the first drawable action, i.e. elimination, of the following round occurs. This way broadcasters can keep on analyzing the previous round even though viewers cannot see the advertisement anymore. This feature does not necessarily have any direct benefit in terms advertising, but it improves the quality of the broadcast by providing talking points to commentators if nothing interesting is happening in the beginning of the following round. Theoretically, it is possible for the commentators to mention the advertised brand if they keep analyzing the previous round during a slow start for the following round, e.g. “as we saw from the round recap sponsored by X, ...”. However, this is something that demands actions by broadcasters and therefore it should not be considered as a goal for this implementation. Figure 4 introduces the view in a web browser when terrorists have won the previous round by exploding the bomb.



**Figure 4.** Live preview in a web browser after the “freetime” has ended.

Production view has the same canvas and information in a web page, but it will be invisible until it slides in when ongoing round is over, and it will slide back to being invisible after the “freezetime” of the following round has ended. Production view can be seen only during “over” and “freezetime” phases so the actual amount of visibility depends on the server configuration. If either of the teams call for a timeout, the advertisement will be seen during that too. Assuming no timeouts happen, if the “over” phase lasts for seven seconds and “freezetime” lasts 20 seconds, advertisement can be seen for 27 seconds between the rounds. It is possible that “over” phase lasts only five seconds and “freezetime” only 12 seconds, resulting in only 17 seconds of visibility for the advertisement. This means significantly less time for viewers to look at the statistics and the advertisement, but since the advertisement can be seen after most of the rounds, it is likely that viewers notice it sooner or later during the match.

### **3.4 Placement of the advertisement**

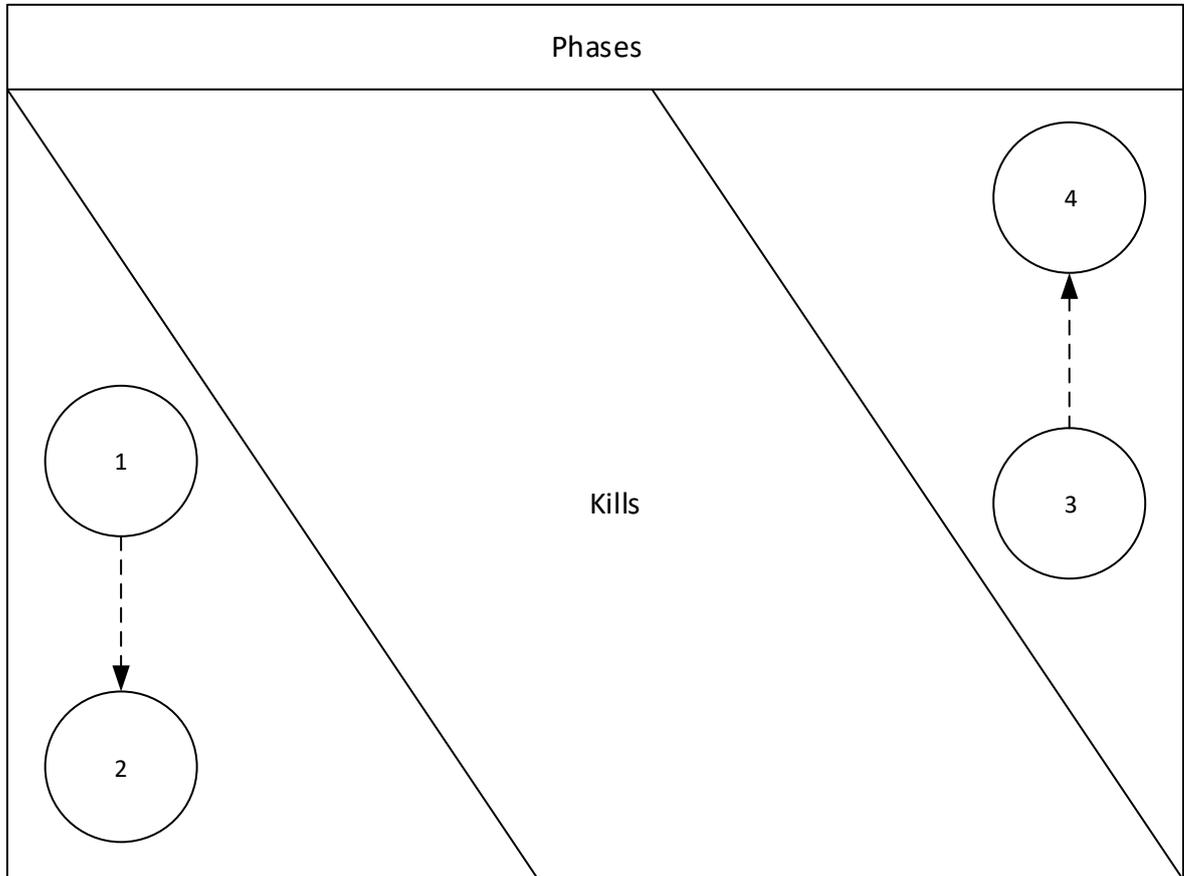
When the round is over, the implementation tries to calculate the best possible placement for the advertised logo. There will always be room for the advertisement in either the top-right corner or the bottom-left corner because of the UI design:

1. If there is not enough room for the advertisement in the bottom left corner, all the eliminations of the round have occurred in the beginning of the round leaving the top-right corner empty.
2. If there is not enough room for the advertisement in the top-right corner, eliminations and actions of the round have occurred in the later seconds of the round leaving bottom-left corner empty.

Advertisement will be placed in the center of the leftover space between the drawn elements and borders of the canvas. The order in which the placement of the advertisement will be attempted is following:

1. Middle-left
2. Bottom-left
3. Middle-right
4. Top-right

Figure 5 presents a simplified demonstration how the implementation tries to place the advertised logo.



**Figure 5.** Presentation of the logo placement.

If there is no room in the middle of the vertical axis (Spot #1), the placement will be attempted for a little bit lower spot until the advertised logo either has enough around it or bottom of the left-hand side (Spot #2) is reached. If there is not enough room in the left-hand side at all because all the actions of the round have happened too early in the round, the placement is attempted in the right-hand side of the HUD element (Spot #3) even though it's the last part of the HUD the viewer will see during the sliding animation. The placement attempts start once again in the vertical middle but in the right-hand side the following attempts are made towards the top (Spot #4) of the canvas instead of the bottom.

After it is confirmed that there is enough space for the logo, it will be checked how many pixels there are free space horizontally to the edges of the canvas and to the nearest kill

markers. The advertisement will be aligned horizontally in the center of the leftover space so that it is not just stranded in the nearest empty corner.

The HUD element is always slid from the right-hand side of the screen. Therefore, viewer will notice the advertisement instantly if it is placed in the left-hand side of the HUD element. In the right-hand side, there should always be plenty of room to fit the advertisement in because there is at least 200 pixels of extra space horizontally for fitting the eliminations happening in the last possible seconds of the round.

## 4 EVALUATION

Evaluation of the implementation was measured by creating two surveys. The surveys were almost identical, but Group A did not see the implementation advertisement at all, only the classic static advertisements. Meanwhile Group B had the same static advertisements, but they could see also the implementation advertisement. With this arrangement it is possible to find out if implementation advertisement affected their opinion on the static advertisements.

This method is called A/B testing. In A/B testing there are two groups with different versions of the same situation. The visual difference between the two versions should be very little which allows to study if that one specific difference is liked or disliked. [20]

In the surveys, there were three different methods to measure the usefulness of the implementation:

1. Checking how many advertisements respondents can remember
2. Measuring opinions about advertising method(s) using 1-5 scale
3. Open questions (voluntary for respondents)

Mann-Whitney U test was used to find out if there were significant differences between the opinions of A and B group about the static advertisements. It was also used to see if respondents of group B had significant differences of opinion regarding the advertisement printed in the implementation compared to the static advertisements.

Open feedback has also a really important role because it contains more structured opinions from the respondents. Open feedback helps to understand:

- the thought process of respondents
- how the survey could have been better
- how the implementation could be developed further



The round was recorded using Open Broadcaster Software (OBS) Studio. Advertisements were added by OBS as image and browser source assets similarly to how they are usually added during live streams of CSGO matches. English shoutcasting commentary was recorded and added to the background of the video to simulate a real live stream of a CSGO match. Shoutcasting does not acknowledge advertisements at all. It was up to the viewers whether they focus on the in-game HUD elements or advertisements.

In a real broadcasting scenario, the implementation is meant to be used by shoutcaster at times when he breaks down the previous round. It was decided not to talk about implementation in the commentary of the survey so that both groups could have the same commentary and it would not affect the respondents' feelings towards advertisements. Implementation should also be as self-explanatory as possible so that advertisement is seen useful rather than confusing if someone has a first glance without getting any help from the shoutcaster.

The survey was done by respondents with the following process:

1. Watching the video
2. Closing the video before answering how many advertised brands could be memorized
3. Possibility to open the video again and answer questions about static advertisements
4. Group B had same questions about the implementation right after third phase as their fourth phase.

Questions of the survey were modified from Viewer Response Profile (VRP) items [7]. VRP can be used in commercial advertising research. VRP questions are designed originally for television commercials and because of that questions were modified for the needs of static advertisements and the implementation. There were eight different VRP items that were selected for the survey to measure the opinions of respondents about the static commercials and implementation as advertising method.

All the questions of the survey are introduced in Table 4:

**Table 4.** Questions of the survey and their VRP categories

Question	Type	VRP Category
List all advertisements you can remember	List	
I thought the advertising method was clever and entertaining.	1-5 Strongly disagree - Strongly agree	Entertainment
These are the kind of advertisements that keep running through your mind after you have seen them.	1-5	Entertainment
The advertisement was too complex. I was not sure what was going on.	1-5	Confusion
It required a lot of effort to follow the advertisements.	1-5	Confusion
These kinds of advertisements have been done many times. It is the same old thing.	1-5	Familiarity
I have seen this advertising method so many times—I am tired of it.	1-5	Familiarity
I think that this is an unusual advertising method, I am not sure I've seen another one like it.	1-5	Familiarity
The advertising method irritated me — it was annoying	1-5	Alienation
Open feedback	Open	

The purpose of the VRP items was to test three things:

1. Evaluate whether there were significant differences in opinions towards static advertisements if the more active implementation advertisement was shown
2. Evaluate if respondents enjoyed the implementation advertisement significantly more than the static advertisements
3. Evaluate if respondents thought implementation advertisement to be too complex

Mann-Whitney U method was used to find out if there were significant differences in

two different sets of responses:

- Responses of static advertisements between Group A and Group B
- Responses between static advertisements and implementation advertisements in group B

In the Mann-Whitney U method, statistically significant difference is confirmed if p value is less than 0.05. Basically, the null hypothesis  $h_0$  is defined as following for every question:

- $h_0$ : There is no significant difference between advertising methods
- $h_1$ : There is a significant difference between advertising methods

## **4.2 Evaluation results**

### **4.2.1 Listing companies from memory**

Listing the advertised brands from memory went poorly by nearly all the respondents. Some of the respondents in group A managed to filter out the advertisements unconsciously and they thought that the team names were the only advertised companies in the video. Even when the advertisements were noticed, only a maximum of 1-2 advertised fake brands were remembered and more than half of the respondents could not name any of the companies. In the group A, 13 respondents out of 23 did not remember any companies at all. The numbers were similar in group B, where 15 respondents out of 24 could not remember anything. The survey was held online and there was no way to ensure that respondents did not cheat in this question by looking them up from the video, but only one respondent out of 47 raised suspicions by listing all the sponsored company names perfectly.

Many responses contained partly correct names, so evaluation is done by using a point system:

- Correct answer: 1p
- Partly correct answer: 0.5p

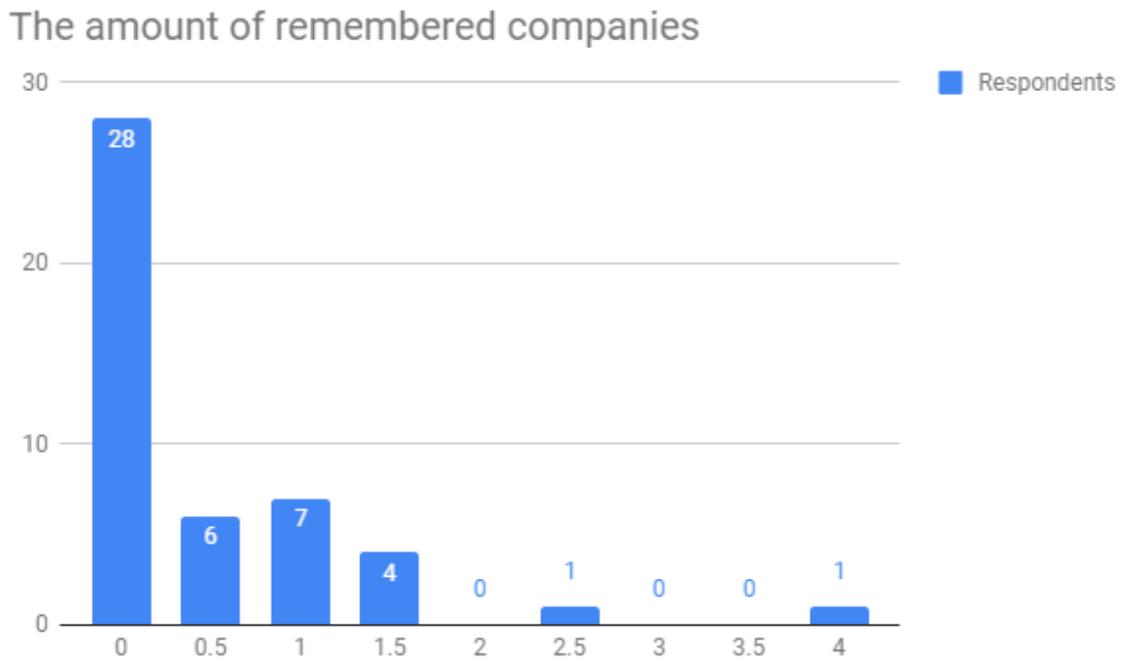
Unfortunately for the implementation, Swift Mobile was not the most remembered

company. Implementation was noticed, but the advertisement in it was not remembered any better than two of the four static advertisements. According to this part of the survey, implementation failed to provide a more noticeable advertisement. The implementation advertisement was not the most remembered advertisement, but it was not the least remembered either. The results for remembered companies are introduced in Table 5.

**Table 5.** Points per brand in the listing task.

Brand	Group A points	Group A %	Group B points	Group B %
Swift Mobile	-	-	3	12.5%
Ultralight Networks	4.5	19.6%	3	12.5%
TropicBets	3	13.0%	4	16.7%
Buzz	2	8.7%	1	4.2%
Strongtech	1	4.3%	0	0%

In hindsight, the survey video should have been longer to ensure that respondents had enough time to spot advertisements in the video, both the static and the implementation. It is also possible that logos have been blurry for some respondents due to that fact that survey videos were shown from YouTube instead of raw video files. There can be very big differences on the monitor sizes of the respondents too. Figure 7 shows the distribution of points by respondents.



**Figure 7.** Distribution of points scored by respondents

There were only two responses out of 47 in which respondent managed to list more than one and a half names and it is important to note that in the best answer, the respondent has most likely cheated.

#### **4.2.2 Analyzing questions using Mann-Whitney U**

There were 23 respondents in the group A and 24 respondents in the group B. Group A had only the static advertisements and it was tested if there were any significant differences in opinions about static advertisements between them and the Group B who saw also the implementation advertisement. There were no significant differences in any of the questions, meaning that implementation advertisement had no significant effect on the opinions towards static advertisements in group B. All the results of the comparisons using Mann-Whitney U method are introduced in Table 6.

**Table 6.** Comparison of opinions on static advertisements between the groups.

Question	U	p	Mean (A)	Mean (B)	Med. (A)	Med. (B)
I thought the advertising method was clever and entertaining.	258	.71	2.30	2.46	2	2
These are the kind of advertisements that keep running through your mind after you have seen them.	218.5	.23	1.74	1.58	2	1
The advertisement was too complex. I was not sure what was going on.	216.5	.21	1.87	1.58	1	1
It required a lot of effort to follow the advertisements.	254.5	.65	2.78	2.58	3	2
These kinds of advertisements have been done many times. It is the same old thing.	267	.86	4.00	4.00	4	4
I have seen this advertising method so many times—I am tired of it.	228.5	.32	2.52	2.92	3	3
I think that this is an unusual advertising method, I am not sure I've seen another one like it.	224	.27	1.57	1.5	1	1
The advertising method irritated me — it was annoying	226	.29	1.61	2.08	1	1.5

The 24 respondents in the group B answered the same questions about the static advertisements and the implementation advertisement. The results of the Mann-Whitney U comparisons between opinions on static advertisements and implementation advertisement are introduced in Table 7.

**Table 7.** Comparison of opinions on static advertisements and implementation advertisements in Group B.

Question	U	p	Mean (static)	Mean (impl.)	Median (static)	Median (impl.)
I thought the advertising method was clever and entertaining.	109.5	<b>.00024</b>	2.46	3.88	2	4
These are the kind of advertisements that keep running through your mind after you have seen them.	114.5	<b>.00036</b>	1.58	2.88	1	3
The advertisement was too complex. I was not sure what was going on.	195	.05614	1.58	2.08	1	2
It required a lot of effort to follow the advertisements.	258	.54186	2.58	2.25	2	2
These kinds of advertisements have been done many times. It is the same old thing.	76	<b>&lt;.00001</b>	4	2.21	4	2
I have seen this advertising method so many times—I am tired of it.	139	<b>.00222</b>	2.92	1.75	3	1.5
I think that this is an unusual advertising method, I am not sure I've seen another one like it.	75.5	<b>&lt;.00001</b>	1.5	3.17	1	3.5
The advertising method irritated me — it was annoying	213	.12356	2.08	1.42	1.5	1

As it is shown in Table 7, both questions of Entertaining category had significantly

different responses when comparing the static advertisements and implementation advertisement. “I thought the advertising method was clever and entertaining.” had a quite neutral value for the static advertisements, 2.46, while mean of implementation was the highest of all questions, 3.88. The next question, “These are the kind of advertisements that keep running through your mind after you have seen them.” had similar difference, .00036 compared to .00024 of the first question. Static advertisements got a mean of 1.58 while implementation had 2.88 so implementation was received better in both of the questions of this category.

Confusion category had two questions and neither of them had significant difference between the advertisement types. However, “The advertisement was too complex. I was not sure what was going on.” was pretty close ( $p = .05614$ ) with static advertisements having unsurprisingly good mean of 1.58 and implementation having 2.08. The difference was expected in this question because there was not really anything to understand with static advertisements while implementation included statistics too without explaining them at all. The second question, “It required a lot of effort to follow the advertisements.” was very neutral for both advertisement types since static advertisements had mean of 2.58 and implementation had 2.25. Interestingly, this question had the biggest standard deviation with 1.53 for static advertisements and 1.29 for implementation.

All the three questions for Familiarity category had significant differences as expected. The first two questions had slightly negative tone for the advertisement being too familiar and static advertisements received the only 4.00 mean for the question “These kinds of advertisements have been done many times. It is the same old thing.” while implementation received 2.21 for the same question. “I have seen this advertising method so many times—I am tired of it.” was more aggressive and it received 2.92 for the static advertisement and unsurprisingly only 1.75 for the implementation since implementation has not been used in many broadcasts yet. The third question “I think that this is an unusual advertising method, I am not sure I’ve seen another one like it.” had a mean of only 1.5 while implementation had 3.17. In the first and third question  $p$  value was smaller than .00001 which means very significant difference when significant difference is smaller than 0.05.

The only question in the Alienation category was important for the research question because it measures irritation towards the advertisements: “The advertising method irritated me — it was annoying”. There was no significant difference between the advertising methods in this question with  $p$  being .12356. As a compliment to the implementation, it had better mean of 1.42 against 2.08 of static advertisements.

Overall the results of Mann-Whitney U indicate that implementation advertisement was a significantly more entertaining and newer advertising method which was not seen as more irritative. Additionally, the result for the question “These are the kind of advertisements that keep running through your mind after you have seen them.” was also significantly better for the implementation advertisement. All in all, in terms of the VRP questions the research question “How to design a more noticeable advertisement for esports broadcasts without making audience more irritated by it?” was solved.

### **4.2.3 Open feedback**

Open feedback provided valuable information about the advertisements, survey and tunnel visioning in esports broadcasts overall. Responses provided some important insight and constructive criticism which can be used for improving both advertisement types and the survey itself. Advertising in esports has not been studied a lot yet so these answers should leave something to think for esports broadcasters and advertising researchers. It should be noted while reading the responses, that Group A respondents saw only static advertisements in their survey while Group B saw also the implementation advertisement.

Even though implementation was seen as an enjoyable advertising method by the respondents, there were some constructive feedback about separating the advertisement and statistics more clearly:

“The design of the advert could be improved so that it is clear that the round summary and the advert are two separate entities.” -Respondent #7 Group B

Both the static advertisements and the implementation could have looked a little bit more polished. As the UI of the implementation was more of a “Proof of Concept”, the

following feedback did not come as a surprise:

“Needs to have some pretty graphics so it doesn't look so rough for the viewers.” - Respondent #10 Group B

Two respondents pointed out the biggest problems of both the static commercials and the survey pretty well:

“Problem with static commercials is that they can't be where one actually keeps their eyes while watching CS:GO. My eyes never went down where the commercials were the whole time. The after round recap was the only place that I spotted because round was over and recap moved in to the screen. Of course, the video was short so maybe in longer video/stream one might spot commercials more easily when there's not much action in game.” -Respondent #1 Group B

“The best thing about them is that they don't cover up any of the vital gameplay elements, and that they aren't distracting. I feel that they would be more effective when you're exposed to them for a longer period of time.” -Respondent #17 Group B

Some of the respondents went even further ignoring static advertisements and claimed they had learned to look at broadcasts without glancing at the advertisements at all:

“Had to confirm my AdBlock actually shows the ads I'm supposed to evaluate. I could not remember anything... Banners are great as my mind seems to ignore them by now.” - Respondent #9 Group A

“Static commercial like in the video aren't irritating but also very unforgettable. I didn't pay any attention to the commercials first time I watched so I didn't remember any during this form.” -Respondent #2 Group A

Respondent #16 noted importantly, that static commercials are usually known brands instead of fake companies, which helps viewers to spot logos:

“The advertised companies should be related to gameplay so that people who usually watch the stream can relate to them better ie. HyperX, Nvidia etc. ...”- Respondent #16

There were some complaints that advertisements should have had bigger logos and texts to be easier to recognize. This is important feedback while evaluating the results of the company listing question. Too small logos and texts might have affected some of the answers if other respondents have had the same problem:

“I don't even pay attention to them in the first place. I had to rewatch the video to answer the first question. Also they are pretty small.” -Respondent #5 Group A

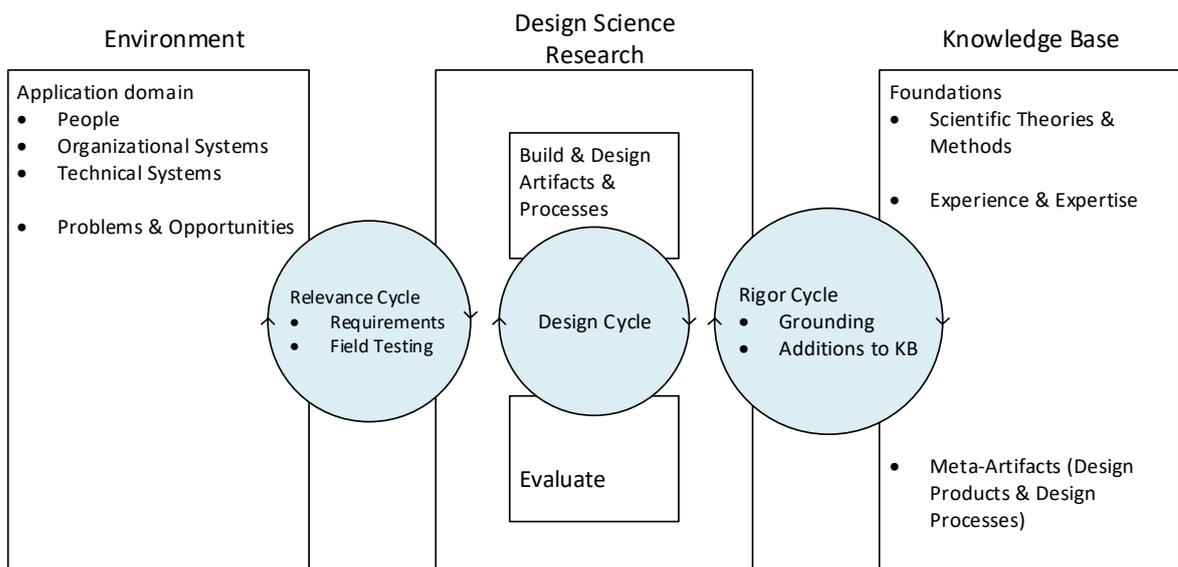
“Too many logos that were all too small in my opinion” -Respondent #11 Group B

All the open feedback responses can be seen in Appendix 2.

## 5 DISCUSSION

The implementation advertisement was designed for the needs of esports broadcasting. There were no strict requirements other than offering extra information and a spot for a new advertisement at the same time. The survey did not measure opinions on the information given by the implementation because the advertising effect was the focus in the Thesis. There could have been questions about the information and its presentation to be able to develop the implementation further. Luckily, open feedback provided some good ideas and pointed out problems which could be fixed.

In terms of Design Science Research, a new artifact was created to help with existing problem and it was evaluated using a survey. The research cycle of Design Science Research is shown in Figure 8 which is adapted from [8].



**Figure 8.** The research cycle of Design Science Research, adapted from [8].

The people in the environment of the research consisted of broadcasters and audience of the broadcasts. Technical systems are pretty much the broadcasting software, game client of CSGO and the advertising possibilities they offer together. Problems and opportunities are the reason for implementation; ineffective advertising methods being the problem and improved statistics being opportunity. Knowledge base includes everything that is mentioned in Chapter 2 about advertising methods. There is also a lot of experience and

expertise of the broadcasting with the author being actively broadcasting esports himself and watching lots of both amateur and professional esports broadcasts.

This thesis also followed Design Science Research guidelines by Hevner, which are introduced in Table 8 [8].

**Table 8.** Design Science Research guidelines and how they were applied

Criterion	Description	How it was applied
1. Design as an artifact	Design research must produce a viable artifact in the form of a construct, a model, a method, or an instantiation.	The produced artifact, website for both advertising and analysis is introduced in the Chapter 3.
2. Problem relevance	The object of design research is to develop technology-based solutions to important and relevant business problems.	Chapter 2 introduces different advertising methods and how they could be improved. Advertising is important business for esports broadcasts.
3. Design evaluation	The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation plans.	Chapter 4 covers the evaluation process which consisted of conducting surveys and analyzing their results.
4. Research contributions	Effective design research must provide clear and verifiable contributions in the areas of the design artifact, design foundations, and/or design methodologies.	These kinds of artifacts have not been used yet in broadcasts. Chapter 3 introduces the implementation and how it benefits broadcasts.
5. Research Rigor	Design research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact.	Chapter 2 explains the basis for implementation. Chapter 3 introduces implementation and all the parts of it. Evaluation is made using Mann-Whitney U method which fits the sample sizes of both surveys.
6. Design as a search process	The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment.	The created artifact was the best possible available for the purpose with the information that was available at the time.
7. Communication of research	Design research must be presented effectively to both technology-oriented and management-oriented audiences.	This Thesis is a presentation for technology-oriented in terms of filtering game data into an automatically functioning presentation. For management-oriented audiences this is interesting with its advertising aspect.

The implementation was more of a “proof of concept” instead of being an advertising

tool ready to be used in an official tournament broadcast. With a slightly better-looking implementation providing a lot better visibility for the advertisement, the advertised fake company would have been remembered better by the respondents. In the future, there should probably be a presentation text with the logo, for example: “Round recap provided by”. Which would help new viewers to understand more quickly which part of the implementation is the advertisement, and which is statistics. This is backed up by some of the open feedback responses:

“I liked that it provided some useful extra information about the gameplay itself. My eye was immediately drawn to it thanks to the sliding motion. I feel like the actual advertisement part could have been a little bit more pronounced, as I was too busy looking at the round statistics to pay much attention to the logo. However, this would have been rectified by repeated viewings.” -Respondent #17 Group B

The video clip in the survey lasted only one round while viewers spend usually a lot more time watching the stream. A regular match lasts at least 16 rounds so there is a lot more time for the viewers to look at the advertisements during the broadcast. The time was too short for both the static advertisements and the advertisement in the implementation to be noticed properly by viewers. Advertisements of both methods were remembered very poorly by the respondents. Some of the viewers even thought that the team names were the advertisements to remember because they had unconsciously filtered out all the sponsored logos of the video. If implementation advertisement would have been a standard advertising method in broadcasts similarly to the static advertisements, it might have suffered from the same effect. In this case, the viewers did not have enough time to watch the advertisement because they were baffled by the new UI element in their screen for 17 seconds.

A more proper research on this subject would include watching a lot longer video with more polished advertisements. It would probably help if the advertised companies were real, existing brands and were not completely new and fake like in this survey. In addition to a longer video, the survey could also be longer and have more specific questions about the usefulness of the implementation. The horrible results of the question “List all

advertisements you can remember” were nothing short of disaster but on the other hand it shows how easily the advertised brands are ignored or forgotten if there is nothing more to the advertisement than just a plain image.

If a similar study is done in the future, there could also be a method which was used in “Did You See That? In-Game Advertising Retention in Players and Onlookers” with a racing game called Torcs. In addition to listing all the advertisements from memory, all the eight logos and 16 extra logos were shown to the respondents and they had to mark whether they had seen that logo or not [16]. In hindsight, this could have been a good method with the fake companies that were used in this Thesis. None of the used logos could have been recognized by respondents while they were watching the video, but they could have recognized them by looking at them one by one like in the research with billboard advertisements in Torcs game.

The validity of the research can be evaluated using four different aspects which are presented in Table 9 [22].

**Table 9.** Validity aspects of the research using [22].

Aspect	Description [22]	Evaluation
Construct	This aspect of validity reflect to what extent the operational measures that are studied really represent what the researcher has in mind and what is investigated according to the research questions. If, for example, the constructs discussed in the interview questions are not interpreted in the same way by the researcher and the interviewed persons, there is a threat to construct validity.	Questions were modified VRP items which have been used originally in commercial research in the past. According to the open feedback the questions have been interpreted correctly by the majority of the respondents.
Internal	This aspect of validity is of concern when causal relations are examined. When the researcher is investigating whether one factor affects an investigated factor there is a risk that the investigated factor is also affected by a third factor. If the researcher is not aware of the third factor and/or does not know to what extent it affects the investigated factor, there is a threat to internal validity.	There was a third factor, visibility time, which affected the results for both evaluated advertising methods. However, it affected only the memorizing question, not harming the opinion questions.
External	This aspect of validity is concerned with to what extent it is possible to generalize the findings, and to what extent the findings are of interest to other people outside the investigated case. During analysis of external validity, the researcher tries to analyze to what extent the findings are of relevance for other cases. In case studies, there is no population from which a statistically representative sample has been drawn. However, for case studies, the intention is to enable analytical generalization where the results are extended to cases which have common characteristics and hence for which the findings are relevant, i.e. defining a theory.	No data was collected of the respondents, but according to the open feedback a lot of them had watched CSGO broadcasts in the past. However, generalization should not be made for the whole audience of CSGO broadcasts with this sample size. This research alone is not enough for that.

Reliability	This aspect is concerned with to what extent the data and the analysis are dependent on the specific researchers. Hypothetically, if another researcher later on conducted the same study, the result should be the same. Threats to this aspect of validity are, for example, if it is not clear how to code collected data or if questionnaires or interview questions are unclear.	The reliability aspect could be evaluated by doing a follow-up survey with more accurate information of the respondents and longer visibility times for the advertisements.
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## 6 CONCLUSIONS

Advertising methods in esports should definitely be looked at more thoroughly because the industry is still young. The esports industry and broadcasts are full of advertising opportunities different from the traditional sports broadcasts but static advertisements are still used surprisingly much. This Thesis did not provide any groundbreaking solutions to the fact that static advertisements are easy to forget but according to the VRP questions and open feedback, the implementation advertisement was enjoyed more as an advertising method.

It was found that this survey was not good enough to measure the overall effect of advertisements because one round of CSGO is not the same thing as watching the whole match. Nevertheless, according to the open feedback given by respondents, implementation advertisement is a good addition to the esports broadcast advertising methods because it provides useful information about the previous round instead of being just another advertisement. It was noted that the looks of the implementation should be refined and that too excessive use of it as advertising method could make it irritating similarly to the statistical advertisements in the traditional sports broadcasts.

The research question “How to design a more noticeable advertisement for esports broadcasts without making audience more irritated by it?” was not completely solved, but steps were taken towards the right direction. The overall result might have been different with logos of real companies and by separating the advertised logo more clearly in the implementation, both of which were mentioned in the open feedback. All the three objectives for the research were completed and the implementation could be used in real esports broadcasts with some graphical tweaking.

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## **APPENDIX 1. Questions of the survey**

### **Section 1 of 5**

**Description:** Watch the following video fullscreen and move on the next section:

### **Section 2 of 5**

**Description:** Close the video and answer the following question.

**Question:** Try to list as many advertised companies as possible

### **Section 3 of 5**

**Description:** Express your opinion on the following statements about the static commercials in the bottom center of the screen. You can open the video if you can't remember them:

#### **Questions with scale of 1-5 (1 = I strongly disagree, 5 = I strongly agree)**

I thought the advertising method was clever and entertaining.

The advertisement was too complex. I was not sure what was going on.

These are the kinds of advertisements that keep running through your mind after you have seen them.

It required a lot of effort to follow the advertisements.

These kinds of advertisements have been done many times. It is the same old thing.

I have seen this advertising method so many times—I am tired of it.

I think that this is an unusual advertising method, I am not sure I've seen another one like it.

The advertising method irritated me — it was annoying

#### **Open question**

**Question:** Open feedback for static commercials

### **Section 3 of 5**

Express your opinion on the following statements about the sliding round recap advertisement in the end of the round. You can open the video if you can't remember it:

(continues)

## **APPENDIX 1. (continues)**

### **Questions with scale of 1-5 (1 = I strongly disagree, 5 = I strongly agree)**

I thought the advertising method was clever and entertaining.

The advertisement was too complex. I was not sure what was going on.

These are the kinds of advertisements that keep running through your mind after you have seen them.

It required a lot of effort to follow the advertisements.

These kinds of advertisements have been done many times. It is the same old thing.

I have seen this advertising method so many times—I am tired of it.

I think that this is an unusual advertising method, I am not sure I've seen another one like it.

The advertising method irritated me — it was annoying

### **Open question**

Open feedback for the sliding advertisement

### **Section 5 of 5**

**Description:** Data collection and handling is done by GDPR compliance. The restored data cannot be used to identify anyone.

**Question:** I understand how the collected data is used

## APPENDIX 2. Open feedback

### Static commercials Group A

<p>Mainokset ovat hyvällä paikalla, mutta en henkilökohtaisesti tykkää siitä että ne ovat koko ajan näkyvillä. Esim. jos vaikka mainokset näkyisivät joka kierroksen alussa sen 10-15sec, niin se olisi ihan ok.</p>
<p>Static commercial like in the video aren't irritating but also very unforgettable. I didn't pay any attention to the commercials first time I watched so I didn't remember any during this form.</p>
<p>no english thanks</p>
<p>I don't even pay attention to them in the first place. I had to rewatch the video to answer the first question. Also they are pretty small.</p>
<p>They are just "static noise", and not really seen when focusing on the gameplay.</p>
<p>I think i focused so much at the actual gamplay i did not notice the adds mostly. Changing or non-static adds that pop up once in a while would catch my eyes better.</p>
<p>Had to confirm my AdBlock actually shows the ads I'm supposed to evaluate. I could not remember anything... Banners are great as my mind seems to ignore them by now.</p>
<p>Its an ok way to advertise but maybe moving commercials are a lot better</p>
<p>Static commercials are the only non-annoying commercials. But yeah, as you can see from my first answer, I paid pretty much zero attention to them.</p>
<p>They aren't bothering me, usually I just won't pay much attention to them.</p>
<p>I concentrated on the content of the video and barely noticed the commercials.</p>
<p>The location for the advertisements (ads) was quite poor for two reasons; firstly, the action and the casting actively shifted the focus the the center and top areas of the screen, and secondly i only noticed there was ads when i noticed the top right corner of the white/gray container where the ads were, and started to wonder what it was, and why was it blocking my view.</p>
<p>Overall, i personally only glanced at the rightmost third of the container of the ads at any time, the reason for which i don't know</p>
<p>The only ad i could vaguely remember was the Tropicbets one, for the reasons that it stood out the most with its vibrant colors from the white/grey background, and it having a unique but simple image as a logo, in this case a toucan (animal). I couldn't remember the name when asked, since i subconsciously deducted it being an ad, so i only read the first word of the name and remembered the logo.</p>
<p>Lastly, I found that the non-native dialect of the caster made me focus more on the casting and gameplay, which made me have a tunnel vision that filtered all but the most necessary things related to the video, which excluded ads and the like.</p>
<p>The advertised companies should be related to gameplay so that people who usually watch the stream can relate to them better ie. HyperX, Nvidia etc.</p>
<p>The advertisement is hard to notice as a player that has played CS:GO before atleast in only 2-3 minute clips with gameplay going on the whole time (No pauses where you can focus on the UI more)</p>
<p>Propably one good way to show commercials that are noticed more often in such small portions of gameplay that are centralized in the screen. (Sprays on places that people usually hold so that the logos are shown all the time in the middle)</p>
<p>I barely noticed them, so they weren't annoying. There's nothing unique about them because it's the kind of advertising you see everywhere. However, I do watch Counter-Strike occasionally so</p>

my mind just ignored the ads at this point.
Was hard to notice, or my mental adblocker is too good. Action tends to be around center and edges of the screen, and a static non-animated ad doesn't really attract attention.
I prefer ads like this. They really don't get on the way of anything and get the job done.
Easy to miss
Didn't notice them at all on the first viewing of the video.
almost every tournament have such commercials. at the very beginning i saw the banner and companies, but didnt even read the names, just looked at the banner in general. static commercials better than moving ones, as they dont distract you as much.
They are there. Nothing special about them. Plain old advertisement.

## Static commercials Group B

Problem with static commercials is that they can't be where one actually keeps their eyes while watching CS:GO. My eyes never went down where the commercials were the whole time. The after round recap was the only place that I spotted because round was over and recap moved in to the screen.
Of course the video was short so maybe in longer video/stream one might spot commercials more easily when there's not much action in game.
Boring, like stickers on top of the UI. Missing the bells & whistles
Static commercials are part of the game and they don't irritate me at all. In this video the ads were placed pretty well, so they were vertically at the center of the screen, which is good for the company, but horizontally at the bottom of the screen, which doesn't irritate the viewer too much. It is also very good that the ads doesn't move or blink, which would take the focus from the actual game.
I didn't pay any attention to the commercials, so at least they weren't distracting. Then again I've seen this kind of thing so many times, I filter them automatically
There is unused space in the advertising section. The logos can be spread further apart to improve legibility.
Didn't even notice the advertisements before they were mentioned in the first question on this survey.
I 100% didn't even notice there were any commercials on the screen while I was watching the clip. There needs to be something that catches my attention even for a while.
Too many logos that were all too small in my opinion
Didn't really pay attention to them at first, would have in case they would have been a.) Companies I know b.) Would have watched the whole game, eventually would have spotted em.
Uninspiring. Animations and flashy ads in transition on conventional sports work.
The best thing about them is that they don't cover up any of the vital gameplay elements, and that they aren't distracting. I feel that they would be more effective when you're exposed to them for a longer period of time.
They don't bother me, I can just ignore them quite easily.
Good placement from the viewers point of view, since the ads were not distracting the viewing experience at all
This kind of advertising in the bottom of the match screen is really common. In this case sadly it was way too cluttered and almost unreadable. I think there was three or four different names there

and some of them were on a really small font. also it didn't help that the background was grey. I tried to eye it out quickly at first when i saw it but because of the readability i lost interest. One interesting add was on the upper right side of the screen with the swift mobile popup. There was interesting after round information there and the add was well coloured; it made me want to look at it.

Commercials are good for gaming industry but they should not affect the watching experience

## Round recap advertisement Group B

Sliding advertisement worked way better because the round was over and movement is easier to notice. Also it (the recap) has something to do with the game.

A good way to advertise. The logo is not visible all the time, so viewer may concentrate on the game, but the logo still gets a lot of so-called "view time" when the stats are there after the round.

I had to watch the video many times to even notice what the advertisement was

The design of the advert could be improved so that it is clear that the round summary and the advert are two separate entities.

I dont know if the recap is standard but it was definitely easy to notice, also here didnt notice the advertisement on it at first.

Needs to have some pretty graphics so it doesn't look so rough for the viewers.

Clever idea!

Wasn't bothered, though had to double check on what the infoscreen was about:)

I liked that it provided some useful extra information about the gameplay itself. My eye was immediately drawn to it thanks to the sliding motion. I feel like the actual advertisement part could have been a little bit more pronounced, as I was too busy looking at the round statistics to pay much attention to the logo. However, this would have been rectified by repeated viewings.

positioning is good, non disruptive

The ad on a sort of bonus element for sure captures my attention. However, this style of advertising can be very annoying when done excessively, like in big leagues such as NFL, NBA and NHL, where almost all statsheets and replays have their own sponsor.

Good ads from the viewers point of view, since the ads didn't disturb my viewing experience at all very good, informative add about the kill times that happened on the last round. The colours were good and the information was there. Only thing that really bothered me that the whole thing could have been a bit larger since the player names were slightly hard to read. Otherwise, good job on this one.

Advertisement with statistics like this give more value to audience