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Non-linear Televised Sports – Understanding the Time-shifted User Experience

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ABSTRACT OF
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Engaging with television is increasingly moving from viewing of linear broadcasts to time-shifted content. Sports is one of the most important but also one of the most time-dependent content genres.

The objective of this thesis is to categorize time-shifted sports viewing behavior and clarify whether non-linear options can offer enjoyable viewing experiences. Our user research included contextual interviews, a survey and analysis of real-life usage data.

The results confirm that live viewing is the dominant and preferred type of sports viewing experience. However, we identified three different paradigms of time-shifted viewing as well. They were perceived as secondary options, but relevant within certain circumstances. Our research shows that a number of peripheral activities affect non-linear viewing of sports. Social interactions, media use and betting are among the factors that seem to diminish the advantages of time-shifting.

The findings support further development of services that offer non-linear sports content. Such services should let the viewers choose between a laid-back type of experience and more active involvement.

Keywords:	user experience, non-linear content, televised sports, time-shifted viewing, user research, user-centered design
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Television katselu on yhä enemmän muuttumassa lineaarikanavien katselusta epälineaarisiin sisältöihin. Urheilu on yksi television tärkeimmistä mutta myös aikasidonnaisimmista ohjelmatyypeistä.

Tämän diplomityön tavoitteena on luokitella urheilun epälineaarista katsomista ja selvittää, voiko se tarjota nautinnollisia katselukokemuksia. Käyttäjätutkimuksemme koostui kontekstuaalisista haastatteluista, kyselystä ja käyttödatan analysoinnista.

Tulokset vahvistavat suorien lähetysten olevan suosituin tapa katsoa urheilua. Tunnistimme kuitenkin myös kolme erilaista epälineaarisen katsomisen mallia. Niitä pidettiin toissijaisina, mutta tietyissä olosuhteissa olennaisina vaihtoehtoina. Oheistoiminta vaikuttaa urheilun epälineaariseen katsomiseen. Sosiaalinen kanssakäyminen, median käyttö ja vedonlyönti voivat vähentää epälineaarisen katsomisen etuja.

Löydökset tukevat epälineaarisia urheilusisältöjä tarjoavien palveluiden kehitystä. Uusien palveluiden tulisi tarjota mahdollisuus sekä rentoon ja passiiviseen katselukokemukseen että aktiivisempaan katselutapaan.

Asiasanat:	käyttäjäkokemus, epälineaarinen sisältö, televisioitu urheilu, viivästetty katsominen, käyttäjätutkimus, käyttäjäkeskeinen suunnittelu
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Espoo, July 7, 2014

Valtteri Munkki

Abbreviations and Acronyms

DOI	degree of interest
DRM	digital rights management
DVR	digital video recorder
EPG	electronic program guide
GUI	graphical user interface
IP	Internet Protocol
IPTV	Internet Protocol television
ITV	interactive television
NHL	National Hockey League
NHLGC	National Hockey League GameCenter
NPVR	network personal video recorder
TWF	Time Warp Football
TWS	Time Warp Sports
UI	user interface

Contents

1 Introduction

1.1 Motivation

Television is one of the most popular and widespread mediums. Since its introduction in early 20th century (Ng 2012), the TV ecosystem has undergone numerous technological changes, such as the switchover from analog to digital broadcasts (Abreu et al. 2013). However, the basic concept of the medium has remained relatively unchanged in the eyes of most viewers transmitting audiovisual content through linear broadcast channels for laid-back consumption (Meyer 2006). Recent developments have made it possible for this concept to change and greatly affect the TV viewing experience.

One of the most significant changes is the transformation from linear, or "live", broadcast streams to non-linear, or "time-shifted", content (Carlson 2006; Meyer 2006). Despite technical advancements that promote non-linear viewing, such as the digital video recorder (DVR), broadcast stations' program schedules continue to hold great significance as the underlying economic model does not yet fully support time-shifted viewing (Ng 2012).

Sports is one of the most important genres on television. In the words of pioneering TV sports director Harry Coyle, "Television got off the ground because of sports." (Wan, Yan 2007). This thesis attempts to shed light on the implications of the changing television ecosystem in terms of non-linear viewing of televised sports content, and thus find ways to support further service development and user interface design in this area.

1.2 Objectives

Previous research does not provide a clear understanding of non-linear viewing in case of sports content. To address this issue, we first attempt to understand how much and in which ways sports content is currently consumed non-linearly and how it possibly differs from linear viewing. Second, we seek to identify different activities and phenomena that affect non-linear viewing of sports to further understand the gratifications of such practice. Finally, we refine the increased knowledge in order to support future service development and user interface design that could enrich enjoyment-driven user experiences. The main objective of this thesis is to answer three corresponding research questions:

RQ1. Do sports fans currently see non-linear viewing as a relevant fashion to experience sports content?
RQ2. Which circumstances and peripheral activities affect non-linear viewing of televised sports?
RQ3. Which qualities should future services and user interfaces hold to facilitate enjoyable non-linear sports viewing experiences in different contexts?

In order to answer these questions, both literature review and user research is conducted. The literature review will cover related research in terms of technical background and user experience highlighting the current state of the television ecosystem and its possible future directions. User research will be conducted in three parts to form a broad understanding of how sports content is used in a non-linear manner. In addition to interviews and a survey, we will analyze real-life usage data from a commercial service called Elisa Viihde.

The third part of user research being relatively unknown, one objective is to discover its potential in relation to the other well-established methods. Conducting interviews and surveys is laborious and it would be highly

beneficial if same type of information could be obtained as a byproduct of normal use. Thus, we seek to answer a fourth research question:

RQ4. How can actual usage data be utilized alongside more traditional methods in entertainment related user research?

1.3 Scope

This thesis focuses on non-linear viewing of sports content. Non-linear viewing includes time-shifted full-length content as well as content that is condensed, either automatically by the service providing the content or interactively by a viewer. Non-linear viewing often takes place interleaved with linear viewing, which is why they cannot be addressed as two entirely separate phenomena. Nonetheless, the focus of the thesis is on non-linear viewing.

In this thesis, sports content covers audiovisual content which is mainly intended to be mediated via television. A range of different popular sports such as football, ice hockey and motorsports are included in this definition. In addition to traditional television devices, mobile devices and media multitasking are taken into consideration.

The user research is conducted in Finland and in Finnish but related research and examples of current services and prototypes are considered globally. The emphasis is on user research and although suggestions for future service development are made and ideas from current solutions are assessed, no new prototype is presented within this thesis.

2 Background

2.1 Technical Background

From technical perspective the television ecosystem and video content transmission in general have faced changes both in terms of the devices on the receiving end and more importantly the underlying broadcast infrastructure and protocols.

2.1.1 Television Devices

The characteristics of the display devices have changed from early monochrome cathode ray tube (CRT) television sets (Ng 2012) to current widescreen, high-definition liquid-crystal display (LCD) and plasma display panel (PDP) devices. The technical difference between a television display and a computer display has become minimal. Resolution and color accuracy among other qualities have improved and stereoscopic image capabilities have become available. These developments offer new possibilities in terms of user interface elements but also cause some restrictions. For example, plasma TVs have "burn in" issues which limit having long-standing static elements and stereoscopic displays cause visual stress symptoms (Atallah et al. 2012). On the other hand, stereoscopic displays offer the possibility of two users viewing different content on the same screen. However, the advances in display technology play a minor role in terms of the changing TV experience.

More importantly, the range of devices on which TV content is consumed has grown. Present-day mobile phones and tablets sport display size and processing power sufficient to manage high-definition video. Despite earlier projections (Meyer 2006), mobile TV standards such as DVB-H have not become popular. In contrast, a large number of IP-based solutions have emerged. For example, in Finland the national

broadcasting company Yle provides live streams as well as recordings of all of its TV channels for numerous mobile, desktop and other platforms. The propagation of 3G and 4G mobile networks has been essential in terms of making mobile devices capable of receiving live video content at sufficient bitrates. In addition to mobile devices, home theater personal computers (HTPC), game consoles and streaming boxes such as Roku and Apple TV as well as smart-TV features have diversified the practices of how televised content, sometimes mixed with other type of content, can be consumed (Abreu et al. 2013).

2.1.2 From Analog to Digital and IP

Technologically, perhaps the most significant change in the history of television has been the switchover from analog to digital broadcasts. The transition has required substantial infrastructural changes and is still ongoing on a global scale. It was largely caused by the need to conserve bandwidth but it is also a way to reduce TV piracy, as it is much easier to control access to channels if a set-top box is required to decode them (Darnell 2008).

From users' perspective, the most common and most visible advances of digital TV include electronic program guide (EPG) and digital video recorder (DVR). The combination of these two has introduced a popular habit of recording large amounts of content and consuming it according to one's individual schedule. Meyer (2006) suggests that television consumption is indeed evolving towards less linear and more personal options.

Another significant technological shift is the rise of Internet Protocol television (IPTV). Recent advances in internet video technologies such as compression formats and digital rights management (DRM) techniques have enabled a shift in television content delivery from channels defined by radio frequency spectrum to IP-based Internet delivery (Olsen & Moon

2011). IPTV has also enabled network personal video recorder (NPVR) services, which store the recordings "on the cloud" and make them available on a variety of viewing platforms.

Convergence between TV and Internet is likely to continue. New services can present content in the form of different applications, widgets (Shin et al. 2008), or video collections (Francisco-Revilla et al. 2012) instead of the established and familiar channels. However, constrained hardware and middleware of television systems have limited performance and graphics capabilities, and such shortcomings will not disappear in a heartbeat as broadcast services available to mass audiences must maintain compatibility with diverse populations of different legacy devices (Cooper 2008).

2.1.3 Interaction Technologies

Despite the apparent possibilities for more interactive TV viewing experiences, the dominant input method is still a remote control which consists of number buttons and a selection of dedicated function buttons. Digital TV has introduced menus, lists, dialog windows and other graphical user interface (GUI) elements. By offering more feedback than a simple light, which indicates that a command was received, these interfaces attempt to make TV interaction more PC-like.

Standard remote controls are not optimal for navigating GUIs (Sweetser et al. 2008): for example, the user is often required to look down at the remote to find a particular command. In addition, typical remote controls offer poor text input and merely four-direction navigation with arrow keys, which in many cases result in a great number of steps in order to accomplish a relatively simple task. While the obvious alternative to traditional remote controls would be a mouse and a keyboard, they are not ideal in a relaxed TV experience (Sweetser et al. 2008). Several different

technologies have been suggested to overcome these limitations in television user interfaces.

Different pointing and tracking based remote controls have been proposed to address the issue of poor navigation on standard TV remote controls. The random access capability of such remotes attempt to enable mouse-like interaction on large displays from a greater distance and without the need for a surface to rest the input device on. Relative pointing devices have been found less ideal than absolute pointing devices due to indirect connection to the screen as well as tendency for pointing drift and lack of rotation compensation (Sweetser et al. 2008).

Voice recognition technology can be used to create vocal command user interfaces or multimodal interfaces, which enable different interaction modes such as voice entry and key presses on a traditional remote control. Voice entry has been found attractive for EPG functions in a multimodal case but designing such interface is also complicated (Portolan et al. 1999). Another potential ”eyes-free” technology is gesture recognition. Motion of a gesture-aware remote control in 3D space, associated with finger presses, has been found both fast and accurate (Bailly et al. 2011). One problem with voice commands and gestures is that TV viewing is often a group activity.

Game controllers and so called second screen applications on tablets have also been found effective as controllers for interactive TV applications (Cox et al. 2012). They do, however, share the issues of traditional remote controls in terms of sharing the attention of the user between the control device and the big screen. On the other hand, the lack of graphics on the big screen when using a second screen solution has been claimed to improve effective interaction while providing ”an uninterrupted broadcast experience on the TV itself” (Cruickshank et al. 2007). Novel commercial systems such as Apple’s AirPlay and Google’s Chromecast allow users to

transfer content from their personal portable devices onto bigger television screens (Buchner et al. 2014) via wireless local area network (WLAN). In such cases it seems natural that the particular portable device is also the control device.

2.1.4 Video Browsing

Content-based browsing of videos can save bandwidth and is valuable in several cases (Arman et al. 1994). It has been studied primarily for information finding and video editing tasks (Drucker et al. 2002) but also from the perspective of non-linear viewing of sports and other type of content (Li et al. 2000).

The analog video-cassette recorder (VCR) in the 1970-80s made it possible to view a video with the additional ability to pause, fast-forward and rewind for skipping or re-viewing particular segments (Li et al. 2000). Aids such as chapter boundaries and scene indices in DVDs have provided coarse access to separate video segments (Girgensohn et al. 2004). Digital video and internet video streaming have made it possible to instantly access any point in the video timeline and present an opportunity to provide new features for browsing video content. As computing costs continue to drop, processing techniques can be utilized to automatically generate shot boundary frames and a visual index into content or shorten the viewing length of a video without missing relevant content (Li et al. 2000).

In a user study with a prototype that implemented these features, sports content was classified as ”informational video-centric content” in which shot boundary frames were particularly important. The participants used shot-boundary frames to seek sports video with an average of 26.5 times in 30 minutes which was much more than for example news (9.5) or shows (4.5). Time compression was also popular but traditional fast-forward remained quite attractive to the users as well. In general, the participants

did not like viewing narrative entertainment in fast versions but enjoyed saving time and being in control when viewing sports and news. (Li et al. 2000)

SmartSkip interface offers similar features for the most part. It shows a sequence of thumbnails of the content when the user presses the fast-forward button or the rewind button and the user can then move the selected thumbnail forward or backward (Figure 1). In a user study on this interface, performance metrics such as time to task completion and number of clicks were worse than in more traditional skip and fast-forward interfaces. However, subjective user satisfaction was significantly better. The researchers suggest that there may be ”some inverse relation between the amount of attention that the interface requires and the amount of satisfaction that a user has with it”. (Drucker et al. 2002)

Figure 1. The SmartSkip interface (Drucker et al. 2002).

The two studies cited above examined browsing a single video. Hypervideo, on the other hand, allows users to follow time-based hyperlinks to navigate interrelated video content (Girgensohn et al. 2004).

Navigating hypervideo has been claimed less rapid and more difficult than navigating hypertext (Girgensohn et al. 2004). Studies have revealed user interface issues and questions about the most suitable form of hypervideo and how to present it to users such that they can understand and use its structure (Girgensohn et al. 2004; Shipman et al. 2008). Within the context of sports content, hypervideo could be used for additional information purposes such as offering links to previous actions of a particular player.

2.2 User Experience

In this thesis the term user is used alongside the word viewer to describe a person who is consuming televised content. The term engager has been used as well (Larsson et al. 2008). For a large part, the television experience is still about passive viewing but recent developments have brought novel user interfaces and increased interactivity to diversify the TV experience.

2.2.1 Interactive Television

Interactive television (ITV) is a term that is used to describe a television system that enables some type of interactive user experience (Gawlinski 2003). It has also been used as an umbrella term to cover the convergence of television with other digital media technologies such as computers, personal video recorders (PVRs) and game consoles (Lu 2005). Interactivity can be defined as simply being anything that lets the user make choices and take action (Gawlinski 2003). ITV can, for example, provide synchronized trivia content during a broadcast, allow viewers to vote during a show or offer time-shifting features (Lu 2005).

Some researchers believe that television is increasingly shifting from the traditional passive viewing experience to a more active two-way experience (Lu 2005). Whereas the traditional model emphasizes linear

entertainment, the interactive experience brings along user participation, non-linearity and infotainment. ITV also enables different business models. Figure 2 presents these differences between traditional and interactive television.

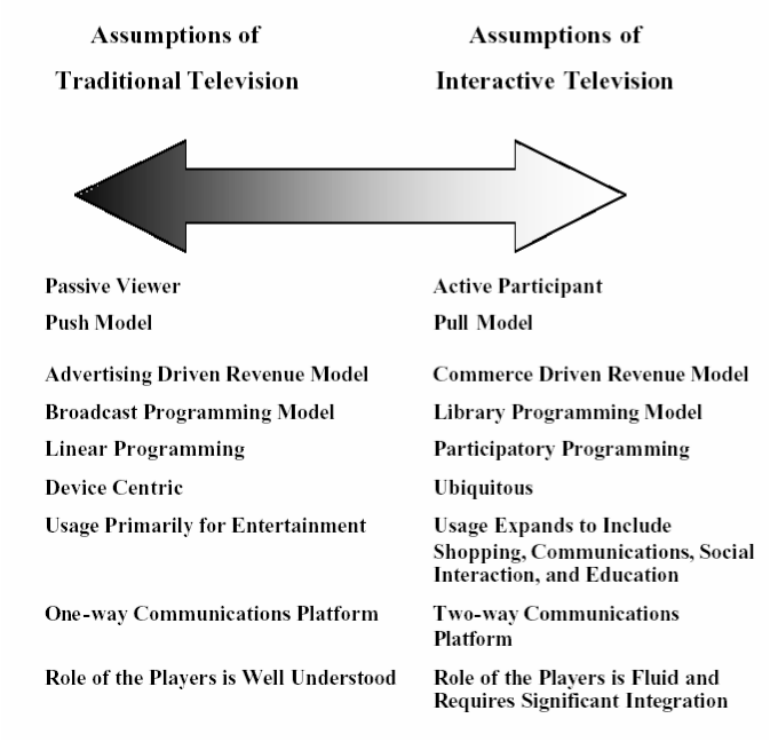

Figure 2. Assumptions of traditional and interactive television (Lu 2005).

Previous human–computer interaction (HCI) research has identified clear differences in the user interface requirements between the PC and the ITV. Interactive TV applications gratify entertainment needs and leisure activities in a relaxed domestic context which is why the mentality of efficiency and task completion found in traditional user interface heuristics may not be suitable for designing ITV interfaces (Chorianopoulos 2008). Instead of trying to make television users more active, new applications should maintain the sense of ease and passivity that accompanies television viewing (Bonnici 2003). Unless the new applications are evaluated with consideration for the ordinary TV viewer, they might end up being appropriate only for the computer literate user (Chorianopoulos & Spinellis 2006).

Although interactivity might seem as the major benefit of ITV, the idea of interactivity being always preferable is a fallacy that designers should avoid (Chorianopoulos 2008). Sometimes interactivity is disruptive to the entertainment experience. Some categories of users do not like to have the option to change the flow of TV content but just prefer to view passively (Vorderer 2001). Some researchers, on the other hand, suggest that viewers are willing to be very active and that interactivity is most appropriate for non-linear or random access content such as news and sports (Jensen 2005). Some studies have identified physical and cognitive barriers for older users to use ITV services (Mitchell et al. 2007; Rice & Alm 2008). Prior knowledge of Internet and mobile phones has been found to support the usability of ITV services regarding navigation and text input (Bernhaupt et al. 2005).

TV viewing is often ritualistic, which contrasts with the focus on the EPG as a method to select content each time a user opens the TV. Most TV viewing starts with a familiar program (Lee & Lee 1995) but it might continue with browsing. Thus, instead of information seeking, relaxed exploration should be supported in ITV applications (Chorianopoulos 2008).

2.2.2 Non-linear Viewing

Non-linear viewing is an increasingly substantive TV consumption model (Carlson 2006; Meyer 2006). Gauntlett & Hill (2002) divide TV programming into three types: favourite programmes, which would always be viewed or recorded, non-favourite programmes, which would be viewed routinely and other programmes which would be viewed because they happened to be on and seemed interesting. The first type highlights the demand for non-linear viewing options.

According to Chorianopoulos (2008), designers should ”try to release the content from the fixed broadcast schedule and augment it with out-of-band

content delivery". This goal can be, and for the large part has been, accomplished with deferred broadcasts, on-demand offerings and recording sevices. Meyer (2006) presented "three scenarios for TV in 2015" and one of the scenarios was "the reign of TV portals" which highlighted non-linear consumption of television content through the aforementioned services. The other two scenarios also suggested that TV viewing will be less linear.

The obvious benefits of non-linear viewing are the abilities to choose when to view and to control the flow of the content by pausing, rewinding, fast-forwarding and so forth. However, non-linearity poses some threats too. In a study that observed less-technically-inclined people using a typical multi-device, multi-remote-control digital TV system, one of the main problems discovered was the lack of clarity and consistency of how to return to linear TV from a recording (Darnell 2008).

2.2.3 Media Multitasking

One distinctive quality of the TV viewing experience is that the viewers are not always concentrated on the TV content. There is a wide diversity of attention levels from background noise to full concentration (Lee & Lee 1995). Media multitasking, which can refer to multitasking several mediums at once or multitasking media with a non-media activity (Jeong et al. 2010), is one reason for such variations.

Media multitasking is a common phenomenon. A study revealed that 81 % of young people in the US share at least some of their media time among two or more media concurrently (Roberts & Foehr 2008). Another study found that young people spend as much as 26 % of their media time doing media multitasking (Foehr 2006).

Television and computer is a typical combination of devices in a media multitasking situation. Rohm et al. (2009) found that in these cases

television often has the role of a background medium whereas the main attention is directed towards the computer. Peripheral display is a popular term to describe a display that presents additional information without diverting full attention from the primary activity (Matthews et al. 2004). In sports context, a peripheral display could present elements such as statistics or an alternate camera angle.

From user interface design point of view, instead of considering television as the focus of user activity, an alternative approach for designers is to consider television use as a secondary function to other activities (Chorianopoulos 2007). Design challenges of multiple device systems in TV context have been discussed as early as 1996. The identified problems include distributing particular types of content across appropriate devices consistently and in relevant display format (Robertson et al. 1996). The researchers state: "The power of PDAs will be most evident when they go beyond the role of a controlling device and are used as a companion computing device." (Robertson et al. 1996). The term PDA is rarely used anymore, but present-day tablets have realized these predictions.

2.2.4 Social Viewing

People enjoy viewing television together but talking about or referring to TV content is very popular as well (Lee & Lee 1995). Whereas PC usage is mostly solitary, television has an important role as a locus of social interaction (Gauntlett & Hill 2002) and it might provide a better experience when viewed with family members (Kubey & Csikszentmihalyi 1990). Designers should consider social viewing that may take place both locally and remotely (Chorianopoulos 2008). It has also been pointed out that increased personalization reduces the chances that any two might have viewed the same program (Chorianopoulos 2007). This holds true for example in case of simultaneous football matches: whereas traditionally one match was broadcasted from each round, new services allow the viewer to choose whichever match.

As non-linear viewing increases, new applications should also support asynchronous communication of people who have viewed the same content but at a different time (Chorianopoulos 2007). A usability study of a system called CollaboraTV indicates that people can understand and appreciate asynchronous communication, essentially recorded comments, while viewing television (Harrison & Amento 2007).

One aspect of social viewing is user contributed content such as annotations, sharing and virtual edits (Chorianopoulos 2007). These possibilities are one part of increasingly active user involvement. Social media as well as more traditional web forums play an important role in these actions.

2.2.5 Dynamic Advertising

This thesis will not focus on advertising and different business models of distributing sports content but the commercial realities will not be completely ignored, as they essentially affect the viewing experience. Some researchers have long ago claimed that the traditional mass communication model of advertising has become insufficient to provide a relevant experience to television viewers (Dawson 1996). Early research has shown that 30 % of viewers change channels during advertisement breaks (Van Meurs 1998). A response to this is to blend advertising into the video content with product placement, branded TV programming or virtual advertising insertion systems, which utilize object tracking and chroma keying (Wan & Yan 2007). Another approach is to use dynamic insertion of personalized advertising to show relevant ads to different viewers. Personalization can take into consideration age, gender, where the viewer lives, what his or her current location is and so forth. Dynamic advertising also has potential to substitute the royalty rights paid to media owners and thus mitigate DRM issues (Chorianopoulos et al. 2003).

One problem of time-shifted content is that the advertisements might be outdated at the time of viewing (Ng 2012). Dynamic insertion of up-to-date advertisements is a simple solution to this as well. As discussed before, viewing is often a group activity, which should be taken into consideration in advertising. ITV solutions also enable interactive elements in advertising. Viewers can, for example, jump to additional information, take part in a contest or purchase a product directly within an advertisement (Jensen 2005). Table 1 illustrates these factors from the viewpoint of user interface design. Time-shifting and increased control over the flow of content allows, in some cases, skipping of advertisement breaks. It is unclear how users react to fixed pre-roll and mid-roll advertisements on a large scale but they are potential causes of frustration if they make the interaction a hassle.

Table 1. The resolution strategy of design factors for the case of personalized television advertising (Chorianopoulos et al. 2003).

Design Factor	**Resolution Strategy**
Real Time Vs Time Shift Broadcasting	Television programming is transmitted as usual, but the advertising break is dynamically created for each set-top box. The overall experience is seamless for the viewer.
Group Vs Individual	Each set-top box holds general household demographics and optionally individual demographics and preferences.
Interactive Vs Passive	Some advertisement spots may have additional interactive content. The viewer is notified and has the option to 'bookmark' an advertisement for later browsing of interactive content.

2.2.6 Sports Programming

Viewing sports is usually a different experience than viewing some other programming genre. A study has revealed that sports fans are more likely than fans of other popular genres to stretch the viewing experience beyond the program itself (Gantz et al. 2006). They are more emotionally involved and engage in pregame activities such as planning and searching information as well as consume follow-up information after the event

(Gantz et al. 2006). Another study suggests that sports viewers increasingly use both traditional and new technologies for following big sporting events and that they are more concerned about content than the medium that delivers it (Tang & Cooper 2012).

The medium is not always traditional television. Global internet streaming services provide content to everyone regardless of whether a local production with native language commentary exist. On the other hand, internet offers cost-effective options to present local sports that would not be profitable enough otherwise. Different sports hold varying interest values in different cultures – some have a few hundred local fans whereas others attract millions of people across the globe.

Televised sports is undoubtedly a very time-sensitive product. Some have claimed that it only has significant value in real time (Cowie & Williams 1997) and that it is one of the few content areas that ”does not work if time-shifted” (Boyle 2009). Such statements may be exaggerated but it is clear that the strong time sensitivity of sports programming has limited the opportunities for windowing and thus made it difficult to segment viewers for price discrimination (Gaustad 2000). According to Gaustad (2000), even minor shifts in the transmission time from the time the event is actually taking place may result in a substantial loss of value. He states that the degree of time-sensitivity for each sport is dependent on how strong the uncertainty-of-outcome is.

Traditionally, the experience of viewing televised sports has more or less simulated the experience of attending the actual event on the spot. This simplistic approach is emphasized when the viewer has an option to choose a constant wide camera angle. For example, the Finnish national broadcasting company Yle provided such feature during FIFA World Cup 2014. A completely opposite approach is to create a game-like experience.

Live betting, fantasy manager games and similar activities have been tied into audiovisual sports content in order to achieve this.

The sports genre is relatively heterogeneous. Sequentality/continuity is one diversifying factor. For example, American football is very much sequential. A single match comprises of clearly defined sections that are separated by breaks. According to a Wall Street Journal article, the average amount of time the ball is in play on the field during an NFL game is approximately 11 minutes (Biderman 2010). There are also breaks between periods. The duration of the break is known and the starting time can be closely predicted. A Formula 1 race, on the contrary, is a continuous event. A racing accident or a safety car period might disrupt the continuity but even in that situation it is usually unknown when the race will continue, keeping the audience alerted. There are many other factors as well. There are individual sports and team sports. There are one-on-one matches and competitions between several participants or teams. Some events occur as part of a series and others are one-off. All in all, in addition to having different terms and rules, there are several factors that contribute to the conclusion that the flow of a sports event can be very different depending on the sport in question. These differences affect the experience of viewing sports as well as enable varying options for developing interfaces that support non-linear viewing.

3 State of the Art

3.1 Commercial Products

Current commercial solutions which support non-linear viewing of mediated sports can be divided into generic services and services that are dedicated to certain type of sports content. NHL GameCenter is representative of the latter type. Within Elisa Viihde, both types exist.

3.1.1 NHL GameCenter

NHL GameCenter (NHLGC) is an example of a commercial service that utilizes and combines several of the aforementioned concepts and technologies. Its web interface (Figure 3) attempts to enrich the viewing experience by offering a plethora of interactive controls.

Figure 3. NHLGC web user interface.

There are several features that are specifically related to time-shifted viewing but the interface also allows seamless transition from live viewing to time-shifted viewing. A designated “LIVE” button takes the user back to live feed at any given moment if possible. In addition to being able to

freely jump to any point on the timeline, the user can select certain events, such as goals, shots on goal and period breaks (Figure 4). The user can also choose to hide the game events in order to avoid being spoiled. In the game view, there are also buttons for pausing, restarting the game and jumping 10 seconds backward or forward as well as a slow motion mode that can be toggled. In Figure 3 and Figure 4, slow motion is disabled for an unknown reason and live viewing is also disabled as the particular match had already ended at the time of the screen capture.

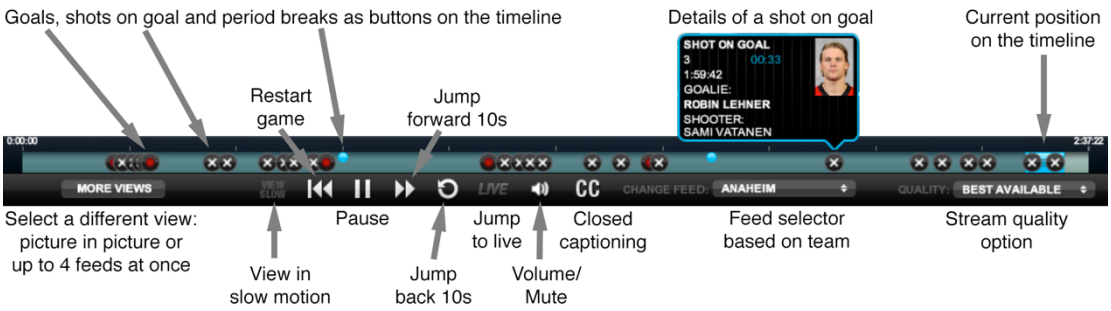

Figure 4. NHLGC user interface elements around the timeline.

The video stream itself can also be controlled: the user can choose the quality of the stream by selecting an appropriate bitrate from a drop-down menu. The default setting is "best available" which adapts the bitrate automatically but users with an unstable connection can select a lower bitrate to ensure smooth streaming and prevent the quality from changing continuously.

When selecting a match, the user can choose to show the live results or hide them to avoid spoilers. In addition to the traditional view of one game, a mosaic view (Figure 5) of up to four parallel matches and a picture-in-picture view (Figure 6) are offered. In these modes, there is a limited set of control features for the non-full-screen windows.

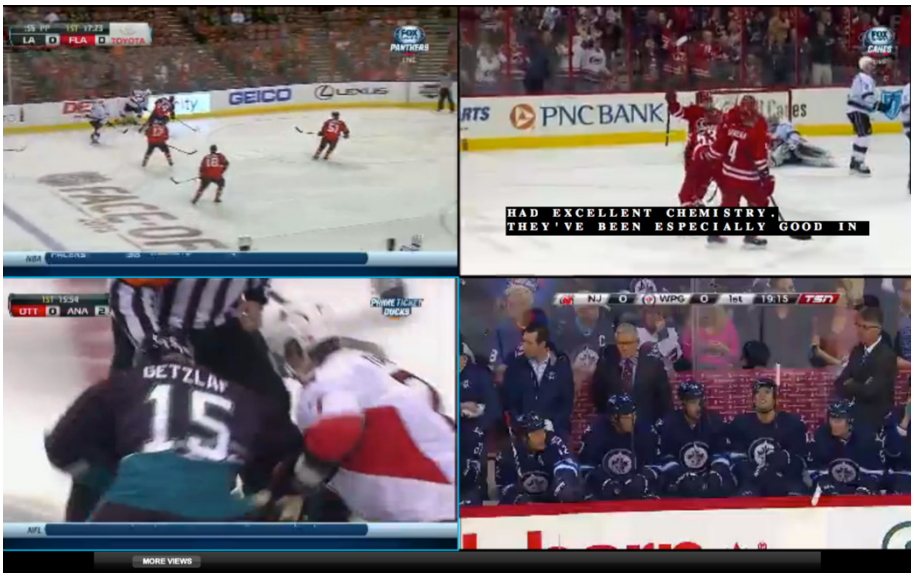

Figure 5. NHLGC web user interface: mosaic view.

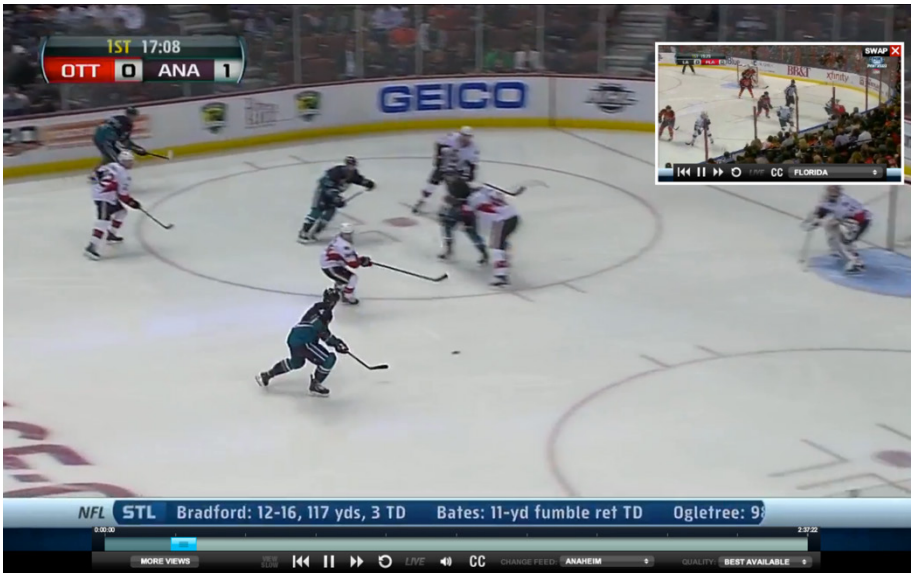

Figure 6. NHLGC web user interface: picture-in-picture view.

Accessibility has also been considered as the UI has buttons for closed captioning for hearing impaired users. An example can be seen in the top right corner of Figure 5. Multi-screen use could be an appropriate use case for this feature too as the user can only choose one audio source at a time. However, the automatic captioning is not particularly precise and and its tempo is very high as sports commentators tend to talk fast.

Advertising is one important factor in non-linear viewing. A common concern among broadcasters is loss of viewing time (Lynn et al. 2009) if viewers can skip uninteresting parts of a broadcast. NHL GameCenter does not limit skipping advertisement breaks. The service utilizes digitally embedded advertisements within the actual sports content as depicted in Figure 7. In theory, the ads could be dynamically customized according to user information such as location, but we have no information whether NHLGC does this. At least the current ads seem mostly irrelevant to a person living in Finland.

Figure 7. A digitally embedded advertisement in NHLGC circled in red.

In addition to the web UI, many of the features are available on a plethora of different platforms such as mobile phones, tablets, game consoles and different set-top-boxes. A user can choose to utilize a different device or a different display for viewing matches, replays and other types of content. While the service is about ice hockey and more precisely the NHL, most of the features could be applied to any ice hockey league and similar fast-paced team sports.

3.1.2 Elisa Viihde

Elisa Viihde is a multi-platform service that includes a digital receiver, a web-UI and mobile applications. It enables viewing regular TV channels

on the cable and antenna network. Some channels utilize IPTV. In addition to linear channels of ”live television”, the IPTV features include video on demand (VOD) services such as rental movies and subscription-based content libraries as well as time-shifted television. The latter consists of several different forms: network recordings, catch-up and dedicated applications for selected sports content.

NPVR is one of the most popular features of the service. In a web survey conducted in spring 2013 for Elisa Viihde customers, 47 % of the respondents (N = 6320) stated that the service has changed their viewing habits and all the most significant changes had to do with increased non-linear viewing. In addition to the digital receiver, network recording can be initiated via web-UI and mobile applications. However, it is only applicable to free channels due to contractual restrictions. Moreover, a recording can only be viewed after it is ready a few minutes after the program has ended. The user interface of the recordings allows the user to move on the timeline 30 seconds or 5 minutes back or forth with shortcut buttons as well as a user selected number of minutes forward. The recording can also be rewinded (3x or 10x) or fast-forwarded (3x, 10x or 30x) as well as paused at any point. A timeline is shown on top of the screen each time one of these actions is done. Users can organize recordings into separate folders such as movies, series and sports but the feature set does not take into account different characteristics of content. Based on user comments, common use cases include skipping advertisement breaks and pausing in case of an interruption, such as answering the phone.

One of the most common user requests is a feature which would enable viewing subscription channels in a non-linear manner. In autumn 2013, a catch-up feature was released to address this frustration. At the moment the feature offers all programs from four different channels for up to seven days. User interaction is similar to the regular network recordings except

the users do not initiate the recordings themselves but choose an item from a library of programs within the seven-day timespan.

The aforementioned features do not make a difference between different genres or other content attributes. For two types of sports content, Formula 1 races and selected ice hockey tournaments, there are dedicated applications that offer some content-specific features. According to a content survey conducted in summer 2013, Elisa Viihde customers are very satisfied with these applications relative to other content sources. The F1 user interface (Figure 8) offers several different views. In addition to the regular broadcast, there is a live timing view, an in-car camera view, a pitlane view, a track map view and a highlights view. The user can select a full-screen regular broadcast view or two small content windows side by side. After a race, a qualification session, or other F1 event, the program is selectable for non-linear viewing. If a user enters the UI in the middle of an event, a dialog window is presented with an option to start viewing non-linearly from the beginning of the event or to enter the live mode.

Figure 8. Elisa Viihde F1 user interface.

The evolution path of the F1 user interface shows improvements in terms of achieving a satisfying non-linear viewing experience. In the first

version, the user was shown the live stream immediately when entering the UI which potentially spoiled an intended non-linear experience. The UI provided buttons to view live or to start viewing from the beginning of the race but the user could not initiate the latter option without seeing the live stream in a small window first. The second version did not show the live stream to begin with and similarly offered the options in the bottom of the UI to view live or from the beginning. The third version introduced a dialog window (Figure 9) when a user entered the UI in the middle of an event. In the third version of the UI, non-linear viewing nearly doubled compared to the second version. Other improvements in the application probably have an effect on this change also but nonetheless this indicates that a simple user interface alteration can indeed affect viewing behavior.

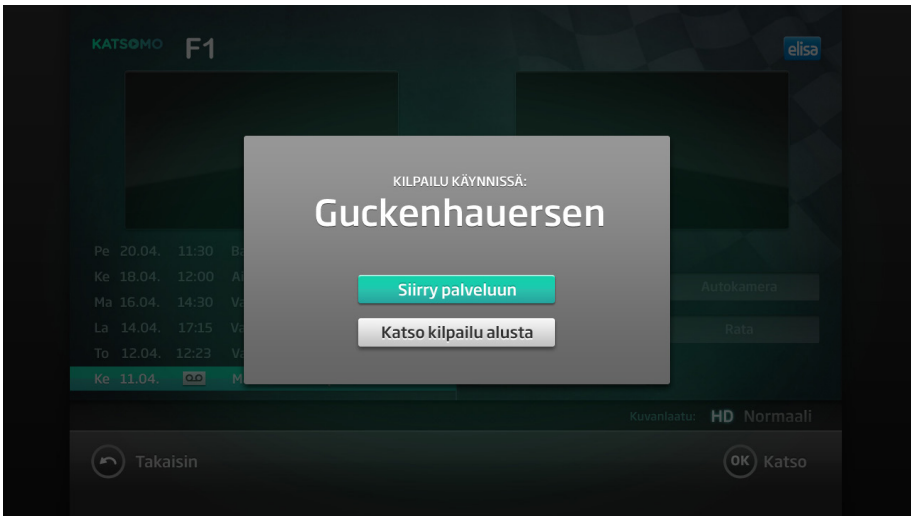

Figure 9. Elisa Viihde F1 user interface: dialog window.

The ice hockey interface offers a feature to show or hide the results of the matches. There is also a statistics view that shows the top scorers et cetera of a specific tournament and a highlights collection that lists the most important moments of each day in short clips, such as goals in one minute videos.

A dedicated application for specific content presents a possibility to develop the interface according to the idiosyncrasies of said content. In

terms of these two examples, users assumedly fast-forward through advertisement breaks and possibly period breaks in case of non-linear ice hockey matches whereas an F1 race is a continuing event from start to finish. Moreover, the start of a race is typically always a highlight moment whereas the beginning of an ice hockey match does not hold such status. One of the objectives of the user research phase of this thesis is to understand whether this type of differences have a significant effect on non-linear viewing.

3.2 Academic Prototypes

In addition to current commercial products, more advanced solutions have been presented in the form of academic prototypes. In relation to user interaction, sports content and this thesis, the most interesting ones are Time Warp Football (TWF) (Lynn et al. 2009) and its subsequent generalization Time Warp Sports (TWS) (Olsen et al. 2010). Semantic annotation of video content is a key to emergent features which is why we present examples from this area also.

3.2.1 Time Warp Football

Lynn et al. (2009) present a system called Time Warp Football which implements instantaneous forward and backward play-by-play navigation as well as viewer's interactive choice of replays, camera angles and statistics. The navigation is visualized in Figure 10. The features allow football fans to view and re-view plays that are interesting to them from any available camera angle. The system was evaluated by 11 groups of viewers in their homes and according to the researchers it was found easy to learn and provides a succesful interactive TV experience (Lynn et al. 2009).

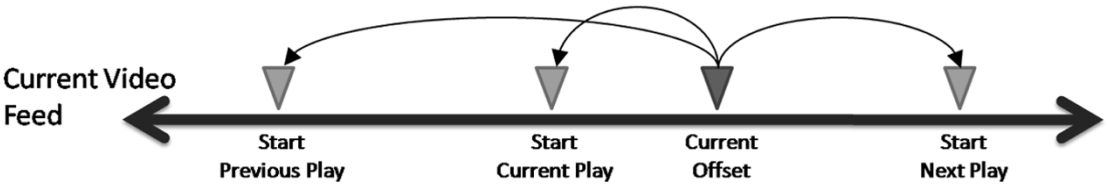

Figure 10. Timeline representation of interactive video (Olsen et al. 2010).

The input device in TWF is a video game controller. Some of the controls are presented in Figure 11. The user interface is fairly simple. For example, no timeline or similar element is shown to the user. Originally there were no visual prompts to indicate jumping in the video stream. The researchers found that this was confusing to the person holding the controller, not to mention the other members of the group (Lynn et al. 2009), and added overlay prompts (Figure 12).

Figure 11. Time Warp Football: navigation control overlay (Lynn et al. 2009).

Figure 12. Time Warp Football: navigation action overlay (Lynn et al. 2009).

For viewers who wish to take an active role in their viewing experience, TWF allows them to act as if they were directors by enabling them to select camera angles themselves. In the prototype, three separate camera angles were used: the normal TV broadcast view, a wide angle sideline view and a wide angle end zone view. According to the researchers it is clear that sports fans want more control over their viewing experience but the dynamic TV broadcast view is appealing to viewers who prefer to relax and ”just view the game” (Lynn et al. 2009).

One of the features of TWF is real time statistics available at any point in the game. According to Lynn et al. (2009) the benefit of this is that fans no longer have to wait for the broadcaster to show game statistics or check the internet for them.

The 11 groups of user evaluation participants preferred the prototype over any commercially available system to view football games. It was found to enchance the viewing experience by increasing and facilitating social interactions. In the test scenario, the users started viewing 10 minutes

behind ”live” time and on average they finished the game 5.6 minutes behind live time. The total playback time of the sample was 102 minutes with 29 minutes being actual game play and 73 minutes being ”skip-able” time between plays. One group even spent longer viewing the game than the playback time. All 11 groups wanted more camera angles which would likely have led to even longer viewing times. These results indicate that user interaction might not be a fatal threat to viewing time and advertisement sales. The participants commented, however, that it felt like they could view the game more quickly. Common requests included slow-motion, visual indication of how far the user was from live time and selecting alternate audio, all of which are included in NHL GameCenter for example. (Lynn et al. 2009)

3.2.2 Time Warp Sports

Time Warp Sports, a generalization of TWF was presented later to provide an interactive experience that is uniform across a class of two-competitor sports (Olsen et al. 2010). According to the researchers, the consistency of the user interface across sports is very important in a relaxation/entertainment experience.

In TWS, tools for sports content producers to support creating interactive experiences were also developed. After all, the creation of the experience and viewing the experience cannot be addressed separately (Olsen et al. 2010). The TWS workflow structure is presented in Figure 13. The parts that differ from a traditional TV sports production are marked in darker grey. The broadcast feed is passed into the TWS Annotator software in which annotation information is manually added to create a game annotation file (GAF) which is uploaded to a HTTP server.

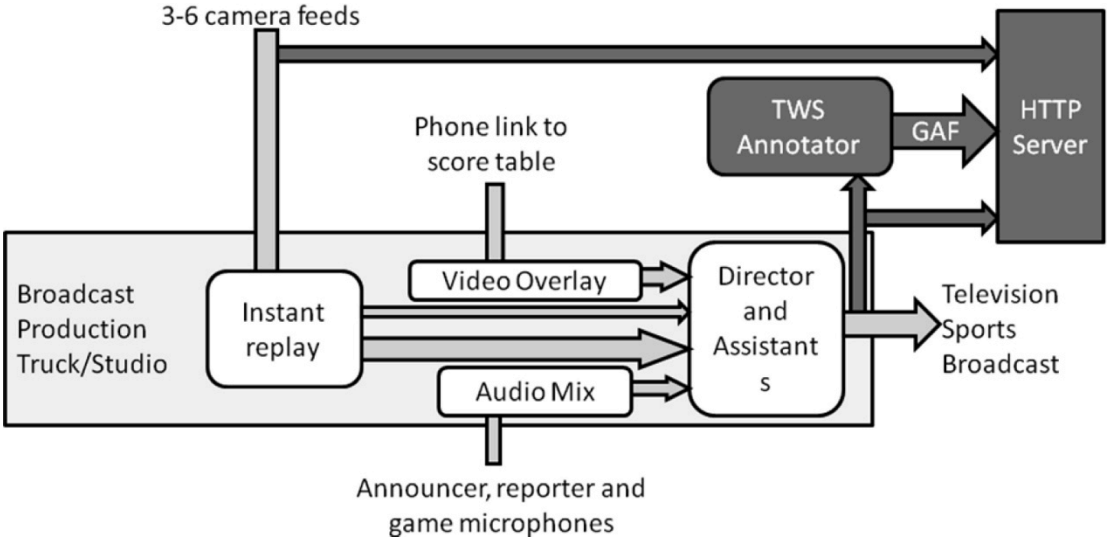

Figure 13. Time Warp Sports workflow (Olsen et al. 2010).

3.2.3 Semantic Annotation of Sports Content

Modern internet video protocols allow viewers to move in a video stream with minimal buffering delay which enables different possibilities for interactive video experiences (Olsen et al. 2010). However, the possibility to skip anywhere in a video by the user does not necessarily lead to a quality user experience (Olsen & Moon 2011). Semantic annotation provides structure to support viewer interaction in an entertainment-driven context and allows generating ”smart summaries”.

Semantic annotation of sports content can be done in numerous ways both automatically and manually. A scorekeeping system can be utilized, camera angles and camera motions can be detected and linked to certain actions in a sport (Saur et al. 1997), players can be tracked via pattern recognition (Sudhir et al. 1998) and spectator audio can be used to detect loud and emotive moments (Tjondronegoro et al. 2003; Rui et al. 2000). In addition to these automatically processed approaches, which have been claimed inaccurate and computationally expensive (Olsen et al. 2010), actual user interaction can be used to detect plays that will be of high interest to future viewers (Olsen & Moon 2011). Another approach is to

mark the points of interest with manual tools, such as those presented within Time Warp Sports (Olsen et al. 2010).

According to Olsen & Moon (2011) viewing sports in less time than the actual event takes is a frequent case. Thus, video summarization through semantic annotation is a relevant pursuit. Olsen & Moon (2011) present a summarization algorithm that utilizes a Degree of Interest (DOI) function and can be used to generate a summary of arbitrary length:

- Select a time *T* for the summary.
- Sort all of the plays *P* by DOI(*P*) in descending order.
- Select the first *N* plays such that the sum of their times does not exceed *T*.

As one approach to generating a Degree of Interest function, Olsen & Moon (2011) propose that some fans would be allowed to access a game for free or without advertising if they rated every play, and the actual fan ratings would then be used as a DOI function. In this approach, the raters can become apathetic or their preference of team could affect the ratings (Olsen & Moon 2011). Another approach was to derive statistics such as touchdowns and fields goals directly from the game play. Third approach was to utilize the data of viewers using the interactive controls of TWF. In the last case the data was a passive byproduct of normal user behavior (Olsen & Moon 2011). Their analysis shows that utilizing viewer behavior improved results but it was not enough alone. Viewer activity seemed to be more a measure of unexpectedness and controversy and many plays that were important to a game were not interactively examined by viewers.

To improve the continuity of a summary, quick transition animations were developed. Viewers agreed that the transitions helped and were not distracting but also indicated that they had problems understanding what they meant (Olsen & Moon 2011).

4 User Research: Methods and Data

4.1 Contextual Interviews

The first phase of the empirical study consisted of contextual interviews (Holtzblatt et al. 2004) that were conducted in the interviewees' home environments. These interviews helped in focusing other parts of research as well as provided valuable in-depth data about non-linear viewing behavior in a real context.

4.1.1 Objectives

The main objective of the contextual interviews was to approach the subject in a semi-open manner in order to gather meaningful qualitative data. The purpose of the in-home interviews was to gather formative and indicative results, similarly to the in-home tests of Olsen et al. (2010). Although the survey was also planned to include free-form questions as a means to gather qualitative data, the interviews allowed interactive and more in-depth approach.

In addition to delving into the many aspects of non-linear sports viewing, the interviews were planned to guide the formation of the survey. The basic framework for the survey was already in place before conducting the interviews but it was unclear which parts of it should be emphasized and whether it should be extended to cover something that was not previously thought of.

The original plan was to analyze usage data before conducting the interviews. In this case, one of the objectives of the interviews would have been to understand user behavior more profoundly by finding reasons to

previously identified use patterns. As the usage data was not available in time, this was not accomplished. Instead, understanding the underlying needs and urges of the users so that those results could be later compared to usage data became an important objective.

4.1.2 Methods

The method referred to as contextual interviews here in fact consisted of two partly overlapping methods: in addition to interviews, informal walkthroughs were used to gather data on one example of a comprehensive UI in terms of non-linear viewing. Before the actual interviews, a set of three preliminary questions was presented to potential interviewees to select different and relevant interviewees:

I) How much do you view sports weekly?
II) How much non-linearly?
III) What are the reasons for viewing non-linearly?

The main benefit of contextual interviews in interviewees' homes is that the users can interact with familiar devices in a familiar setting without having to learn how to use new devices or try to feel comfortable in a temporary laboratory setting. This is especially important in case of enjoyment driven action that relies on a very different environment compared to task-driven work (Eronen 2001). Also, the users are able to actually show how they do things instead of just trying to remember and describe past actions – many of which might be unconscious routines.

Informal walkthrough is a method that suits testing existing products or high-level prototypes when there are no clearly defined tasks (Riihiaho 2009). In this case, the method was used to gather users' views on an existing UI – namely the web UI of NHL GameCenter, which is described in detail in chapter 3. NHLGC was selected because of its comprehensiveness in terms of features that enrich non-linear viewing

possibilities and its easy setup at in-context interview environments. It was also familiar to me, and considered interesting to most Finnish sports fans. This assumption proved correct as all of the interviewees stated being interested in ice hockey and NHL in particular. A set of optional test tasks (Appendix A) was prepared for the walkthrouhgs but it turned out to be unnecessary as the interviewees explored the UI themselves with great interest.

4.1.3 Process

The goal was to interview 3–5 young adults who actively consume sports content and are not currently Elisa Viihde users. In contrast to at least some of the survey participants, these users are not stuck in the traditional pay-TV service model, and are open to pursuing new ways to improve their experience of consuming mediated sports.

The users were selected after presenting a set of three questions related to the experience of enjoying mediated sports on a sports related web forum. In addition, interest in participating in a contextual interview was inquired. Some respondents strongly indicated that they never view sports non-linearly and were thus ruled out of the selection. Next, four individuals were selected based on differing answers as well as convenient location and naturally their interest in participating. One of the four scheduled interviews had to be cancelled due to illness thus reducing the total number of interviews to three.

Each of the open-ended interviews focused on a slightly different set of areas from a slightly different point of view according to the habits and interests of the interviewee. There was no fixed set of questions to be asked in a specific order. As such, the interviews cannot be directly compared with each other. Moreover, the first interview inspired some further questions to be asked in the second interview and so on. The basic topics of discussion were, however, identical. Those included:

- The experience of enjoying mediated sports content in general,
- The experience of viewing sports content in a non-linear manner and how it differs from the linear experience,
- Different mediums, devices, and situations related to viewing sports both in a linear and a non-linear fashion,
- Peripheral activities related to viewing sports,
- The experience of using a state-of-the-art user interface for non-linear use.

The interviews were conducted "in context" at the living rooms of the interviewees and each of them lasted two to three hours. The interviewees were asked to demonstrate their typical settings including TVs, laptops and other devices. The interviews were recorded with a handheld audio recorder. During the walkthroughs the participants were asked to think aloud and in addition to recording audio, observation notes were made. Moreover, paper screenshots of the NHLGC web-UI and highlighters were used to produce heat maps. The interviewees were awarded with movie tickets after the interviews.

Based on a process presented by Taylor-Powell & Renner (2003), the qualitative data was analyzed in five steps. First, the audio recordings were listened several times and transcribed to get to know the data comprehensively. Although limited in number, the interviews were noted valuable in this phase. Next, the analysis was focused. Given the nature of the open-ended interviews, focusing was done by topic and not by question. Consistencies and differences were identified in this step and irrelevant data was discarded. In the third step the identified themes and ideas were grouped into categories, which affected the upcoming survey. For higher-level findings, patterns and connections between the categories were identified and interpreted.

4.2 Web Survey

The second phase was an extensive web survey to Elisa Viihde customers. In addition to validating the results of the interviews and measuring prevalence of various phenomena through quantitative data, new qualitative data was gathered via open questions.

4.2.1 Objectives

The main objective of the web survey was to evaluate the qualitative data that came from the small number of interviews with a broad quantitative sample. While the interviews resulted in numerous remarks of how mediated sports is enjoyed and what kind of activities are affliliated with it, the survey sought to assess which of them are the most relevant on a large scale.

In addition to gathering a lot of quantitative data, some qualitative data was also obtained through voluntary open questions. The answers are much less detailed than in the actual interviews but there are a lot of them and it was a way to take into account issues that the respondents could not directly address in other parts of the survey.

4.2.2 Methods

Surveys have previously been used to investigate television viewing behavior for example in a survey conducted over a five-year period by The British Film Institute (Gauntlett & Hill 2002). This study consisted of questionnaire diaries completed by 500 respondents and it revealed that most respondents' daily activities were structured by a clearly organized schedule and that an important part of the TV experience was talking about it afterwards. We pursued a similar number of respondents but the intention was that the respondents could fill the survey form in less than 30 minutes.

Our survey focused on the same topics as the preceding contextual interviews and consisted of 18 multiple-choice questions, two open questions and six background information questions. The response options were finalized after a quick analysis of the contextual interviews. The questions are presented in Appendix B in Finnish. The majority of the multiple choice questions included alternatives on a 5-point Likert-scale: very frequently, frequently, occasionally, rarely, never.

In the analysis phase, the data was examined by question and by sets of a few connected questions about a single theme. Background information was used to seek differences between subsets of the sample.

4.2.3 Process

4000 Elisa Viihde customers were invited to participate in the web survey via an email message that briefly explained the purpose of the survey. The target audience consisted of subscribers of sports related channel packages or similar sports related paid content. Hereby we obtained a sample of customers who are sports fans and who might have used the different non-linear features of Elisa Viihde. The general nature of email invitations to a web survey might leave out some potential respondents as this type of email tend to be classified as spam.

The survey was implemented as a simple web form. At the end of the survey, the respondents had the option to participate in a draw to win gift certificates. The survey was open for one week during which it gathered 478 responses resulting in a response rate of 12 %.

4.3 Usage Data

The third and final phase of the empirical study was usage data analysis. Originally, usage data was supposed to be analyzed as the first phase but due to delays in accessing said data, the overall user research process was

adapted so that it was the last phase. From the start, this was considered as an extra method because it was not clear which kind of data could be obtained, and on the other hand which kind of results could be published within this thesis.

4.3.1 Objectives

Whereas the survey was used to validate the results of the interviews, the usage data was used to further validate the results of the interviews and the survey. Some of our actions related to media use are subconscious. For example, in a study about media multitasking (Brasel & Gips 2011), participants estimated that they jumped between different mediums 88 % less than they actually did. Similarly, usage data might reveal matters that interviewees or survey respondents fail to note and report. In an enjoyment driven case such as this one, ”real use” is also difficult to test by observation in a traditional user testing setting.

Another objective was to find out how sufficient the available data was in terms of examining use behavior and how it could be improved in the future. In the end, this was an experimental method that did not have more clearly defined objectives.

4.3.2 Methods

Previous work has attempted to extract behavioral patterns from logged user actions to discover users' high-level strategies (Fern et al. 2010). As it was first unclear which type of data would be available, we were not able to prepare a clear set of methods beforehand. In the end, the data was mostly analyzed by filtering, sorting and combining it with different conditions and plotted in numerous ways to visually identify matters of interest. Depending on the source, the data consisted of a few hundred to several thousand viewing session instances.

4.3.3 Process

First, the available data simply consisted of timings of individual non-linear viewing sessions conducted on Elisa Viihde set-top-boxes. An excerpt from the F1 application is presented in Table 2. The first column shows device ID numbers. It should be noted that individual users cannot be identified because a set-top box is often used by a family or otherwise several people. Similar type of data logging has been used to study usability of a task support system in a study that investigated for example frequency of overall use and frequency of different interaction events (Nieminen et al. 1995).

This type of data was gathered from Elisa Viihde catch-up, F1 application and ice hockey application, which are described in detail in chapter 3. Based on the data it is possible to examine the temporal distribution of viewing sessions of a particular program. In addition, the total lengths of the sessions can be calculated from the start and end time codes, and they can be compared to play durations. For example, in the second row of Table 2 the play duration, 16 minutes and 39 seconds, is exactly the same as the session duration whereas in the third row the play duration is approximately 51 minutes and the total session duration is over 111 minutes.

Table 2. Usage data excerpt.

Device ID[1]	**Program ID**	**Program name**	**Play duration**[2]	**Session start**	**Session end**
84839711	500	"Brasilian Grand Prix"	138 min 56 s	2013-11-28 14:37:57	2013-11-28 18:55:58

[1] The device IDs in this example were generated randomly and cannot be used to identify actual devices.

[2] Play duration does not include the periods during which the video was paused, rewinded or fast-forwarded.

79207211	491	"Aika-ajot"	16 min 39 s	2013-11-27 18:45:39	2013-11-27 19:02:18
83667925	500	"Brasilian Grand Prix"	51 min 26 s	2013-11-27 15:39:52	2013-11-27 17:31:11

By comparing the session duration and play duration it is only possible to calculate the time that the video was paused, rewinded or fast-forwarded. For further analysis, more detailed data of user interaction events was obtained from user-initiated recordings, the F1 application and the ice hockey application. The latter two were emphasized in the analysis phase as the data from those was directly comparable.

An excerpt of user interaction event data from the F1 application is presented in Table 3. This excerpt only shows the ”session end” and ”user interaction events” columns to save space but this new data data also held all the other attributes seen in Table 2. For example, the first row shows that a user jumped forward and backward on the timeline several times. Some of the jumps are 5 minute ones (300 seconds) and some of them are 30 second jumps. In addition to the JUMP_FORWARD and JUMP_BACKWARD events, the data includes REWIND, FAST_FORWARD, RESUME and PAUSE events. The wind events have an additional speed attribute of 3x, 10x or 30x. Normally, every session begins with a START event and ends in a STOP or a STILL_ACTIVE event.

Table 3. Interaction event data excerpt.

Session end	**User interaction events**
2013-12-07 15:34:11	4,START,9,JUMP_FORWARD (300),10,JUMP_FORWARD (300), 19,JUMP_BACKWARD (-300),200,JUMP_FORWARD (30),209, JUMP_FORWARD (30),5585,STILL_ACTIVE
2013-12-06 13:25:47	5,START,115,FAST_FORWARD (3x),116,FAST_FORWARD (10x), 136,RESUME,550,STOP
2013-12-06 12:11:42	8,START,2521,STILL_ACTIVE

5 User Research: Results

5.1 Contextual Interviews

The interviews can be divided into three parts as explained in chapter 4: preliminary questions, in-depth interviews and UI walkthroughs. The results of each of these parts are presented in detail.

5.1.1 Preliminary Questions

The three preliminary questions served the purpose of selecting different and relevant interviewees. A summary of the preliminary questions is presented in Table 4.

Table 4. Summary of preliminary interview questions.

Topic	Interview A	Interview B	Interview C
I) How much do you view sports weekly?	It varies a lot, but in case there are no World Cups etc., maybe between 5 and 8 hours.	It varies but approximately 3 to 6 hours.	20-26 hours. Usually 3-4 NFL matches, 3-4 NBA matches and random NHL/Liiga matches.
II) How much non-linearly?	1/3 at most.	Only some short clips, perhaps half an hour in total.	Approximately 1 or 2 NBA matches, because I don't want to multitask several screens at once. NBA League Pass makes this easy.
III) What are the reasons for viewing non-linearly?	Sometimes I view a rerun on the next day if I miss a match live. NHL and Liiga are not included in my channel package, so I only view highlights on the web.	I want to see a specific highlight moment such as a hit, a goal, etc.	Usually I can view everything live as the matches don't take place simultaneously. Interesting simultaneous matches are the ones that I view later.

All the interviewees spend several hours per week viewing sports and can be seen as sports fans. However, the amount of time they spend viewing sports varies a lot. One of them (B) spends 3 to 6 hours while another (C) states spending as much as 26 hours weekly. As the later interviews reveal, B is mostly a fan of motor sports and C is a fan of basketball (NBA) and American football (NFL). At the time of the interviews, Formula 1 and World Rally Championship (WRC) seasons were on a break which might significantly affect the answer of interviewee B. Purely on the basis of the amount of time they spend on sports, interviewee C can be classified as a hardcore fan while A an B are "regular sports fans".

The preliminary questions already reveal clear differences in habits of experiencing sports content in a non-linear fashion. C mainly views whole games afterwards using a service dedicated for that. The reason is reluctance to share attention between several matches when the matches take place. B only views specific highlights non-linearly while A views both highlights and might randomly catch a rerun of a match he missed earlier.

5.1.2 In-depth Interviews

The actual interviews reveal much more differences as well as detailed remarks. A summary of the contextual interviews is presented in Table 5. The answers are organized by common topics.

Table 5. Summary of contextual interviews.

Topic	Interview A	Interview B	Interview C
1) Main interest	Football (Premier League)	Motorsports (F1 and WRC)	Basketball (NBA)
2) The effect of personal schedule	My work schedule and studies dictate when I am able to view sports. Luckily Premier League matches air at	In case of WRC rally, I follow the stage times live and when I know that something has happened I	I often work on a morning shift. NBA, NFL and NHL matches air during the night and I like to view them live. It's

	evenings at convenient times.	go and see a video about that.	possible to view multiple matches in a row.
3) Devices for enjoying mediated sports	TV is the main device and pay-tv channel package is the main source. I also use my computer and my mobile phone.	The main device is my computer equipped with a TV card. Also mobile phone and radio.	Usually a laptop connected to a TV. Sometimes I only use the laptop for viewing something briefly. I don't use my smart phone a lot.
4) Viewing reruns and/or time-shifted content	Viewing reruns depends on my schedule; it's coincidental, unlike live viewing. Usually I already know the result.	I only view summaries afterwards, no complete events (matches, races etc.).	When viewing time-shifted matches, I only view a particular situation or the whole match providing that I've managed to avoid seeing the result.
5) Intentional and random viewing	Usually I know the schedule and plan to view a live game. I never plan my schedule according to reruns.	It's rare that I would plan to view something, except for F1 races. I tend to browse and view something that happens to be on.	Usually I plan to view particular games. Sometimes I check out which games were played last night and pick one randomly. In this case I might fast-forward it more.
6) Social aspects	Usually I discuss sports with a few friends that follow the same league. This often happens on the next day. Sometimes during a match too via Facebook or SMS.		Sometimes a friend recommends a game to view afterwards. Many colleagues are interested in sports so we debate and view clips. The discussion is half the experience. SMS and Facebook during a game.
7) Recording	I would like to do it, because I must work often on weekends. I don't have a device for doing it.	I could record if I wanted but I never do it. The problem is that the computer should be turned on all the time.	I don't have to record NBA matches as the service I use offers all of them for time-shifted viewing.

8) Viewing highlights	I do view highlights and it reduces the urge to view complete reruns. If I'm not very interested in a sport, the highlights are enough, e.g. F1.	Partly I've replaced viewing games by viewing highlights from YouTube or e.g. NHL.com.	I like NBA Game Time because you see more than you would in sports news and I don't want to search for clips on the web, except if I have spare time on work.
9) Changes in viewing sports	Nowadays I view less as I have access to less content. When I'm busy it's more about following online forums.	I used to view a lot more. Nowadays the content is spread across different pay-tv channels.	Due to NBA Game Time I've started viewing time-shifted matches. I still view mostly live.
10) Do you you miss beginnings of sports events? What would you like to do in a situation like this?	Yes, a lot. If you miss the first 10 minutes the score can be 2-0 and there won't be any goals anymore. It would be very convenient to rewind that 10-15 minutes and view the whole game.	With F1 races yes, I've missed some starts. I'd just like to see the live situation. Probably you will see the start at some point anyway.	Yes. In a situation like that I just begin viewing live. I don't want the hassle of rewinding. It should be really easy for me to do it.
11) Activities before and after viewing sports	I might view a pre-game studio show if I find the commentators entertaining. Afterwards I like to speculate and discuss. I view after-game shows more than pre-game shows.	Usually nothing significant. The F1 broadcast might start 2 hours before the race. I tune in 5 min before. It depends on the commentators.	I'm interested in betting tips and experts pointing out things. I'm such a hardcore fan that I usually know which players to follow etc. but I still want to view the pre-game shows.

The participants use a wide range of devices for enjoying mediated sports. One of them (B) does not have a television in the traditional sense but uses a TV card on his computer. This makes switching between web content and TV effortless for him and he states that TV is almost always running in the background as a separate program, as background noise. A has a more traditional setting: his medium size flat-screen TV is the main

device and a pay-tv channel package is the main source of content. However, he too uses a computer as a complementary device and has placed it near his TV. For C the main source of content is a service that he can only access on computer. Therefore, the typical setting is a laptop connected to a TV but for viewing something briefly he only uses the laptop.

C was the only one who stated that time-shifted viewing has recently become a significant change in his sports viewing habits. His interest in American team sports leagues and experience with new services that support time-shifting are probable causes. Still, he stressed that viewing live, even at the middle of the night, is the number one choice. While recording has been a significant change in TV viewing habits, none of the interviewees record sports content. C does not have to because the service he uses offers ready-made recordings, A would like to do it but does not have the capability and B simply chooses not to do it.

In addition to their most typical setting, all the participants reported using different setups according to which content sources they have access to. For example, A stated that the best option for him to follow domestic ice hockey is a combination of radio and the website of the league. B reported experimenting with "some fancy setups" for following rally including several windows on the computer, GPS tracking on mobile phone, radio, etc. All the participants reported using a mobile phone but usually only in case they were not near a computer or a TV. None of them owned a tablet.

The three interviews already revealed very different attitudes towards time-shifted sports content. While participant B underlined that he only views short summaries afterwards, C thought completely otherwise stating that he never views them. C usually views the whole match time-shifted without rewinding or fast-forwarding but it is essential for him

that he has managed to avoid seeing the result as the experience is otherwise ruined and not worth the time. He stated that if he sees the result beforehand by accident, he would not view the game at all, unless there is a particularly interesting phase in which case he might view it by skipping some parts. A, on the other hand, stated that when viewing a rerun he usually knows the result of the match and has discussed it with a friend. For him it is a different experience: when he views live matches he intentionally fixes his schedule according to the match but reruns are something that he sometimes happens to view coincidentally if he sees an interesting match. On the other hand, he mentioned that: "In time-shifted viewing you are more active. If you're viewing live you can't affect it and you are more passive."

All of the interviewees viewed highlights regularly. Interviewee A stated that viewing highlights greatly reduces the urge to view complete reruns. According to him most sports have so few events that the highlights are enough for getting a general view of what has happened.

Rewinding and fast-forwarding is one part of user interaction in non-linear viewing. Interviewee C stated that overall he rarely rewinds or fast-forwards. He occasionally fast-forwards to skip ads, and rewinds to view an unclear judgment or how a particular play developed. However, he emphasized that the urge to rewind or fast-forward greatly depends on the sport and its pace, more precisely the amount of "dead spots".

One of the most interesting situations in terms of time-shifted viewing is when a person misses the beginning of an event he or she intended to view by less than 30 minutes. The interviewees confirmed that this is a common frustration. Person A thought it would be convenient to begin viewing the game from the beginning in these situations. B, on the other hand, told that he would like to just view the event live. He added, however, that it depends on the delay: in his opinion 5-10 minutes is an

insignificant delay but an hour would be too much. He stressed that it is not about being afraid of spoilers but about being constantly aware that there is a delay and wanting to see what has already happened. C also commented that he does not use the option to time-shift content in these situations because it is too much of a hassle. Notably the NBA service, that C mostly uses, attempts to make it clear how to switch between time-shifted and live broadcast with a separate button.

An intermediate solution between viewing live and missing some of the event and viewing with a delay would be gradually shifting from delayed viewing to live viewing. The interviewees were somewhat interested in a user-initiated solution like this. B noted that a Finnish TV channel used to do a similar thing without user initiation. They showed highlights from the first and second period of ice hockey games and after that the third period was a live broadcast. At the time this was probably done because of the scheduling of the channel but it proves that this is not an unthinkable way to enjoy a sports event. B recounts: "I did view the highlights although I already knew what had happened. I saw the most significant events and then continued viewing the last period normally."

Social aspects are a significant part of viewing sports – as much as "half the experience" to quote one interviewee. The interviewees reported viewing a lot alone but discussing the events both during the viewing experience and after it. Facebook and SMS were mentioned as common digital options. For interviewee C, a major factor was being able to avoid spoilers when discussing sports. He recounted having faced situations in which he had decided to view a game time-shifted and thus had to avoid discussions about the game in work.

There are different peripheral activities related to enjoying mediated sports that take place before the main event, during it and also after it. All the interviewees reported viewing some amount of pre-event shows but

the reasons were different. A emphasized entertainment while C was mostly interested in betting tips and expert analysis. B stated that while the pre-race shows in F1 might start up to two hours before each race he only tunes in 5 minutes before the start. The same observations apply to after-event activities. A was the only one who clearly stated viewing after-event shows more than pre-event shows. C stated that time-shifting does not affect viewing pre- and after-game content. A and B, on the other hand, did not think they would view pre-event shows when viewing delayed content. They both stated that time-shifting does not affect viewing after-event content as much but it might also decrease the urge to view those.

Searching additional information is also a peripheral activity that all the interviewees mentioned. Searching the web and league websites are the most popular actions. Twitter was also mentioned as an instant source of injury reports and other information that might not be available via commentary.

5.1.3 UI Walkthroughs

The third component of the contextual interviews was an UI walkthrough. The walkthrough consisted of the participants trying out the web-UI of NHL GameCenter while thinking aloud and commenting the experience. When familiar with the UI, the participants marked on paper screenshots which features they found relevant and useful and which parts were unnecessary in their opinion. A heat map that shows a rough average of these results is presented in Figure 14. The interviewees were quite unanimous.

Figure 14. Heat map of NHL GameCenter web-UI.

The main timeline was clearly considered the most important element of the UI. Some features, such as the volume/mute button and closed captioning, were not rated, as they were considered irrelevant for the participants in this context of use. While closed captioning can be seen as mainly an accessibility feature, it might also be useful in multi-screen use. In general, the usefulness of different features and views depends on the context. Relaxed live viewing using a big screen requires a different set of features, or lack of them, compared to a hurried urge to see a particular play with a small screen. First and foremost, rating the features was valuable in terms of provoking opinions and detailed comments also from areas that were not covered during the interviewing phase.

Although the UI seems to include a plethora of features, all the interviewees agreed that it was ultimately fairly simple to use and easy to learn. Participant C commented that the UI is very similar to those of NBA Game Time and NFL Game Pass and thus felt instantly familiar to him. He also emphasized the multi-platform capability and the possibility to switch off the results.

A common frustration among the participants was that sometimes when viewing sports there is no replay of an interesting play or situation. Some of them found out that in the examined UI the user can initiate a replay himself by jumping back 10 seconds and optionally using the slow motion mode. However, the participants were unanimous about not wanting to replace the director completely by selecting all replays or even camera angles themselves. Interestingly, participants A and B stated that they would like to select replays etc. in a time-shifted situation but not in a live situation. Participant B again commented that it depends on the sport: for example in ice hockey there are several breaks during which to view replays whereas in football there are no breaks except at half time.

A was interested in the possibility of viewing condensed games. He commented: "If I had a service like this, I think it would be possible to view a game in 15 minutes by fast-forwarding – or several matches. If, for example, I had 30 minutes to spend." When asked whether he would like a ready-made 15-minute summary or wanting to fast-forward himself, he preferred the former option.

The mosaic view did not interest the participants. According to them, it was not possible to focus on anything with four screens side by side. C speculated that it might be important for those who bet a lot and that it might be better suited to slower paced sports than ice hockey. The picture-in-picture view, on the contrary, was regarded as a useful feature for following another game in the small window while focusing on the main event in the large view. C commented that this is relevant especially in a situation in which the results of two matches greatly affect each other in terms of a playoff spot or something comparable. It seems that in case of several simultaneous matches it is common to change between them. B commented that he found this useful when trying out a service called Ruutu: during the period break of one game he viewed another game that did not have a break yet. For C, betting is an important factor to

determine which game to view and which games to follow by checking out results. Betting is also a significant factor that prevents viewing a game afterwards.

The timeline induced varying opinions. A commented that it would be nice if the timeline included some hits and saves too in addition to shots and goals. C compared the UI to NBA's version in which the user can filter events by type, team or player. He stated that an occasional use case for him is to only view the actions of one interesting player. B said that the UI would be too complicated if the user had to choose which events the timeline included.

The possibility to change the feed according to which team one is cheering for or to change the commentator in case of an irritating one, although a minor detail, was also seen as a positive feature. C commented that NFL Game Pass even allows the user to select camera angles, which is useful at times.

An interesting observation during the walkthroughs was that the users were not always sure which elements on the screen were part of the interactive UI as opposed to statistics and other text graphics elements chosen by the director and shown near or partly behind the UI elements. In fact, the heat map in image 5 shows that the topmost scoreboard as well as the power play and penalty kill statistics were regarded as important UI elements when in fact they are not interactive elements at all. However, they could easily be interactive elements, which is why those ratings were not removed from the heat map. When asked about the matter, A and C stated that relevant data should be shown without user interaction. C, on the other hand, commented that he would like to choose when to see the basic statistics of the game but otherwise the director should take care of showing relevant trivia.

As a minor observation, the participants did not pay special attention to digitally added advertisements in the rink. When mentioned, B responded: "It's a funny thing. You realize there can't be a real ad in front of those spectators." In addition to advertising, digitally added graphics can aid the spectators. C was familiar with yard lines that are used in NFL matches and underlined the importance of them.

To summarize, the three phases of the contextual interviews revealed that there are different use cases in which non-linear content is a relevant way to enjoy mediated sports. It can be done as a pursuit to achieve the same experience as live viewing but at a more convenient time. It can also be a totally different experience during which one is already aware of the end result. It can be done in "real time" or "efficiently" by skipping uninteresting moments. Time-shifting also affects peripheral activities that take place before, during and after viewing. It depends on the context as well as the nature of the particular sport, but for some people in certain contexts, non-linear viewing is never a sufficient option to replace the live experience. The quantitative results of the web survey are essential in understanding the proportions of these findings.

5.2 Web Survey

The web survey gathered 478 responses from paid sports content subscribers. 84 % of the respondents are men. Only 3.2 % are younger than 25 years old but otherwise the age distribution is very even. As much as 59 % uses a tablet.

5.2.1 Linear and Non-linear Viewing

Starting off with general perception of how often they view linear content compared to non-linear, it is clear that the respondents still prefer traditional linear broadcast. Out of different types of non-linear content, self-initiated recordings is the most common. Ready-made recordings via

services such as Elisa Viihde catch-up and Yle Areena are used to some extent but significantly less than self-initiated ones. In sports content the significance of linearity is amplified. While 48 % view self-initiated recordings frequently or very frequently, only 15 % do the equivalent in case of complete sports events and even less in case of other sports content. The most significant results of the first questions of the survey addressing linear versus non-linear viewing are collected in Figure 15.

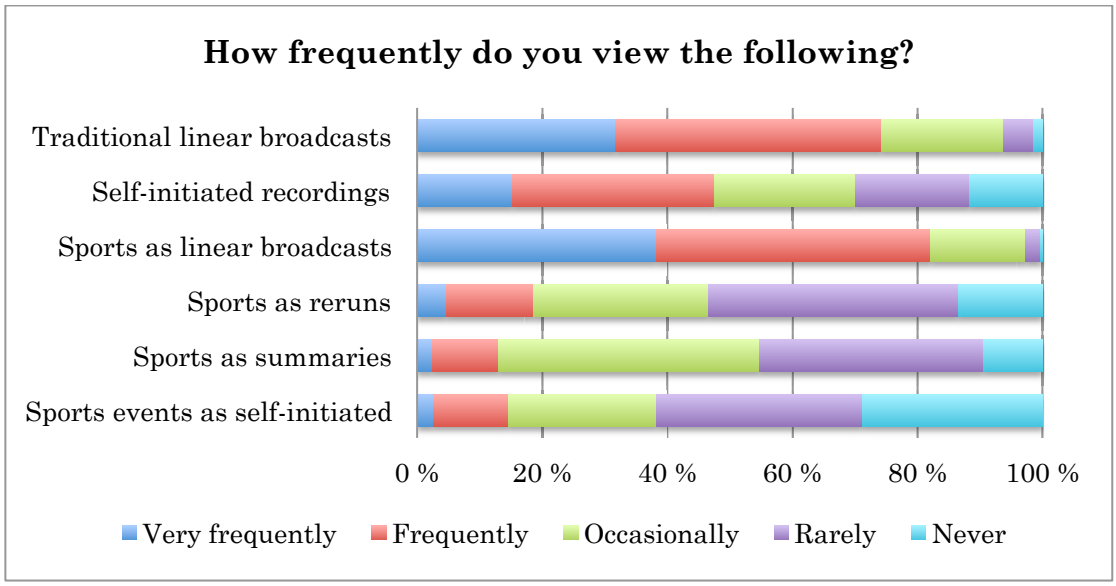

Figure 15. Linear and non-linear viewing.

One important factor is, however, that a lot of popular sports content is only available on pay-tv channels which can not be recorded in Elisa Viihde. The relatively novel catch-up feature aims to solve this problem by providing a collection of recorded content for seven days from certain channels, but this did not seem to significantly affect the results of the survey. 20 % responded that they use the catch-up feature occasionally or more frequently. The most popular services for viewing pre-recorded sports content are the dedicated ice hockey application in Elisa Viihde and Yle Areena with 36 % using them occasionally or more frequently. 12 % use NHL GameCenter occasionally or more frequently.

While a set-top-box is by far the most popular device for viewing sports, a laptop is the second most popular with 19 % using it frequently or very frequently. 9.5 % used a tablet and 4.4 % a smartphone frequently or very frequently for viewing sports.

The most popular sport for the respondents to enjoy by viewing is ice hockey. 67 % view ice hockey frequently or very frequently. It was followed by football (54 %), Formula 1 (48 %), skiing (41 %) and track and field (39 %).

As seen in Figure 16, time-shifted viewing of sports events most often occurs on the same day or within the next day. Quite often time-shifted viewing is initiated less than 30 minutes after the event has begun while it has not yet ended.

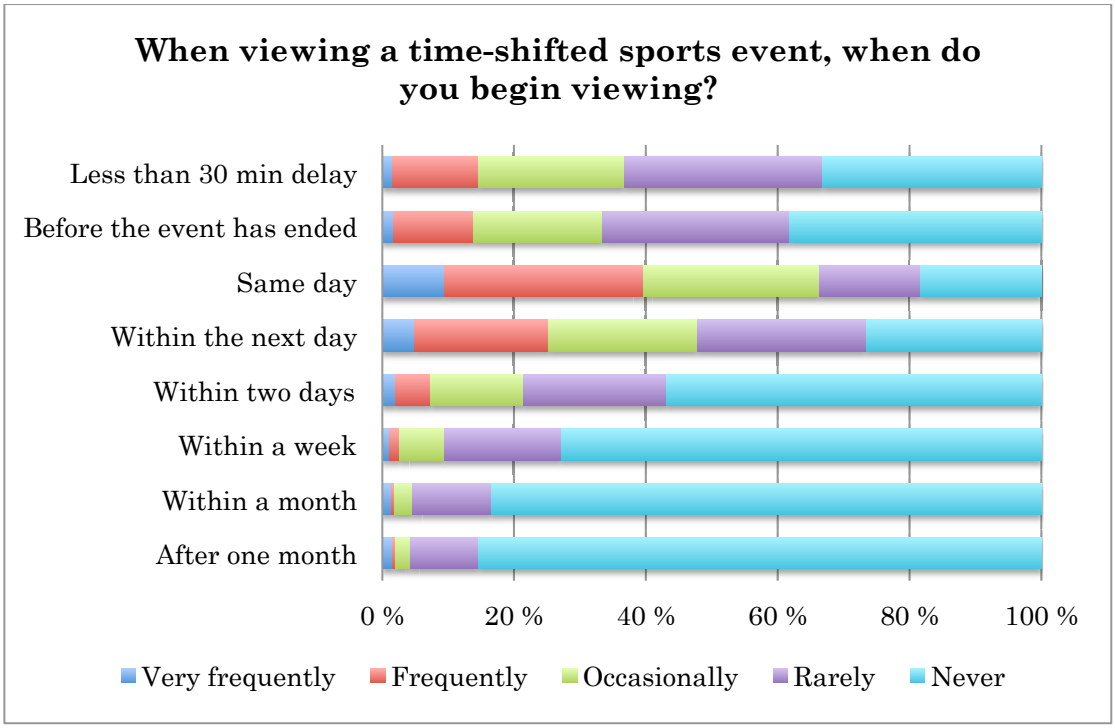

Figure 16. Delay in time-shifted viewing of sports events.

37 % of the respondents stated that when viewing time-shifted sports content they frequently or very frequently fast-forward to skip uninteresting parts. 19 % responded that they frequently or very

frequently rewind to view an interesting part again. Most respondents skip parts more than view parts again as 85 % never or rarely view time-shifted content longer than in case of live viewing. 44 % attempt to avoid spoilers frequently or very frequently whereas 10 % responded that they frequently or very frequently know the result when beginning to view. Figure 17 illustrates these results.

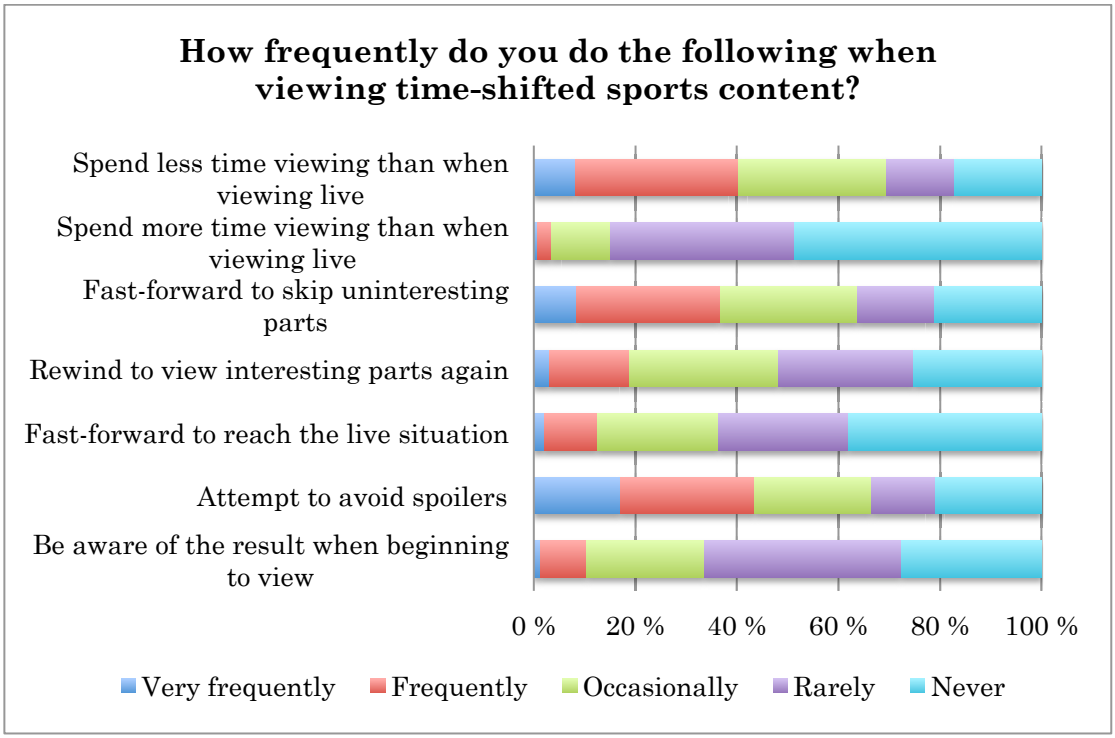

Figure 17. Time-shifting when viewing sports content.

5.2.2 Peripheral Activities

The most popular peripheral activities before viewing a sports event are viewing pre-event content (37 % frequently or very frequently) and searching for additional information (24 % frequently or very frequently). 43 % engage in betting occasionally or more frequently. As much as 48 % occasionally begin viewing a sports event when it has already begun while only 15 % do that frequently or very frequently. Pre-event content is more popular than after-event content: 30 % of the respondents view after-event content frequently or very frequently.

During viewing, the most common activity is to discuss with other spectators. 22 % do that frequently or very frequently. 20 % follow results in relation to betting frequently or very frequently but only 5.4 % do live betting. Viewing sports is sometimes a background activity: 17 % frequently or very frequently do something else such as work or engage in a separate hobby while viewing sports.

32 % use social media for obtaining information before viewing. 20 % use it during viewing and 24 % after viewing. Facebook is the most popular form of social media with discussion forums and Twitter following behind. Twitter is the most evenly used before, during and after viewing while the others are less used during viewing than before or after it. Discussing with friends and Internet news are the most popular information sources during viewing. Before viewing the most common source is Internet news (71 %) but after viewing the most popular are broadcasted sports news (54 %) and summaries (45 %). The most common device for searching information before and after viewing is a computer. During viewing smartphones and tablets are the most popular but only slightly more popular than laptops.

5.2.3 Frustrations and Desired Features

The survey confirms that missing the beginning of a sports event is common. The most common reason is work or hobbies: 48 % miss the beginning because of them occasionally, 25 % frequently and 3.6 % very frequently. 56 % miss the beginning occasionally or more frequently because of viewing some other content such as a simultaneous match. Less frequent but noteworthy reasons include not remembering to view an intended event from the beginning and intentionally beginning to view only when hearing about an ongoing event as well as simply sleeping.

The most common frustration among the respondents is advertisement breaks. Only 13 % never or rarely find them irritating. Inconvenient

airing times are the second most frequent frustration as 27 % find them irritating frequently or very frequently. Unnecessary replays are a more common frustration than the absence of important replays. The absence of statistics is, on the other hand, a more common frustration than excessive use of statistics. The frustrations related to replays, statistics and camera angles are, however, mostly occasional or rare.

When asked, which features would be the most interesting in terms of viewing non-linear sports content, the most common choice was a timeline that allows the user to freely move back and forth. The second most popular feature was self-initiating a replay and the third was a condensed stream without long breaks such as period breaks. These features gathered the largest amount of number one ratings as well as top-3 ratings. All the suggested features were favorable to some extent. They are listed below based on the amount of top-3 ratings, which is mentioned in parentheses:

1. Timeline allowing free movement back and forth (281),
2. Self-initiated replays (267),
3. Condensed streams without long breaks (232),
4. Easy switching from time-shifted to live stream (230),
5. Picture-in-picture view of a separate event (210),
6. Marked points on a timeline for goals and other plays (208),
7. Mosaic view of several events (192),
8. Hiding results in order to avoid spoilers (191),
9. Selecting camera angles for replays (189),
10. Condensed streams according to user-selected amount of time (175),
11. Picture-in-picture view of another camera angle from the event (164),
12. Embedded additional information such as tweets (153),
13. Mosaic view of several camera angles from the event (152).

On the contrary to what interviewee A commented, a clear majority (61 %) of the survey respondents find viewing time-shifted sports a more passive experience than live viewing. 28 % could not say whether it is more active or more passive.

The survey respondents were also asked to briefly describe how time-shifted viewing of sports from their perspective differs from live viewing. The comments were for the most part rather similar to the interviews and sum up different viewpoints well. Some respondents stressed the benefits of non-linear viewing: "When viewing a recording, I can go eat, talk on the phone or go to the toilet in between viewing. I can define the timing freely." According to one respondent, sticking to live viewing only would rule out some interesting offshore events such as NHL because of the schedule of the league. Some commented that there is no difference providing the lack of spoilers while others stated that there is no similar feeling even if no spoilers have occurred. For some, live viewing seems to be the only choice: "I'm an active punter – sports happens here and now!" Others see different gratifications in non-linear viewing: "— I pay attention to HOW something happened technically or tactically – in live viewing the focus is on the excitement and WHAT happens." There were also several comments about how time-shifting limits social aspects. In addition, actively picking highlights and trying to catch up the live stream are common intentions.

All in all, the survey did, for the most part, bring out similar points as the interviews and accomplished in finding proportions and priorities. The analysis of actual usage data attempts to shed light on realized use patterns.

5.3 Usage Data

Usage data was gathered from four different sources within the Elisa Viihde service: the F1 application, the ice hockey application, the catch-up feature and regular network recordings.

5.3.1 View Session Data

First, viewing sessions of Brazilian Grand Prix via the F1 application were examined. A large part of the sessions have less than one minute of play time, 96 % of which occurred on the same day as the race. These sessions were omitted from further analysis in order to avoid skewing the figures. After this, there were no significant differences in average play durations by date or by hour. While it is possible to intentionally catch a few highlight moments in one minute, it is likely that many of these sessions are also accidental starts or they might have ended in an error. In addition, there is one session in which the play duration is more than 23 hours. This session was classified as an anomaly and thus also rejected from further analysis. The second longest duration is 4.5 hours.

Figure 18 illustrates the distribution of play durations and session durations, both of which were examined in 5-minute intervals. Still, the short 1-5 minute sessions are the most common constituting 13 % of analyzed sessions. The winning time of the race was 92 minutes and in 37 % of the analyzed sessions the play duration is between 95 and 135 minutes, as seen in the center of Figure 18. Similar to the Time Warp Football study (Lynn et al. 2009), few users spent more time than the original runtime.

Illustrated in Figure 19, the time differences between session durations and play durations are mostly small, meaning that most sessions do not include long periods of paused time, rewinding or fast-forwarding. The formula for calculating these is Difference-% = [(session_duration –

play_duration) / session_duration] * 100 %. In 39 % of the sessions there is no difference at all and in additional 21 % the difference is less than 1 %.

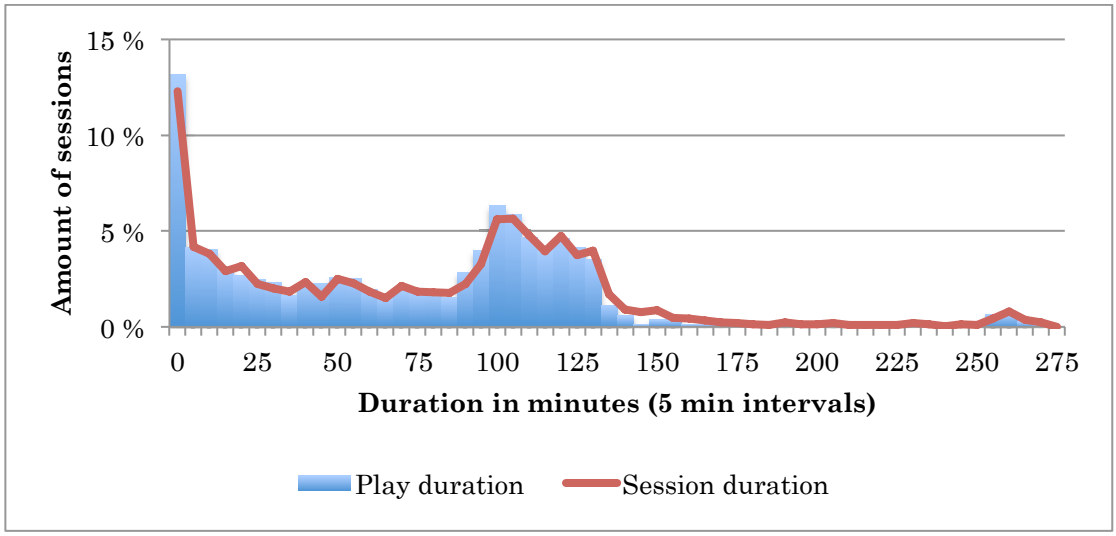

Figure 18. Play durations of an F1 race.

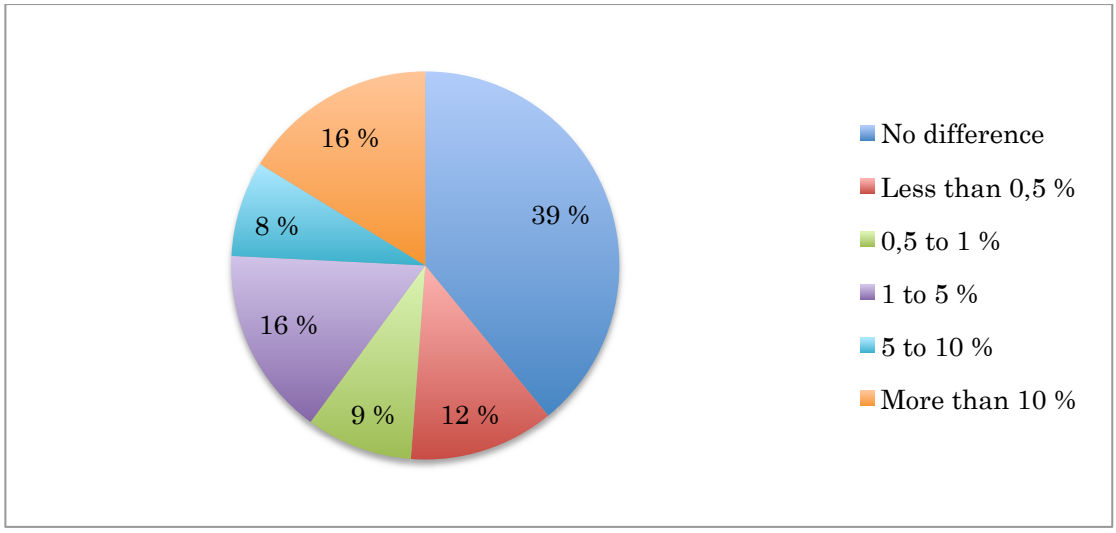

Figure 19. Differences between F1 session durations and play durations.

The temporal distribution of the analyzed sessions confirms that the majority of non-linear viewing takes place on the same day as the event. In this case, 88 % of the sessions started on the same day as the race. Figure 20 illustrates the distribution on the same day after the race that began in 6 PM. A few respondents in the survey commented that in case of F1, they prefer slightly non-linear viewing simply because the video stream is more stable that way. This is one explanation to the high

number of short delays. There were no similar comments regarding the ice hockey application. Figure 21 shows that the remaining amount of sessions quickly drops after the next day. The next weekend does not seem to have an effect.

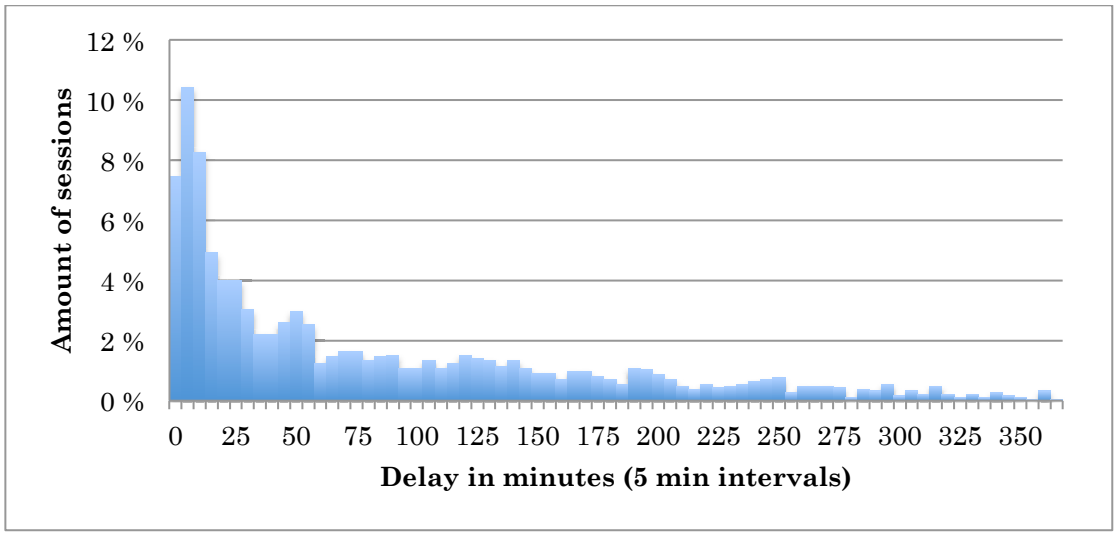

Figure 20. F1 race views on the same day.

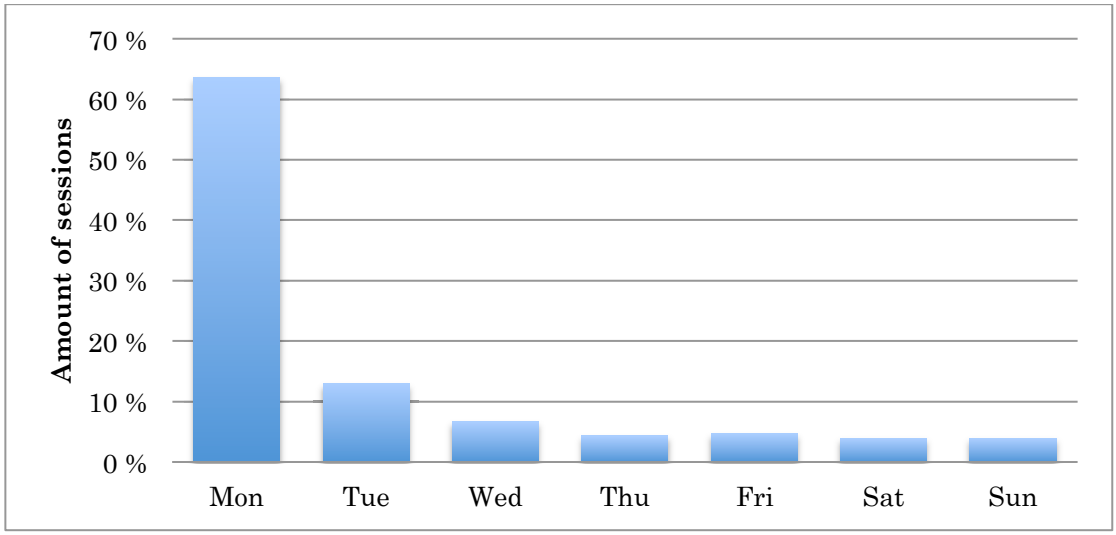

Figure 21. F1 race views on the following week.

United Stated Grand Prix, which took place a week before the Brazilian GP at 9 PM, was also examined to verify the results. There was only one significant difference: a more sudden drop in views in the following week after Thursday. This might be because of the Brazilian Grand Prix already

starting with free practice sessions in Friday, and the UI highlighting the new GP instead of the previous race.

To determine whether the results apply to other sports as well, viewing sessions of a popular ice hockey match between Russia and Finland were analyzed in a similar way. Correspondingly, the data is from the Elisa Viihde ice hockey application. Shorter than 1 minute sessions were again omitted from further analysis. Interestingly, there is a similar spike in the left but we do not see a similar bump in the center of Figure 22 compared to Figure 18, indicating that fewer users viewed the game as a whole. The durations are more evenly distributed. Figure 23 indicates that the ice hockey sessions included much more fast-forwarding, rewinding and pausing. One reason that can lead to this is the different temporal nature of the two sports. While an F1 race is normally a continuous event from start to finish, in ice hockey there are two period breaks that last 15 to 18 minutes. There are also constant breaks within a period because of penalties, offsides, icings et cetera, some of which are longer advertisement breaks.

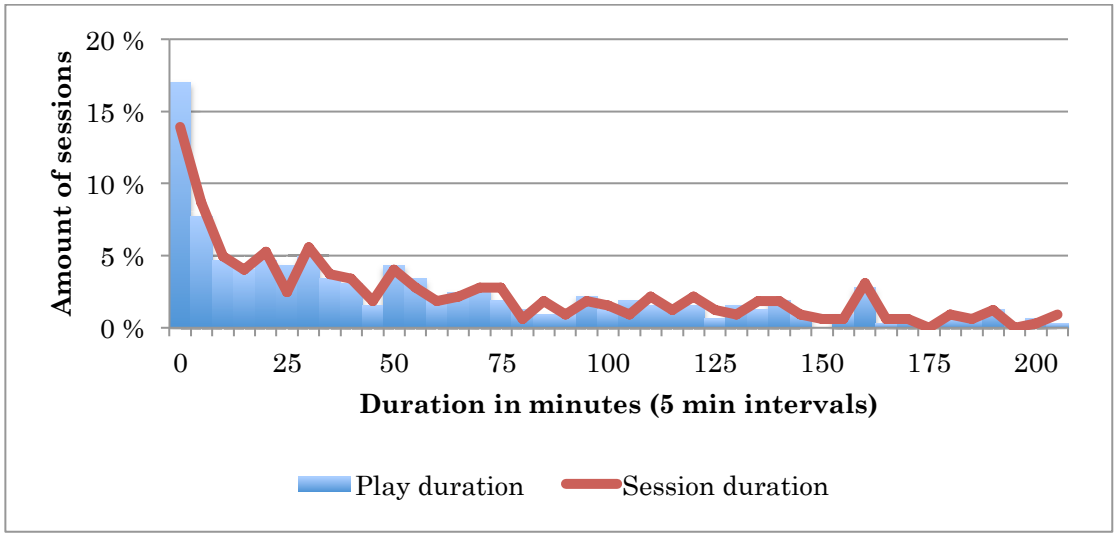

Figure 22. Play durations of an ice hockey match.

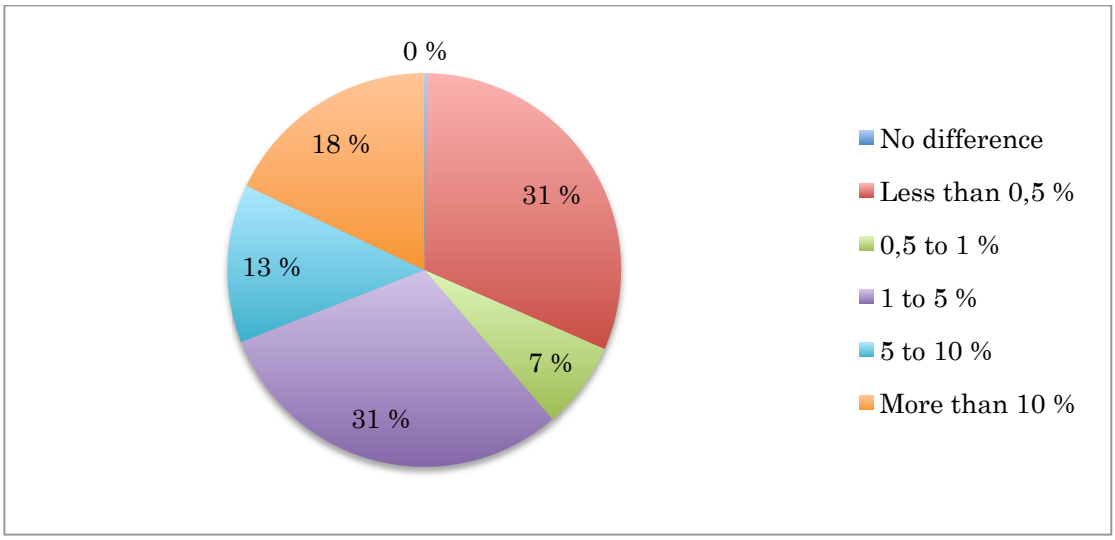

Figure 23. Differences between ice hockey session durations and play durations.

The data reveals other differences also. In the ice hockey case, there are almost as many sessions on the following Friday as there are on Thursday November 7th 2013 when the game was played (Figure 24). In addition, Figure 25 shows that the distribution of session delays on the same day is very different to that of the F1 race. There is no similar spike for short delays as there is in Figure 20. In the F1 example, 15 % of the users had more than one viewing session. The corresponding amount in the ice hockey example is 21 %.

One explanation for these differences is that because of the nature of the two sports, the urge to view an F1 race from the start is much stronger than that of viewing an ice hockey match from the start. In F1, the start is always a very important part of the experience whereas in ice hockey the first minutes or even the first full period might be much less significant regarding the flow of the events. Thus, the F1 application might be more widely used for viewing the full event with a short delay whereas the ice hockey application is mostly used for time-shifted viewing that takes place noticeably later.

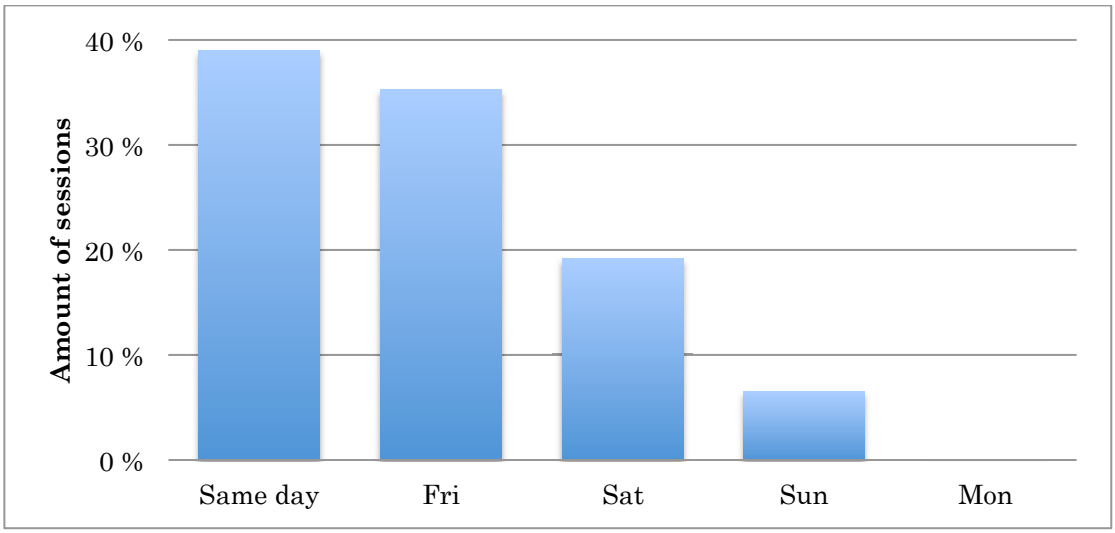

Figure 24. Ice hockey views by date.

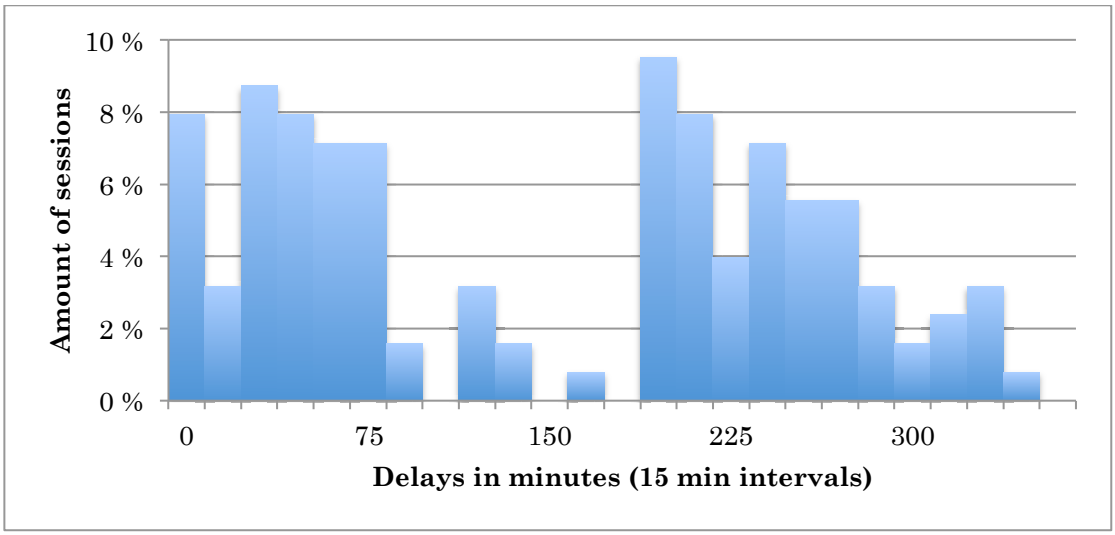

Figure 25. Ice hockey match views on the same day.

Another possible explanation was suggested by some of the survey respondents. If it is indeed a popular habit to view F1 races in just a little time-shifted streams because of supposedly increased stability, these differences might reflect the nature of the applications and the available data and not only different behavior because of different content and different sports. However, it is impossible to draw a definite conclusion, as it would not be convenient to discard all sessions with a short delay. The truth probably lies somewhere between these two explanations.

5.3.2 Interaction Event Data

Interaction event data was gathered from the F1 application, the ice hockey application and network recordings of a high-interest football match which was aired on a free channel. The following figures show results from the first two as the data from those was directly comparable. Inasmuch as comparison was possible, there were no significant differences between the football data and the ice hockey data. Figure 26 shows that both the jump feature and traditional wind controls are used a lot. It is obvious that moving forward on the timeline is much more common than moving backward. There are more interaction events per viewing session in ice hockey sessions than in F1 sessions.

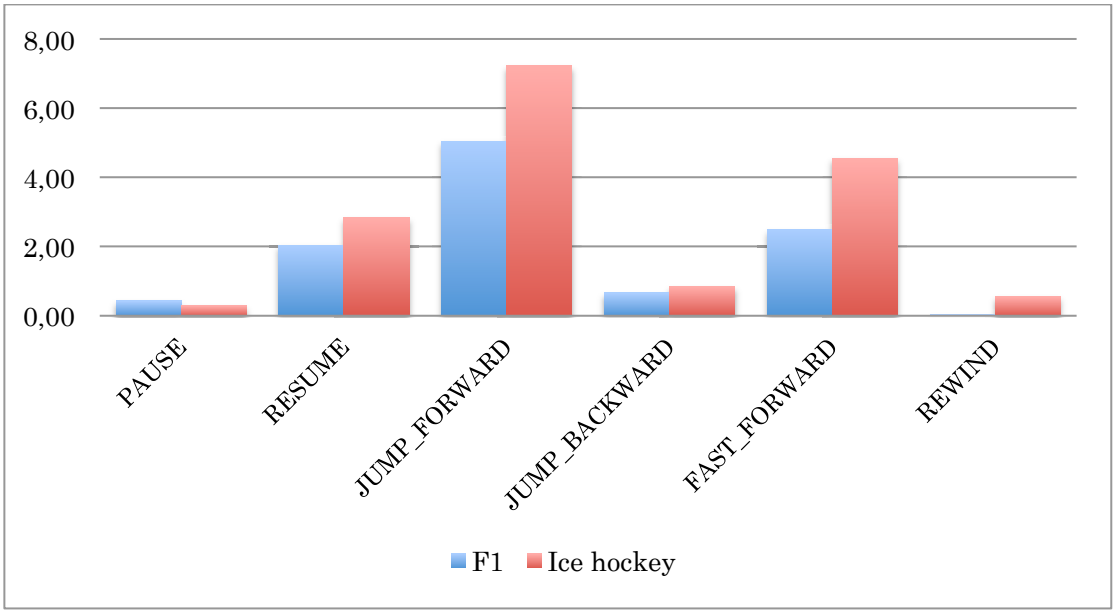

Figure 26. Interaction events per session in non-linear viewing sessions.

In a more detailed look, Figure 27 illustrates that jumping 5 minutes (300 seconds) is more common than shorter 30 second jumps. Fast-forwarding and rewinding, however, are mostly done with the slowest 3x speed, as Figure 28 shows. The wind controls always start with the slowest speed: if a user intends to rewind at 30x, the data logs also register 3x and 10x events first. Still, it seems that the jump feature is used for skipping longer periods of uninteresting content whereas the wind controls are used

for fine adjustments. Jumping forward often occurs in sets of several jumps, sometimes followed with one or several jumps backward. This behavior highlights the benefits of semantic annotation and so called smart controls that would let the user to directly jump to the next interesting moment (Figure 29).

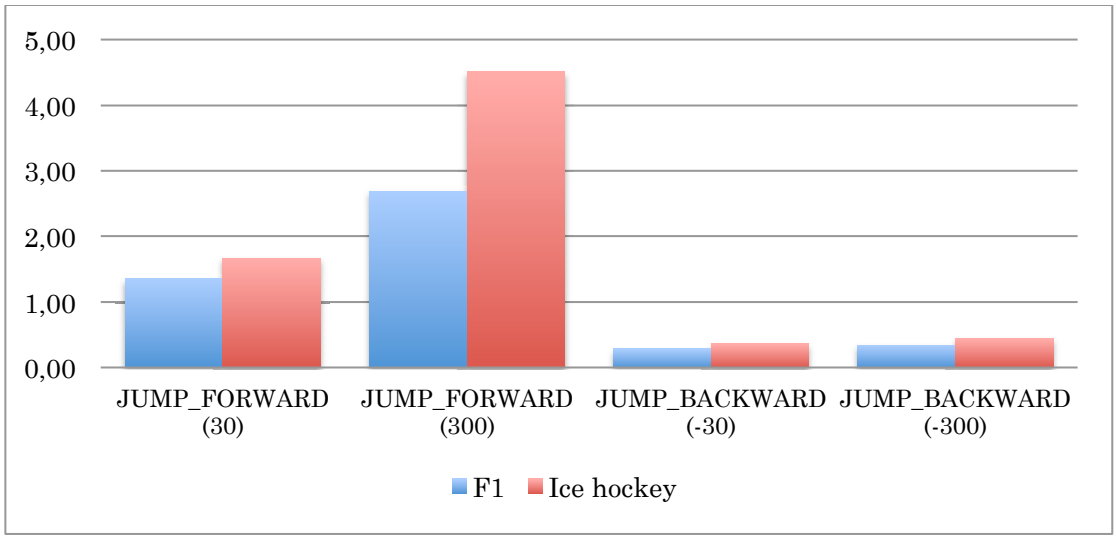

Figure 27. Jump events per session in non-linear viewing sessions.

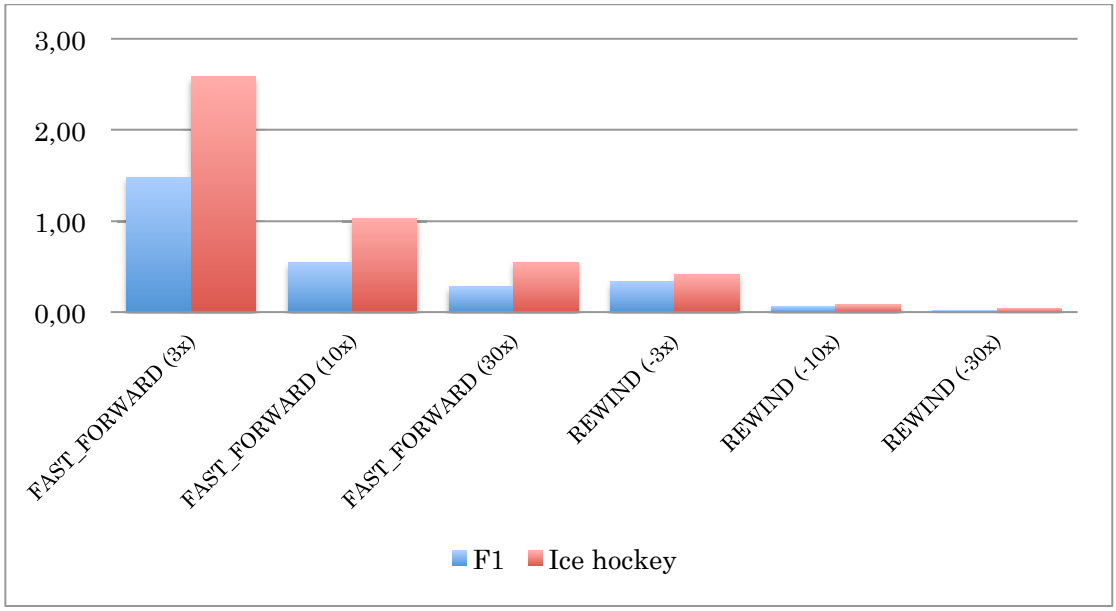

Figure 28. Wind control events per session in non-linear viewing sessions.

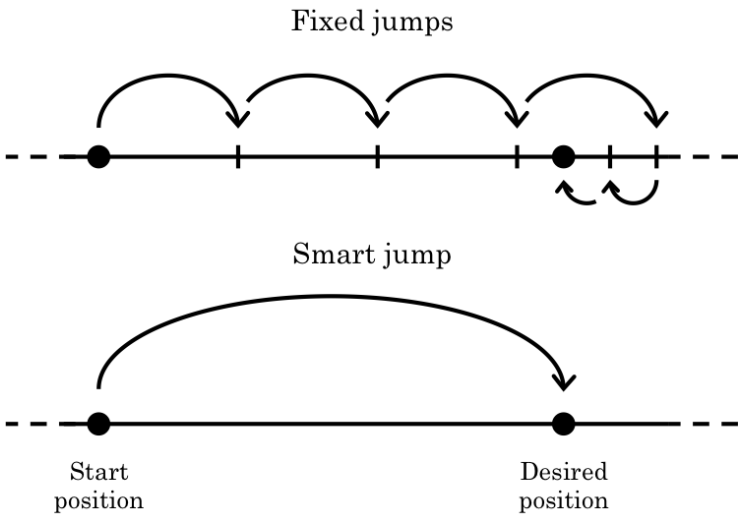

Figure 29. Fixed jumps and smart jump controls.

As illustrated in Figure 30, approximately 25 % of the examined non-linear viewing sessions had 6-20 interaction events per hour and a similar percentage had 21-100 events per hour. The F1 data included much more sessions with 1-5 events per hour whereas the ice hockey data had more sessions with no interaction events at all or over 100 events per hour. The viewing sessions with over 100 interaction events per hour were mostly quite short.

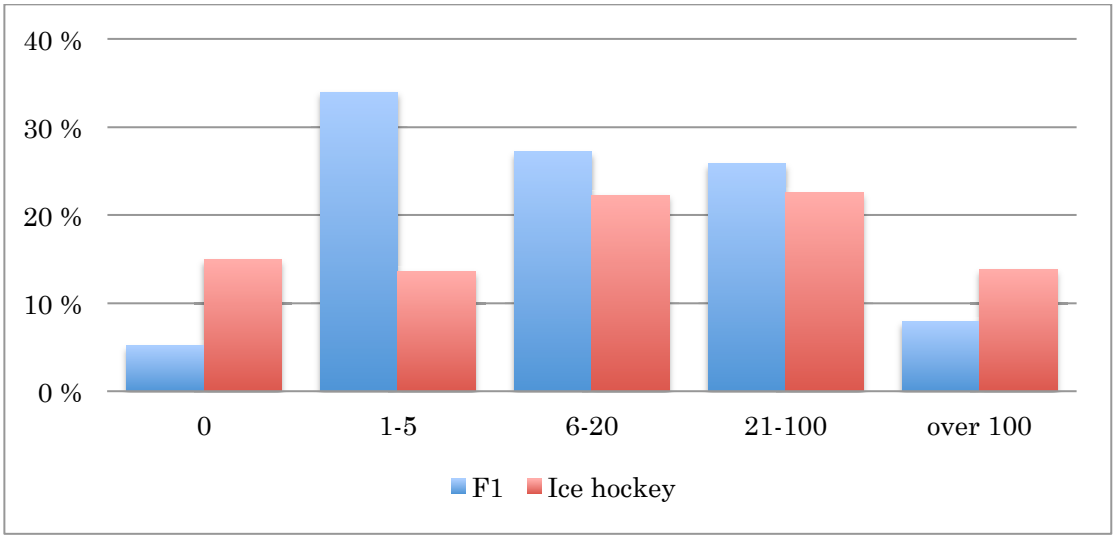

Figure 30. Number of interaction events per hour in non-linear viewing sessions.

5.4 Analysis and Findings

There seem to be three distinct paradigms in non-linear viewing of sports content. The first paradigm is about attempting to create a similar thrilling experience than in case of live viewing, only at a more convenient time in terms of work shifts et cetera. Avoiding all spoilers is a key factor, which limits the use of media and discussing with friends before and during viewing. Otherwise the delay, whether it is 10 minutes or 2 days, does not affect the actions such as viewing pre- or after-event shows. Jumping on the timeline or fast-forwarding usually only happens in case of advertisement breaks which are not truly considered a part of the experience and thus the duration of viewing does not significantly differ from live viewing either. In case of two simultaneous interesting events, the preferable option is to view the other event afterwards and not view two events side by side.

In the second paradigm, time-shifted viewing is not supposed to offer similar thrills as the live viewing experience. The user probably knows the result, or at least the winner, but wants to see the events partly or completely. As a minimum, the experience can be reduced to viewing something that is essentially a collection of highlights. Skipping period breaks or even long periods of the actual event is common. In this case, the user is also likely to skip peripheral activities such as viewing the pre-event show but might utilize more content from different media than usually, as he or she is not distracted by spoilers and not afraid to miss a thrilling moment. Compared to live viewing or the first paradigm, the intention is not so much to enjoy a thrilling event as to keep up with a team or a league and to view more analytically.

The third paradigm is about trying to avoid time-shifting if by any means possible. The live factor is valuable itself. One survey respondent elaborated: “Recordings are always a little less interesting because you know that the game has been resolved in some particular way. In live

viewing there is always some kind of a potential surprise moment that nobody in the world is yet aware of." Within this paradigm, the user values the live factor so much that he or she is willing to view live even if the time is not very convenient. In case of simulatenous events, one is chosen as the main event and others are followed concurrently through results or a second screen. It seems that this is the dominant paradigm among the respondents. Betting is clearly one factor as well as following media and discussing with friends but many argue that "sports just have to be viewed live".

6 Discussion and Conclusions

6.1 Answers to Research Questions

The main purpose of this thesis was to address three research questions about non-linear viewing of sports:

RQ1. Do sports fans currently see non-linear viewing as a relevant fashion to experience sports content?
RQ2. Which circumstances and peripheral activities affect non-linear viewing of televised sports?
RQ3. Which qualities should future services and user interfaces hold to facilitate enjoyable non-linear sports viewing experiences in different contexts?

The principal way to enjoy mediated sports is and probably always will be live viewing. For many, different non-linear options to experience sports content are nonetheless relevant at least occasionally. Everyone seems to agree that the live experience is the best but there are varying opinions about how much less satisfying the non-linear options can be.

A large number of peripheral activities affect non-linear viewing of sports. Viewing sports is almost always a social activity in some way. Viewing in the same physical space with friends or family has been common for long. Sports is also a common topic in everyday discussions. Internet and social media have enhanced shared viewing experiences regardless of location. They have also diversified pre- and after-event activities. Betting is a common activity for active sports fans and live betting is a new phenomenon. These activities mostly lessen the benefits of non-linear viewing. On the other hand, there are circumstances that strongly support the need for non-linear viewing options. Inconvenient airing times,

missing the beginning of a sports event and generally not having time to view a whole event are common frustrations.

Based on the user research there are three different paradigms in non-linear viewing of sports: simulating the live experience at another time, condensed viewing to absorb information without seeking thrills and only time-shifting if necessary. Based on the user research, some users persistently follow one of these paradigms while others have varying habits depending on context. The three paradigms form a groundwork for developing new services that take different sports viewing needs into consideration.

In an ideal case, the first paradigm could be supported through a service that would help avoiding all spoilers. In some cases, this is undoubtedly very difficult. If a Finnish person views an ice hockey world championship final between Finland and another country with only a five-minute delay, he or she is likely to hear the neighbors rejoice just five minutes before each goal scored by Finland. At least it would be almost impossible to view the game the next day without having heard or seen the result on (linear) TV, the web, radio, newspapers or everyday discussions. However, different sports such as NBA basketball in Finland or local small-scale sports are not as exposed to vast media coverage. Then, if only the Finnish NBA fan is able to avoid absorbing the comments of the NBA community – which has no overwhelming presence in Finland – regarding a particular match, he or she can enjoy the match later without any loss of excitement. The person might still want to read, view or listen to other NBA content, which could be achieved with a combination of metadata and media filtering.

Another feature that would serve the first paradigm is asynchronous communication, such as CollaboraTV (Harrison & Amento 2007). Time-shifting social and/or other media to match the viewing delay could enrich

the non-linear viewing experience by enabling a peripheral activity that would otherwise cause spoilers. A large-scale implementetation of this would require metadata and compatibility between the peripheral medium and the source of the main non-linear content but simple asynchronous annotations of original content are relatively simple to implement, as CollaboraTV has shown.

The second paradigm opens up more opportunities for service development and user interface design than the other two, especially in terms of constantly moving back and forth within the content or selecting a condensed video to begin with. There has been debate about whether TV viewers want to be active or not. For those that do not want to affect the flow of the content themselves, an automatic summary is a suitable feature. Semantic annotation of sports events, whether automatic or manual, is a key element. A service that would allow the user to select a desired amount of time, and would then present a condensed version of the sporting event, would serve the needs of the passive segment of this paradigm.

Some users prefer to have an active role regarding the non-linear viewing experience. Academic prototypes such as Time Warp Sports (Olsen et al. 2010) and commercial products such as NHL GameCenter have proved that these needs can be addressed as well. Still, the active non-linear viewers rarely want to fully take over the job of a director. They might want to choose a camera angle or an additional slow motion replay from time to time, but not constantly. Increased detail in semantic annotations would enable new features to this type of viewers, but due to large variations between different sports, this would require sport-specific services. Consistency between services and user interfaces shortens the learning curve, which should be emphasized in an entertainment-driven context. However, most sports fans only have one or two “main interests”,

which are also the ones that they are likely to view in an active non-linear fashion.

While the third paradigm seems to leave little to innovate in terms of service development, one interesting part is when the user unwantedly misses the beginning of an event. If not wanting to time-shift the whole experience, such as in the first paradigm, it might be a compelling option to see the most important moments from the beginning and gradually catch up the live stream, automatically or with user interaction. Missing a part might as well happen in the middle of the event but our data indicates that missing the beginning is the most common case.

There are two types of reasons for missing the beginning of a sports event that a person wants to view: forgetting and having some kind of obstacle. A simple solution to forgetting is reminders – preferably cross-platform ones. The "obstacles" include work, hobbies, being on the move and so forth. While a paradigm one person would in this case want to delay the whole viewing experience to a more convenient time, a paradigm three person would want to have a live experience even if the audiovisual quality is much lower. For these users, a low-quality live stream on a small mobile phone display would be better than to wait and see an Ultra High Definition stream later. Mere audio or text updates could suffice as well. In other words, the live factor is a much more important quality attribute than audiovisual quality factors.

Overall, there are a lot of possibilities for novel services in this area. Key dilemmas include how to offer sport-specific features while maintaining famialirity and how to enable active control while allowing the user to be passive and partly inattentive. As Olsen et al. (2010) underlined, creating content and viewing it cannot be addressed separately. Some features suggested here are very dependent on how the content is produced and

transmitted, and cannot be fully implemented in the presentation phase alone.

6.2 Reliability and Limitations of Results

The amount of interviews in this study was small. The initial questions helped in choosing relevant and different interviewees, but ideally there would have been more interviews and thus more qualitative data. Still, the contextual interviews were the source of the most original and profound findings. If I had to start over now and use only one of the three user research methods, it would be the contextual interviews.

The relatively vast survey provided much needed quantitative data to compensate the small amount of interviews and to put the initial findings into perspective. These two methods supported each other very well. Again, if I had to choose only two methods, they would be the interviews and the survey.

Inevitably, the results are partly genre-specific and even ”sport-specific”. Most of the findings were affiliated with either continuous motorsports such as Formula 1 or two-competitor team sports such as ice hockey. Thus, the essential differences between continuous and intermittent as well as two-competitor and many-competitor sports were taken into consideration. However, these are not the only differences. In some respects there could even be significant differences between different leagues of a certain sport. In some respects, the results are culture dependent: some sports such as ice hockey and Formula 1 have historically had a strong position in Finnish sports fan culture.

The fourth research question was:

RQ4. How can actual usage data be utilized alongside more traditional methods in entertainment related user research?

The key issue with usage data was that it was difficult to understand its general reliability and pecualirities. One such pecualirity was the notion from the survey of some users time-shifting F1 content just a little bit in order to achieve a more stable stream compared to the live option. It is impossible to determine from the data which portion of the users who time-shifted a small amount were the ones that pursued a more stable video stream, and would normally view live, and which portion time-shifted for other purposes. It is likely that users who have once perceived a quality benefit in one option, in this case the time-shifted stream, have a strong urge to continue using that option without trying out the others again. This ”routine effect” might be amplified in entertainment contexts.

Despite some issues, there is potential in utilizing usage data as a user research method alongside more traditional methods. It could prove an especially useful method in case of entertainment-driven use contexts, which are difficult to recreate in laboratory conditions or observed in context. Partially, usage data provided similar quantitative evidence than the survey. If automated, it could be used to replace at least some survey questions altogether. In this case, however, obtaining and analyzing the usage data required a lot more effort than creating the survey and analyzing its results.

I believe usage data could be utilized more effectively with two improvements: 1) effective filtering and 2) A/B testing. A critical prerequisite is that the data can be properly filtered to avoid irrelevant parts of it distorting the analysis. For example, if the goal is to understand user behavior and seek use patterns, situations in which technical errors greatly affected use should be identified in order to clearly distinguish them from the desired actions of the users. Similarly, in case of novel services or interfaces it might be convenient to distinguish the learning and testing phase of a new user from regular use behavior. In traditional laboratory tests or contextual inquiries these issues do not normally exist

as the situation is predefined and the researcher is present, being able to assist in case of technical difficulties.

A/B testing is another approach to enhance the usefulness of usage data. Previous results from Elisa Viihde F1 application indicate that a simple change to move a button from the main menu view to a separate dialog window greatly increased non-linear viewing behavior. Similarly, usage data can be utilized in user interface development to determine behavioral differences between alternative interface elements or different versions of entire user interfaces. From users' perspective, constant changes in early versions of new services and user interfaces are nothing new. However, especially in an entertainment-driven context the learning curve should be smooth and constant changes could cause confusion. When analyzing two comparable data sets in relation to each other it is also less important to filter technical errors et cetera out of the data if those are likely to affect both sets in a near similar way.

6.3 Future Research

The results of this thesis offer base knowledge for understanding non-linear viewing of sports content. Future research should include a larger range of different sports and possibly different cultures to determine the generalizability of our results. Additional work is also needed to determine which type of services and features can be created in the "presentation layer" alone and which need to implemented across the whole production chain from content creation to content delivery and presentation. One interesting topic for further research is user preference between UIs that are dedicated to specific sports content and general UIs that do not require learning.

Although we made suggestions about future service development, this thesis did not present detailed design guidelines or new prototypes of digital services or user interfaces. In future research, the assumptions

based on current user research should be formulated into new prototypes and the prototypes should be tested in appropriate circumstances regarding the entertainment-driven nature of engaging with televised sports.

In addition, this thesis only scratched the surface of which kind of possibilities usage data analysis presents within user research in the context of television. Much more research is needed so that this method can be understood, refined and used as effectively as its more familiar counterparts. Usage data can be very valuable if a suitable set of data mining algorithms can be found and used to discover meaningful behavioral patterns.

6.4 Conclusions

It seems clear that television is increasingly moving towards non-linearity at the same time as its convergence with Internet continues. A more debatable matter is to what extent television viewers, or users, wish to have an active role regarding the flow of content. The viewing experience has been mostly passive for a long time and that is not likely to change in a heartbeat, if ever.

Sports is undoubtedly one of the most time-dependent TV content genres. Some have even claimed that sports content ”does not work” in a non-linear fashion (Boyle 2009). The user research within this thesis confirms that live viewing is the dominant and preferred type of sports viewing experience. However, the different types of time-shifted viewing paradigms that we identified are very relevant within certain conditions, even if they are perceived as secondary options.

A number of peripheral activities affect non-linear viewing of sports. Social interactions, media use and betting are factors that seem to diminish the advantages of time-shifting. Without question, these are

matters that must be taken into consideration when designing new services that offer non-linear sports content. Such services should support one or several of the paradigms presented in this thesis. In addition, they should let the viewers choose between the well-established laid-back type of experience and more active involvement.

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Appendices

Appendix A: Optional Test Tasks for UI Walkthroughs

1. Start viewing the match between *Florida Panthers* and *New York Rangers* on Sunday, November 10th.
2. Use the navigation controls to skip uninteresting parts of the match.
3. Choose to show the results and navigate to see the goal by *Aleksander Barkov* in the first period.
4. Re-view the goal in slow-motion.
5. Open up another match in a picture-in-picture view and enable closed captioning on it.

Appendix B: Survey Form (in Finnish)

Käyttäjäkysely 11. –18.12.2013

1. **Kuinka usein katsot…**

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- perinteisiä (lineaarisia) TV-lähetyksiä?
- itse tehtyjä tallenteita?
- valmiita tallenteita (esim. Catch-up) Elisa Viihteen kautta?
- valmiita tallenteita jonkin muun palvelun (esim. Yle Areena) kautta?

2. **Kuinka usein katsot urheilua…**

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- perinteisinä suorina TV-lähetyksinä?
- perinteisinä uusintalähetyksinä?
- perinteisinä koostelähetyksinä?
- itse tehtyinä tallenteina kokonaisina lähetyksinä?
- itse tehtyinä tallenteina koostelähetyksinä?
- valmiina tallenteina kokonaisina lähetyksinä Elisa Viihteen kautta (esim. catch-up)?
- valmiina tallenteina koostelähetyksinä Elisa Viihteen kautta (esim. catch-up)?
- valmiina tallenteina kokonaisina lähetyksinä jonkin muun palvelun (esim. Yle Areena) kautta?
- valmiina tallenteina koostelähetyksinä jonkin muun palvelun (esim. Yle Areena) kautta?

3. **Mitä valmiita tallenteita tarjoavia palveluita käytät urheilusisältöjen katsomiseen?**

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- Elisa Viihteen catch-up
- Elisa Viihteen Katsomo F1 –sovellus

- Elisa Viihteen Katsomo jääkiekko –sovellus
- Yle Areena (Elisa Viihteessä)
- Katsomo (Elisa Viihteessä)
- Yle Areena
- Katsomo
- Ruutu.fi
- Teevee.fi
- NHL GameCenter
- NFL Game Pass
- NBA League Pass
- Jokin muu, mikä?

4. Mitä laitteita käytät urheilun katsomiseen?

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- Elisa Viihde –digiboksi
- Muu digiboksi Pelikonsoli
- Muu televisioon kytketty päätelaite
- Pöytätietokone
- Kannettava tietokone
- Tablet-laite
- Älypuhelin
- Jokin muu, mikä?

5. Mitä urheilulajeja katsot?

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- Jääkiekko
- Jalkapallo
- Amerikkalainen jalkapallo
- Lentopallo
- Koripallo
- Baseball
- Pesäpallo
- Salibandy
- Uinti
- Yleisurheilu
- Pyöräily

- Ratsastus
- Ravit
- Suunnistus
- Hiihtolajit (ml. ampumahiihto, yhdistetty)
- Mäkihyppy
- Alppihiihto
- Lumilautailu
- Taitoluistelu
- Pikaluistelu
- Nyrkkeily
- Paini
- Vapaaottelu
- Tennis
- Golf
- Purjehdus
- Formula 1
- Ralli
- Ratamoottoripyöräily
- Jokin muu, mikä?

6. Kun katsot urheilua tallenteina tai viivästettyinä lähetyksinä, miten pian alkuperäisestä urheilutapahtumasta aloitat katsomaan?

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- Alle puoli tuntia urheilutapahtuman alkamisen jälkeen
- Ennen kuin urheilutapahtuma on päättynyt
- Samana päivänä kuin alkuperäinen urheilutapahtuma
- Korkeintaan seuraavana päivänä
- Korkeintaan kahden päivän kuluessa
- Korkeintaan viikon kuluessa
- Korkeintaan kuukauden kuluessa
- Yli kuukauden kuluttua

7. Miten usein teet seuraavia asioita katsoessasi urheilua viivästetysti tai tallenteena?

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- Katson lyhyemmän aikaa kuin suoran lähetyksen tapauksessa
- Katson pidemmän aikaa kuin suoran lähetyksen tapauksessa
- Kelaan eteenpäin vähemmän merkittävien kohtien yli
- Kelaan taaksepäin katsoakseni kiinnostavan kohdan uudestaan
- Kelaan viivästettyä lähetystä eteenpäin päästäkseni live-lähetykseen
- Pyrin pysyttelemään "uutispimennossa" kilpailun/ottelun tulosten suhteen
- Tiedän jo kilpailun/ottelun tilanteen tai lopputuloksen, kun alan katsoa

8. Miten usein teet seuraavia asioita urheilun katsomisen aloittamista koskien?

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- Valmistaudun katsomiseen etsimällä lisätietoa
- Valmistaudun katsomiseen keskustelemalla aiheesta
- Lyön vetoa
- Harrastan fantasiamanagerointipelejä, kuten Liigapörssi
- Aloitan urheilun katsomisen ennakkolähetyksestä
- Aloitan urheilun katsomisen kun kilpailu/ottelu alkaa
- Aloitan urheilun katsomisen kesken kilpailun/ottelun

9. Miten usein teet seuraavia asioita urheilun katsomisen aikana?

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- Täydennän katsomistani etsimällä lisätietoa
- Keskustelen muiden katsojien kanssa
- Seuraan tuloksia vedonlyöntiin liittyen
- Seuraan tuloksia fantasiamanagerointipeliin liittyen
- Harrastan live-veikkausta
- Teen muita asioita (työt, harrastukset, jne.) ja katson urheilua "sivusilmällä"

10. Miten usein teet seuraavia asioita urheilun katsomisen lopettamista koskien?

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- Lopetan urheilun katsomisen jo ennen kilpailun/ottelun päättymistä
- Lopetan urheilun katsomisen kun kilpailu/ottelu päättyy
- Katson kilpailun/ottelun jälkeistä jälkilähetystä
- Palaan kilpailun/ottelun tapahtumiin esimerkiksi lukemalla tai keskustelemalla

11. Millä tavoin etsit lisätietoa urheilun katsomiseen liittyen?

Ennen katsomista, Katsomisen aikana, Katsomisen jälkeen

- Lukemalla uutisia paperilehdistä
- Lukemalla uutisia internetistä
- Katsomalla videoita internetistä
- Katsomalla urheilu- uutislähetyksiä
- Katsomalla koostelähetyksiä
- Käyttämällä sosiaalista mediaa
- Hakemalla tietoa urheilusivustoilta, kuten urheiluliigan tai -joukkueen kotisivuilta
- Hakemalla tietoa yleisillä työkaluilla kuten Google tai Wikipedia
- Keskustelemalla ystävien kanssa
- Jokin muu, mikä?

12. Millä laitteilla etsit lisätietoa urheilun katsomiseen liittyen?

Ennen katsomista, Katsomisen aikana, Katsomisen jälkeen

- Televisio lisälaitteineen
- Pöytätietokone
- Kannettava tietokone
- Tablet-laite
- Älypuhelin
- Jokin muu, mikä?

13. Mitä sosiaalisen median muotoja käytät urheilun seuraamiseen liittyen?

Ennen katsomista, Katsomisen aikana, Katsomisen jälkeen

- Twitter
- Facebook
- Blogit
- Keskustelufoorumit
- Jokin muu, mikä?

14. Mistä syystä lopetat urheilun katsomisen ennen kilpailun/ottelun päättymistä?

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- Kilpailu/ottelu on tylsä
- Kilpailu/ottelu on selvästi ratkennut
- Lähden töihin/harrastuksiin/tms.
- Menen nukkumaan
- Siirryn katsomaan muuta sisältöä (esim. samanaikainen ottelu)
- Jokin muu, mikä?

15. Mistä syystä aloitat urheilun katsomisen kesken kilpailun/ottelun?

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- En ehdi katsoa alusta asti nukkumisen vuoksi
- En ehdi katsoa alusta asti muun tekemisen kuten töiden tai harrastusten vuoksi
- En muista katsoa alusta asti
- Aloitan katsomisen vasta kun kuulen, että kilpailu/ottelu on käynnissä
- Aloitan katsomisen vasta kun kuulen, että kilpailu/ottelu on erityisen kiinnostava
- Olen aluksi katsonut toista sisältöä (esim. samanaikainen ottelu)
- Jokin muu, mikä?

16. Mitkä tekijät ovat ärsyttäneet sinua urheilun katsomisessa?

Ei koskaan, Harvoin, Silloin tällöin, Usein, Jatkuvasti

- Huonot katseluajat
- Katselun aloittaminen kesken kilpailun/ottelun
- Mainoskatkot
- Urheilun osat, jolloin ei tapahdu mitään merkittävää kuten pelikatkot
- Ohjaajan valitsema huono kuvakulma tietystä tilanteesta
- Hidastuksen puuttuminen kiinnostavan tilanteen kuten maalin tapauksessa
- Hidastuksen näyttäminen huonosta kuvakulmasta kiinnostavan tilanteen kuten maalin tapauksessa
- Hidastuksen näyttäminen turhaan esimerkiksi tärkeän pelitilanteen aikana
- Tulosten tai tilastojen puuttuminen, kun haluaisi nähdä ne
- Tulosten tai tilastojen turha näyttäminen siten, että ne peittävät olennaista sisältöä
- Selvästi ratkenneen ottelun tai kilpailun tylsä loppuosa
- Kiire
- Vaikeus valita samanaikaisten sisältöjen välillä (esim. rinnakkaiset ottelut)
- Jokin muu, mikä?

17. Minkälaisista ominaisuuksista olisit ensisijaisesti kiinnostunut liittyen urheilun katseluun viivästetysti tai tallenteina?

(Listaa kolme tärkeintä ominaisuutta tärkeysjärjestykseen, siten että numero 1 on tärkein, numero 2 toiseksi tärkein ja numero 3 kolmanneksi tärkein.)

- Mahdollisuus siirtyä aikajanalla vapaasti eteen- ja taaksepäin
- Mahdollisuus siirtyä merkittyyn kohtaan, kuten maalitilanteeseen, seuraavaan merkitykselliseen pelitilanteeseen tai erätauon loppuun
- Mahdollisuus siirtyä helposti live-lähetykseen 2 viivästetystä lähetyksestä
- Mahdollisuus katsoa itse valittu kohta hidastettuna
- Mahdollisuus valita itse kuvakulma hidastukseen
- Mahdollisuus valita tiivistetty lähetys, josta on poistettu 2 esimerkiksi erätauot yms. pidemmät katkot
- Mahdollisuus valita tietyn mittainen tiivistetty lähetys sen mukaan, miten paljon aikaa haluaa käyttää katsomiseen

- Mahdollisuus katsoa pienessä ruudussa toista kuvakulmaa samasta tapahtumasta
- Mahdollisuus katsoa pienessä ruudussa toista tapahtumaa (esim. toinen jääkiekko-ottelu)
- Mahdollisuus katsoa samasta tapahtumasta useita kuvakulmia samanaikaisesti useassa rinnakkaisessa ruudussa
- Mahdollisuus katsoa useita tapahtumia samanaikaisesti useassa rinnakkaisessa ruudussa (esim. erilliset jääkiekko-ottelut)
- Mahdollisuus piilottaa tulokset, jotta on mahdollista pysyä 2 "uutispimennossa" ennen viivästettyä katsomista
- Mahdollisuus nähdä sisältöön liittyviä twiittejä, uutisartikkeleita tms. lisätietoja varsinaisen videosisällön lomassa
- Jokin muu, mikä?

18. Koetko katsovasi viivästettyjä urheilulähetyksiä tai urheilutallenteita aktiivisemmin vai passiivisemmin kuin suoria lähetyksiä? Aktiivisuudella tarkoitamme tässä katseluun liittyvää toimintaa, kuten lisätiedon hakua, kelaamista, veikkaamista, sosiaalisen median käyttöä jne.

- Aktiivisemmin kuin suoria lähetyksiä
- Passivisemmin kuin suoria lähetyksiä

19. Kuvaile, millä tavalla urheilun katsominen eroaa kohdallasi viivästettynä/tallenteena katsottuna verrattuna suoran lähetyksen katseluun.

20. Voit vielä täydentää vapaamuotoisesti edellisiä vastauksiasi.

Mitkä tekijät vaikuttavat urheilun katsomiskokemukseen erityisen negatiivisesti tai positiivisesti?

Minkälaisilla ominaisuuksilla ja palveluilla urheilun katsomiskokemusta voisi mielestäsi parantaa?

Vastaathan lopuksi vielä muutamaan taustatietokysymykseen.

21. Sukupuoli?

- Mies
- Nainen

22. Ikä?

- Alle 18 vuotta
- 18–24 vuotta
- 25–34 vuotta
- 35–44 vuotta
- 45–54 vuotta
- 55–64 vuotta
- 65 vuotta tai yli

23. Ammattiryhmä tai elämänvaihe?

- Työntekijä
- Toimihenkilö
- Ylempi toimihenkilö
- Johtavassa asemassa
- Yksityisyrittäjä
- Opiskelija
- Kotiäiti tai –isä
- Eläkeläinen
- Työtön työnhakija
- Jokin muu, mikä?

24. Talouden rakenne?

- Asun yksin
- Asun puolison kanssa kahdestaan
- Asun puolison ja lapsen/lasten kanssa
- Asun lapsen/lasten kanssa
- Asun muiden kuin lapsen/lasten tai puolison kanssa
- Jokin muu, mikä?

25. Kotona asuvien lasten ikä?

Tarvittaessa voit valita useamman vaihtoehdon.

- Alle kouluikäisiä
- Kouluikäisiä
- Teini-ikäisiä
- Ei lapsia

26. Asuinpaikan postinumero?

27. Onko käytössäsi tablet-laitetta?

- iPad
- Android-tablet (esim. Samsung Galaxy Tab)
- Joku muu tablet
- Ei tablet-laitetta