A concept on the Internet-based television

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Abstract

Television is moving towards Internet-based services with an increasing popularity of online streaming and connected TV sets. However, the lean-back viewing experience is often forgotten in the design of such services – traditional broadcasted television is still the source for relaxed entertainment in the living room. In this study, a concept of a new TV service is proposed. The aim is to create a solution where the qualities in traditional television are preserved in an online environment.

The decisions that were taken when shaping this concept are based on a literature study, a market analysis, a design workshop and expert interviews. The main results are that the interfaces of today’s Internet-based TV services require too much interaction and decision-making, and that TV channels should be redefined and take more advantage from the independence of a fixed broadcasted source.

Sammanfattning


Utformningen av konceptet är baserat på en litteraturstudie, en marknadsanalys, en design-workshop samt expertintervjuer. Det huvudsakliga resultatet av studien är att dagens gränssnitt för uppkopplade tv-tjänster kräver för mycket interaktion och beslutsfattande, samt att tv-kanaler borde definieras om för att dra mer nytta av oberoendet från en broadcast-källa.
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1 Introduction

We are in a digital age where the technological change hugely impacts all forms of media. Television is not an exception and is today facing a rapid transition toward Internet-based services. TV was once as simple as radio-scheduled broadcasts received by the public with a device capable of changing the channel and adjusting the volume. Not only has technology brought new innovative features, but it has also challenged the notion of what the entire TV media really is. Although video on demand is well established with services like Netflix and iTunes, the lean-back TV experience is essentially unaltered since the analog days. Initiatives such as Magine and SVT Flow suggest a future of semi-linear viewing that could be the beginning of a restructured TV landscape without the current form of traditional channels and program schedules.

New services that attempt to define what television should be are frequently being released on the market: new devices, new applications and new models of content delivery. Although the options are many, it is difficult to recognize a solution that covers both the need for usability and a comprehensive access to content.

The purpose of this study is to propose recommendations on how the TV of the future could look like. The result is a new TV concept, delivering content over-the-top, on the Internet, into the living room TV set. A prototype has been developed to illustrate how it could be done in practice. The focus is mainly user-centered but the study also puts it in perspective with the forces within the media industry.

The initiative to do this study came from the tech company Arkena, formerly known as Qbrick, and the project was carried out in their Stockholm office with Magnus Hazell and Johan Andersson as supervisors. Arkena provides video management solutions and content delivery over the Internet.
1.1 Research question

The research question for this study is the following:

- How can the Internet-based TV service of the future be shaped?

To answer this question, and provide well-founded conclusions on how the future could look like, a large part of the theoretical background in this report consist of a market analysis. The question that the analysis strives to answer is:

- What is the current state of Internet-based television in Europe, what is successful in different regions and why?

The countries that have been studied are Germany, United Kingdom, France and the Scandinavian countries.

1.2 Delimitations

This project does not aim to further develop an existing system for Internet TV, but rather starts from a clean sheet, aiming to create a holistic approach with reasoning in broader perspectives. With that in mind and considering the time frame, the aim has not been to deliver a complete solution but only the beginning of it.

Since the media landscapes vary in different regions, the conclusions might not be generalizable globally. The market analysis has been focused to the three largest countries in Europe, plus Scandinavia, and the conclusions are drawn with the variation in the markets in mind. If the aim had been shifted to, for example, South Korea, the results would most likely have been very different.
1.3 Method outline

The initial task was to get an idea of the current state of television and the history of how it came to be that way. In this market analysis, both commercial structures and technical solutions were taken into account. The market analysis was followed by a literature study in human-computer interaction and TV viewer behavior. After receiving input and ideas from a design workshop, carried out with eight individuals, the concept began being developed. With opinions from three experts from the streaming industry and own reasoning, the concept was put together into a high-fidelity prototype, and conclusions and suggestions for the future were made. The developing of the prototype was an iterative process that began half way in the project and continued throughout the study. The last version of the prototype was evaluated on five potential users to get input on what the next step in developing the service would be.

Figure 1 below shows an illustration of the workflow. More detailed descriptions on the method are found in chapter 3.

![Figure 1. Method outline](image-url)
2 Theory

The theory presented in this chapter starts with explaining the basics in digital TV technology and shows how Internet comes into the picture and the requirements for a switchover to Internet-based services. The second part is about TV viewing behavior in general and a review of HCI studies within the field. The last and largest part of this chapter is a market analysis of the television market today and historically.

2.1 Technology within the TV media

This section explains technical aspects of modern television and introduces terminology that will be used in the report.

2.1.1 Digital television and the role of Internet

The transition from analog to digital television began around year 2000 throughout Europe, and today, most countries have completely turned off analog broadcasting. The substitute is a European-based consortium standard called Digital Video Broadcasting (DVB). The standard describes how digital television (DTV) should be coded, encrypted and modulated among other details, when transmitted via terrestrial antenna, satellite or cable (Reimers, 1998). For using DTV, a receiver with a TV-tuner is needed to decode the signal. This could be built into the TV set or in an external set-top box. Although the video signal is now digital, it is still a one-way form of communication. The main benefits compared to analog TV are the possibility for better picture quality and access to more channels, alongside some lesser interactive features such as episode guide, multiple audio tracks and subtitling.

Since middle of 2000s it is also possible to receive television through broadband connection using Internet protocol, this is called IPTV and opens up for interaction between the user and the service provider. Common features for IPTV, aside from live television, are time-shifted television - the possibility to start watching a program within a period of time after it has aired - and video on demand (VoD) - the possibility to browse a catalogue of TV shows and movies unrelated to program schedules (Wauters,
et al., 2008). However, the distribution of IPTV is bound to and controlled by specific network operators and service providers who decide all the aspects on how the service can be used and which external hardware (set-top boxes) that is required to use it.

The Internet can of course be used for watching video without involvement of IPTV standards; a common example of this is YouTube. Subscription video on demand (SVoD) for watching full-length TV shows and movies for a monthly fee is also becoming increasingly popular (e.g. Netflix). Furthermore, many of the traditional broadcasters are making their content available to stream on their website, both live and on demand. These types of content providing are referred to as over-the-top (OTT), which means that Internet service providers (ISP) only have responsibility for delivering the IP packages and leave distribution rights, viewing abilities etc. over to another actor (Baccarne, et al., 2013). In other words, OTT services uses the same network services as regular web browsing does.

### 2.1.2 Technical requirements and bandwidth

Providers of streaming services can make their content available through a web browser, an application or both. This implicates that some form of Internet connected computer is needed that can stream the content and show it on a screen. Below is a short explanation of the most common devices that can be used. The different options provide different user interfaces, functionalities and compatibility with the content providers. Many streaming services are multi-platform but they are not guaranteed to be compatible with every device.

- **Smart TV**, also known as connected TV or hybrid TV, is the collective term for TV sets that have an internal TV-tuner but also integrated Internet-connected technologies and applications that can be run; a convergence between television and computers.

- **Set-top box**, is an external TV-tuner that converts an incoming TV-signal (terrestrial, cable, satellite or IP) into a video stream that can be viewed on the
TV screen. These boxes can also have Internet capabilities and interfaces similar to smart TVs.

- Digital media player, is also a box placed next to the TV set, but it focuses solely on streaming media and does not contain a TV-tuner for broadcasted content. A popular digital media player is the Apple TV.
- Game console, e.g. PlayStation and Xbox, have Internet capabilities in their later generations and applications that enable video streaming.
- Tablet and smartphones.
- Laptop/desktop computers.

The required bandwidth for streaming video depends on how the video file is encoded, the level of compression and the resolution of the video and audio. While broadcasting of digital video has strict standards on these matters, the quality of streamed media is adjustable. It will oftentimes be changed even during playback; it starts with a low bit rate and gradually increases as more of the video is buffered. This technique is used to present the content as immediate as possible after a video is selected (Fernandez et al., 2012).

For using Netflix, the recommended minimum bandwidth is set to 1.5 Mbit and 7 Mbit is needed to stream 1080p-content (Netflix, 2014). Worth noticing is that Netflix and similar video streaming sites use heavy compression on the video compared to broadcasted HD television. As an example, SVT HD is transmitted with a bitrate of up to 16 Mbit (SVT a, 2014), and that is for 720p, which is less than half the amount of pixels as 1080p. However, the bandwidth might not correspond directly to image quality since more or less effective compression algorithms can be used (Schaar-Mitrea and With, 2000).

According to a study carried out by Akamai, 66-77% of the households in the studied regions have a down speed above 4 Mbit (Akamai, 2014), see Table 1. This suggests that we are not yet entirely on the levels needed for a complete switchover to OTT television in high quality. Moreover, there can be problems with buffer times during
peak hours, and with increased usage of online video, the load will be even greater. However, as seen in the Table 1, the annual speed change is a positive 29-45% in each region, which must be considered as a promising increase.

Table 1. The data refers to Q3 2013 (Akamai, 2014)

<table>
<thead>
<tr>
<th>Region</th>
<th>Average. down speed</th>
<th>Users above 4 Mbit</th>
<th>Year over year avg. speed change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scandinavia (avg.)</td>
<td>8,9 Mbit</td>
<td>66%</td>
<td>+32%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>9,1 Mbit</td>
<td>77%</td>
<td>+45%</td>
</tr>
<tr>
<td>Germany</td>
<td>7,6 Mbit</td>
<td>75%</td>
<td>+29%</td>
</tr>
<tr>
<td>France</td>
<td>6,5 Mbit</td>
<td>69%</td>
<td>+36%</td>
</tr>
</tbody>
</table>

The broadband penetration rate - the number of high-speed Internet connections per 100 inhabitants - has historically been higher in Scandinavia compared to UK, Germany and France. According to data from Eurostat, the advantage has been kept from the start of the measurements in 2002 until late 2009 when most of the compared countries converged to a penetration rate of around 30% (obtained from graphs on Google Public Data, 2014).

### 2.2 Nature of television

This section gives an overview on different types of TV content, followed by a section on viewer behavior.

#### 2.2.1 Types of content

TV content has been greatly complexed with the expansion of the Internet and the increasing presence of screens (smartphones, tablets etc.) on which content can be presented. Some types of content can benefit from the connected technologies, the
existence of others are dependent of it. In this section, different types of content will be presented to explain the different needs when creating a concept for the modern TV.

Sports, events and news programs are by their nature shown on fixed times thus naturally placed in a program schedule. Nevertheless, in the case of physical events such as sport championships, the experience can be altered by OTT streaming because of the opportunity to show individual content on the viewers screens. For example, one viewer might want to get an overlay with statistics for a certain player during a football game, or make use of social applications and choose freely between the different cameras covering the playing field (Dawson, 2013). On the other hand, the latency when streaming over the Internet can be an issue for sports that involve betting, for example horse racing, since the delay is notably longer compared to a broadcast (Hazell, section 4.3 Interviews).

Talk shows, late-night talk shows, breakfast chats and similar shows often consist of a host, one or more guests and a live audience. Those shows are often aired every weekday and usually recorded the same day or in the near future as they are aired. The sense of presence in such shows might make it unsuitable for putting it in an on demand archive. However, clips from highlights are often found on streaming sites. There are of course many more examples of regular TV programming but no research could be found on the preferred method of receiving such content.

TV-series and movies are recorded a long way in advance and is the type of content usually found on today’s VoD services. TV series often follow a storyline, making them dependent of watching the episodes in a chronological order. Netflix has used a unique approach with its original series (e.g. House of Cards) by releasing entire seasons at once.

Video sharing sites like YouTube and Vimeo contain both professionally produced clips and clips created by the community. The median length of the most popular YouTube videos is around two minutes (Pew Research Center’s Journalism Project
staff, 2012). Some specific genres of even shorter videos are common to be merged together to longer clips by members of the community; two classic examples of this are “Funny cats” and “Driving in Russia”. The videos are often uploaded as a part of a “channel” which carries more resemblance to a playlist than a traditional TV channel.

### 2.2.2 Viewer behavior

In the 1950s, the TV set was a central point in the living room, watching it was a communal activity and an important opportunity for socialization and bringing family harmony. Media professor Chuck Tryon (2013) argues in an article published in Screen that TV viewing today is more about personal escape rather than something we do together (Tryon, 2013). On the other hand, with smart devices, families and friends can still be spatially together in the same room although viewing solitary on their own screens. This might be a development in the direction when TV once again can unite people, according to the author (Tryon, 2013).

Tryon writes in the article about different types of mobility that are important for modern television consumption. In addition to the desire of spatial mobility - the ability to view content at any location of choice - there is also a desire for platform mobility and temporal mobility. Platform mobility means that TV shows can move seamlessly from one device to another and the temporal mobility means that the content should be on-demand and not bound to programming schedules. The article centers around a commercial slogan from a broadcasting company “Make any room your TV room” which according to Tryon well describes the industry's view on what the TV media is today (Tryon, 2013).

Multi-screen or second screen are terms that are often on the agenda when discussing modern TV experiences. Nielsen (2013) found in a survey that almost half of the smartphone and tablet owners in the US use their device simultaneously as watching TV every day. The study concludes that at least one-fifth of the time spent on the second screen is related to the current program, transforming the TV viewing to a more deeply engaged experience (Nielsen, 2013). Another series of surveys, carried out by
The Research Intelligence Group, also came to similar conclusions on the use of second screen while watching TV (Mancuso and Stuth, 2012). They also discovered that the behavior was not unique to linear viewing but also very common when watching VoD and time-shifted television.

Cord-cutting is an expression for the process of ending cable and satellite TV connection in favor of Internet based TV services. It has been a rising trend during this decade and the trend is confirmed as a reality, at least in the Nordic countries, by an extensive survey called Arkena Nordic Video Index (Arkena Nordic Video Index, 2014). It is found in the survey, which consists of interviews with over 4000 representatively selected respondents, that 7% have already cut the cord and 20% are considering to do so in the near future. The key driver for doing so is the desire for flexibility, primarily to be able to choose when to watch something. The freedom to choose which content to watch comes as the next most important driver, followed by the flexibility to choose on which device to watch it. The survey concludes that the computer (desktop and laptop) is still by far the most popular device to watch online content on. Smart TV is on second place in popularity, closely followed by tablets and smartphones. The least popular devices are gaming consoles and set-top-boxes (Arkena Nordic Video Index, 2014).

However, it is debatable if OTT services are replacing the traditional form of TV consumption or if it is just additive to it. In May 2014, Viacom revealed the result of a study on the customers experiences when pay-TV companies also offer OTT solutions to view their content (Viacom, 2014). The main result was that the use of such applications led to an overall increase of TV viewing and a greater customer loyalty to the pay-TV providers, and not a decreased interest in the big screen. A study by Consumer Electronics Association, published early 2014, get similar results in regards to traditional TV viewing in general, which is concluded not to decrease as a result of emerging online video sources (CEA, 2014).
2.3 Human computer interaction within the TV media

Bill Scott (2012), writing for the VOD Professional website, published an article on what makes a great TV user experience. The first thing to recognize when designing applications for TV is that it differs from other devices in terms of the users attitude towards it. While computers and smart devices are personal, the context for TV is in the home - a medium that is shared with family members and friends. Scott writes in the article that TV is all about instant gratification, and simplicity is critical. He continues to explain the importance of making users feel that they are watching TV when using the application; the user interactions should be limited to whenever the user feels like interacting, otherwise it should just be content. To make it feel like TV, the viewer always prefers to begin the experience with full-screen video (Scott, 2012).

The input to a traditional TV set is normally just changing the channel and adjusting the volume. Occasionally a menu is brought up to change some behavior of the TV set or tweak the image properties. Some systems also have an electronic program guide. For this, a remote control with four arrows, a select button, a menu button and power on/off would be sufficient. Nonetheless, the remotes of that generation of TV set usually have an abundance of buttons, many of them with unclear functionality and often an inconsistency even for simple operations. Not to mention that a plural of these remotes are needed simultaneously, often from different brands lacking a collective design philosophy (Nielsen, 2004).

TV sets today in mid- to high price range are usually controlled through a more advanced interface since they are equipped with a computer running not only linear television broadcasts, but also applications of various kinds. The manufacturers develop their own software - Samsung Smart TV, LG Smart Hub, Panasonic Smart Viera, Toshiba Cloud TV among others - with different design and functionality. The most common approach is to have a home screen with a grid of installed applications and sometimes widgets for weather, calendar, social media etc. See Figure 2 for an example of a smart TV home screen.
When designing applications that are intended to be used on a TV screen, a lot differs on how things are visualized and interacted with. The substantially longer viewing distance to a TV compared to a desktop screen or mobile device requires the interface to be large, with lots of spacing. A good rule of thumb is to make the interface four times larger than it otherwise would be (Mischel, 2011).

Google has published a design guide for developing Android applications for their smart TV platform. It is stated that:

“When you're designing your application, remember that Google TV display is fundamentally different from that of a computer or mobile device. Despite its size, it displays less information overall than for a computer or mobile UI. You'll need to provide less UI, and you may want to automate some tasks instead of asking for user interaction.” (Google Developers, 2012)
They continue explaining that it is not only the screen size that differs, but also the user expectations of TV interaction, which is a more lean-back experience compared to interacting with computers and smartphones. The users want to be entertained by content and not involved in the interface. Therefore, all interaction should be done with least amount of effort (Google Developers, 2012). Scott (2012) shares this opinion; the viewer should be taken on a journey when watching TV. In terms of interaction, this means that instead of disjointed functions selected at random (compare to clicking with a computer mouse), the interactions must be contextual and lead the user forward from one view to another with simple choices.

Google also points out weaknesses of TV displays that have to be considered when designing the graphical interface. Some of the hands on tips are:

- Pure white can cause vibrancy and image ghosting.
- Bright whites, reds and oranges should be avoided since they cause especially bad distortion.
- Large gradients can result in color banding.
- Paragraphs of text should be no more than 90 words and line length 5-7 words.
- Place the interface on the left or the right side of the screen and save the vertical space for content.

(Google Developers, 2012)

The interfaces are normally designed to function without the use of mouse and keyboard. The manufacturers have different approaches on handling the issues that occur when interaction gets more advanced but the input device is of the same format as for traditional TV. A common approach is to use a second screen (smartphone or tablet) as a remote, an example of this is Google Chromecast which depends solely on a second screen for navigation. Jim Mischel, writing on the blog for software developer SmartBear, argues that the navigation must be simple enough to do with your thumb without looking at the input device (Mischel, 2011). A study carried out by Japan Broadcasting Corporation came to the same conclusion, that users prefers not to letting
their eyes off the screen when interacting (Komine et al., 2007). The same study also argued that one of the central factors for increasing usability on a remote control is to have fewer buttons on it.

2.4 Market analysis

The first part of this section gives a historical introduction for television and an overview on current OTT services in United Kingdom, Germany, France and Scandinavia. In the second part, notable technical solutions that gave inspiration to the prototyping are summarized.

2.4.1 Region specific analysis

The history of television broadcasting began in the 1930s in UK, Germany and France but Second World War largely halted the advancements. After the war, it took some years for the technology to gain momentum but in the 1950s, most countries in Europe began public broadcasting and TV became an important part of people’s life.

2.4.1.1 United Kingdom

BBC, British Broadcasting Corporation, was from the beginning and still is the world’s largest company in television broadcasting. Before the closedown during the war, around 20,000 families in the country were able to watch TV in their homes. However, the technique was costly for a nation struggling from the Depression and preparing for a war. One important reason for the government to push the technology when other countries did not is said to be to encourage the development of the cathode-ray tube, which was essential for radar defense technology (BBC, 2014).

Since the technology was already in place, the broadcasts continued quickly after the war. A great tipping point, when TV really started to reach the masses, was the broadcast of Queen's Coronation in June 1953 viewed by 27 million people around the country. A year after that, the government decided to grant permission for commercial
television, which led to the creation of Independent Television (ITV). This new ad
finance TV franchise took many years to be completed throughout the country and was
not becoming truly profitable until the beginning of the 1960s. Channel 4 was launched
in 1982 but was regulated by statute not to compete with the type of contents generally
found in the other channels. Furthermore, the advertising in Channel 4 was carried out
by ITV who then returned revenue but kept the monopoly for TV ads (Parliament,
2010).

Satellite broadcasting became available direct-to-home in 1989 and that is the year
when Rupert Murdoch entered the TV business in Britain and created Sky. After a
merging with their competitors, British Sky Broadcasting Group (BSkyB) was formed
and is today the largest pay-TV broadcaster in the UK. In 1990, the television policies
shifted radically to a much more deregulated market where broadcasting permission
was auctioned out rather than quality controlled by a certain threshold. A joint venue
called FreeView was established to deliver digital television to the people of UK and to
be an alternative to pay-TV from Sky (Parliament, 2010). FreeView consists of BBC,
ITV, Channel 4, BSkyB and, for delivering the infrastructure, the telecommunication
company Arqiva.

A TV-license is mandatory for everyone in the UK who owns a TV-set or any other
device used for watching live TV. The license fee is the main revenue source for the
BBC while other free-to-air channels rely on advertising and pay-TV on subscription
fees.

OTT
UK broadcast and agency Ofcom release reports on the developments on the TV market
annually, in the most recent report that summarizes the trends for 2013. They conclude
that Internet connected television is on a steady rise but that linear broadcasting stands
for 90% of the total consumption (Ofcom, 2013). When it comes to online video
consumption through televisions, shorter video clips are dominant followed by catch
up-TV, while film and TV services like Netflix only constitute 16% of the time spent.
This, according to the report, is also supported by BBC statistic where iPlayer as the most used OTT TV service in the UK accounts for just 2% of the consumption of BBC programming within the country. Following the BBC iPlayer in size are ITV Player, 4oD and Demand Five, which are all the OTT alternative of already established broadcasters. Furthermore, Ofcom sees an increasing trend of collecting the content from all these services into one interface. Examples of such services in development are the set-top boxes from Sky on Demand, YouView and Virgin TiVo. Sky has also started offering subscriptions to customers without their branded set-top box. This service is called NOW TV and has quickly gained in popularity (Ofcom, 2013).

Another trend that Ofcom noted in the report is that companies without background in broadcasting are driving subscription by self-produced content. Examples of these are Netflix with their original series and Amazon who plans to move into TV production for their streaming service LoveFilm (recently rebranded as Prime Instant Video). The first YouTube pay-channel in the UK has also been launched by media production company Digital Theatre (Ofcom, 2013).

### 2.4.1.2 Germany

While other countries involved in the Second World War closed down broadcasting during that time, German television remained in the air. It has been found that the Nazis had long gone plans, including recorded programs, for delivering propaganda on big screens in public places as well as supplying transmitters to German homes (Elsner et al, 1990). The plans never became reality and instead, two new broadcasting organizations were founded in 1950, ARD in West Germany by the Allies and Deutscher Fernsehfunk in East Germany by the Soviet Union. ARD consisted of six different public service channels controlled by the winning nations in the war.

A second public broadcasting company called ZDF was established in 1961 in West Germany to be an alternative to ARD but it took until 1984 for the two license-fee funded companies to get competition from private broadcasters. After the reunification of Germany in 1989, the East German broadcasting companies were dissolved and new
regional networks were founded as well as many new private stations (Witkowski and Kellner, 1998).

Public service television has remained very important in Germany with 46% of the total TV revenue coming from public funding as of 2008. Advertising stood for 42% and pay-tv relatively low 12% (International Television Expert Group, 2009). On the privately funded advertising side, the largest actors are ProSiebenSat.1 Media and the RTL Group. The leader in pay-TV is Sky Deutschland, which like BSkyB is owned by 21st Century Fox.

**OTT**
The relatively low interest for pay-TV in Germany could be one reason for a slow growth in the subscription VoD in the country. However, in 2013 the number of smart TVs and other connected devices has been rising rapidly and the OTT TV market has started taking off (Barraclough, 2014).

Sky Deutschland is offering their pay-TV customers on demand streaming with their service Sky Go and in addition to that, Sky launched Snap in the end of 2013, which opens up for subscribers without a pay-TV subscription (Campbell, 2013). Snap aims to compete with the other large subscription VoD services in Germany, Maxdome by ProSiebenSat.1, LoveFilm by Amazon and Watchever by Vivendi (Barraclough, 2014).

Netflix is planning to expand to Germany in the end of 2014, but in an interview with the BBC, media analyst Ian Maude expresses that Germany is a potentially difficult market because of the low willingness to pay for TV content (Keilon, 2014). The Swedish start-up Magine (more details on their service is found in section 2.4.2 Technical solutions) has also chosen Germany for their next market to launch (Krieger, 2014).
2.4.1.3 France

After the war, France was far behind their neighboring countries in terms of public reach of television. By 1950, only a few thousand TV sets existed in the country, compared to almost a million devices in the UK. Furthermore, the French state isolated the market from the rest of Europe by choosing another TV standard (Rozat, 2011).

The state in France chooses to keep a monopoly on television in contrast to Britain with the ITV-duopoly and Germany with ARD away from government control. This national agency that handled the broadcasts was called RDF, later changed to ORTF - Office de Radiodiffusion Télévision Française. This was not without controversy considering that television news, among other programs, was vetted directly by ministers of the government. This led to strikes within the staff and while the first one in 1969 was handled by firing around 60 journalists, the threat of another one 1974 made the government dissolve the ORTF. It was split into seven different companies of which three were TV stations: TF1, Antenne 2 and France Régions 3 (Rozat, 2011).

The privatization of television in France came in 1982 with the new broadcaster Canal+, followed by La Cinq and TV6. TF1 was also privatized in 1987. However, the new companies were not entirely independent since all the investors who were given a broadcast licence were close to the president and considered trustworthy for him. Due to strong influence by the state over the media, all the following privatization and new private initiatives for TV channels were bound by fulfilling a great number of obligations regarding for example advertising, financing and censorship (Rozat, 2011).

OTT

The tradition of strict media legislation in France is an important factor also for the online TV market. The “Cultural Exception” is a set of rules sanctioned by the French government to protect the TV and film industry from foreign competition. The effect of that is for example that VoD streaming services have to wait three years after the cinema release before it can be available to stream. Furthermore, such services that are based within the country and have annual earnings of more than 10 million euros have
to invest almost 30% of their revenue into the European film industry and French filmmakers (France 24, 2014).

Despite the legislation, there are several actors in the subscription VoD market in France and Canal+ has the largest one called CanalPlay. Among the competition the most notable ones are Jook by pay-TV broadcasters AB Groupe, Videofutur owned by the tech company Netgem and FilmoTV (Paoli-Lebailly, 2014). Netgem and FilmoTV sealed a partnership in March 2014 and it has been speculated that it is a mobilization for Netflix upcoming introduction on the French market (Fabre, 2014). It has also been reported that CanalPlay recently has strengthened their content offerings and diversifying their fees, for the same reason (Paoli-Lebailly, 2014).

### 2.4.1.4 Scandinavia

Denmark was the first country in Scandinavia to introduce television in 1951, followed by Sweden in 1956 and Norway in 1960. In all three cases it was state controlled organizations who made the broadcasts, Danmarks Radio (DR TV), Norsk Rikskringkasting (NRK) and Radiotjänst (SVT). The first commercial TV that reached Scandinavia was MTG owned TV 3 on New Years Eve 1987. It was broadcasted to all three countries by satellite from London to circumvent the laws forbidding commercials on TV. After just a few years, TV3 was separated into one channel for each country and MTG also got competition from other private initiatives that were broadcasting from abroad. The monopolies on terrestrial television were kept much longer than other European countries. In Sweden, it took until 1992 for TV4 to get permission to compete with SVT in the terrestrial airwaves; TV3 was left out until the conversion to digital during the years 2004 to 2007 (Jauret et al., 2007).

The largest actors in the Swedish TV landscape today are SVT, Bonnier (TV4, C More etc.) and MTG (TV3, the Viasat-channels etc.) followed by ProSiebenSat.1 with Kanal 5 and Kanal 9 (Myndigheten för radio och TV, 2011). In Denmark, the market is dominated by the publicly-owned DR and TV 2, where the latter is commercially financed but still with some public service responsibilities. On the privately owned
side, Denmark shares Bonnier and MTG as key actors on the broadcasting market, accompanied by SBS/Discovery communications (Kulturstyrelsen, 2013). In Norway, the publicly owned NRK has an especially high market share with 37.7% compared to the TV2 channels (owned by Egmont), which have 25.1% of the average daily viewing. That makes TV2 the second largest network without any close competition from others (Medianorway, 2014).

**OTT**

The Stockholm-based tech company Voddler was founded in 2007 as an early attempt on creating an OTT video-on-demand service based on subscription or advertisement. When first launched in 2009 it was called a “Spotify for movies” but the great success failed to come and the company has now shifted focus to selling their video platform instead of targeting the end users (Leijonhufvud, 2013).

All the larger TV channels in Scandinavia are available to view on the Internet, both live and with a catalogue of programs on demand. When it comes to subscription VoD today, Netflix is the dominant provider and has an especially strong position in Denmark where 74% of the population who watch TV online use their service. The next most popular services are ViaPlay and HBO Nordic (Arkena Nordic Video Index, 2014).

SVT in Sweden have, in addition to their on-demand site Play, launched a new web TV service called Flow. Another service that aims on delivering television in an innovatory way is Magine, which left beta-stage in 2013. More details on these two services are found in the next section 2.4.2 Technical solutions.

A notable development in 2014 is that not all media corporations are going from broadcasting to streaming, it can also be the other way around. Aftonbladet TV began four hour, live news programs during the evenings in late 2013. In March 2014, Aftonbladet got a MegAward for being Renovator of the year for this web TV service.
(Jansson, 2014). A short time after that, they announced that they will be launching linear terrestrial broadcasts (Andén, 2014).

2.4.2 Technical solutions

This section summarizes notable technical solutions and features that were inspiration for the work of creating a new concept on a TV service.

SVT Flow is unique in its way of combining VoD and scheduled television by releasing a program schedule in form of a playlist each morning. When svtflow.se is opened with a web browser, the initial view is a full screen video of one of the shows in today's schedule. The programs can then be played continuously, or chosen freely by the viewer either from the schedule or from a catalogue of all the available content. The service does not aim to keep a comprehensive catalogue of videos like the one found in SVT Play, instead there is a selection of shows and some of them are exclusively produced for Flow (SVT b, 2014).

Magine is a platform on which the users can watch broadcasted television through the Internet on various devices, including smart TVs, tablets and computers. The channels are located in a program guide (see Figure 4) and can be watched live or time-shifted, similar to current functionality in many other TV solutions, but the service is entirely OTT. This brings device independency and flexibility to when during the day a program can be watched. It is also easy to add more channels to the program guide, either free or subscription based.
Streaming linear television on computers and mobile devices is also possible with ComHem TiVoToGo. For using that service, the TiVo set-top box is needed at home, but the user is then provided with the same range of channels on all devices (ComHem, 2014). With smart TVs from both Philips and Samsung, it is possible to send broadcasted TV content to tablets and smartphones, but only within the network to which the TV is connected. Google Chromecast does it the other way around. Chromecast is a media player in form of a HDMI-dongle that is plugged into the TV set. Smartphones, tablets and computers can then be used to find something to watch and send it to the Chromecast, which takes over the playback of the content so that the other device can be used for something else. Panasonic has a similar feature in their smart TVs called swipe and share.

Vodio is a TV application for mobile devices that combines different video sources into one interface. The user can select “channels” which are based on themes such as Sports, Food and Comedy. The channels are feeds, which continuously fill up with videos that are shared by people and other sources around the world - the user chooses which
sources that should be used for which channels (Vodio, 2014). Another device that searches through multiple content sources at once is the media player Roku 3 with a feature called one-stop search. It searches in the catalogues of all installed on-demand applications from one place and presents the result in one list.

Regarding on-demand services in general, VOD Professional have studied 150 video user interfaces in such services and concluded that most of them share a toolbox of features. The most common of those featured are listed in Table 2 below.

Table 2 (Kanji, 2012)

<table>
<thead>
<tr>
<th>1 Featured Content</th>
<th>13 Video Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Categorisation</td>
<td>14 Favourites</td>
</tr>
<tr>
<td>3 Category Pages</td>
<td>15 Playlists</td>
</tr>
<tr>
<td>4 Most Popular</td>
<td>16 Sign in / Register</td>
</tr>
<tr>
<td>5 Recently Added</td>
<td>17 Social Sign-in</td>
</tr>
<tr>
<td>6 More Episodes</td>
<td>18 Parental Controls</td>
</tr>
<tr>
<td>7 Content Recommendation</td>
<td>19 Help</td>
</tr>
<tr>
<td>8 EPG (Electronic Programming Guide)</td>
<td>20 About</td>
</tr>
<tr>
<td>9 Search / Predictive Search</td>
<td>21 Contact</td>
</tr>
<tr>
<td>10 A-Z Page</td>
<td>22 Accessibility</td>
</tr>
<tr>
<td>11 Social Sharing outbound &amp; in-service</td>
<td>23 Watch on other Platforms</td>
</tr>
<tr>
<td>12 Customised Video Player</td>
<td></td>
</tr>
</tbody>
</table>

All on-demand services have some form of discovery mechanism for recommendations on content for the viewer. It is either based on an algorithm, human-curation or a hybrid of the two. The most used algorithm is basic content-based filtering, which analyses TV shows and movies for properties such as genre, name of the actors, cast members and release date. Recommendations are then presented in lists such as “Most Popular”, “Recently Added” and can be filtered on the properties mentioned above (Kanji, 2014). A recommendation engine that stands out is the one built by Netflix. The have
exhaustively tagged almost every possible TV show and movie and the tags have been made in such detail that they have been able to generate more than 70,000 micro genres in which the titles are categorized. For a genre to be shown on the Netflix site there needs to be a critical mass of content in it, the name can not be too long and it has to make syntactic sense. An example of a genre that does exist is Scary Cult Mad-Scientist Movies from the 1970s, which illustrates how profound the categorization is (Madrigal, 2014).
3 Method

The different methods used in this study are described in detail in the following chapter.

3.1 Market analysis and literature study

The first part of the project was an analysis of the TV markets in Europe, both in historical aspect and current OTT solutions. The regions that the study was limited to were The United Kingdom, Germany, France and Scandinavia. The analysis aimed to describe the following:

- Influence and power within the market structures in television, both historical and current.
- Content owners and rightsholders efforts to make TV content available online through different video streaming services, and the consumer technology enabling such services.

Innovative features on the current alternatives for OTT were then identified. The success of the services in their respective markets gave an indication on how good the features are, if also the power-factors found in the market analysis were taken into consideration.

A literature study in the following fields in television was conducted:

- Technology
- Interaction design
- The nature of TV content and viewing behavior

This, alongside with the further methods described below, provided support for design decisions on new features and technical solution which could be used in the prototype.
3.2 Design Workshop

A design workshop was arranged with participants interested in the TV media. The incentive for this was to distinguish which ideas were favored and how they could be enhanced. The workshop resulted in some sketches and general ideas on the participants ideal TV experience.

There were eight participants in total working at Spotify, Valtech, Tieto, Netlight and students/alumnies from Hyper Island and KTH. The selection of participants was not randomized but rather chosen for their interest in digital media and expected ability to give good feedback. The workshop took place in a classroom at KTH, see Figure 3 for a photo of the environment.

![Design workshop](image)

Figure 3. Design workshop.

The participants were given pen, paper and post-its to write ideas on. The workshop was then conducted in the following steps:

1. Introduction explaining for the participants how the workshop was to be conducted
2. Lecture on the background of the subject.
3. Collectively in the group: identifying problems and opportunities with Internet TV today.

4. Divided into three smaller groups: each with the objective to come up with ideas on how a service should look like according to them.

5. Presentation and discussion of each group’s ideas. Audio was recorded on this part of the workshop, which was then transcribed and quotes from the different groups were organized thematically.

3.3 Expert interviews

With the knowledge from the literature study, the market analysis and the design workshop - the most interesting ideas were discussed in interviews with experts at Arkena. The questions for the interviews were both general and specific for prototype (questions can be found in Appendix A). The experts were interviewed to get a more pragmatic view on what a feasible TV service is and to get an insight in the current developments in television. A dialogue with Arkena on design decisions was ongoing during the prototyping process.

The interviewed experts from the Arkena team were Karsten Vandrup - Senior Vice President Products, Magnus Hazell - Head of Development and Jesper Arenhill - Commercial Lead & Market Manager. The interviews were carried out individually in a semi-structured way with the same questions as a base for discussion. The interviews with Vandrup and Arenhill were done via video call over Skype since they were situated in Copenhagen and Gothenburg. The interview with Hazell was carried out in a conference room at the Arkena office.

Before the interview, a description of the prototype along with the questions was sent via email to the interviewees. Hazell, who supervised the project, had also seen the actual prototype on different stages of development.
3.4 Prototype and evaluation

The findings from the methods described above were used to develop a concept of a TV interface. A prototype on this concept was created. It was built with JavaScript and HTML5 and was intended to be run in a full screen web browser on a TV set. A remote control was developed as an application for an Apple iPhone 5.

For programming this prototype, there was a collaboration with another student from Computer Science at KTH - Love Ekstam. He was also situated in the Arkena office, and will get credits for this project as an individual course at KTH. All the HTML and JavaScript was built by Love as well as figuring out how to solve everything technically. My part was to use the methods described in the previous chapter to create the concept and the design for the prototype. I made sketches in Photoshop and suggested features, then Love implemented it and we discussed the details of them collaboratory. My job was also to do CSS-styling, input data for video content and create the graphics for the remote control.

When the prototype resembled the concept well enough, a user evaluation was conducted with five potential users. The participants were selected among acquaintances and with spread in age and technical experience. The evaluation was carried out with one user at the time. The session started with a short introduction on what the service was about so that the user would expect a somewhat standard TV experience. The only instruction on how to use the system that was made was to show that the remote control would accept text input if held horizontally. Audio was recorded with a smartphone.

The user was placed comfortably in an armchair and the prototype was started. The user was now supposed to perform a number of tasks, entirely without guidance if possible. The user was encouraged to think aloud for each decision that was taken and to talk about what he or she experienced when using the system. The tasks were the following:

1. Switch to the National Geographic channel
2. Play the program that is scheduled at 18:00 on SVT1
3. Switch to TV-series menu and play episode two of Sherlock Holmes
4. Search for something with Monty Python

The user also got time to explore the system without any aid or instructions. Afterwards, the user filled out an evaluation protocol. This was based on a method called System Usability Scale (SUS), originally created by John Brooke (Bangor et al., 2008). It consists of 10 different questions about the experience that the users had with the system, assessed on likert scales from 1 (strongly disagree) to 5 (strongly agree).

1. I think that I would like to use this system frequently.
2. I found the system unnecessarily complex.
3. I thought the system was easy to use.
4. I think that I would need the support of a technical person to be able to use this system.
5. I found the various functions in this system were well integrated.
6. I thought there was too much inconsistency in this system.
7. I would imagine that most people would learn to use this system very quickly.
8. I found the system very cumbersome to use.
9. I felt very confident using the system.
10. I needed to learn a lot of things before I could get going with this system.

The responses were recorded with a Google form and a score was calculated according to the SUS methodology. The score itself was not used for any conclusions if compared to other products; instead this method was used since the answers provided a quick but comprehensive view on the usability according to the respondees.
4 Result

This chapter begins with the findings from the design workshop and an overview of the concept that has been developed. After that are the results from the user evaluation of the prototype followed by a presentation of the most important findings from the expert interviews. A detailed description of the final concept and the prototype is found in section 5.2 Analysis.

4.1 Design workshop

The workshop was conducted after the markets had been analyzed and the technical solutions identified. The participants of the workshop gave input on the initial ideas for TV concept that was going to be developed. The findings have been categorized into three sections: 1) user interface/interaction, 2) functionality and 3) linearity vs. on demand. The opinions by the three groups are summarized below.

4.1.1 User interface and interaction

The participants were all negative towards the current situation where different content sources have different applications with their own look and feel. Group A said that “no matter what source you are watching, it should be the same graphical user interface through the entire TV experience.” – the other groups agreed on this. Group A felt that the remote control is unnecessary and should be replaced by the viewers personal smart device. However, this was not the consensus and group C thought that the Apple Remote or similar was the ultimate solution. Group A also proposed that a bracelet or other wearables could detect the mode of the viewer and adjust the content according to that, the discussion continued towards other more science fiction gadgets but did not end up in any realistic suggestions.

One of group C’s major opinions was that there should be content immediately when the TV was turned on and if the viewer wants to enhance the experience further with, for example, Twitter or other apps, it should be possible but it should come after the initial TV experience has been presented. They said that “With smart TV you have to
force yourself through a lot of interactions before you get to the content.”. Group C illustrated this by a drawing, see Figure 5, where the viewer at the top of the illustration can watch video content immediately and can, if he wants to, go further into the interface and find Twitter and other smart-TV functionality there. The viewer on the bottom of the illustration has to force himself through a lot of interaction before finally reaching the content.

Figure 5. Illustration of the smart TV “Funnel”

4.1.2 Functionality
A clear trend in the discussions on what a TV set should be able to do was that the functionalities should be stripped as much as possible. Group A thought that everything should be removed except for channels (or playlists) and a search function. They also talked about the importance of “omni-channel”, which was explained as the ability to take the TV experience with you on any preferred device.

Group C pointed out that “Tasks that are better done elsewhere should not be in the TV; do not add features just for the sake of adding features. When it becomes too much, there is a risk that people just do not manage to use the smart TV and just watch linear
TV”. They took the example of checking the weather or your Twitter feed which, according to them, was more conveniently done in their own smartphone than in the TV. As mentioned before, group C was in favor of a very simple remote control but they also thought that more advanced interaction and features could be done on a second screen, for example a tablet or laptop.

### 4.1.3 Linear or on demand

The groups agreed on that channel grazing is still an important feature for the TV, even if everything will be available on demand. To make this possible, the content should play in real-time so that when switching to a channel, you will end up in an ongoing show regardless if its streamed instead of broadcasted.

Group B discussed the difference between lean-back and lean-forward entertainment and proposed that there should be one mode for each type. Lean-forward would be when you want to watch for example a specific TV series and the content would be found by searching. To get the lean-back experience when the source of the content is a VoD archive, group B came up with a couple of solutions. One is to create your own channel by scheduling on-demand content weekly, for example to choose that specific TV series should be played at a certain day. It should be possible to share this channel with friends for the feeling of fellowship. The other idea was to create channels with semi-randomized content on a specific theme, for example Comedy. Group A added that channels (playlists) do not have to be homemade, but they can be personal with content picked out based on previous preferences.

All the groups concluded that linear TV has important benefits and group B summarized them as the following:

- Belonging to a community and feeling fellowship
- Its becomes a part of a routine
- It has low threshold for getting entertained
• The content is curated

Group C added that with VoD, you tend to watch the same kind of things but with linear TV, you can get surprised.

The low threshold is perhaps the most precious benefit with linear TV according to group B. They said that “sometimes you want the TV to feed you for relaxation.” which the rest agreed on.

One last idea that group B came up with was a live-mode, separated from both VoD and linear TV. In this mode, all live broadcasts from different TV channels would be gathered in one place. This mode would be the go-to if the viewer wants coverage on an ongoing event and does not want to be restricted to just one source.

4.2 The Prototype

This section gives an overview of the concept and the prototype that was developed. A more detailed description was finalized after the input from the interviewees and is found in section 5.2.

The static home screen of a smart TV, game console or other media player is removed from the initial view when the TV is turned on. Instead, there is content immediately, just like a traditional TV. Nevertheless, everything is streamed via an Internet connected computer/smart device.

The viewer interacts with the TV set with a simplistic remote which, when flipped, becomes a qwerty-keyboard and triggers a search-bar to show on the TV screen, see Figure 6.
Searching however is secondary. Grazing through channels or switching on what you usually watch at a specific time would be the most common interaction. The concept of what a TV channel is has changed since the media is no longer constrained by being broadcasted - but the qualities of linear TV have been kept.

Channels are playlists that progress in real time. The benefit of streaming from the Internet in contrast to receiving a broadcast is the possibility to play any program in the schedule at any time, and there is no competition over the frequencies in the air for adding new channels and it is to no extra cost. Channels can therefore be very narrow or very broad; there is no need to satisfy millions of viewers only because it is prime time. Furthermore, programs in the channels can come from different content owners, providing a broader range of content within a theme of interest.

Though it is not to be forgotten that the viewers value curated content from professionals who have insights in the current trends in TV programs. The viewers want to watch programs that can lead to discussions around the water-cooler the next day at work; they want to be a part of a collective experience. It will therefore still be a place for the traditional television networks to maintain their channels, but they will be accompanied by channels created by communities or influential individuals. Content is paid for via subscriptions from the content owners - some channels might need one or more subscriptions while others will only use free or ad-based content.
The Internet is also a place for shorter video clips, usually found on sites like YouTube and Vimeo. Navigating such sites with a simple remote on a big screen is not optimal, and it is not a lean-back experience if the viewer needs to browse for new videos every five minutes. The proposal for this concept is that short videos will be found in highly customizable channels where clips are placed thematically in longer programs. For example, a viewer might want a channel called Urban Sports. In the schedule for that channel there will be programs like base-jumping, fixed-gear biking and skateboarding. Each program will contain multiple clips, put together automatically from different online sources. The viewer can then choose a program - a theme - that looks interesting instead of picking individual clips from huge catalogues.

The channels are organized in an interactive program guide (IPG), which is brought on screen with a button on the remote, see Figure 7.

![Figure 7. Mock-up of the interactive program guide](image)

The viewer can either choose to watch something that is currently on the different channels, catch up on what they have missed earlier that day or pick a program that is scheduled in the future. News programs and other live shows are placed in the same list but are marked with a red dot and will not be possible to start before they take place.
There are many benefits of putting content from an on demand catalogue into a time schedule when making a lean-back experience. In contrast to what you get from a video on demand service, it makes the threshold lower for finding something to watch. When something is on, you might as well have a look at it even though you would not have picked it out of a catalogue of videos.

4.2.1 Evaluation results

This section presents the results from the user evaluation of the prototype. Note that the participants in this evaluation were not given a description of the concept and the ideas behind it in beforehand. The details on how the evaluation was conducted can be found in section 3.4.

The participants had mainly positive opinions about the concept although some flaws in the design became obvious. All of the participants complained about one interaction in particular, namely that the same button was used for bringing up the program guide and switching between browsing the channels and the TV series. One participant thought that the blue color that was used in the interface should be changed since some information became indistinct on certain backgrounds.

Most of the participants had issues when navigating away from search mode, since the remote control changed appearance of the navigation buttons when flipped. Regarding the searching, one user thought that the search results should not only be displayed on the TV but also in the remote.

The participants with less technical experience were generally more positive towards using this service if it would be released on the market.

Below in Table 3 are the results for the System Usability Scale (SUS) evaluation. The table shows the average score from the five participants. The score ranges from 0 to 4, where 4 means that the responder strongly agrees on the statement, and vice versa. The
score for the negative statements (every other) have been inverted so that a higher score always is positive in terms of usability.

Table 3.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>I think that I would like to use this system frequently.</td>
<td>2.8</td>
</tr>
<tr>
<td>I found the system unnecessarily complex.</td>
<td>3.2</td>
</tr>
<tr>
<td>I thought the system was easy to use.</td>
<td>3</td>
</tr>
<tr>
<td>I think that I would need the support of a technical person to be able to use this system.</td>
<td>3.4</td>
</tr>
<tr>
<td>I found the various functions in this system were well integrated.</td>
<td>3</td>
</tr>
<tr>
<td>I thought there was too much inconsistency in this system.</td>
<td>3.4</td>
</tr>
<tr>
<td>I would imagine that most people would learn to use this system very quickly.</td>
<td>3.4</td>
</tr>
<tr>
<td>I found the system very cumbersome to use.</td>
<td>3.6</td>
</tr>
<tr>
<td>I felt very confident using the system.</td>
<td>3</td>
</tr>
<tr>
<td>I needed to learn a lot of things before I could get going with this system.</td>
<td>3.4</td>
</tr>
</tbody>
</table>

With the scores added together and multiplied by 2.5 to scale the result from 0 to 100, the score for this version prototype was 80.5. When comparing large quantities of evaluations for different products, the average SUS score is found to be 68 (Sauro, 2011). However, that score is based on users expectations on complete products while the participants of this evaluation knew that they only tried an early prototype.

**4.3 Interviews**

The opinions on the different topics that were obtained from the expert interviews are summarized below. The questions that the interviews were based around can be found in Appendix A.

**4.3.1 The future of linear TV without broadcasting**

The shared opinion among the interviewees was that linear TV has a future for many years to come, at least for some age groups and certain use-cases.
Advancements in recommendation engines for online video is a factor that will limit the need for linear TV, which is also what is being developed mostly right now. Netflix is investing heavily in this, according to Vandrup, and small start-ups with psychology majors and behavior analysts are also going into this field. This can enable “flow TV” and couch-modes to be successful in online TV. Since it is not known if a proper recommendation engine will be here mid-term or long term, a hybrid version as suggested in the concept, is a good solution according to Vandrup.

Another factor for the survival of linear TV is simply that the older generations are slower to adapt. While, according to Hazell, the generation below 20 mostly watch on-demand, the 50+ generation still watch a majority of linear and will probably not change their behavior during their lifetime, meaning that it will take many years for a potential switch-over. With that said, it is nothing that stops a switch-over to an IP based solution instead of broadcasting. However, not with the current IPTV standards mainly because it is not quick enough to respond to interactions (e.g. change the channel). TV has to be snappy and it must be able to provide a lean-back experience, according to Hazell. The only reason that TV still exists in its current form according to Arenhill is because of its legacy as a natural part of the living room, and such thing takes a long time to change.

A technical aspect that Hazell points out is the latency delay which, in online streaming, has not been solved despite years of efforts. That makes it unsuitable for broadcasts that involve betting and gambling, for example horse racing and other situations where latency is extremely important.

**4.3.2 TV interface and remote control**

When proposing a very stripped functionality and interface for television, there were some different opinions among the interviewees. Arenhill pointed out that you should not underestimate the power of recognition; the grid of apps is a layout that people are used to and appreciate, but at the same time it is not very suitable to control with a traditional remote. His personal preference is to use existent devices (smartphones and
tablets) to control the TV, but if a dedicated remote was chosen, a touch screen with the same type of interactions ought be used, again, for the power of recognition.

Hazell believes that it is a good idea to simplify the interface and interactions; it is an ongoing process in all computer related devices - compare for example the first smartphones with today’s iPhone. Smart TV manufacturers have a hard time in competition with media players such as the Apple TV which is a much more stripped service. The trick is to add functionality and at the same time reduce complicity, according to Hazell. This was also the Vandrups opinion; he said that the companies that break the code for proper and fast interaction will be the ones winning in the smart TV competition. Vandrup however, believed that technology advancements will come quicker than one might expect; TV interfaces will be less of a discussion since TV will just be display technology and a terminal - the interface will be personal to the one standing in front of the screen and the screens will be present everywhere, based around the cloud, the Internet of things and embedded technology.

None of the interviewees saw a future for mouse, keyboard or hand-controls for controlling the TV. Voice control and face recognition is not working either in its current form but when that technology matures, it will start getting very interesting.

4.3.3 Business model
Regarding the business model for the concept, that an independent service bundles content from different sources, all believed that there will not be a big issue from the content owners perspective. Vandrup points out that it is already happening, that companies such as HBO deliver raw content to various service providers, including their own OTT service. Arenhill supports this opinion and also points out that when it comes to streaming, the business model by the rights holders is just to keep people to subscribing to the content, but the more people stream, the higher the cost becomes for running that traffic. They are not interested in all the over-head cost for that play-out service if it can be avoided.
A bigger concern is the business model for the one providing this TV-service. Vandrup says that nobody has yet been able to aggregate content in a way that it has met critical mass, but at the same time, huge things are happening in the distribution and content owner definition and at some point, someone will crack that and create a common flow from all the big studios. Both Hazell and Arenhill compare the situation to the music industry and Spotify, who despite being hugely successful in terms of number of users, still does not manage to make profit.

4.3.4 Variety of content and short clips

Regarding the question of if it is a good idea to create lean-back TV with shorter clips by automatically bundling them together as suggested in the concept, the opinions among the interviewees slid apart. Arenhill was negative to the idea because the television industry should differentiate itself in other ways; it might add some value to the user but on the whole, the reason for having a big TV is not to get that type of content. Furthermore, the owners of premium content are from a business perspective not interested in having their content exposed side by side with user generated content, according to Arenhill.

Hazell on the other hand sees a shift in people’s confidence in the institutions that used to be quality marks or label grants. With the communities on the Internet, it is not obvious anymore that only because TV4 or SVT launches a new show, people will assume that it is quality and will watch it. An OTT service with a proper recommendation engine that uses the opinions of the consumers will shift the power in these matters. Hazell means that even though people behind the big labels see no gain in this, they will have to adapt.

4.3.5 On TV Markets

When comparing how successful this concept could be in the markets Scandinavia, UK, Germany and France, there was consensus that it has highest chances to succeed in Scandinavia.
Hazell argued that on a large market, it is much easier to create a business case for a somewhat weak service. The players in Europe's larger countries are huge even with a limited share of the market, this makes it easier to create walled gardens for their customers. That can for example mean that if you belong to a certain network, you will get a specific branded set-top box with no influence on the features. There is also lawmaking and licensing that over a long time have adapted to these structures, which makes it more difficult to be established on those markets. There is a reason that HBO chose the Nordic region as a test market for their OTT service.

According to Arenhill, there is too much legacy in media corporations in the large European countries, which makes the markets there much slower to change. Another important factor that he and the others brought up is the quick expansion of broadband in Scandinavia, which early on made that market more susceptible to OTT technology.

Vandrup argues that if you have a small market in a highly advanced consumer space, the product teams seems to be more feature driven and more competitive in terms of feature richness. He says that if you have big markets, you will have players who go for critical mass and not so much to compete on feature richness and how advanced their solution is. The fact that the Nordic markets are so small drives innovation.
5 Analysis

This chapter is an analysis of the results from the literature study, the market analysis, the workshop and the interviews. The first part of the chapter presents the general findings on how the future of TV can look like, supported by external sources. The second part is a description on the details of the concept and features of the prototype.

5.1 Values to preserve

Online TV is well established today but most experts describe it as an additive for traditional TV and not a supplement. The idea for the concept is to replace broadcasted TV entirely. Therefore, all the things that people value with broadcasted TV must be preserved in the OTT environment, while at the same time enhancing the overall experience of TV watching. The bullet points listed below, followed by an explanation, has been identified as qualities of linear TV that should be preserved.

- Lean-back viewing
  - Immediate content
  - Channel grazing
  - Simple interaction
- Communal activity
- Curated, aggregated, recommended content

5.1.1 Lean-back viewing

With traditional TV, it is not a requirement to actively make a choice on what to watch, which easily makes it a lean-back experience. There is a constant flow of content from the moment the TV set is switched on and grazing between different channels is effortlessly done with the familiar remote. On the contrary, smart TV:s and streaming services usually present a static home screen when switched on (SVT Flow being an exception). This becomes a barrier according to the interview- and workshop results.

Even if the program that shows up on a traditional TV is not what the viewer ultimately
wants, it is still an instant content experience. As the human interface design company Punchout puts it in an article on their website:

“\text{It’s a bit like eating out at a restaurant. As soon as you’re seated, fresh bread and glasses of ice water are brought to your table. Eventually you’ll order a real drink and a full meal, but the bread and water that greet you immediately mean your dinner has already begun.” (Cox, 2014)}

A program schedule is still a good starting point for displaying available TV content; recommendations that are computer generated or based on friend’s activity can have a place in that schedule since the channels no longer have to be defined by a broadcaster. If nothing in program schedule is of interest, then of course comes the possibility to search for other content.

Regarding searching, Konstantinos Chorianopoulos writes in an article published in International Journal of Human-Computer Interaction that relaxed exploration is favorable over information seeking when it comes to online television. “As a principle, instead of information seeking, support relaxed exploration. Therefore, content navigation support should be subtle and not enforced to the user” (Konstantinos Chorianopoulos, 2008).

### 5.1.2 Curated content

A lot of work is put into the program schedule in traditional TV channels; their job is to package the right content at the right time. With today’s streaming services, collaborative filtering with help of e.g. ratings, votes and likes are used to highlight content that is likely to be of interest for the viewer. Related content is oftentimes shown as well. However, it was pointed out in the workshop that it is easy to get stuck in old habits with sites like Netflix since you tend to use it mainly as the source for watching a certain series or movie that you know is in their archive. As Vandrup points out in the interviews, even though Netflix and similar sites put a lot of effort into recommendation engines, the implementations are not good enough.
The expert opinion of staff in a broadcasted channel can make you discover things that you would not have done otherwise. On the other hand, the broadcasters do not have a monopoly on good taste. In today’s connected society, power is shifting to the opinions of the consumers. Anyone can publish or aggregate media today and if that anyone gets high ratings by the community, his or her channel can be equally influential as the ones from the largest broadcasters.

5.1.3 Communal activity
There is a social aspect of the TV media, which to some extent has been imposed with functionalities to share links in social media. On the one hand, the discussion forum is expanded to virtually everyone with an Internet connection. On the other hand, it’s not very likely that one’s real friends recently watched and are eager to talk about, the same episode as you. As pointed out in the Punchout article, one of the goals of consuming content is to allow for future discussions about it (Cox, 2014). The question is if today’s utilization of social media can satisfy the social aspect of TV when the viewer is not attuned in time with his or her friends. Chorianopoulos (2008) argues that since TV content is a “placeholder for discussion”, the personalization of the TV experience decreases the chances that your friends have watched the same program.

“.../ the 500-channels future was turned upside-down by the user modeling research community, which put forward the vision of a single personalized channel. Nevertheless, it is acknowledged that TV content is a placeholder for discussion and, thus, personalization reduces the chances that any two might have watched the same program” (Chorianopoulos, 2008).

Chorianopoulos also argues that additional media sources should be used in the TV interface, instead of fixed broadcasts.

“As a principle, designers should try to release the content from the fixed broadcast source and augment it with out-of-band content delivery. Therefore, an appropriate UI for content delivery should allow the user to customize the
preferred sources of additional information and video content” (Chorianopoulos, 2008).

To preserve the feeling of TV being a communal activity, the choice of having channels instead of VoD-like catalogues plays an important role. Even though the channels might contain content from various sources and not listed in any newspaper TV guide, they can be shared among friends or found on top lists. This can be compared to what Spotify achieved when introducing the social aspect of music listening by connecting the users with their Facebook accounts. It is very common now to have not only your own playlists but also the ones created by your friends and other individuals you find interesting.

5.2 Detailed description of the concept and the prototype

This section provides a description on how the details in the concept finally ended up, categorized in details about the remote control, the interactive program guide and searching. Lastly are conclusions on the business model and how this concept can be put to practice.

5.2.1 Remote control

Remote controls throughout television history have had their fair share of design flaws. The issues ranges from abundance of buttons for simple interaction to computer-like interaction with a simple remote. One solution for modern TV sets is to have a wireless keyboard and mouse on the couch table, but many people do not seem to find that nor aesthetic or convenient. Another solution is to build a smartphone app that connects to the TV, but the viewers then have to go through lock-screens and menus to change the channel - and they cannot answer the phone or multitask while doing so.

The proposal for this prototype is a dedicated remote control, 15 by 4 centimeters, with a touch surface that could change between two modes: navigation and qwerty-layout text input. The navigation is in four directions with a select button in the middle and
beneath only two buttons - one to bring up the program guide and one to bring up the settings menu. The buttons will be tactile with a technology using gas-filled bubbles under a plastic film. This makes the remote natural to control even without looking at it. Gyro sensors detect when the remote is held horizontally and it will turn into a keyboard for searching for specific programs. For this version of the prototype, an iPhone 5 application was developed to represent this remote. The remote has functionality to navigate and search, but the settings menu is not yet implemented. See Figure 8 for a screenshot. Users who find it more convenient to use their smartphone rather than a dedicated remote, can of course continue using this input method in a finalized version.

Figure 8. Screenshot of the remote held vertically.
5.2.2 Interactive program guide (IPG)

This section is a description of the interactive program guide, which is a central part of the concept. See Figure 9 for a screenshot of its appearance.

The channels are arranged in a list and on top of that list there is a timeline. Each row in the list is a separate channel, identified by the channels logo. The IPG emerges from the right of the screen and if desired only the logos will be shown for quick access to a certain channel. If you choose to display the entire IPG it will cover 3/4 of the screen and schedule for the upcoming hours is visible. The programs are blocks with length corresponding to their duration and will show the title, start time and as mentioned, an indicator if it is a live stream.

A vertical line overlaying the channel list shows the current time and if the up- and down-buttons on the remote are used, it will instantly switch to the next channel as if the programs were broadcasted. If you want to start from the beginning of a program that you see in the IPG, you press the select button and then step sideways or up and down through the programs in the list. Press select again and it will start playback from the beginning. If a program has been watched earlier, but not to the finish, it will jump to the last viewed position instead if it is selected.

If you want to pause a program for a longer time it might get difficult to find it again in the timeline. Therefore, there is a field below the list of linear channels where these programs can be saved. Channels in this list look like the ones above but it will not progress in real-time. This list can also contain entire TV series if you want to watch them in your own pace.
5.2.3 Searching

When the remote is flipped and the qwerty-keyboard turns up, a search-field appears on the top left of the TV screen, see Figure 10. When you start writing, search results will pop up in a list below. Initially it displays a mix of programs, series and movies that match the search words. However, if the hits get too broad, there are more tabs which are accessed by stepping left and right on the remote. The tabs single out the different types of content. There is also a tab for searching for channels that can be added to the IPG.

If no text has been typed in when accessing the search-field and browsing through the tabs, recommended content and channels will be found in the lists instead. The recommendations are based on previous viewing habits and the type of channels that currently are in the IPG.
When you have found something to watch, it can either be played directly or added as a channel in the lower part of the IPG, which only progresses during playback. The latter would be a good choice if you want to watch an entire TV series.

![Figure 10. Search-field in top left corner, activated by holding the remote in landscape mode.](image)

### 5.2.4 Business model

Television is not the easiest market to do an overhaul like this in since the content ownership is spread across many different actors with their own business models and ways of delivering the media. But for the consumer, it is clear that the optimal way of enjoying content is not to have multiple streaming services, smart TV applications and devices plugged into the TV, each with their own look and feel and none with the holistic approach.
It will require a combined initiative from many different actors to start this up. However, if chord-cutting is a reality (the process of ending costly premium cable TV subscription in favor of free-to-air TV and OTT services), the incentive for change will rise.

A user of this TV service will have an account where any desired subscriptions are collected in one place. The corporations that currently have the rights to content, for example Netflix, Hulu and Amazon, can continue bundling different sources into single subscriptions. Large content owners like Time Warner and Disney might choose to offer their content through own subscriptions without middlemen.

The necessary hardware, aside from the TV screen, could be any preferred device that allows a web browser to run HTML5 on instant full screen when turned on. Since it is a web application, the viewer is not bound to obsolete interfaces from their old set-top boxes or similar devices, but can receive continuous updates and use equipment by choice that fits in their living room.
6 Discussion

This chapter is a discussion around the results of the study, how they corresponded to the initial expectations, how well the research questions were answered, and the validity of the result. Source criticism, proposal on further studies and how the results can be used in practice will also be discussed.

6.1 The research question

The research question that this study sought to answer was the following:

- How can you shape the Internet-based TV service of the future?

The question for the theoretical background was:

- What is the current state of Internet-based television in Europe, what is successful in different regions and why?

What the current state is has been answered in section 2.4 Market analysis and opinion on the current state have been presented in section 4.1 Workshop and section 4.3 Interviews. In the following section, further discussions on why different services are successful in different regions will be presented and also the strengths and weaknesses of the proposed concept and prototype.

6.1.1 Discussion on the current state

Scandinavia has adopted Internet streaming of television far more than France and Germany; UK is somewhere in the middle with big successes with BBC iPlayer. Sweden is pioneering with semi-linear streaming service with the launch of SVT Flow and Magine. None of the two have reached the larger audiences but it is too soon to judge what the success will be in the future.

The reasons for the quicker development in the much smaller countries in the north are believed to be a combination of many factors. The substantially larger populations in UK, France and Germany are perhaps the most important. As Vandrup pointed out in
the interviews: critical mass can be reached with just a few percent of population in a large country, making it more easy to create a business case for lesser innovative services. That percentage can be obtained from more than being the best alternative in a free market. Television is often bundled with other telecommunication services - you get telephone, broadband and a set-top box chosen by the service provider. Long subscription agreements make it hard to gradually convert to other paid services because you are locked into their system. Apartment buildings can for example have deals with certain service providers and just by having a small percentage of population in that situation can make it a good business for service providers in the larger countries. In Sweden, there are ComHem equipped homes which receive the much criticized TiVo set-top box (Arons, 2013), not precisely chosen by its innovative qualities. However, it is unlikely that there would be room for many more similar players on such small market.

Another factor can be that Scandinavia has a shorter tradition of broadcasting, and therefore not the same time to create the massive powers structures that are in effect in the larger countries. TV4 as the first privately held terrestrial broadcaster in Sweden in 1992 can be compared to British ITV who began its launch in 1955. Public service television has a responsibility to not be to disruptive on the market, where as private corporations can use the control they have freely, meaning that public service structures are more adoptable. As an example, SVT got critique when releasing Flow because they competed with media technology when they ought not to (Helin, 2014).

The long tradition and the larger populations have also brought UK, France and Germany a greater selection of channels and content. They have a lot more domestically produced content that is broadcasted within the country. This implies that Scandinavia has a greater need for content from abroad and streaming would be a suitable method for obtaining that.

Scandinavia has also had a quicker broadband penetration historically, which is a prerequisite for streamed media. It enabled early adoption of the technology.
6.1.2 Discussion on the concept and the prototype

One of the biggest concerns with the proposed concept is that people are slow to adapt to change. A rollout of this TV solution must be large; otherwise it is not worth much if other services have to be used in parallel. The industry is also slow and powerful and might not be susceptible to new business models if their old ones bring in good revenue. The competition is high on the market and many companies are doing the same thing.

Rights management in the TV business is a tough thing to handle; different content owners have their own rules on how the content can be used, sometimes in high level of detail, for example how the video should be encoded. This was a big concern initially but the interviewed experts unanimously believed that this issue is not that huge because the content owners will have to adapt to the consumers.

While the content owners might choose to accept this concept, the manufacturers of hardware - smart TVs, set-top boxes, media players etc. - might be less enthusiastic. They compete with branded products while this concept is based around a web application in an open HTML environment. In this concept, updates can be rolled out continuously without making the user need to buy a new product - this is good from a consumer perspective but not as feasible for hardware manufacturers.

A possible remark for this concept is that the functionality and interaction to scaled down: that the concept is aimed to low considering the fast technological development. Maybe TV could be something fundamentally different than it is today. However, since the concept is based around existing technology with computers already plugged into the TV, shifting over to this solution would be very easy, and equally easy to move away from it if new technology emerges.
6.2 Discussion on the result

A critical discussion on the results of this study is presented in this section.

6.2.1 Correctness of the results

Of practical reasons, it was not a possibility to get first hand data for the market analysis by for example conducting surveys. Instead, all the data is collected from various online sources. Mainly when it came to studying Germany and France, it was difficult without prior knowledge to know which sources gave fair assessments of the market. The language was a barrier, thus relevant publications on the subject might have been missed because of that.

Regarding the result from the workshop and the interviews, the subjective opinions of the people involved have influenced the findings. The participants in the workshop were all former or current media technology students; the interviewees works at Arkena which is a company who specialized in online streaming. It is not self-evident that their opinions correspond to the population. However, this was taken into consideration during the process of creating the concept and the aim is that it should target the masses and not only advanced users.

6.2.2 Results corresponding to the expected

Initially when the project started, the expectation was that linear TV is not part of a future. This is not what the results show and not the course which was taken for the concept. Furthermore, the idea from the beginning was to include more functionalities and more advanced interactions, performed on a second screen, but that turned to not be appreciated since its not lean-back. It was concluded during the workshop that advanced tasks can be done better on other preferred devices and that you do not have to squeeze everything into the TV just because it is possible.
6.2.3 Alternative interpretations of the result

Since this study wanders in uncharted territory, one can not know with certainty if the proposed concept will have a future in television. It is therefore relevant to discuss alternative interpretations of the result and propose other ways on which the development could go.

It is safe to assume that online media in all forms will keep expanding, but can it turn into another direction? It could be that linear television does not have a future. If artificial intelligence gets advanced enough to always present relevant content from a VoD catalogue to the viewer, no involvement of editorial staff from TV channels or other aggregators would be needed.

The concept assumes that the TV screen will be present in the future in its current form, but maybe the big screen is replaced by omnipresent screens, making creating a lean-back experience in any desired room. If content can be displayed on every flat surface in a home, or perhaps mid-air, or on head-on displays like Google Glass, then the interface and interaction methods could be totally different.

Maybe linear streaming will be a reality even in the future as the study suggests, but the interface proposed for the prototype is wrong. TV sets could simply be big screens and all content on that screen is pushed from any arbitrary device that automatically personalities itself based on whom it is used by. This scenario was proposed by Vandrup during the interviews but was not taken into account in the concept since it was believed to be to futuristic.

Another alternative, regardless of interaction design of the prototype, is that streaming media will not be allowed to take over broadcasting for a long time because of the mentioned lock-ins by the companies who provide TV packages/subscriptions with accompanying set-top boxes, and the term of notice that goes along with them. If you have one provider for telephone and Internet, it is not uncommon that they provide
television with a branded set-top box as well. Furthermore, the business model for this service might not just work as suggested by Arenhill in the interviews.

6.2.4 Further studies
The next step of this study would have been to implement the prototype with real channels and real content so that it could be tested properly. Many channels already stream their content live on the Internet as well as supplying a VoD catalogue. With their permissions, a better prototype could be made fairly easily just by embedding their video URLs instead of local files into the current prototype. It would then be a good idea to test it on viewers in their home environment.

6.2.5 Recommendations on practical use of the result
The concept could be sold by e.g. Arkena as white-labeled product so any company could use it the way they see fit. However, the intention is that it should be delivered as a complete product; good enough to make the users of it abandon their traditional TV solutions. The simplistic program guide and search function is not so usable if it cannot be filled with great amount of content.

It is conceivable that many types of companies can put this concept to reality. A feasible scenario would be that a start-up releases this service and as it gains the masses, more and more rightsholders will contribute with their content, similar to how Spotify sooner or later gets approved by even the most critical artists and record labels. It could also be one of the Smart TV manufacturers who start looking upon this type of service to distinguish themselves from the competition of grid-of-apps variations.

It is important to remember that if this concept were to be released to the consumer, it is critical to put a lot of effort into polishing and making everything run smoothly. Especially technical experienced consumers, as seen in the user evaluation of the prototype, have a demand of high usability or will otherwise reject it.
6.3 Source criticism

This report treats a novel subject - lean-back Internet television – and a service like the one proposed in the concept has not yet been tested on the market or investigated in scientific studies. Although it is easy to find peer-reviewed publications on viewing behavior and traditional TV technology, it is harder to find strong support for the concept itself. The main sources for that are instead reports from the industry and publications from experts who very well might have a personal economical interest in the subject. One cannot know with certainty how trustworthy such opinions are to draw conclusions on.

Sources like Google, Netflix, VOD Professional and Arkena are all associations who have an economical interest in success within the streaming industry, which probably gives them a more positive attitude, compared to the general opinion. On the contrary, the publication from Viasat, which claimed that steaming is just an additive for traditional pay-TV, is of course laden with their own values and economic interest in the version of the reality that is presented.
7 Conclusions

Studying the television media is especially interesting at this time in history. Fundamental change is happening right now to technology and viewer behavior and there is a huge opportunity for new innovative companies to establish.

The desire among the consumers for something new is obvious. In Sweden as an example, Netflix has become extremely popular. This is despite their very limited content offerings and the lack of domestic productions. HBO Nordic has been praised for its quality TV series but usability-wise, their service is beneath contempt. Still, it is the fastest growing video on demand service in Sweden (Mediavision, 2014). If someone launches a new service with great usability and comprehensive content that also is adapted to the viewers in the country, it will explode in popularity. When such a service arrives and video on demands becomes the norm for watching TV, the need for the concept proposed in this report will become greater.

Whether the ideas with maintaining the qualities of traditional TV will be utilized by an independent actor as proposed, or if each video streaming company will implement them is difficult to say. However, the wait to find out is likely to be short given the incredibly rapid progress within the field of Internet-based television.
References

Written literature


Wauters, Tim; Van De Meerssche, Wim; Backx, Peter; De Turck, Filip; Dhoedt, Bart; Demeester, Piet; Van Caenegem, Tom and Six, Erwin. 2008. Proxy caching algorithms and implementation for time-shifted TV services. *European Transactions on Telecommunications*, 19(2), p111-122.

**Online sources**


Kanji, Kauser. 2012. 25 Most Common Functions found in Video User Interfaces. VOD Professional. 


Keilon, Leo. 2014. Netflix to expand to Germany, France and Switzerland. BBC News. 


Appendix A

Expert interview questions:

1. Suppose that all TV content in the future is distributed over the top, on the Internet, would there still be a place for linear television? What are the most important values that linear TV have? Do this concept preserve them in a suitable way.

2. What do you think of the proposal of replacing the traditional smart TV home screen (a grid of apps and widgets) with a more simple interface? This means going away from computer-like functionality and instead letting the user interact mainly by changing the channel.

3. Is the remote described in the prototype the best way to go? Would it be worth adding things like keyboard, mouse, hand-control, smartphone/tablet-app, gestures or speech to get more functionality on the TV?

4. Do you think that this TV concept can enable feasible business models for the content owners? The idea is that they will only sell subscriptions for accessing their catalogue, and not provide their own look and feel to the player.

5. What do you think of idea of automatically putting shorter video clips of the type found on YouTube, into programs? The idea is that TV viewing is a lean-back experience and not suited for the engaging interaction of browsing social media sites.

6. Given the concept of the prototype, would you change it in any way?

7. What are your foresights for the future of television? Can you see any important differences in the markets of Scandinavia, UK, Germany and France?