2020
The End Of
Television

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Foreword

It's early 2014 and television is still a very strong media. Some of you will read this and consider that it is crazy to say that TV will be gone in 6 years (2020). Some will think that the writing is on the wall and that it is not a far stretch at all. In this book, I'll share with you my logic and why I think that it makes sense.

But first, I think that it is important to define what we mean by "Television".

A typical dictionary definition would read something like this: "The transmission of transient pictures by electronic means through a wire or though space, using electric or electromagnetic signal, usually accompanied by sound".

This doesn't go too much in details and a bit old school, not taking into consideration that it can also be transmitted by light. Nevertheless, it talks about transient images and as such entails a notion of synchronicity between transmitter and receiver.

So let's try to be a little more specific. The definition of television used to be easier to nail. At the beginning, it was essentially a means to transmit a real-time synchronous signal composed of images and sounds. Basically, someone would speak in front of a camera and a microphone and people would be able to watch it from their homes, without wire (within reach of a terrestrial TV transmitter).

That was the time when engineers would balance the on-air signal with test patterns and a tone when the station was off the air. It was common in the 1950s and 1960s to have limited transmission time and even to shut down the transmitter at night to save power and prolong the life of

the vacuum tubes since solid states transmitters did not exist yet.
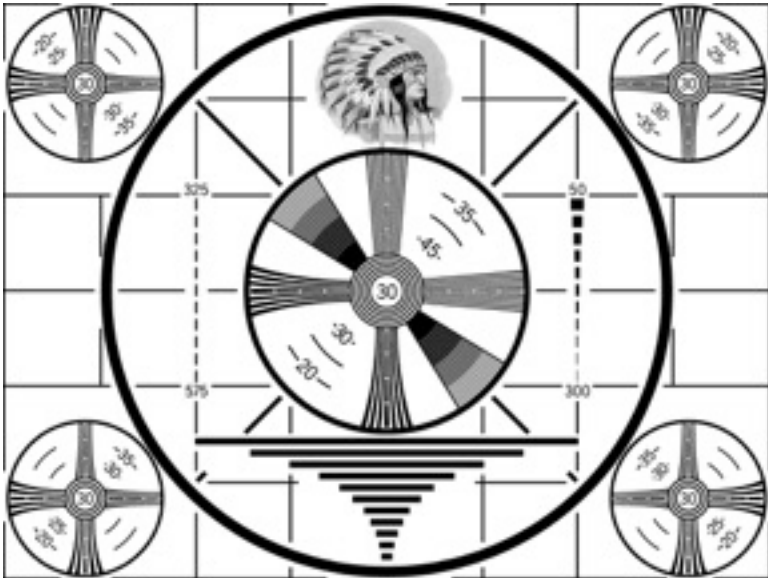
The famous "Indian Head" test pattern above was widely used in North America and people would spend long periods of time watching it. Content was not abundant at the time and it was a big attraction just to watch it for the novelty. Technicians would set it up in front of a camera and transmit the picture for a certain time in order to warm up the equipment and align it (a job that needed to be redone every day), after which the live program would be broadcasted at the scheduled time.

Such was television at the beginning - simple. Source in the studio, radio frequency transmitted over the air and the receiver, the TV set at home.

However, with time, the signal began to use other means. Community antennas were the base of the first cable systems. Those systems enabled the installation of

larger antennas that could receive more distant signals and distribute it to the local communities. That way, communities could receive more channels at higher quality, instead of with a personal antenna located in homes or on rooftops.

In time, those local cables enabled the beginning of the cable network industry. These channels were not broadcasted over terrestrial airwaves - they were sent to satellites, received by cable operators and sent to the consumers' home. This was an evolution of TV in the distribution form but it did not change the fundamental principle of those being synchronous channels. However, this technological step is what allowed specialized channels like 24 hour news and sports to be created.

Next came digital distribution, IP technology, and the Internet. This enabled a non-real time, on-demand experience. Is that form of distribution still television? Is it more assimilable to video non-real time distribution such as what was done in video-clubs? I think it is.

So what we can say is this: If it is a linear synchronously (real-time-ish) distributed channel, then it is television.

If it is on-demand content or streaming of an isolated event, it's a different media - video (or audio-video) content.

For clarity's sake, let me explain a little more. For a long time, content was defined by its recording medium and by its destination. A movie was shot on film for theatrical presentation. A television show could be shot on videotape to be broadcast at home. But now, we can produce the content digitally regardless of if it is for theater, home-viewing or mobile and with various quality level and resolutions.

We still say a "television series" or a "movie" but it is more in reference to the intent or the style rather than a true fundamental distinction.

With that said, we can say that a playlist of audio-visual content could be something that *looks* similar to a television channel but in order to still have television you need to also have a shared experience. You need to have a constant stream that is programmed with a goal in mind and also that viewers can join at any point so that viewers can experience the same thing at the same moment : the stream needs to exist independently of viewers. The program stream is playing constantly and an arbitrary number of viewer can independently join it (or tune in to it) at different points while experiencing a shared, simultaneous experience.

Am I trying to limit television's definition just to be able to say that it will meet it's end by 2020?

Of course not! It is simply important to understand what we are talking about and what kind of impact this could have. Saying that television in the traditional sense is going to end has a huge impact from all perspectives. Broadcasters have reserved frequencies for their operations and those are more valuable than ever. Mobile devices have become widespread and users require more bandwidth. As such, the pressure to take away ever bigger chunks of RF space from broadcasters and to use it for mobile will rise even more as people stop watching traditional TV.

With the bulk of the financial model for content production still basing itself on large broadcast networks supported by advertisers, the collapse of the distribution model will completely change how production will be made. This will change who will control content and the resources that are available to produce it.

With this, even if we narrow down the definition of television to what it fundamentally is, in a traditional way it still is very significant. In fact, it will change everything in the media landscape.

CHAPTER ONE

A world with no television

Imagine this scenario: it's September 2020 and, like it has been for decades in the US, people are getting back to a higher level of activity after the summer break. Students are back to school, Wall Street is busy with people trying to get rich and the NFL is filling stadiums all over the country. September as usual.

September as usual, except that there is no television anymore. Broadcast signals have been turned off as owners have convinced congress to let them auction all of their channels. The irony is that this follows years of battles with the mobile operators in which broadcasters were making claims about "how important the broadcast services were to the communities in case of emergencies".

But with time, people slowly stopped tuning in to that signal anymore, connecting instead with content over the Internet and mobile. People didn't care about the broadcasters as they used to. In fact, it's these very people that pushed for better service and more speed for their mobile devices. Mobile operators didn't want the broadcasters to get rich with the spectrum since they got it for free but in order to reach a compromise, they agreed to auction the spectrum. The broadcasters were relieved at the end since the power bill required to keep running the transmitters was getting hard to justify in relation to the few viewers that were still tuning in.

Sure, there are still some TV channels on cable and satellite. Television has not completely disappeared yet,

but it feels a bit like watching a movie on VHS or DVD : Quaint and dated. Few people are watching the remaining channels. It is still relatively popular in remote areas where satellite is the only viable option to get the Internet and therefore tends to put limits on speed and data transfer. There are still pockets of TV die-hard fans and nostalgics that could not imagine watching something on-demand: "You have to watch it when it's on TV!", period.

The few remaining channels that still exist do so on a limited number of platforms. These platforms had to drop a lot of the underperforming cable channels as consumers started "cutting the cord" in droves. It was the exact opposite of the 1970s. Instead of adding channels to expand the offer and charge more, they had to reduce the offer to only the core channels that most viewers wanted in order to bring the cost more in-line with Internet-based services.

But for most Americans, watching video content is something they do on *their* schedule - when they have time no matter where they are. Except for very remote places, it is easy to have high speed fiber access to the Internet and to watch what you want, when you want it.

While commuting or on the road, the speed of the mobile Internet makes watching video a very simple thing as well. Not only is there currently more bandwidth available for the mobile Internet but cells have become smaller so that a higher number of people can have better access.

Location doesn't matter. Maybe you are in vacation visiting the Great Wall of china and you want to watch the news from Kansas City, MO? No worries, no channel guide to pull through. Search it on Google and make the choice of what to watch. Maybe a live one? In progress, from its

current point, or even from the top? Just click and there it is directly on your tablet!

Outside of the US, it was harder to watch american content a few years ago but over time content distributors made sure that they retained international rights and as a result, there are no longer borders to content!

People used to think that sports would still stick on TV for a long time since the appeal is bigger when it is live and with higher quality. However, the Internet Service Providers progressively improved the capacity of their network to handle high quality live stream and sports organizations quickly figured out that fans were willing to pay them directly to have a better selection of their favorite sports. Instead of buying cable channels like ESPN, fans could buy a complete yearly NFL or NBA package without cable subscriptions. This has been great for fans of international sports as it is now possible to also subscribe to packages for various European football leagues, Indian cricket games, Formula 1, etc.

In some countries, TV is still going strong. This is notably the case in China and India. For China it is mainly a question of control of information; it is much easier to control television with dedicated delivery mechanism than it is to control the Internet (although, they are not doing such a bad job at that). In India, it is more a question of infrastructure and of median income. Too many people lack broadband Internet to even consider eliminating TV completely. However, a significant part of the population have had broadband for several years now and are consuming video content primarily online - it's a country divided.

In the US however it is a done deal. TV is a thing of the past and very few are nostalgic about it.

CHAPTER TWO

The two other mass media

Back to 2014, let's look a bit at what happened with the other two mass media : print and radio.

An expression I have long heard being spoken is that "A media doesn't kill another". This is, certainly, partly true. When radio appeared, people were saying that newspapers were dead. When TV appeared, people said radio was dead. And yes, we still have newspapers, radio, and television, even if the Web and the "new media" are there. But, although each media didn't kill an older one, it certainly did force the older to redefine itself and adapt.

It's doubtful that one would claim that the newspaper business is as strong today or as influential as it was a century ago.

There is a fundamental difference about the relations of Web and print compared to the one between Web and electronic media (TV, and Radio). TV and Radio are, fundamentally, ephemeral, transitory media; Print is a more stable reference : newspapers can be read and analyzed. For that reason, typically, more in-depth information could be found historically in the newspaper than on radio or television. With the Internet, this is completely different. In fact, we can search and retrieve Web content that is more than a decade old in a few milliseconds! The Web is even better at being a stable reference than newspapers.

Newspapers

Newspapers, particularly dailies, were the first widespread news media. Until the development of radio they were the fastest and easiest way to learn a little about what was happening in the world. You can really see it as a distribution means.

An organization sets up the infrastructure to create and distribute a daily bundle of information. In the creation process, a team gathers the various elements that the editor believes will have a level of interest for its readers. Local, national and international news; Weather, arts, sports, opinions and finance; Add advertising and classified ads and you have created a "bundle" that will, hopefully, appeal to a mass audience. Individuals may not care about the complete bundle but will hopefully care enough about some piece of it enough to buy the full package.

Once the "bundle" is created you need to be able to print it efficiently, quickly, and economically. Then you need a timely distribution. With big dailies, you would typically have a deadline around 11 pm or midnight and would need to have the printing process and the delivery done before 7 am, in time for people to get it before their workday.

The entire efficient printing and distribution process is expensive and therefore requires a large number of readers to be economically feasible. Just a section on news would probably not have drawn enough readers to pay for the entire thing. Other form of print media would address more specialized audience than dailies but with a slower pace, typically weekly or monthly. That slower pace and frequency would allow for the printing and distribution infrastructure to be shared with other "magazines" so that it achieve it's means economically.

The information gathering infrastructure is costly. In a competitive field, if you want to find all the significant information everyday, you need to have an imposing number of journalists working for you and offices (or "news bureaus") all over the world. While some very large dailies like the "New York Times" could afford a massive news gathering infrastructure due to the size of its market, others that serve only a smaller town could not. For this reason, news agencies were quickly created to allow for a more efficient sharing of information (although with lesser diversity).

That "bundling" model for the dailies has been a winning formula since their beginnings in the 19th century and even through the 20th century even when they had to face competition from radio and television. The Internet , however, would change all that, piece by piece in the early 21st century.

First, creation of more efficient, "classified" ads distribution was established on the Internet with Web applications such as "Craigslist". For most ads, those sites were free to both advertisers and audience (although some sites shows advertising). Those free sites have many advantages over print; Distribution is very low cost. Delay is minimal: an ad can be placed and removed in seconds. Tools to sort and narrow down the search allows for a far superior experience for potential buyers. This technology advancement basically killed the market for classified ads in daily newspapers. This was a meaningful part of their revenue and also one of the reason that a section of the readers were buying it. Classified ads were the first part of the dailies to be "un-bundled".

Weather was already more immediate on radio and TV. This would become such a significant part of the attraction that several full-time weather TV network were created.

However, print was still a reference to find your local weather at the time you needed it, even considering that it was less up-to-date than electronic media. With the Web however, various sites offers to the users the exact information they want, when they want it and totally up-to-date. A significant share of the readers stopped to use dailies as a source for weather information and thus, in effect causing the un-bundling of another piece from the dailies.

Magazines specialized in sports and even some sports dailies have been long considered by fans as higher quality resources than general dailies. Dailies still had an edge in term of speed and efficiency (price per information) over the print specialists. Radio and TV however definitively had the edge on speed and would present live events, a thing impossibly out of reach for print. The Internet has presented itself in recent years as a formidable challenger to dailies. On the Internet, it is possible to find full, in-depth analysis (at the specialist's level of quality), immediate information and even live-event coverage. While some casual sports fans still rely on dailies for their sports coverage, a significant part of the readers have found their needs better covered elsewhere, hence "un-bundling" yet another part of the dailies.

Breaking news has long been better served by the radio and television. While daily newspapers have a daily deadline with a minimum delay of 6-8 hours (and sometimes over 24 hours) on breaking news, TV and radio can be instantaneous, especially so for radio which can go live to an event's site with a few minutes warning. The Internet has increased this problem significantly by enabling not only the immediacy of news coverage but also the availability of in-depth analysis and background information. Furthermore, a lot of international news are

provided to the newspapers by news agencies that sometimes get it from local papers elsewhere. With the Web, no longer does the reader need to wait for the agency to take the information from a local paper, process it, transmit it to its subscribers and then for those papers to re-publish it. No, with the Web, the reader can find the information anywhere in the world directly from the original source, without other intermediaries. In fact, they can even get the information straight from a witness without any journalists involved but this is another topic due to the problem of identifying credible sources. And with that, an additional piece of the dailies also got un-bundled.

What remains in dailies today? Well… a lot of the sought after "bundles" of the past are still part of the dailies from inertia. Readers who prefer paper and those that don't want to use the Internet can still see value in these bundles. However, that number is fading[1] and at some point there will no longer be enough of them to justify the expensive distribution infrastructure. Already many dailies have disappeared and many others have revised their infrastructure. While dailies of the past owned their printing presses, today most have delegated the work to facilities that can print other works as well since the number of prints has steadily declined. The only real piece of the "bundle" that still has some unique values

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[1] The New York Times total weekdays circulation has dropped from 1.1 millions in 1998 to 861,000 in 2010 if we exclude the 90,000 electronic subscriptions. Source: http://www.nytco.com/investors/financials/nyt-circulation.html

Additionally, a lot of the dailies subscriptions have been heavily discounted when not given for free which is a factor that keeps the circulation artificially higher.

are the commentaries... but the papers are also increasingly making these available on the Web through their own sites. Even so, the trend in dailies has definitively going towards more commentaries (of various types, editorial, opinions etc.) and less of the other types of content.

The chart below (US daily papers and circulation)[2] displays the total number of daily newspapers in the US and their total circulation (in millions). While the total number of newspaper have decline generally since 1940, we can see that the decline has been increasing steadily and significantly since 1980. On the total paid circulation front, it has declined since around 1985, but more significantly after 2000 and is now roughly at the same level as in 1940.

US daily papers and circulation (total)

In the next chart (US newspapers advertising revenues)[3], we look at the advertising revenue of the US daily newspapers. We can see that there has been a significant decline between 2006 and 2009 that closely match the collapse of revenue of the classified ads followed by a more steady decline in total revenue. As we can also observe, this decline is not compensated by the increase in online revenue of newspapers' Internet editions, which are still small in comparison to print.

Classified — **Print Advertising**
Digital Advertising — **Total Advertising**

US newspapers advertising revenues
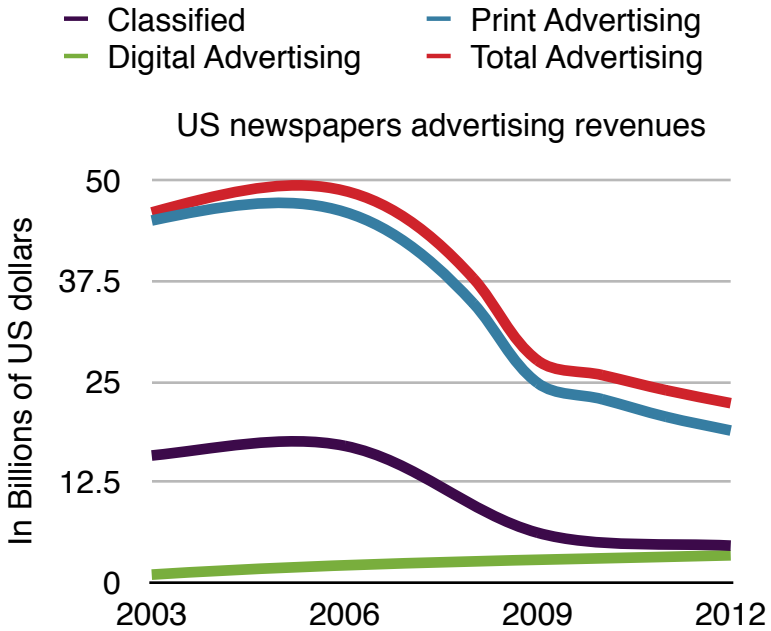
Printed dailies have tried to offset the decline by offering content on the Internet but very few have been

3 Source: Newspaper Association of America http://www.naa.org/ Trends-and-Numbers/Newspaper-Revenue.aspx

able to successfully market it. Additionally, a significant part of those revenues came from advertising and the revenue they would receive for each reader online is far inferior to what they can receive on the print version.

Through the pairing of their papers and websites, a few dailies will likely remain in business for a long time but it will be the ones with the most original content or those in languages that allow them some longer protection (if alternative sources of information are not readily available in that language on the Internet). The others will continue to disappear as the number of readers that find their "bundle" value decrease by choosing other information sources for their needs.

I think that we can observe a parallel between the "bundle" nature of dailies and those of the cable industry. It is likely that the cable industry will have to live through a similar path of changes over the next few years and that, in turn, will likely have a significant impact over the whole television ecosystem.

Radio

Radio has a different story than print. It's a media that has sound in common with television and shares a lot of the same distribution technologies. It used to be enough for a radio station to play some music and do some presentation of it. Put in some advertising, some news, and you're in business. In large markets, different stations would have different music "formats": "Adult Contemporary", "Top 40", "Country" and so on.

With the internet and a plethora of music services (free or by subscriptions), it's hard in our day and age to define yourself simply as a music station. Yes, some still focus highly on that (maybe the number of people who are not

technically savvy is large enough) but for the most part they have to find something more. Music based stations in large cities are increasingly hiring hosts that are celebrities (including well known actors and comedians) to become a destination not just for music but for general entertainment.

Talk radio is, generally speaking, doing well. Most often, it is performed live, brings content that is constantly fresh and can quickly react to changes during the day. Since compressed radio requires minimal bandwidth and is easy to stream efficiently on the Internet, most large stations today also have an Internet streaming option. This is very convenient for those who are traveling or the expatriates that want to follow information from their city of origin.

With the increasing bandwidth and availability of mobile data networks, the radio stations have also made custom applications available for iPhones and the main mobile platforms. As portable radio becomes an ancient forgotten item, people increasingly listen to radio on their mobile phone through these custom apps. In fact, it's much easier to access radio stations anywhere with those apps than on a standard radio receiver or through the Web. Sometimes, even when I drive my car outside of normal coverage area, I will connect my phone to my car audio system (though bluetooth, USB, or audio wire, depending on the car) and listen to my home radio station while driving halfway around the globe!

If radio have made it that easy to listen to their programs over mobile on the Internet, why hasn't television?

Bandwidth, for one, is certainly a factor. Even compressed, video is much larger than audio (not to mention that you still need to carry audio) and as such, not

as easy. This is an issue that will get addressed gradually as faster and more efficient networks get deployed.

Secondly, we have rights - legal stuff. While radio has a type of content and rights that don't limit them in terms of geography, video content is much, much more complex. Everything has to be negotiated piece by piece for each territory. While some shows can be streamed worldwide because the network owns all rights, for most shows this isn't the case. Not only that, sometimes the rights and regulations for content in programs puts a limit on the program distribution, even if the program owner would want to make it available worldwide. This could be a piece of music, a picture, etc.

Availability without geographical limitation is a big plus for radio and *could* also be the case for television in general. However, this will require a lot of changes to the business practices and will probably be very bad for television stations in small countries that get their content from larger markets such as the US or UK.

CHAPTER THREE

The key parts of television

For television to exist, there are certain basic elements that also need to exist who are fundamental to the media. The way that these parts have been achieved has changed and evolved with time but they have been there since the dawn of television and will still be until its end.

Early Television (until the 1970s)			
Content	**Stream**	**Distribution**	**Viewing Device**
Studio (camera, microphone)	Channel	Radio Frequencies (RF)	TV Set
Telecine (film)			

These parts are:

1. Content: The audio-visual package that form the basis of the program.
2. Stream: A constant flow of images that form a linear channel that can be transmitted.
3. Distribution: The technological part that enables the signal to flow from its origin (like a studio) to its destination (like a television set).
4. The viewing device: The technological device that receives the stream from the distribution and presents it to the viewer. This is, historically, a television set.

These four parts have evolved a lot. Each can be simple or complex, but if you eliminate any one of them, then it's no longer television.

It's hard to image television without content for sure but the content does not need to be compelling to still call it television. In the 50s, people were sitting for quite long periods of time simply to watch a camera calibration

Television today (since 2010 or so)			
Content	**Stream**	**Distribution**	**Viewing Device**
Studio	Channel	RF	TV Set
		Cable	Computer
Field		Satellite	Mobile Phone
Server		Internet	Tablet

chart... it is content, if not particularly compelling!

Similarly, it's hard to imagine television without a viewing device! Without anything to watch it on, it might as well be radio!

It used to be only television sets but now computers, tablets and mobile phones are all acting as viewing devices as well.

The stream is a bit trickier as it is actually partly what makes the distinction between "television" and "audio-visual" content. You can watch a live event, like an Apple product launch, without it being "television". If the audio-visual stream is setup for a specific reason then it does not qualify as television. To be television, the stream needs to be something that exist daily and has a regular schedule independent of the viewer. In other terms, if it's a pre-programmed playlist that is access on-demand it is not television.

The distribution means are also important as they need to allow a constant real-time access to the existing stream. The distribution mechanism needs to allow the viewer to join and leave an existing stream easily.

If any of these parts are missing, then we are no longer looking at television.

Some will argue that we have home-recording devices since the late 70s and so if I record a TV channel and I am watching it tomorrow is it still television then. It is not quite. It is recorded television. Wether you did record it at home or access a recording on the Internet, recorded television is not the same as television. If you watch a television stream directly, anything can happen. A program may be interrupted by an emergency report that is happening now.

To make it more real, let's take a look at how these parts have existed in reality.

In the early days of television, there was no video tape recorders[4] and most of the programming was done live, directly in front of cameras and microphones. Any recorded material had to be presented from film though the use of a telecine. In those days even the commercial were done live. So in the early 1950s the content was essentially from live studio or film. TV networks had multiple studios under one roof so it was possible to create a stream of programs by going from one studio to another or to a telecine for presenting a movie. The stream was created manually as no automation did exist at the time. The stream is what we call a channel in the traditional sense of the term.

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[4] The Video Tape Recorder (VTR) was invented by Ampex in 1956.

The distribution was initially all done on radio frequencies (RF) with terrestrial antenna and the viewing device was a television set; an RF tuner with a cathode ray display.

All those parts have evolved but the basic principle remains the same.

Today, the content can be originating from a variety of sources but in general, it is now either a live signal created in the studio or the field, or a recording mostly in a data file on a hard drive (content server).

The stream is mostly created with an automation software that "plays" computer files one after another or "switch" to a live source.

The distribution can be done via earth based radio frequencies transmission, via satellite, cable or the Internet. As long as the distribution retransmit the stream in a constant "live" manner.

The viewing device is often a flat screen television set but can also be a computer, a mobile phone or a tablet.

As long as we have all four parts of the chain in place, we can still talk about television. On the other hand, if any part is missing then it is not television anymore.

When we watch a prerecorded show on Netflix or iTunes, it is video on-demand, this is no longer television since we are not watching a common stream of program at the same time as others.

Also, when we watch a live boxing event that is available on pay-per-view, we are watching a video transmission, it is not part of a channel that has regular programming and therefore, this is not television.

This can be confusing as often terms are used without a proper context and definition are often extended when things change due to progress in technologies. We will often referred to movies when the intended use of the

product was to present it in theater. We talk about a "TV movie" when it is created with the intention of presenting it directly on television, not in theater first, but when the format is similar to a movie. We talk about a "TV series" when the content is created in episodic format and is similar in style to a series that would normally air on television. But those terminology are heritage of conventions that have been established in past decades and more precise terms that represent today's reality have yet to be created or used widely.

For example, a series like "House of Card" which was presented originally on Netflix is still considered a "TV series" even though it is not presented on television. What is the fundamental differences between a "movie" and a "TV movie"? What is the difference between a "TV movie" like Steven Sodenbergh's "Behind the Candelabra" that he did for HBO and his movie "Full Frontal" that he shot in video in 2002? My point it that to classify video content on the basis of its intended usage is making less and less sense today. Twenty years ago, those classifications made some sense as it did place a set of expectations for the audience. You could expect that a movie made for theater release would have more budget, a longer shooting schedule, and a more elaborate scenario. You would also expect that a TV series would be shot quickly and follow certain types of episodic and predictable conventions. But today, these lines are blurrier and the use of those older conventions have more to do with marketing than with reality.

Another point of view where we can observe this, is when someone watch a movie like "Star Trek Into Darkness" on Blu-Ray DVD, the people will not consider that they are watching television even though they are looking at it on their large screen "TV set". They are watching a "movie" on their "home entertainment

system". Similarly, if they watch the same movie on Netflix, they are not watching television either. Would they watch it on network television on a local ABC affiliate, with commercial breaks and promotions about the "upcoming news at 11", then they would watching it on television.

It is important in my view to be more precise about what we are talking about when we want to grasp what is happening, how things are changing, and trying to make decisions that will have a significant impact on the production and distribution industry of video content in the next few years.

CHAPTER FOUR

Technology as a driving force

Media would not exist without technology. Without the advent of fast high volume printing presses daily newspapers would not have existed. Same for radio, TV and social media. No technology no media. Therefore, it is not surprising that technology evolution are changing and reshaping the media landscape constantly.

Just to focus on the television side, technology developments have so far had the most significant impact on the distribution side. It has most certainly impacted the production process as well but it is in distribution where we have felt the consequences of those changes the most.

Technological development are an enabler. Without the right technology a change will not happen. With the right technology a change will happen.

In this chapter, we will take a look at key technologies that we have to take into account in how television will evolve in the near future.

Broadcast TV

Wireless is the fastest and easiest way to setup a wide distribution infrastructure.

At its simplest form in order to offer a single television channel to a city, the required infrastructure is simply to put up an antenna at a high point with a transmitter and to start broadcasting. Terrestrial broadcasting of television on Radio Frequencies (RF) was the first way to distribute TV

widely and the only practical form that the technological progress did enable during the early years of television (between the 1930s and '1970s). The reason for a high point is that the frequencies used for television requires "line of sights" between transmitting and receiving antenna. They can go through small obstacles but not much. An antenna on a mountain or very tall building limits the number of obstacle between that point and the receiving ones of customers. The higher the antenna, the larger is the potential coverage area since at some point the curvature of the earth limit the line of sights to the transmitter.

The TV transmission antenna on top of the World trade center[5]

Distributing television with an earth based transmitter has its limitations off course. Until the 21st century, terrestrial transmission was done using almost exclusively analog technology and as a result, viewers could see all kind of "artifacts". Radio signals would bounce on obstacles such as hills and tall buildings and create "long ghosts" effects and color errors on the viewer's TV set. Reception was tricky when changing channels as it would require an adjustment of the receiving antenna for optimal viewing. Problems were less important in close-by flat suburbs where people had rooftop antennas, but much more prevalent in large cities where obstacles and harder access to rooftop made reception difficult.

High power transmitters on mountain tops have been the solutions of choice in US and Canada as the territory to cover is large with zones of varying population densities. This was a convenient choice but one that also comes with a high energy bill.

Solutions have been different in other parts of the world. For example, in France, transmitters and antenna sites were operated until the mid 1980s by a national communication group (ORTF then TDF) and as a result, they choose to use a higher number of smaller transmitters to cover the territory. Colocation of all the channels on the same sites also meant that the viewer's antenna did not need to be reoriented when switching channels.

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[5] Picture of the old World Trade Center taken by me in August 2000. Every Broadcast TV station had their transmitters on the top of 1 World Trade Center, the North Tower. As a result of the attacks of 2001 and the destruction of the tower, all TV stations had their transmission equipment destroyed and were "off the air".

CATV

In cities, early attempts to solve reception issues were to erect antennas on large building and to share the RF (the received radio frequencies) signal to the various apartments through a 75 ohms coaxial cable.

In remote communities too distant from the transmitter for small antennas, large community antennas were erected (too costly for average customers) and the signals were distributed by cable to the various homes. This is the origin of Community Access Television (CATV) and of cable systems.

Eventually, cable systems also appeared in larger cities to help solve bad reception of local channel and to enable the reception of more distant channels with large shared antennas. This was the case in Montreal where a cable subscription in the mid 70s would bring good reception of the Montreal-based station but also giving access to stations in Plattsburgh, NY and Burlington, VT which were affiliated station to the big american networks ABC, NBC and CBS as well as PBS stations in those cities.

A Jerrold Starcom II Cable TV Converter

The late 1970s were a significant growth and consolidation period for the cable industry. I remember that in my hometown, Montreal, there was a few local cable system that were offering mainly the broadcast channels. Câblevision Nationale was my local cable operator and was basically just offering the basic. At the same time, Videotron was much more innovative in it's territory in suburb and was offering a much larger lineup with the mix of broadcast and specialty channel. That was a game changer with people going from a set of five channels to 36.

Videotron like many other cable systems at the time, were offering their lineup with a wired cable converter box. People were truly amazed by that technological change and there was a wave of new subscribers to cable.

Videotron eventually bought Câblevision Nationale and s series of other system and was able to extent the offering even more with the advent of satellite based specialty channels. It is now one of the dominant communication company in Canada and is part of Quebecor.

Such consolidation have continued and is still going on today throughout North-America.

Satellites

Before the development of communication satellite technologies in the 70s, live signals from the network to its affiliate (from New York City to Plattsburgh for instance) was carried by a series of line-of-sights microwave relay towers (serving various other stations on the way).

With the development of communication satellite in the '70s it became easier end cheaper to build distribution over large area (such as a continent) and it made it possible

to create stations that were only distributed by cable systems. This technology development did enable the creation of the first wave of specialty channels in the late 1970s including CNN, ESPN and HBO. Satellite communication also made it possible for networks to receive contribution from anywhere in the world. No longer did you have to ship video reports on plane, video can be sent across the Atlantic or from anywhere with satellite coverage.

Satellite technology is still relevant today as it is the simplest way to reach remote areas. For satellite, a clear line of sights is required. Since communication satellites uses a geosynchronous orbit (following the rotation of a the same point on earth), that is orbiting the earth at a distance of over 35 thousand kilometers (22 thousand miles), and clear line of sights is possible for almost half of the earth at once. In practice, this is often much less as "beams" are focused on an area to provide a more powerful signal and requires a smaller dish. Still, in practice, we can easily cover a full continent[6] with one satellite. Given that, it is often the only really practical technology to provide communication service in desert areas or in the middle of an ocean.

Satellite technology uses directional parabolic antennas. This serves two purposes. First it increases the weak signals that are received from from the distant satellite and secondly, it allow for multiple satellites at various position the use the same frequencies in an overlapping area.

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[6] This is a bit different in the polar area as the angle towards communication satellite makes it impractical. In those cases, a constellation of lower orbit satellite is more useful.

The second purpose is quite useful as the "space" available in the RF spectrum is limited and many different applications want to use it. Further, this means that as long as satellite are distant enough from each other, they can carry a set of different channel to a single area.

You have probably seen "dish farms" near TV networks or teleports. The goal of these is to receive good quality signal from a series of satellite at different positions over the horizon. Since they are all located over the equator, you'll notice that antenna generally points towards the south. Some are directly in the southern direction while others may point more toward the eastern or western horizon. The lower a satellite is towards the horizon the larger the antenna needs to be in order to receive a strong enough signal (since the distance is greater to that particular earth location). On North America's east coast for instance, trying to receive a satellite that is orbiting near the European coast require much larger antenna then a satellite over Columbia for instance.

The largest satellite antennas are often those that are used for "uplink" purposes, to send a signal to the satellite rather than to receive it and even larger are those to control a satellite, although those are less common.

Satellite are expensive to build and to launch. They have a limited amount of fuel and it is not practical to refuel them in space (the technology to reach it and perform the operation would be more costly than launching another). For this reason, satellite tend to have a typical lifespan of maybe a decade. I had the chance to visit large satellite control facilities such as the one from SES Astra in Luxembourg. They have an astro-physicist working there and performing advanced calculation. When you have a satellite that cost over $300 million to build and launch, it is well worth it to pay an astro-

physicist if he can extend the life of it for a year or two. The trick with satellites is that once it is at it's stable orbit, it more or less stays there. It does not need to burn fuel to do so. However, it tends to slowly shift position and this is fine to a certain point, it must remain inside an imaginary box that are within the tolerance of the parabolic antennas that points towards it. So, once it is in a situation that can compromise reception, the earth station needs to initiate a burn on one of it's stabilizing engine to reposition it for a while. To minimize those "burns" and the fuel consumption. The better the calculations the less fuel will the burned and the longer the satellite can remain in service.

Once a satellite have used most of its fuel, it is generally replaced by a new one, of a newer generation with more capabilities but the older one does not necessarily pulled out of service just yet. It can be switched to what is called an "inclined orbit". While it no longer can be useful for user of common fixed satellite dish antenna, it can be used by professional antenna that can track it.

But I digress, as fascinating and useful that satellite technology is, it is great when you have one source that need to be receive by many but is much more limited when you want to have bi-directional communication. This is why we use primarily wired earth-based technology when we want to broadband bi-directional communication.

Satellite is here to stay and serve us but it is not going to be the core delivery mode for video content in the future.

Electronic News Gathering (ENG)

The '70s was also the time when portable video recording was made possible. Prior to the development of portable cameras and portable video tape recorders, news were shot in film. The turn-around for news was at least a few hours as the film had to be processed and edited before air. The news team were generally shooting on "reversible" film stock which is essentially motion picture diapositives. That way, it was not required to make a positive print of a negative in order to edit and present it. This was a long and expensive process so news gathering was often limited to an host reading its text on air rather than reports from the field.

As satellite communication was still very expensive and the uplink equipment quite large, its usage was limited to large and significant events. It's only with the introduction of digital and real-time compression technique in the late 80s, early 90s that satellite communication became cheaper and easy enough for the widespread use of it for news and events. Digital microwave links in metropolitan area are also still very much in use for local news as it represent a simpler and cheaper alternative to satellites.

The development of professional "camcorders" in the mid 80s was also a significant step. Before that, an ENG technical team was at least two people, one to operate the camera and one for the video tape recorder. A camcorder being both a camera and a VTR in one, a single operator could operate it, provided that the work on the audio recording was simple. This gave birth later to a generation of camera-reporter, people that are doing both technical and journalistic work.

Digital Video and Real-time compression

It's hard to talk about the technical advances of digital video without talking about real-time compression. The problem with a digital representation of a signal in relation to analog is that it uses at least 4 times the bandwidth. In a world were radio frequencies are limited, this is a big deal to take more space to transport essentially the same thing!

To take a step back, digital processing of video did began to appear in the mid to late 70s. The technology at the time was very expensive and limited. Video and audio signal chains were still completely in analog format and the digital processing would only be part of a device internal processing. Early usage were basically digital framestores (working on a single frame but in real time). The inputed analog video signal would be digitized and manipulated internally before been re-transformed back into analog. The digital manipulations could allow for a re-sizing of the picture allowing the first picture-in-picture effects. More advanced effects would be introduced through the 80s by specialized equipments such as AMPEX ADO or Quantel Mirage. These equipments did range in value from $250k to nearly a million dollars.

It was not practical to use digital video widely before further development of the technology that made the processing faster, smaller and cheaper. By 1987, the technology had evolved enough to enable the first generation of complete digital studios. This was a significant step as signal no longer had to be transformed from analog to digital and then back to analog at each processing step. The signal could be captured digitally with a camera and remain in digital format for the whole production process. At that point, it was also possible to record the digital signal with the D1 videotape tape

format. Going to a full digital format had a huge impact on the post-production process. Before it, each time you would have to use the product of an edit session as a source to another, you would loose a "generation" with a perceivable effect on the quality. Even with top of the line analog video recorders, it was not really possible to go beyond 7 generations, including the distribution copies. This was a severe limitation. With digital, you can go to a much higher number of generations without any perceivable degradation.

At that point, digital technology became a practical tool in the professional studio environment. It was still not practical for distribution due to the increased bandwidth. However, with the increased speed of processors a few years later it was possible to compressed the digital signal in real time with significant efficiency. For transmission, the MPEG-2 standard was adopted and implemented in hardware by the mid 90s and it enabled to squeeze more channels and with higher quality than was possible with analog technology. In other words, for a given resolution you can take a digital video signal that was 4 times bigger than its equivalent analog and compressed it to just 1/4 th of the space required by the analog signal and with higher quality! Suddenly, digital was better and smaller, a lot smaller!

That technology milestone did enabled another wave of specialty channel. By enabling 5 to 12 channels to be transmitted on a satellite transponder that could carry only one before, satellite transmission cost was cut dramatically. Specialized channels that didn't reach enough audience to pay for a full transponder (over $1 million a year at that time) could now do the same coverage but at a fraction of that price.

Real-time compression also had an impact in the production workflow as it did enable lower cost disk-based video editors. By the early 21st century, high quality HD disk based video editor was even available to consumers with product like Apple's iMovie, Sony Vega and Adobe Premiere. All that thanks to digital video and compression.

It is also digital video and compression that did made possible the transition of television system to HD. Compression did enable to put more than one television channels (including one HD) into the same space (or bandwidth) that was allowed to a TV channel in the old analog formats. Without it, the transition to HD for terrestrial transmission would have been impossible since bandwidth is limited and others want to use it for other application such as wireless communication (phone etc).

It's the same progress in digital technology, compression and satellite power that did enabled satellite distribution directly to the home consumer. Once those technology reached a usable phase, services like DirecTV and Dish in the US, Sky in the UK and Star in Asia became available and competing with cable.

This is also compression that did enable video streaming over the Internet. Of course, before this could happen, Internet Service Providers had to install high speed Internet access but as soon as those were available through cable, DSL or fiber video, services began to appear thanks to compression. At first, with limited quality but as bandwidth connection does progress and better compression is developed, the quality of video streaming on the Internet gets better. The success of Netflix is entirely related to these two technology development.

HDTV

Progress in screen technology have also contributed largely to the evolution of television to high definition. While consumer are always happy to to get better picture quality, the amount of extra money that they are willing to pay for it is limited. Aside from a few enthusiast (often referred as "early adopters") my estimation is that the bulk of the consumer would not pay more than a 30% price premium to get a higher resolution TV. And in fact, the widespread use of HD screen did not began before the price of the screen reached that price threshold. Further, for many customers, "flat screen" were actually a better reason to buy those HD screen than the resolution. To get to the mix of larger screen, better resolution, lower energy usage and low prices, the development of color LCD was the main driving technology innovation. Without that technology, people would probably still have older TVs in their homes.

WWW

My first look at the "Web" was in early 1992. At the time, the Internet was just beginning to open-up to non-research organizations and we had a modem phone connection to a non-profit ISP.[7] A colleague of mine had found and downloaded a copy of the "WorldWideWeb" software from CERN's Tim Berners-Lee that was available

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[7] ISP: Internet Service Provider.

only on NeXT[8] computers at the time (a good thing that we were developing on NeXT!).

At the time, the Internet was not very friendly. We were using it mainly as a conduit for emails and for connecting to usenet "newsgroups". Command line software like "finger" and "ftp" were how you can find and exchange information on the Web. While this was acceptable for expert users and researchers, there was no way that this could open the Internet to a wide audience.

WorldWideWeb was going to change all that and my first reaction to the software was exactly that "WOW, this going to change everything"! And it did. There, an easy way to create a web of information linking any number of sites around the world that could be easily access by casual users.

From that point, the Internet and the Web grew so tightly connected that it's now almost synonymous. So much, that people have now trouble understanding that some apps (mainly on mobile) do access information through the Internet without the use of the Web.

At the time, I was already aware of the concept behind "hypertext" (one of the Web key principle) because it was a core concept behind Apple's HyperCard half a decade earlier. The Web was not such a great leap from an engineering stand-point. It was making use of a lot of existing technologies and concepts. If a committee would have work on this, the technology would most certainly be more advanced and more efficient... but it would also probably took at least 10 years to be usable. The genius of the Web was that it was there, simple and usable. Like most inventions today, when the technology have reach a

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[8] NeXT Computer was a company founded by Steve Jobs and was bought by Apple Computer in 1996.

certain level of maturity, someone, somewhere will make the next invention. It was Tim Berners-Lee but if he did not, someone else would have found a way to navigate the Internet simply, it was something that just needed to happen at that time.

The opening of the Internet to everyone and the Web were the enabling factors that did enabled social media and all that followed. A lot of progress and infrastructure was still needed to enable social media and wide spread use of video on the Internet but the foundation was there. An important piece was off course bandwidth, enough speed to make it efficient to be constantly connected to the Internet and to allow video to be streamed in real-time (well, bandwidth and compression) but 10 years later around 2002, it was beginning to be possible and by 2012, it was also taken for granted.

One of the downside of the Web however is that people tried to make it what it was not conceived to do. While it is great at presenting   plain text content and making it available, it is not so great at presenting content in a stable uniform way. Early on, content would be presented with significant differences depending on the browser, the platform where it was viewed and the user preferences. It was considered fine if your goal is to access scientific research (Berners-Lee's initial goal). It was not so great if you want to use it for marketing and want a look that match your corporate image.

Pushed by commercial needs to present the same content everywhere, standardization efforts were begun. With time, the Web became something different that it was meant to be. No longer a simple and easy way to access content, it was now a platform. An architecture that contained not only format convention but also ways to execute application. The browser became a fat client rather

than a thin one. No longer it was a fast and simple application but the browser became almost a virtual operating system. And with that, it also became a vulnerable platform that can introduce weaknesses into your environment. It also became an environment that consume a significant amount of resources and in turn requires more memory and faster processors.

Dedicated VS General Purpose

As it has been the case with all computer technology, the first digital products have first appeared as specialized purpose-build devices. The first word processors were dedicated machines built by forgotten name like AES that have been replaced by software like MS-Word on general computer platform. Similarly, the first non-linear video editors were expensive machines like the Quantel Harry (nearly a million dollars) that could edit up to 80 seconds of video in standard definition (not HD!) and are now replaced by software like Apple's Final Cut Pro or Adobe Premiere on general computer platforms.

It's similar with distribution networks. Purpose built television distribution infrastructure with transmitter, cables and satellites are in the process of being replaced by a general network, the Internet. While the current technologies that form the Internet are not as efficient to distribute video, especially for live content, its evolving technology will enable more bandwidth at lower price and optimization of broadcast and multicast will certainly make it (the Internet) more cost effective in the future. At that point, we will reach a tipping point where it will no longer make sense from a economical stand-point to maintain a specialized delivery infrastructure. The lobby of broadcasters is powerful and they have been able to keep

their RF spectrum basically for free while communication operators have had to auction their frequencies. At some point, the balance of power will shift. If there were to have a referendum on wether a TV station that you don't watch much (especially with a terrestrial antenna) should keep its bandwidth or if will have a speedier connection for your mobile phone, how would you vote?

Dedicated TV delivery

As I will referred to the concept of dedicated TV delivery vs general purpose network often in this book, I feel that it is important to clarify these concepts further.

The television delivery is essentially an unidirectional delivery system. It is divided in "channels" and it will transport the content of that channel from a single source to multiple receivers. As this technique uses a fixed amount of space (or bandwidth), regardless of how many people actually watches it, it is very efficient when a large number of people watch the same content at the same time.

In its original form, RF broadcast terrestrial TV, a very limited number of channels can operate within a geographical area otherwise channels will create interference with one another.

In North America, where distances are large between population center, the broadcast TV infrastructure did evolve in a way to try to cover a large area with a single transmitter. Line of sight is require between the transmitter and the receiver and to counteract the curvature of the earth and reach further, transmitting antenna are generally on top of mountain or tall towers. For example, I can receive perfectly the digital channels of WCAX-TV whose transmitter is located on Mount Mansfield in Vermont

(USA) from my home in Montreal (Québec, Canada) with a rooftop antenna. This is about 100 miles away (160 km). This, however, require significant transmission power. WCAX operating power is 443 Kw.

This is a bit different in various regions. In Europe, they typically use more transmitter with lower power to cover territories. Still, this technique require more transmitter sites and is more complex to cover a large area. However, it provide for more diversity in channel choices when it is required.

Satellite television delivery is a variation on the principle of terrestrial broadcast delivery. It also transmit a unidirectional "broadcast" signal but many satellites can share the same frequencies within a geographical area. This is made possible by the use of uni-directional parabolic antennas that reflects a lower power signal into a focal point. There is a minimum separation between the satellites so that the parabolic antenna are able to concentrate only one satellite signal on its focal point. By comparison, while a terrestrial transmitter like the one used by WCAX is operating at 443 Kw, a "high-power" direct broadcasting satellite like the Astra 4A will operate at about 8 Kw. Additionally, satellites will cover often a whole continent. Like terrestrial ones, those require line-of-sights between the satellite transmitter and the home receiver but since it is orbiting the earth at over 22 thousand miles (35 thousand km), line of sights is possible on a wide area. Also, the fact that it is space provides for few possible obstacle between transmitter and receiver.

The third main category could be called "wired" television delivery. It was originally cable TV but it is now possible to do that form of delivery on various types of

wires, from a pair of telephone "twisted pair" wire[9] to fiber-optics without forgetting the coaxial cable (historically used by cable companies). This type of dedicated delivery is also uni-directional and the signal flow from the source (the television station or network) to the viewer at home but through a wired infrastructure. This type of delivery system is more expensive and takes longer to install, but it is more flexible once it is in place. As it doesn't have to restrict its frequency usage (as it is the case for wireless), it can carry more channels and can be used for other purposes (like Internet connections). Distribution of uni-directional TV channel is simpler than Internet service has it involve a simpler distribution model but it uses available bandwidth in a non flexible way. In other term, regardless how many people is watching a channel, that channel always use the same "space".

The Internet, a general purpose network

The Internet is in fact a series of interconnected networks with various characteristic. It has not been build to transport video signals but for general data. In fact, although it was theoretically possible to transport video on the Internet when it began to be open to the public in the early 90s, the available connection speed made it unpractical.

Transporting data on the Internet is fairly unpredictable. Spikes in usage in any points between the server and the user may introduce unforeseen delays in the

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[9] The technique used to carry video on twisted pair wire is a bit different than with cable and fiber but it is not useful to go deeper into this topic here.

delivery of a data stream. This make the transport of live video a very tricky operation.

The Internet is also capable of bidirectional communication. This makes it possible for the end users to request content on demand and to be served without delays.

For the most part, video transport is done, even today, with large buffers of many seconds if not minutes. When you begin to play a video at home, the client player on your computer will try to download data faster than the playback rate and create a buffer that will let you experience the video smoothly even if there are times when the delivery is slowing down. In some cases, if the network is too busy of the resolution too high for your connection, the buffer will empty and you will have to wait to resume video watching. While this is not a big problem when watching library content on a service like Netflix, it is more of a concern if you are watching a live event.

For example, Apple do present some of their big announcement event live on the Internet. Those event draw a large audience, estimated to be over a million[10], that want to watch it live, as the announcements are made. But, as impressive as a million viewer might be, it's still far from the TV audience of an event like the Superbowl which was estimated[11] to 108 million in 2013. Even so, the quality of the video streaming at these event is not

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[10] According to http://www.scribblelive.com/press/record-breaking-one-million-viewers-simultaneously-stream-scribblelive-coverage-of-apple-event/

[11] As reported by the "Wall Street Journal" http://online.wsj.com/news/articles/SB10001424127887323380700457828430413529 0258

comparable to HD broadcast television, it is far inferior and still, the experience is not a seamless one. I was watching such an event this week and not only was there a few seconds buffer but the steam did stopped several times.

Apart from the fact that Internet was not build for video streaming, the reason that it is still hard today to do massive streaming event is the fact that every user needs his own stream.

As opposed to dedicated video delivery infrastructure, where a signal is sent over the whole chain regardless if someone is watching it, on the Internet it is sent only is someone request it by initiating a connection. Each of those connections require the some resources from the source. In a specialized delivery system, the source server has a constant, relatively light load regardless of if it watched by 1 person or 100 million. But on the Internet, each viewer require server resources. Today, it would be unthinkable for a single server to server a million stream. Not only would that use a lot of computing power, but it would also need the connection speed. Let's imagine that 1 million connection are done simultaneously at 1 megabit per second (relatively low quality), it would mean that the server need to be able to handle 1 million Megabit or 1000 Gigabits/second (1 Terabit). Given the fact that the most common Internet backbone connection today is what is called an OC-192 that operate at nearly 10 Gigabits/second, it would take 100 of those connection to achieve that level of services.

It is possible, but unpractical and very expensive. For that reason, organizers of those live events uses Content Delivery Networks of CDNs like Akamai. Those service typically will receive the signal of the live event and distribute it to various data centers spread over the world

and do the streaming to the audience members from those sites. This has the advantage of cutting the long range traffic over the Internet and spreading the load to various part of the world. However, using a CDN for a live event is very expensive and it would be prohibitive to use that today for a large event like the Superbowl.

There are solutions to that problem that would bring the Internet to a level where it could compete with dedicated delivery systems. The technology is called "multicast" and it is a technique that is available in the various pieces of equipment that transport the Internet traffic like the routers and switches. The reason that multicast is not enable on the Internet is that, if left open, it would flood the Internet with all sort of traffic and would make it less usable and prone to more cyber-attacks.

Multicast is a technique were a source will send a single signal to a specific "multicast address" and all the clients that have registered to that address would receive the signal.

Multicast along with network broadcast (a multicast that is send on all network ports) is used widely on local networks for application such as automatic network configuration and discovery (such as DHCP and Apple's "Bonjour") as well as media distribution and application like multi-point videoconference.

However, there is significant challenges to expand multicast to the Internet especially on the configuration side in order to allow efficient video delivery while preventing unwanted usage. A fairly new technique called "Software defined networking" or SDN may bring the foundation of the solution to the that problem. In fact,

Cisco[12] did announce the availability and deployment of product with that feature in September of 2013. With those type of technologies deployed through the Internet, the foundation would be there to support efficient, scalable live video.

It would also require for the ISPs to collaborate with content owners for that to happen but we can well envision that content providers and ISP can draw deals that can be mutually beneficials. This would prevent ISP's network to be saturated and would lower the cost of content delivery for the content provider.

While the technology do exist today to enable the Internet to be more efficient for real-time video delivery, it will still take quite a few years before the various ISP have acquired and deployed the technology. But with the increasing demand, it is more than likely that those conditions will be place by 2020.

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[12] Cisco press release http://newsroom.cisco.com/release/1268183/Cisco-Delivers-Network-Convergence-System-to-Power-Internet-of-Everything?utm_medium=rss

CHAPTER FIVE

Distribution is key

The reason that Hollywood dominates the movie market is not because it has all the best ideas for movies. It is not because they have the best directors in the world, It is not because they have the best actors either. It is not because they have the best stages and locations for shooting. No, a lot of other places can match Hollywood and those aspects. The one field where Hollywood have the upper hand is distribution and this is the most significant one.

Control of the distribution channel allow also control of the revenue streams and with those revenue comes the power to decide where to invest, which production to finance. Distribution is what makes Hollywood... Hollywood!

Control of the distribution in television is also the key. Historically, the first to control distribution in were TV stations and networks that were formed to connect them. Television stations in large cities were often used as the base to create a countrywide network. Before the widespread use of communication satellites, the distribution of live program to a network of television station had to use microwave towers to repeat and carry the signal over distances. Only large generalist network could afford to pay for such an infrastructure.

The advent of communication satellites did enable cheaper and simpler distribution for the networks but also the creation of specialized channel like HBO, CNN and

ESPN in the USA. Those channels could then be carried by distributors that did not have a local TV station like cable systems. Satellite were the enabling technology to create TV distributors that did not own a TV station.

From modest beginning as community antennas, cable operators were able to grow and consolidate starting in the mid-70s. They expanded their offering by adding specialty channels to the initial broadcast channel thus providing an added value for their customers. Through the 80s and 90s, adding a variety of channels proved to be good business as it allowed them to create various packages and to charge the customers more.

A lot of those specialty channels carried on cable were increasingly created or acquired by the cable operators giving them an increased revenue and more control over the offering. In fact, the money generated that way was so significant that some even acquired large TV Networks as was the case in the US with the acquisition of NBC/Universal by Comcast. In Canada almost all specialty channels are now owned by distributors such as Bell Media, Rogers, Videotron and Shaw.

The Internet has been putting considerable pressure on that established model of creating "bundles" of channels and pushing it to consumer. The consumers now have an alternative means to find content and are no longer limited to the offering of their TV distributors. By 2010, it was easy to find TV content on the Internet through legal or alternatives channels. This doesn't mean that the "bundle" model is dead yet but since it is not the only way to get access to the content, those bundle have to increasingly justify their value. Conscious of that, distributors have been putting pressure on the TV Networks to sell them their content for less money or to "un-bundled" them and sell it "a la carte".

In the summer of 2013, a struggle have taken place between CBS and Time Warner Cable (TWC) over distribution fees and although not publicly discloses, the terms that were finally agreed was seemingly more a victory for CBS than TWC. In that case, although the content owner seem to have won over the distributor we have to remember a few key things: CBS is also a distributor as it has its own transmission channels (broadcast); CBS was by far the most successful american network at that time so it had a much better bargaining power than others; Broadcast networks are still a significant reason why viewers subscribe to cable.

In fact, it's important to note the evolution of distribution in the US. While at the beginning subscribers mainly paid the cable operators for the "service" of having a better reception of the broadcast channels, the evolution of cable led to an increased number of channels (and increased fee) that was no longer related to the transport services but to the acquisition of content. So with decreasing audience and revenue from advertising, the broadcast networks began to turn to cable to get paid for their content as well since they represent a significant part of the attractiveness of cable's content offering.

The new trend where broadcasters ask for "carriage" fees to distributors further amplify the pressure on specialty channels as they now need to justify their carriage fees in relation with the broadcasters and they increasingly need to be a real reason why the consumers subscribes to the cable system. It used to be enough just to be a reason for the cable operator to increase the fees, now each channel is being weighted and scrutinized in view of how much it is justified to carry it.

Now if you are a cable channel and you loose carriage on a cable system, it becomes harder still to stay

competitive and to offer attractive content. The less carriage that you get, the less revenue from the distributors and the less chance to get an audience for any given program, meaning even less advertising revenues. It becomes a dead spiral, a vicious circle.

When a specialty channel loses coverage, it may want to compensate by increasing its distribution fees. This is hard however in this climate to get it from other distributors as they also try to reduce carriage fees. Channels can also be dropped entirely of a bundle on a cable network and be offered individually "a la carte". The problem with that is that in order to justify the distribution cost, they have to be sold at a much higher price. Often, a channel that is widely available on a bundle or "tier" of cable system may cost something between 10 and 50 cents per subscriber per month. When offered "a la carte" they may be sold for as much as $10 per month to individual subscriber. Very few channels can have such attractive content as to justify that much. Those who do are generally "premium" commercial free channels such as HBO or Showtime of specialized "ethnic" channel like Chinese, Russian or Arabic ones.

Another aspect that we need to understand is that distribution models don't evolve linearly. Once a specialty channel or network looses a critical mass of carriage, it is not able to sustain itself anymore and is sold or disappear. With time, it is most likely that quite a few channels will be unable to stay in business and this will in turn weaken the global channel lineup available to distributors. At some point, there is a "cliff" effect where this business model remains profitable only to a few and this may not be enough to justify the traditional distribution infrastructure. At that point, distribution of channels and networks by satellite following a linear model real-time model may

simply be stopped and replace entirely by Internet-based delivery.

A distributor deciding to entirely drop its television offering because of lack of demand may seem like a distant perspective as the demand in TV is still strong today. However, often the same cable operators that deliver traditional television also are Internet service provider. Already, a lot of Internet/TV bundle have customers paying more for Internet and perceiving the Internet connection as a better value. In a competitive environment, distributors may end up getting more profit from Internet delivery and may be inclined to focus their services entirely on that. Not a scenario that will happen this year but it will likely be the case at some point, maybe as early as 2020.

As distribution will shift from traditional television to the Internet, the revenue stream will shift even more towards the distributors and further from the content owners. In an Internet-driven distribution environment the distribution of video-content will be controlled by two groups: The Internet service providers and the content directories (including aggregators).

At first, the Internet access business may seem to be a competitive environment. However, in practice very few have the infrastructure to actually deliver high speed Internet to each house. In my town there is really two alternative which are the traditional cable provider (Videotron) and the historical telco company (Bell Canada). Of those, only Videotron actually offer a real high speed connection to my home. So the real choice that I do have is... none. Only a single provider is available. All others are offering basically a resale of that service. My situation may be unique but most people even in urban centers have little more than two real option and this is a

quasi-monopolistic situation. As the value of an Internet is increasing, other options will likely appear which may be driven by electric or natural gas providers but this will remain a market with few choices. Those access providers (ISP) are not in a highly competitive situation and therefore do not have to heavily invest in content. Some of them will try to differentiate their offering by trying to invest in content that may be available only to their subscribers but this is a model that will be hard to justify. ISPs are basically the movie theaters of the Internet.

On the other hand, the movie studios of the Internet are the directories and aggregators and they are and will increasingly be in the key role in relation to content distribution. Already, iTunes, Netflix, Amazon and YouTube are key destinations in Internet distribution. Each of them have considerable power and can influence how the content is distributed and can even finance some content production. Among those, Netflix have taken the most traditional approach in financing series like a traditional network would have done. YouTube has taken a different route by giving money to exclusive "channels". There will certainly be a lot of experimentations and various model that will be tried but as viewing habits gradually shift towards the Internet, this will be even more significant and those will most likely be the type of organizations that will have the most influence on content production in the next 10 years. In parallel, other less official distribution directories such as "the pirate bay" will continue to provide options and competition on the open Internet.

Another aspect that is putting pressure on traditional distribution models of television is the global nature of the Internet. Traditionally, distribution of television and movie content has been based on territories. All the production

and distribution contracts have been based on rights to present a show or a movie in a country and have been negotiated as separate rights in each country. Often, the distribution windows have been organized with a significant delay. American productions would first be presented in US and Canada and later elsewhere in the world, often as much as a year later or more in some market (especially when dubbing in different languages was done). Now with the Internet and digital technology it is quite hard to do. Generally, if a show is not available worldwide, it is made available on pirating sites or via peer-to-peer distribution in a matter of hours after its original airing. For shows like "Game of thrones" that are presented in the US on a premium channel like HBO, the worldwide audience by peer-to-peer distribution often exceed its legal viewing. That situation will certainly change the distribution models where the largest market will want to distribute its content itself directly to a worldwide audience without having to limit themselves to their national territories. This in turn will have impacts on contracts with the creative team including actors' contracts.

Distribution is key and in the process of changing the main distribution channel from the traditional purpose-built video distribution that is television to the general information exchange infrastructure that is the Internet, it does not just change the distribution conduit, it changes the control of video production with all its consequence. It's a major disruption.

CHAPTER SIX

Key trends

In this chapter, we will take a look at a few key trends that we need to consider in the way that video content will evolve in the next few years, leading to the end of television.

Connected TV

Let's step back a minute and see what is a TV set. It is basically an audio-video display with a an RF tuner to receive and watch the on-air channels. In many cases today, people don't use the RF tuner at all, relying on "set top boxes" from signal distributors like cable and satellite. Not everyone uses the built-in speakers either since they produce poor quality audio, especially since the TVs are "flat screens" What remain is essentially a TV monitor, a screen

A "connected TV" is a television set that is equipped with the required hardware and software to connect to the Internet, get connect through it and play it on the screen. It's a screen with an "Internet tuner". It could be viewed as a screen with a computer in it. In other words, a "connected TV" can be a lot of things. It could be very powerful with plenty of computer function but it could also be very basic and very limited. Since the manufacturers don't want to add a lot of cost to their TV to make it "connected" they tend to be on the very limited side and the content that can be accessed from the Internet

is generally quite limited in form. It's generally applications that are provided by the TV manufacturer or by specific partners, The other problem is that it is not very upgradable. With memory and processing limitations, it is hard to follow advances in computer technology and it will be hard to follow new steps in quality and content delivery. It's a, "Internet tuner", but often a poor one.

The problem is that we tend to keep TV sets longer that we keep computers. If you buy an 50 inch TV screen, you will not want to change it after 4 years just to get more access to "connected" content.

Some manufacturer have begun shipping "upgradable" connected TV but it is not an open platform. You could not upgrade the TV with a choice of products from different manufacturers and will be limited by what the manufacturer wants to make available, if they think it's profitable.

Connected TV reminds me of those "stereo consoles" of the 50s and 60s that included the radio tuner, amplifier, turntable and speakers. You would buy it and that was that. The market has since move past that and for the most part, people prefer to buy separate pieces that fits their needs and upgrade parts of it when they want or need to do it.

For large TV screens, people often will integrate it to their own cinema systems, with a game console or a cable box. Including the "connected" functions to a set top box, a game console or a specific devices (think an evolution of the Apple TV box) makes better sense and is much more flexible.

For small screens, people are already watching their connected content on laptops and tablets. An evolution that we could already seen happening is the integration of a device like the "Apple TV" with various computer and

tablets on your home network. That way, any content that you could see on those devices could effectively be "pushed" on the large screen.

Playing content acquired through the Internet is certainly important and if this is how people will define "connected TV", then yes, as a concept it's fine. Thinking about it as a "connected" TV set, that doesn't make much sense... unless I guess you are a consumer manufacturer and think that you can convinced people to upgrade their TV set every 3-4 years!

The paradox of the larger but cheaper market

Let me first address this part from a technology perspective.

Every year in April, I am going to the world's largest exhibition for broadcast and professional television equipment and being doing so for over 25 year. The NAB[13] Convention have been held in Las Vegas every year since 1991 and in other cities as well before that.

Each year at NAB, I make sure that I walk the entire show floor to make sure that I see if there are any hidden gems somewhere, especially among the new and small organizations. I have been doing that basically since 1987 when the NAB was held in Dallas. I certainly have the impression that there is less and less of those hidden gems. The less there is interesting things to see, the faster it is to walk around. The first years, I was barely able to do it in 4 full days. Now, with each year, I know more things and there is less things new that I haven't seen. This is

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[13] NAB is the National Association of Broadcasters

especially true since I also go to IBC[14]. Still, last year (2013), it took me less than two days to walk the entire trade show, the fastest ever.

One of the issue I think is that the small companies are no longer very innovative. A lot are selling more of the same. Lots of storage and SAN[15] based solutions. Lots of IP streaming and codec solutions providers, lots of manufacturers of small gears for camera etc. In fact, I did not really find true surprises that year.

What I saw among the bigger booths are lots of 4K. The same way that there was a lot of 3D 3-4 years ago (almost nothing now) everyone in the higher end of the market seems to jump into the 4K bandwagon. This makes sense as they try to find niches that are driving bigger orders and hopefully larger margins. But you can see that the places where there are more crowds and more excitements are those companies who make cheaper equipments. Equipments in the price range that an independent contractor could afford. This is the case notably with Blackmagic, GoPro, Adobe and Red to name a few.

An hence the paradox: There is more demand and more video production than ever before but organizations have ever diminishing budget to produce it.

This drive profound changes at the manufacturers level. On one hand, the television organizations have less expertise in house and demand complete solutions from vendors but those customers that have money to pay for high end solutions are becoming fewer. Manufacturers try to hang on the higher end of the market to get the return

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[14] International Broadcasting Convention held in September every year in Amsterdam, The Netherlands.

[15] Storage Area Networks.

on investment necessary for their operations but that high end market is shrinking.

On the other end of the market are all those independent who struggle to find cheap alternative to cater to organizations that have small budgets. They are learning on the fly, they find ways to make do with what they can and help each others in forums on the Internet. The quality of what they do is variable in function of their skills.

That leads me to the overall market. As production is done with less budget, less resources by people with various skill set, there is a huge disparity over the video content that we can watch on television and on the Internet.

On the quality front, something made me smile at Avid press conference during NAB. They shared a market study that was saying that 65% of consumers believe that quality was important. The problem is that quality is not defined. This is a highly subjective issue. In fact, people will watch something with relatively poor effective resolution, highly compressed but feel that the quality is good because it is well crafted with good sound and good camera work. On the other hand, something may be shot in high resolution with good quality equipment and presented under good conditions, yet, the camera work and the editing may have been done poorly and the viewer will feel that it is a low quality product.

We are then back with a problem. How can a talented person can independently create a very high quality product and make it available while been able to do so profitably? Without access to a good distribution mechanism and without a brand his product will be one among the millions. As of September 2013, 100 hours of video are uploaded to YouTube every minute. 100 hours

every minute[16]! A good and original production is simply a drop of water in the ocean. True, most of it are cats video and copies of existing content but how can one makes his mark in this environment and make a living out of it? Without a strong brand it's almost impossible and that only amplifies the paradox.

There is most certainly a large demand for video content. People are connecting better with video than with printed or audio-only content and with today's production tools it is certainly possible for individuals to produce video content. However, this create an even greater pressure on organizations that wants to offer video content to their customers. No longer is it possible to create low value content since it will simply appear as the work of an individual. Large organizations will increasingly try to do commercial content with higher production value but will want to do so economically. With the number of young people that are growing with the video production tools, the draw to make a little money from those organization will be high so the money they will get will likely remain low as well.

In a nutshell, we will see even more video production from individuals and from organization but most of that content will be produce at lost or with a very small profit.

3D, 4K, UHD

These are were the electronic industry wants to bring television in the future. Will the consumer follow?

Let's see what those are first:

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[16] According to youtube webstite: http://www.youtube.com/yt/press/statistics.html

• 3D is for now essentially "stereoscopic 3D" or the 3D that you perceive when using the combined vision that comes from both of your eyes and where a perception of depth is created in your brain based on it. This is not the only way that an individual perceives 3D as there is also what is called "monocular depth cues". Those includes shadows, angles, movement, a series of elements that can be captured by a single eye but still is processed in the brain and perceived as depth. In reality, everyone uses both ways together except those that have limited stereoscopic perception due to lower visual acuity from one eye or other problems. In those cases, they can't perceived depth (or perceive less) in Stereoscopic 3D TV since depth is created essentially with the presentation of two images.

• 4K: Refers to an horizontal resolution of around 4 000 pixels. It could be a bit more in Digital Cinema (depending of "aspect ratio") and is defined as 3840 pixels × 2160 lines in television (with a 16:9 aspect ratio).

• UHD: Stands for Ultra High-Definition and is meant to signify higher than HD resolution which include currently 4K and 8K (8K being twice the horizontal resolution of 4K, four times it's pixel count and 16 times that of HD).

So, with that in mind, you bought a "full HD" 1080p television set three or four years ago maybe. Can the consumer electronics industry make a strong enough case for you to change it (before it breaks) for a newer one and with which argument?

3D was the first shot a this. What is interesting about 3DTV is that is brings a different experience to you. It is not so much a better quality of the picture that 3D brings you, it's a more immersive experience. 3D was not new in the entertainment world, various technology versions have

been tried since the 50s but it was not until digital technology and polarized glasses in the early 21st century that the quality was high enough and the experience good enough to become a mainstream experience in theatre.

Historically, the theater business have always tried to be ahead of television, to give customers a reason to go out and spend extra money rather than watch programs at home. As soon as television started to present programs in the same format that theater were using 4:3, the movie business tried to push for larger picture, and so on. Every time that TV catches up, theater moves further a bit.

So theater were now making extra money with 3D and the consumer electronics industry, fresh out of the conversion from analog to digital along with SD to HD and CRT to flat screens, did see an easy way to sell yet another technology upgrade.

However, if you go to theater, you are looking for an immersive experience. And while some people will want to see a movie in 3D, not everyone is going to. Yet, those who wants are willing to pay an extra say, 30% to have a more immersive experience. That doesn't necessarily translate at home. When you are watching television, you are not looking for an immersive experience all the time. Yes, there are some shows that are so good, that you would want to be immersed in it as much as possible. You drop your "second screen" pump up the volume and focus on the show. But what is the percentage of your time watching TV where you do that? Further, how much 3D content is available right now that you would consider watching in "immersed" mode? My guess is, not many. And those would not form a lot of hours. Now, for that small number of hours, would you change your "full HD" television to get a new one?

Some early adopters did, but not a lot. People that are late to upgrade their televisions and are just now changing an old CRT for a flat screen will sometime buy a 3D screen if the 3D basically comes for free. Maybe some would pay a 30% premium for a better TV with 3D, but I don't think they would pay much more. So people didn't just jump on the 3DTV bandwagon, they just bought some as part of their normal TV set replacement cycle (when a TV breaks or begin to show serious signs of deteriorations).

A large part of the TV professional and consumer electronics manufacturers have now given up on 3D seeing the lack of demand as a sign of low interest from the consumers. A smaller part thinks that the problem were the glasses that you have to wear and that people will flock back to 3D once "glassless" 3D is available.

I think there as been overall a complete lack of understanding of stereo 3D and of realism in terms of expectations.

First, stereo 3D is not an easy media to master. By its nature, it is basically an effect that plays on the way that the perception of 3D is organized in the brain of the majority of the population. However, if one do not have stereoscopic perception, no matter what you'll use, you are not going to see stereo 3D[17] period. Not in theater, not at home. Also, if your vision have declined and/or your wear glasses and your eyes does not have an acuity that are

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[17] There are other ways to present a 3D picture. Holography is a technique that is not based on stereoscopic vision but create the image in space. For holographic images, you don't need to have stereoscopic vision to see it, if you have good monocular depth perception, you will see it. Holographic images have been used for year but only prototype of holographic TV have been demonstrated. It is impressive but it is early and it will require a totally different production workflow.

close to each others, you will not see it correctly. You have to wear the 3D glasses over your prescription glasses to see the depth correctly and many people still don't know that.

From a production standpoint, it's also not easy. In order to create a good 3D experience, you have to carefully plan and execute each shot. As an example, let's say that in reality you are looking at a close object. your eyes will converge for you to see it correctly. But your eyes will also focus on that object and the background will be blurred. That's the depth of field. In a 3D production, there are a number of ways to shoot that scene. You may also make the two camera (that simulate two eyes) converge in the same way on that object. However, you can control also the depth of field with a camera. If you are not careful and put too much depth of field, the background will appear on screen clearer than would have with your own eyes. And since the camera are converged, the background will show signs of divergence. There is no guarantees that viewers will look exactly were the director wants it to look. They may look at the background and experience a distorted image.

That was just one simple example and there are a number of similar cases. With inexperience and different "creative" beliefs, the quality of 3D products in the marketplace are highly variable. There are already relatively few 3D content and the majority is not that good to begin with, leaving a very small number of hours of 3D that really worth watching.

To make things worse (did you think that was it?), the size of the screen, the distance from the screen and the room lighting changes the quality of the stereo 3D experience. A big action movie is great in Stereo 3D in theater (even better on a large IMAX screen). This is because the size of the screen and the distance from the

screen is logical in relation with the size of the content. If something comes "out" of the screen, it feels normal. If you take that same movie, with the same settings and show it in your living room on a 50 inch screen and you are sitting 6 feet from the TV, then what made sense in the theater no longer makes sense. The immersion is not as good.

Would there be content that could have been really good to see in your living room. Yes, but that content has not been created and the customers never had the chance to experienced it. In my last project, we did some test conversion of TV dramas (a few minutes of "Damages" for instance) and the experience was quite good. This made total sense and the immersion was good. Granted, not everyone would want to watch such a show in "immersive" mode, but some will. Think about other shows you love and think about whether you would like to watch it at home in an immersive mode. What about "Game of thrones"? Or "Breaking Bad"?

There is a technology in development to present 3D on a TV screen without glasses. This is called "auto-stereoscopic" TV or "lenticular" display. In that technology, a layer is put over the screen and it direct the light with a tiny lens in a specific angle range only. Each pixel can be sent in a narrow angle. With that, you can create multiple different views. In order to create a good experience in a living room so that the viewers can be in mostly any position, you need to create multiple viewing angles (as many as 19 or 21). The problem is that for each angle that you create, you have to divide the screen resolution. To do so with a device that is used by a single user, like a tablet, you only really need two views (one for each eye) as the viewer can position his tablet for optimal viewing. Dividing the resolution by 2 still gives you a pretty good picture. Dividing it by 19 then the resolution is

pretty low, any letters or graphics become unreadable. This is why people who believe in "glassless" 3D, also are big believer in Ultra-HD since the higher the screen resolution is to start with, the higher the quality of the resulting picture will be once divided.

I saw some 4K auto-stereoscopic displays and while it is more acceptable than with an HD screen, I felt that the image quality was still low. The problem is that 3D needs to be immersive to worth it and a low picture quality is not very immersive. Even if the display technology evolves way past 4K to 8K and new technique are created to optimize the auto-stereoscopic display (a sensor that detect the number of people and locations in the room and optimize the number of angles and each angles), still people will want to watch 3D (and pay a premium for it) only if there is compelling content to watch!

So 3DTV was not the magic wand that enabled the consumer electronic industry to sell millions of new sets to people who just upgraded to HD. Maybe they just did not care about 3D enough to upgrade their TV.

But hey, what about more resolution?

Yes, more resolution! That's the new magic wand! With that, people will come in flock to buy millions of new, more expensive TV for sure! After all, they did it from SD to HD isn't it?

This represent yet another step in the wishful thinking of merchants. First, observing the market and the people around me, I don't see that many people so frustrated with the "poor" quality of "Full HD" that they are begging me to find better. Further, I believe that a lot of people that did upgrade from SD to HD were not even frustrated with the resolution of SD. They often changed their old CRT for a "flat-screen" not really concerned about the resolution but more about how practical flat screen were. Further, they

did so mostly because they had another reason to do so; Their old TV broke or was experiencing issues etc.

Another sign that they did not care that much about resolution is the fact that many people still did watch SD content on those HD screens years after they bought it and without thinking that this was a problem.

Even the channels that are presented today in "HD" are very far from the full quality possible with a 1080 picture. All the signals that we receive today from broadcast, cable or satellite are highly compressed. As part of that compression, the first thing the algorithms are doing to the picture it to cut the high frequencies and as a result, you loose the fine details in a picture. I was looking at a Blu-ray DVD[18] in 1080p of the movie "The Road Warrior" and I was amazed on the amount of details that we can see in the sand and the grass. You never see that much details on a TV channel as the compression is crushing it completely.

All that to say, I really don't see the bulk of the consumer market making and early upgrade to 4K. It may happen but with two conditions:

1- The upgrade cycle for Full HD has been reached and most customers needs to replace their flat screens.

2- The price difference between a TV screen of the same size in Full HD and in 4K is less than 30%.

That means, I need to buy a new TV and I can have a better screen for a small incremental amount of money.

Now what about Ultra-HD beyond 4K like 8K? Well, same rule, once the 8K screen will be priced with a 30% delta from a 4K one of the same size, it will begin to move

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[18] Blu-Ray HD DVD are also using compression but less than TV networks and distributors.

in large numbers but in no case, resolution will accelerate significantly an upgrade cycle.

I want to note here that I am talking about the consumer market. On the production side, there are numerous advantages in producing content at the highest solution that you can afford.

Live

Live video is still something that the traditional television networks are better at doing than the Internet.

On demand content is the domain of the Internet. If someone wants to see something specific, there's no better way today than making use of the Internet. Of course, the experience is not yet seamless to view high quality content on your big screen TV, but it's coming quickly. The iPad, introduced by Apple in 2010 is the perfect device for personal media consumption. You can use it around the house or around the world. It has a screen big enough for quality viewing of shows. For all on demand video content, this is a great device and it is tipping the scale even further towards the Internet as the mainstream delivery conduit.

Streaming live high quality video content on the Internet is still a challenge and it is very expensive to do so. There are ways to make the Internet better and more efficient for live content but it is still a few years away. Traditional, synchronous delivery of TV on purposed-built networks (broadcast, cable, satellite…) is very efficient and cost-effective for delivering high quality video content to a large audience.

The advantages of live TV is that you don't know what might happen next. People will tune-in just in case something does happen and to witness it in the very

moment. Sports is a good example: It's fun to watch the Superbowl when you don't know who will win, how the game will unfold… not so much when it is recorded. This also applies to shows where there is audience live interactions, call-ins etc.

Live doesn't represent a panacea and as mentioned, the Internet will get there but it is a way to prolong the effective life of traditional TV. It is also a way to deliver a premium experience on the Internet as well. As the technology evolve and it becomes easier to stream live on the Internet, there are options to get users to pay to access a live event while protecting it from piracy on the short term. For sure, pirated versions will show off in the hours to follow but if the event was a live one, the content available later will have lost a significant part of its value.

Mobile

One factor that we need to consider in the future of television is the "Mobile Internet". Like the Internet is often taken as synonymous with the "Web", the Mobile Internet started as a effort to extend the Web to mobile.

Some mobile devices (smartphones) did try to offer a simpler Web or to build on the Web foundations outright. This proved to be not a very good experience for users and came with serious limitations due to screen size, processing power, memory and power usage.

It's really Apple and its iPhone that changed the equation. They built a mobile device that was using a scale-down version of Mac OS X (which was an evolution of NeXTSTEP) at its core. They called it iOS but they could benefit from a stable modern core with over 20 years of development at the time of launch. All that maturity have the effect of basically letting Apple bring more functions to

the iOS as the power of processors and available memory increased.

It also benefited them in having proven, mature development tools to create native apps. That rich environment did enable developers to build sophisticated applications very quickly. While doing so, they could also benefit from strong guidelines from Apple that kept the iPhone environment more homogeneous, without preventing innovation.

The advantages of using custom-built applications over Web-based are numerous. For one, applications can run faster with the same processing power available and by using less energy to access network resources when required. The context that each application keep and the launch speed enables the user to move efficiently between applications without having to go back to where they were before or keeping a series of Web context (tabs or windows) opened. Applications are also totally optimized for the screen size and for the "touch" interface of the devices.

In fact, that model is so efficient over the Web that it makes sense that our access to the Internet even with our desktop computer would be modeled around that same idea in the future. Already, with tablets like the iPad, we can see that a merge back to the desktop is not that far away.

For TV, the impact is significant. First, the broadcasters have mainly wrote-off mobile television from North America by adopting a transmission standard that is very

deficient from a mobile perspective[19]. Second, with the portable devices, it's easy to connect from a data perspective to any media source around the world, regardless of your location. This effectively makes local station compete with anyone globally. Some might be able to offer unique local content that can be appealing for part of the audience but as far as national or international content, it will be very hard for them to compete.

It is also interesting to note that some mobile service providers are already working on providing infrastructure that could enable efficient live content delivery. Adapting technique such as multicast and broadcast technique to high speed mobile infrastructure are interesting steps in that direction and Australian's carrier Telstra did some real world testing of that[20] in late 2013. At this stage, they are talking mainly about broadcast were a high demand live content would be sent to all user but a smarter version may enable that broadcast to selectively occur within selected cells as the user demand happens.

The myth of the "second screen"

Thrust marketers to create buzzword and try to make money out of everything. I have been using my portable

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[19] ATSC-M/H is the effort to add mobile capabilities to the North American digital broadcasting standards. However, it is a supplemental service that can't be received by existing receivers. Instead of being one broadcast signal for all, it's a mobile one inside a signal targeted for fixed receivers, taking additional bandwidth in the process.

[20] As reported on Gizmodo Australian's site http://www.gizmodo.com.au/2013/10/telstra-finally-trialling-lte-broadcast-tech-in-the-wild-to-lower-network-congestion/

with wifi to access the Internet while watching TV since 1999, years before they coined the term "second screen".

The logic behind the second screen hype is that you will watch a show on television on your "big screen" and you'll use a second screen (a laptop, tablet, phone) to interact with that in some way. The second screen concept is that it would bring extra interactivity or content that is synchronized with the show.

This is a very TV centric view of the world. It is as if TV is still the centerpiece of our lives and everything that I will do or think revolves around it. While this view is convenient for those that can gain from it, especially the broadcasters and the providers of "second screen" technology including "social media", it is far from what I have done myself or watched people do.

For instance, as I am typing this, I am sitting in my living room using my laptop in front of the TV. My main focus is not the news that are currently on TV but the book I am writing. I am listening to the news in background, just in case something there would peak my attention. If it does, I will stop my writing for a while and put my focus on TV. If the subject really intrigues me, I will switch to my browser and search more details on the subject, probably looking at the site of "La Presse", a Montreal newspaper if it's local or the New York Times if its in the US and so on. Would I connect to the station site or search for a second screen app? Certainly not. My mind is taking me in directions that are not necessarily the ones that the second screen apps wants me to go.

My behavior can be slightly different when I watch a fiction. The show may peak my interest about an actor and I would look for more informations on IMDB. A word may intrigue me and I may look up the definition. A city name

may intrigue me and I may look at the location on Google map and what's around etc.

I have tried to do the behaviors that are expected of me by the second screen tenors some times, just to see. I have watched political debates on TV while looking at the reactions on Twitter. I found the experience very annoying. Not only is it very hard to follow the debate seriously, but most "tweet" are a wave of people repeating some phrases from their pet candidate and just reacting positively or negatively to those comments, mostly with very similar and expected reactions. Once in a while, one person would do a clever reaction and then hundreds would "re-tweet" it. A truly annoying and useless experience.

That is why I am considering second screen as a myth. The people are not using those devices the same way or the way that people wants them to use it. Restricted interaction is not very appealing or useful. It reminds me of the "Interactive Television" experience done by Videotron in the early 90s that were offering four interaction choicest the viewer.

Privacy

The nice thing with digital technology is that you can make perfect copies easily. You can copy a copy of a copy and it is no different than the original.

The bad thing with digital technology is that you can make perfect copies easily. A user or a content owner may decide to remove its information from the Internet but anyone who had access to it in the past may have made a perfect copy of it without any knowledge from the originator.

We may feel secure by having our information protected by clever encrypting algorithms but with equally

clever engineer and exponentially rising processing power, the question is not if that encrypted information could be accessed but when.

From an end-user stand point, knowing that not only what you share on the Internet can essentially be public but also everything that you do, may become a deterrent to use the Internet eventually. Knowing that every click you make, every image that you see, everything that you hear can be tracked and analyzed, it may be worse than being watched by a camera all the time or your conversation listened too. The whole information about the information that you access is called metadata and it is precisely what was a key revelation from the US government in the summer of 2013 following information leaked by Edward Snowden. The problem is that while someone has to listen to a conversation or watch a video of you, computers can easily search, do correlations and find patterns through that metadata. Not only about a person but more importantly through its contacts, accesses and network. At some point, a user will either be happy with the fact that he has no privacy at all or stop using the Internet.

From a content owner perspective, sharing anything may mean giving it up to uncontrolled free access forever. While technology may help delay that access, it can not be assumed that it will protect the content for a long period of time.

One possible way to distribute video content on the Internet is to want it to circulate freely. If you basically forget about revenue from distribution and only get it from product placement for instance, than all is good, the more it circulate the better.

One advantage that the Internet has over a dedicated delivery channel (like TV transmitter and cable) is that it's totally upgradable. While it is hard to upgrade all existing

TV receiver and set-top box out there, it is fairly easy to change the software player to support a more advanced encryption scream. Further, with advanced in computing power, you can envision high value content to be distributed with individualized stream for each user. The content would be with its own encryption key and a watermark identifying it within the picture itself. As a result, the file itself could not be shared and if the video would be re-scanned, then it would be possible to find through electronic means who did re-share it.

As time allow for encryption to be broken, this technique would be efficient in the short term but not over a longer period so it would be optimal with content that loose value over time. Premiere events or live would be good examples. If the content owner decrease the price of accessing the content over a short period of time then the solution would be optimal. All that to say that there is way to still make money on the content distribution but models would need to be adapted for sure.

The scarcity of original content in a sea of copies

I remember reading an article in a computer magazine in the 90s were the author, a computer programming teacher, was saying that the number of programming students has grown exponentially since the 70s but that the absolute number of very good programmer has not progressed. In other word, the percentage of very good programmer is much lower today than it was before. The computer programming market is much wider but the number of very good programmer has not increased, making it harder than ever to find top talents.

The explosion of mass and social media that we have seen since the 80s and the trends of "citizen reporter" and

"user contributed content" tend to make me think the same for journalism. The number of "journalist" has exploded with the "all news" channels, the blogs, the news Web sites and the social medias but it seems that the average quality has come down. Very few journalists create truly original information and very few with a constant quality. Once in a while, we can see one "citizen reporter" presenting a truly original story but rarely it can followed with others.

While the number of media outlet of all kind have exploded, what we can observe is very few original content and an incredible number of copies. Sites of all kind repeat the information through re-writing, translation, commenting and sharing but there is very few that generate truly original content on a regular basis.

Cutting the cord

If you believe what researches are showing in 2013, the trend where people are unsubscribing from TV distribution packages is relatively small and there is nothing to worry about.

That phenomenon is referred as "cord cutting" but it does refer only to TV service, not off course to Internet. As the providers of TV distribution services and Internet access are often the same, their policy to create bundles have most certainly served the goal of limiting cord cutting.

According to various survey from Nielsen[21] and others, in 2013 as much as 95% of american houses are still

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[21] As reported by Nielsen on the Web site http://www.nielsen.com/us/en/newswire/2013/zero-tv-doesnt-mean-zero-video.html

subscribing to cable. According to those studies also, cord cutting has been growing in the past couple of year by a significant factor. Still, going from 1% to 3% or 4% may not seem like a big treat to cable and satellite TV providers. However, it is important to note that the conditions to replace TV viewing from dedicated infrastructures (cable and sat) to a general network are still not completely in place.

But to see that within two year the number of people who choose the cut the cord have more than double, despite the lack of readiness of the Internet is significant. We can only extrapolate what it would be once the Internet is completely deployed, upgraded and ready to replace it.

Still, Nielsen is talking about 5 million US homes. That's a significant number even if it's a small percentage.

This is anecdotal but my household has cut the cord three years ago. True, we are still watching TV partly from a conventional delivery mechanism, broadcast, but we don't pay for it. My younger son who lives with us, never watch television. His entire media consumption is though the Internet with Netflix and some download services. My older son and his wife don't watch TV at all. They watch downloaded content and DVDs.

Eliminating the middle men

Sports are a big driver of massive TV audiences who watches it live. The excitement of live sports is something that lose a lot of appeal when presented later. For the mass appeal, TV networks are ready to pay a lot for the right to present popular sporting events.

In fact, sports have been instrumental in expanding significantly the coverage of the fourth big US network, Fox. In 1993, Fox was able to outbid the other networks for

the rights to broadcast NFL football games and striping it from CBS. That enabled Fox to acquire more station directly and get a significant amount of affiliates.

Complete cable networks are also built on sport notably ESPN and those are still among the most successful TV networks today.

But since those sports are bringing so much interest and so much audience, why would the owners of those team want to split the profits with middle men such as TV networks? Until now, it has been about coverage. Since the large networks have been able to reach far more audiences then a network owned by a league, networks have been able to pay more money than the league would have gather itself.

However, once the Internet is able to match the characteristic of dedicated networks, leagues and teams will be able to reach the whole potential audience directly through advertising supported or subscription feeds.

Eliminating most of the distribution intermediaries would only follow a trend already well established in retail.

CHAPTER SEVEN

The road travelled

I think that in order to see where we are going, it is important to see where we have been. Just in my lifetime, video went from a low quality black and white experience, expensive to produce and available in small quantities to an omnipresent medium available to anyone in HD quality at low cost.

Television became the main source of news for Americans in 1963, the year before my birth and is now in the process of losing that to the Internet.

This chapter is probably the most personal one of this book as I look back at some of my personal experiences with television and use that to show how much things have changed.

Early me

I was born in 1964 at a time when television sets were becoming ubiquitous in houses in North America and where a few TV channels were already available. In Montreal the public network CBC (and the french counterpart Radio-Canada) were the only channels available until the early 60s but in 1964, we had both public and private services.

My family had already a strong link with radio and television since one of my uncle was a popular radio and TV host at the time. Because of that, I grew with a strong connection to the broadcast media. Print was obviously

still a big part of the media landscape but from a very young age my attraction was toward electronic media.

By age seven, I was visiting regularly my uncle at his workplace, CKBS-AM in St-Hyacinthe, a Montreal's suburb.

Most radio station at the time had at least three studio:

• The main one was used for most on-air shows. It was both a control room and a studio as the host was often doing its own technical operations. The layout was basically a mono console (radio was still mainly a mono AM operation at the time), a microphone for the host/DJ/operator, two turntables for music, cart machines for commercials and an open-reel tape machine for long form recorded programs.

• The second studio was like a small conference room and was typically used to host guests for interview shows. The control room from the on-air or the production studio would be used in tandem with this one for either live broadcast or recording.

• The third studio was similar to the main one but was used primarily for productions. This is where commercials or pre-recorded programs would be produced.

So while my uncle was in the main studio hosting a live show, I would spend hours in the production one using the professional gears to record program for fun. I would also spend countless hours in the music library of the station discovering music and using it for my pretend broadcasts.

In 1973 the CBC/Radio-Canada opened a modern, massive, state-of-the-art facility (for the time) called "La Maison de Radio-Canada" in the east side of Montreal. I was 9 at the time and the place became a regular hang-out for me for the next several years. They had free visits to

tour the facility and it was possible for the public to go to the cafeteria and restaurant for lunch or dinner. I would do the tour many times a year as we would get the chance to see different aspects of production depending on what was being shot. I would also eat there often. I almost had the impression of learning things by osmosis. Whenever I would see something that I did not know, I would research it and I became very knowledgeable about TV production and technology even if I was not even in high school yet.

TV at the time was a very heavy media. It was easy to go live on radio as long as you had access to a phone line. Quality was even decent when using a Shure M67 microphone mixer that had a wire terminal where you could hook a phone line. On TV, it was a different world. Professional cameras where big and heavy. There were some "portable" professional cameras, but it was more towards the end of the decade. Editing video was still a very big deal as it was only really beginning and the technology was in it's infancy. Professional VTRs were still the large 2 inch tape machines and did require a lot of maintenance and alignments.

One of the most interesting or maybe scary piece of technology that I saw at the time was the Ampex ACR-25 video cart machine. It was meant to play commercials in two inch tape cartridges. The monster was as big as three full size refrigerators and had a carrousel to hold cart, each containing a commercial. With two video tape player, it could play back to back commercials that could be as short as 10 seconds. That means, within 10 seconds, it could rewind and eject a tape, move the carrousel, load and cue the next cart and start it. When you take into consideration that at the time, other tape player took at least 5 second just to lock the picture! To achieve that, it used a pneumatic

tape loading system and very fast robotics. That what made in 1970!

The same that ACR-25 was made, my father gave me a Nikomat (the semi-professional Nikon camera of the time, the Nikon itself was only the "F") camera when I was 6 years-old. With this, I was very quickly drawn into the more professional aspects of photography. Depth of field, shutter speed, aperture and framing all became second nature to me. I read some photography books, learned the various film kind and sensitivity (speed, ASA, ISO) and the processing techniques. By age 11, I had my own dark room in the basement and would process my own monochrome films (bought by 100 feet rolls) and print my 8" X 10" enlargements.

Through my high-school years, I would often do audio-visual projects for class including synchronized slide show (a slide show with an open-reel audio track. One of the open-reel track would be dedicated to a tone that would advanced the slide projector and the other track with music and commentary), "super 8" film and video production (with monochrome half-inch open reel Sony VTRs). All this was state-of-the-art for audio-visual "industrial" productions in the 70s.

I was 15 years old when I got my first real summer job as radio host or Radio "Disc Jockey" in a northern New Brunswick french language radio station called CJVA 810, Radio-Acadie at the time. The Caraquet-based studio was overlooking the entrance of "Baie des Chaleurs" with a view on the fisherman's port. The station was an AM one with 10,000 watt. In AM an unrestricted antenna near the ocean can carry quite far and we would receive mail (by postman, no email at the time!) from over the ocean (Norway, Ireland etc) from people that were listening to us!

All through the summer of 1980 , I would replace various hosts during their vacation. I would typically work night shifts from 7 pm to midnight or midnight to 6 am (and my second night from 7 pm to 6 am!). On that shift, I would be alone in the station doing everything. I was doing my own technical operation. Cueing music, loading the commercial, doing the on-air commentary and answering the phone.

I also had the task of doing the news (including sports, weather and tide predictions) so I would have to look regularly the press wire that was delivered trough a slow connection paper terminal. I would separate each individual news story, classified the important ones, adapt

it for the hourly news report and then read it on air... all that while continuing to operate and host the show.

Although the station was quite modern back then, it would certainly look quaint by today's standard. It was still a completely analog environment and although the console was capable of stereo operation, we were using it in mono since the stereo broadcast on AM radio was still a few years away. The console was made by "Harris" and had big rotary potentiometers. A relay would start the turntable when the input channel would be open. This was an early form of automation since the operator had only to flip one switch on the console to both open the turntable channel and start it. Of course such a technique required you to correctly "cue" disc so that the on-air effect was seamless. To this day, each time that I see an "Harris" brand piece of equipment, I always seem to remember that audio board... and to be nasty, when I see how much Harris tend to be on the conservative side I say to myself "Harris, broadcast as it used to be!".

The turntables, also branded by Harris, was big heavy piece of equipment. The disc plates had two levels, one higher for the 12" disc and one lower in the middle for the 7" 45 rpm ones. A big lever on the front would allow for the speed selection and for the transmission to be put in "neutral" so that it is easier and quicker to cue the songs. The big needle was made for stability and ease of cueing, not for quality. When cueing a song for playback, the console's potentiometer for that input had to be put in "cue" position which would allow the turntable sound to be heard through a little "cue" speaker on the audio board but not on-air. You would then put the disc on the turntable, put it in "neutral", position the needle and then turn it manually until you hear the sound... then back down about one-sixth of a turn to allow the speed ramp-

up and then engage the transmission at the correct speed (33 or 45 rpm... well 78 rpm was also supported but I didn't play any while I was there).

The microphone was a Sennheiser MD-421 held by a spring loaded support coming right over the console so that you can operate and speak at the same time without too much trouble. Headphone were yellow (hey, it's 1980!) Sennheiser HD-400 open-air type which was an important development since you had to hear your environment easily while working alone.

Commercials were played from a three-slot cart machine. Professional carts had a similar look than 8 track consumer cartridges except that it had only two audio tracks and played much faster for better quality. Also, it had an opening at the bottom so that the machine's capstan could come in to drive the tape allowing for better quality than 8 track. The advantage of a cart is that the commercial would always be cued correctly (through a tone on an extra track) and so it was much easier for the operator.

There was also a Revox open-reel tape machine in the studio but I was only rarely using it. I think I did a few time in early morning to play capsules that were prepared by european radios. And last, the console was equipped with a phone-hybrid so that we could put calls from listeners on-air.

That summer, I can say that it was quite a good school. Being that many hours operating a broadcast radio station all by myself was a great way to learn. For instance, remember on my second night having prepared way too much news for my 4 am newscast and realizing after 10 minutes that a 30 minutes newscast at that time was probably a bit too much…

Summer 1981 I did cover the news for two Montreal community radio stations. I would go to various events and press conferences. For all the events that have covered during that time, I began to feel that the news reporter job was a bit repetitive. Sure, I had great time covering lavish events and was very well fed (something worthy for students!). I covered the formula 1 race in Montreal that year and was witness to an incredible scene by Ferrari driver's Gilles Villeneuve. I covered an historical convention by Quebec's nationalist party (Parti Québécois) where the historical leader and prime minister René Lévesque, unhappy with the convention position threaten to resign. On one side, it was exhilarating to be part of all that, on the other hand, I had the feeling that I was one among other covering it. With a slightly different angle but still one in many. Also, on a daily basis, the news reporter job is repetitive with major events happening just once in a while. Further, as a reporter for a community station, I had the advantage of being able to pick myself what I was covering, something that you don't usually do in a commercial organization. I was still convinced that the media was where I belong, but maybe not as a reporter.

At the same time, I was editing my own stories. I would cover events with a reel-to-reel Uher 4000 portable tape recorder and then edit it a the station with a Revox machine, cutting the tape with a razor blade and splicing it. Yes, that was the way to edit audio at the time and that was not that long ago.

College and cable TV

As soon as I began college in Montreal in September "81 (at College du Vieux-Montréal) I began to research the media possibilities. I was a Science major but I was

completely immerse in media by then. College radio did seemed like a step back with everything else I was already doing. I began to look at the options on the TV side. Turns out that my college had a fairly large fully equipped TV studio. The stage was fairly large and well insulated, it had a light grid and a choice of grip equipment. Aside was a full size video control-room, an audio control, a VTR room (with two 3/4 inch VTRs and time-base corrector... quite something at the time!) and a make-up room. The whole setup was barely used but I had to find the personnel and budget to use it.

Producing a TV show is one thing but presenting it to the audience is another. While most high-schools and colleges have a "cafe" where closed circuit radio can be played, it's a whole different story for TV. Fortunately, in Canada at the time cable systems were required to present and fund a community TV channel. The Montreal area was divided in two with cable operators' Videotron and CF cable. I presented my project as a "student public affair show" covering all aspects of student life from politics to culture. I secured distribution with good time slots on both systems (they needed good content so our weekly show would actually be repeated every day at various times).

I had the ambition to do a weekly show that would extend far beyond the boundaries of my college and include people from all over Montreal. We would not limit ourselves to cover only the things in Montreal (although they would form the core) but from all over Quebec and include reports from Boston, New York City and Washington. Pre-production did began in November '81 and the first show was broadcast in January '82 with weekly show through the whole year except for two months during summer. I think I would have enough stories from that time to write a separate book so I will not

dig too much it into this. I will say however, that it kept me extremely busy that year. I was hosting the show for the first half of the year including the on-set live interviews. I was reporting from the field and editing my own stories and therefore learning the technical aspects of video editing.

Production in the field at that time was not at all simple. Once, in order to cover an event in Laval, I had to borough the "field equipments" of the cable community channel. This was before the "camcorder" so it was a large "portable" Sony 3/4 inch recorder that was attached to a hand truck with a car battery at the bottom as a power source. Additionally, I needed to transport the heavy camera in a box and a large tripod. Basically, we needed to be three people to just carry the stuff. Being students and without money, we had to carry that in public transport! You needed to be motivated to do that!

Editing was also a tedious task at that time. Simple cut edit did requires to have two VCRs. Those were Sony VO-2850s with an RM-400 edit controller. What is important is that those model didn't had a "jog" feature. So in order to find your editing point you had to rewind and play (possibly play in slow mode at 1/20 the speed) but if you missed that point by even one frame, you had to stop, rewind and try again. Again. when you found your edit point after a number of trials, you would push the controller button to do an auto edit. If both machines did not lined-up at the edit point after the 5 seconds "pre-roll" the machines would abort and retry. Very long and tedious process. I spent hours in that room that year to edit my pieces that way! Oh, and I learned all there is to know about the first generation "time-base corrector" that we had... opening it and calibrating it regularly.

TV Post-Production

My first regular full-time job was for an Astral Media (now part of Bell Media) subsidiary called "Astral Bellevue-Pathé". It was first and foremost the largest film lab in Canada. A lot of the work was printing and processing distribution copies for the "Majors" in Hollywood. They were also processing negatives, printing dailies, providing film editing facilities, negative cutting, dubbing, post-synchronization and sound services.

Conscious of the growing significance of video production, they wanted to add video post-production capabilities to their offering and I was hired as "Technical Director" to help them set it up. I can tell you that it was quite a step for me to have such a responsibility for my first "real" job and that while I was only 20 years old!

At the time, high-end TV content and movie were shot in film and the processing of the negative would be done nightly with a positive copy printed (called "dailies") for projection and editing. That work copy would not be color-corrected (or "timed"). Editors would work on film editing table. Popular models were Moviola, K-E-M and Steenbeck and the later was the one used at my workplace. Film were shot in "double-systems" which means that the sound was captured independently from the picture, typically on the set with a "Nagra" on quarter-inch open reel with a timing track. A "slate" would be used at the top of each shot to act as an audio-video synchronization point. At the lab, the quarter-inch tape recording would be transferred using a "mag dubber" to a magnetic 35mm film so that it can be used on the Steenbeck flat-bed film editor in sync with the picture.

"Dubbers" were large rack-size machines with two big spools to hold the magnetic film. That film would record at

the same speed as optical film and therefore a typical reel (double-size) would be only about 20 minutes in length.

In a workflow, once the editor (along with the director and the rest of the team) is done with its editing, it would be "conformed" with the negative by specialists. At the lab, that task was outsourced to a specialized team in a separate company called "Negbec" since a mistake on the negative cutting could lead to very expensive lawsuit and that was a way to minimize the loses. To "conform" the negative to the edited work-copy, the team would read the "edge-numbers" (a unique number printed on the negative that was reproduced on the prints) and find the corresponding original frames.

Since the typical film workflow was expensive, the organization was trying to find ways to use video as part of the process. The "work-copy" alone on a typical motion-picture would cost at least $200,000 (in 1985 dollars!).

So, the first project I had to solve was a TV mini-series co-produced by Astral that was going to be shot on film in what was known at the time as "Yugoslavia" and called "Race for the bomb". The goal was to shoot in film in Yugoslavia, send the negatives daily by plane to the lab in Montreal. Process the negative without a work-copy. Transfer the negative directly to video and do the editing process all in video until the end. Then, two version would be done. One for North american TV distribution finished entirely in video. One going back to cutting the negative based on the video edit for european release.

Some more expensive systems were developed in the following years including a technology led by Kodak called "keykode" introduced in 1990, but in 1985, there was nothing and no-one had done it yet (the editing in video going back to negative part).

So, I worked on the problem and came up with a workable solution that was simple but required some manual steps to work.

First, let me put one thing in perspective, professional video equipment at the time was mostly analog and did cost a lot of money. The standard broadcast VTRs (Video tape recorders) were 1 inch open-reel machines that did cost between $80,000 to $120,000 (US dollars of the time, 1985!). So, building an "off-line" editing suite with lower quality 3/4 inch cassette players and the editing system was at least a $100,000 project while an "on-line" editing suite was a few millions! For this reason, and since it was the studio's first video project we had a limited budget for the time.

There was already some base setup that we had inherited from Astral's acquisition of "Premier Choix-TVEC" and "First Choice".

From that deal, we had a small off-line[22] edit suite with three Sony U-Matic 3/4 inch cassette and a "Convergence" editor. Also, we had a number of large 1 inch Hitachi "HR-310".

The first piece of equipment we had to acquire was an high-end telecine machine to transfer the original negative into video. A negative original is an asset that must be

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[22] Before the arrival of disk-based high quality editing systems, the video editing process was divided into two large categories. "Off-line" was done with lower quality video cassettes with less expensive equipment. This is where most of the editing time was spent, doing all the creative decision. The product of the "off-line" process was an "Edit Decision List" (EDL). That list would then be used to "conformed" an higher quality finished product in an "on-line" editing suite with high end tape machines and expensive video processing equipment, adding digital video effects and titles in the process.

treated with the upmost care as if it is damaged, the shooting would have to be re-done with all the cost involved in term of crew, locations and equipment. The environment where the negative is manipulated needs to be dust-free (often with positive pressure rooms) with humidity and temperature control. A negative cannot be handle by a regular movie projector as it will damage it and so are older-style telecine that used a projector as part of their mechanism. The state-of-the-art telecine at the time were manufactured by "Rank-Cintel" and were sold for $750,000 to a million dollar. A very expensive and complex piece of machinery. Our initial budget did not allow for that so we had to settle on a used one for around $250,000. That machine however, needed to be upgraded and carefully brought back to specs for us to be able to work with it. The model was what was called a "Rank Cintel Mark III". It had been upgraded before we bough it to a "Digiscan" model and we added an "Amigo" control computer to it. To align it and bring it up to specs we had to bring a technician from the "Cintel" factory in the UK. He did spend three weeks full time to do that job. That was quite a complex piece of machinery combining optics, pneumatic, analog and digital processing and mechanics. The imaging technique was called a "flying spot scanner" where a very high-end specialized CRT was used as a light source. That CRT had to be replaced regularly to keep the quality of the transfer. The film would be driven through the scanner by a capstan mechanism similar to a tape machine rather than being driven from the "sprocket". That technique ensure that the scanning was done very smoothly at constant speed rather than the quick "start and stop" on each frame done by projectors.

I need to stop here to tell a story from the Rank Cintel technician. He was flying all over the world to preform

maintenance and installation on those "Mark III" telecines. They needed to be carefully maintained in order to stay up to specs which meant a visit from the technician about once every six months. He told us that in Saudi Arabia, rather than having him do the maintenance every six months, they would buy a new one and replace the telecine! That's nearly a million dollar every six month! Well, the story blew my mind at the time... and remember a million dollar was a LOT of money in 1985.

Back to the main story...

Our "Rank" as we used to called it was now operational and began commercial services. We trained a few operators on it but the main one was the star "timer" of the lab, A "timer" is the artist/technician that balance the color on a movie. Color "grading" is very important in film as it will not only create the look and ambiance of the film but also correct the shots so that they "match" together. Sometimes scenes that will be cut together, two actors responding to each others, are shot at different time of the day on location so the color temperature changes. Part of the job of the "timer" is to make the corrections so that it matches.

Directors would often ask for a particular "color timer" as they would know that this particular individual was able to create the look that they wanted. Our "star" timer at the lab was called Tom and what was interesting is that he once told me that he had a defective color perception in the green area of the color spectrum. That's right, a star sough after color grader had a less than perfect color perception I think this speaks volume on how that aspect is subjective and artistic.

Anyway, we now had a good color grading suite with a good Ikegami broadcast reference monitor, the Rank Cintel telecine, a sound follower (or dubber) for the dual system

audio recording, a 1" Hitachi broadcast VTR for the high quality video transfers and a Sony BVU-800 3/4 inch VCR for the work copy.

We did add a custom-modified piece of equipment. That was a time-code generator that was link with a shaft encoder on the Rank Cintel telecine. The time-code generator would generate a 24 frame per second frame count synchronized with the film reel. Also, we would encode the negative film reel number in the "user bits" of the time code. The film time code would be recorder along with the video time-code in "burn-in" format (visible on the screen) on the work copy recorder on the 3/4 inch tape. That way, we could track back any edited frame to both the one inch master and to the negative.

This solution was simple and would allow the editor to do multiple generations and reach a final version with standard equipment. The solution had one draw back in that at the end, a production assistant would have to sit down and write the film time code for each shot manually so that the negative edit-list could be created.

Once that part of the workflow was up and running, we turned our attention to building an on-line editing room. We had to use the Hitachi HR-310 one inch VTRs that we had on hand and that, presented a specific challenge. At the time, the serial control interface based on the Sony protocol was not yet widely used and each family of VTRs had their proprietary parallel control. Further, those Hitachi had 3 hour reels and were use more for broadcast playout than for editing and very few of the time's edit controllers could support it. One manufacturer did support smaller Hitachi VTRs and was open to do the R&D necessary to support that model. The company was Paltex based in the UK and their flagship edit controller the "Esprit Plus" had quite a number of advanced features

for the time. We just finished our edit room in time for the on-line finishing of "Race for the bomb" but we did not have a local editor that would know that edit controller. So we flew-in an editor from the UK that did the on-line editing for the project while training the local staff.

The editor told us a funny story one time during the project. He pointed to a button that was totally inactive and said: "This is the producer's button. You always need a producer's button. This is the only button in an edit room that the producer is allowed to touch. Whenever he feels like it, the producer than touch this button while looking at the screen and say: Humm... it looks better!"

To put things in perspective, that project was done in 1985 for an approximate budget of $3 millions. That included, 1 off-line editing room, 1 on-line editing room and 1 film-transfer room. This was a good but small post facility. $3 millions in 1985 would have been equivalent to roughly $5.4 millions in 2005. However, I did build a complete TV network in 2005 for about $2.5 millions. That included: a complete master-control with all the on-air gears, monitoring, playout and graphics; 3 complete finishing room (equivalent to on-air); Complete studio facilities with a stage, video and audio control rooms; An audio Pro-tool finishing suite with an audio booth and about 30 video creative stations. All this in digital HDTV while the 1985 project was analog standard definition. That is a good indication of how much the technology evolution have changed the TV market.

Today

Today, it is almost possible to do the complete post-production process on a portable computer. Independent professionals can acquire a DSLR camera with a few good

lens and shoot very good content. They can transfer the HD quality material to a computer disk-drive from the solid-state memory of the camera. They can create titles, graphics, do color-correction, create advanced special effects and mix sound, all within the computer. The only real limiting factor is the expertise. All this for a few thousand dollars. This is how far we have gone and this is why video is now such am ubiquitous medium.

The reason I tool you on this quick journey of my early media experiences is to try to communicate how far we have progressed technologically in just a few decades. Not only that, but the progresses have accelerated. We can't just sit down and think that television organizations can stand still and keep making good money.

People that work in technology can't expect that changes will take a long time and they don't need to learn new tricks. Working in technology means to constantly learn new things. It means challenging ourselves and the way we do things.

Creating content is not done in a vacuum. There is not such a thing as unlimited time and unlimited budget. One way or another, we are confronted with constrains. The media environment, the competition, the budget and the technology are all variable that we have to take into account when creating content. Evolution of the video and audio technology have allowed us to gain more creative freedom, it has democratized the tools and enabled millions to become content creators but it also created and environment when it is harder to standout. Instead of being one in a few hundreds, or one in a few thousands, we are one in millions, if not billions.

CHAPTER EIGHT

The tipping point

The end of television will not be the result of a single factor. It is the addition of many.

The enabling factor is the technologies that will allow the Internet to match the characteristics of dedicated distribution networks. Today, the television is distributed on purpose-built delivery mechanism. The Internet is not build for TV, it is a general-purposes network. However, its speeds and characteristics makes it good enough in most cases for live-streams and video downloads. It is is still somewhat expensive to use for events with a massive audience watching live, but the infrastructure should be evolved enough to do so more economically than the dedicated networks by 2020.

Once it is possible to match and surpass traditional TV delivery with the Internet, the next step is a business model.

The most expensive TV shows today are financed by the large US networks. Only through their massive audience and advertising revenues can they pay for the high cost of major dramas. A typical primetime drama in the US will have a budget of 2 to 3 million dollars per episode with about 22 episode per year.

The next step are the premium cable drama which are about 30% cheaper per episode. However, they can't justify as many episode per year for a show and seasons are typically between 10 and 13 episode per year.

On both cases, it's a lot of money. US networks will not typically pay it all. It will have the rights for the first year broadcast in the US and the producers will sell the rights for other countries separately.

For an Internet-based only distribution, we need to build a revenue stream if we want to keep the same production model. Advertising revenue on the Internet are certainly not comparable to those on network television (a primetime commercial on a big US network is over $100k for 30 seconds). However, if a network would buy the complete worldwide rights to content instead of just the US, it could increase significantly the total audience and try to justify the costs with a commercial-based model or a subscriber's based model similar to Netflix.

Let's try a concrete example. Let's imagine what would happen if CBS would want to transition to the Internet. First, it would need to get the rights of the content in relation to that use. CBS own a production studio called CBS Television Studios that owns library content and some of CBS current hits including NCIS. We can imagine that it would not be too hard to secure those rights.

The second step would be to make that available on the Internet through a distribution mechanism. Again, not very hard as it is already doing so in the US, both with a website and an application. At this time, their content is restricted to the US market but with the rights, they could easily expand it worldwide. They could increased the technical quality of that content so that it matches or surpasses the quality of their TV distribution. Not completely practical in 2013 but in a few years this will not be a challenge.

Then there is the business model. They could use any number of formulas and those can be mixed. They can offer the content in premium format at the first pass. That

could mean, if you want to watch NCIS at 8:00 pm on Tuesday when it becomes available, you have to stream it at the same time as others and watch with the commercials. You can pay a "premium pass" to watch it without commercials or a day early for example. After that first "broadcast" window, there may be a cheaper window for downloads or for watching it with less commercials. In other terms, the sooner you want to watch, the more expensive it is, the longer you wait the cheaper.

They could also have a subscription service that would include their current new shows, their library content and the one from their premium cable "Showtime", all offered in a "CBS direct" service competing with Netflix.

So, direct distribution business models, content rights, technology, every pieces would be in place to have a video content service on the Internet, cheaper to own and operate than the dedicated transmission infrastructure. I don't know about you, but it feels very scary for TV!

I want to insist on the fact that the conditions are still not there to make that sort of transition in 2013. The different component of that equation are moving towards that transition but it is not there. Network television still generate the most revenue and is a great promotional avenue. Niche market will reach the "tipping point" faster than the generalist but it will gradually happen so it is important to have a strategy that match the model of the organization to be ready when that happen.

It is also important to be able to sense and analyze the trends correctly and to be able to have a good grasp of when will this happen for the various parts of the content industry.

Moving too quickly to an all Internet distribution may prove to be an unwise move as an organization may cut

itself of valuable revenues generated from traditional TV and not enough from the online world.

Moving too slowly may left you with a dying model without the rights to the content that you would need to succeed online. Acquiring rights for content over new distribution channels may take years of negotiations so for those organizations, the time to plan is now!

CHAPTER NINE

Shelf space

In traditional retail, shelf space is a crucial variable. If your product is not visible on the shelves of markets, it will not sell. Too much shelf space will not however increase sales significantly past a certain point.

Also, a bad product will not typically sell for a long time even if it has very good shelf space allocation. Worst, it may reduce the sales of the store since it will restrict the space of good products that would have sold significantly.

In the TV world, the broadcast networks can be associated to the equivalent of big chains like Walmart and Target in the retail industry. Not every product can be sold at Walmart and have good shelf space.

Similarly, the large US broadcast networks have limited shelf space. Best shelf space are the primetime hours, between 8:00 and 11:00 pm from Sunday to Thursday. Shows that are programmed during those time periods have the best chances to gather audiences and therefore command more advertising dollars. A show that doesn't deliver enough advertising dollars will likely be cancelled and be replaced by another that can have better chances.

Main difference between broadcast and cable networks is that the formers do finance their shows mainly from advertising while the laters derives it mainly or totally from subscribers revenues.

In some ways, success drive success. When you have a good shelf space in a good store, you are likely to do more sales. Similarly, a good time slot on a network with a lot of

successful shows maximizes the chances of success of a new show. On the flip side, if the show with all its good shelf space does not deliver the expected ratings, it will be move to a less desirable space or be cancelled to make room for others.

In the early 2000s, ABC had experienced a long period of low rating and had fell in fourth place among the US networks. It was struggling to get a significant audience back. Then in 2004 it was able to program two shows that gained back significant audience, these were "Lost " and maybe more significantly, "Desperate Housewives". With that increased audience for those two show, ABC was then able to leverage that higher exposure to present other potential shows in adjacent time slots. That better shelf space combined with attractive shows did bring them back to a second place among the big four within two years. It is important to note that they did not start from nothing. Even in fourth place, it was still a spot where you could get noticed if you present something interesting but it is harder than when you have more exposure in first or second place.

It is a much harder job for a cable network. AMC for instance was launched in 1984 but it is not before the launch of series "Mad Men" in 2007 and "Breaking Bad" in 2008 that they really began to get noticed and gathered significant audiences.

All that to say that it is not impossible to get noticed and to launch a successful show if you don't have prime shelf space, but it is much harder.

Shelf space may be a concept that will keep networks on air even after most of the audience have switched to the Internet and that their television infrastructure might not generate significant profit. They might keep it just to still be able to have the prestige factor and the exposure for

new shows. A movie success in theater drives the sales of that movie in DVD and on-line even if the theater revenue is not the bigger part of the profit. Shelf space.

So, on the Internet currently, the best virtual shelf spaces are the front pages of the iTunes store or Amazon and the ranking of search results on Google. Good shelf space can also be found on other content distribution services. Netflix is so far the most advanced one and its shelves are organized according to what they think is interesting to you, but also it is based on your past usage ratings and your friend's usage. It's targeted shelf space.

CHAPTER TEN

Business Models

In this chapter, we will take a look at some of the possible business models that organizations may adopt in order to be successful online.

The Big Fat Hit Series

The "Big Fat Hit Series" is the TV equivalent of the "Holy Grail". This is the elusive, hugely successful series that can make you successful. This is a hit so big that people would wants to subscribed to your channel or service just to see it. As we talked about in the previous chapter, for AMC it was "Mad Men".

But here's the problem: Everybody else is trying to find a "Big Fat Hit Series"! At this game, the more resources you have, the more likely you will be to find one.

Large US networks have the most resources to find a hit. From hundreds of pitches for new series each year, each of those big network will order about 20 pilots. From those around 5 or 6 on average will be picked as new series. Most of those will be cancelled and some will have moderate success. Some years, even if you combined the four large networks, none are "Big Fat Hit Series". So, from hundreds of concepts, you may have one in a year if you are lucky or have an incredibly capable team, most likely both.

Once in a while, a cable network will find such a hit after years of trying. It was the case two years in a row for

AMC with "Mad Men" and "Breaking Bad". But even there, "Breaking Bad" was a huge hit… for AMC. It would not have been considered such a hit on broadcast television. To put things in context, the series finale of "Breaking Bad" draw an incredible audience for AMC with about 10 millions[23] viewers. It was a peak for the show as the fourth season did deliver just under 2 millions two years ago... and it was already record territory for AMC. Yet, if you compare it to a regular broadcast week[24], a show like CBS' NCIS draw around 18 million viewers. If you look at a show that draws about 10 millions viewers, you are down to shows like NBC's Blacklist or CBS' Blue Blood, both of which are not considered big fat hits.

We can concede that "Breaking Bad" was a big fat hit series for cable. It was certainly enough of a hit to help raise the status of AMC significantly so in that sense it was a real success.

Similarly, Netflix have begun creating original series with "House of Cards". That series was successful enough among Netflix viewers and critics to create a significant buzz and help the innovative distributor establish itself as a credible source for original production. Would that be consider as a "big fat hit series". Hard to say. Netflix doesn't publish ratings and so it's hard to evaluate how many of its viewers have watched it. It was however presented in France on premium channel Canal+ and drew a million viewer there, about 20% of the channel

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[23] As reported by Entertainment Weekly http://insidetv.ew.com/2013/09/30/breaking-bad-series-finale-ratings/

[24] Nielsen ratings for the week of October 14, 2013 as reported by "TV by the numbers" http://tvbythenumbers.zap2it.com/2013/10/22/tv-ratings-broadcast-top-25-sunday-night-football-tops-week-4-with-adults-18-49-and-total-viewers/210710/

subscriber. Based on that, we can say that it is a solid success if not a "big fat hit series". Alone, it would probably not draw a lot of subscribers to Netflix, but combined with their movie library and other original series, it seems enough to help them grow their subscribers base.

The concept of "big fat hit series" was one that was often talked about when I worked at Al Gore's Current TV. That was primarily a hot topic around 2006-2007. At that time, the early concept of the network that was based on a "shuffle" of short form documentaries was put in question . As executed, it was not as successful as hoped. The management came back to this notion of "big fat hit series" that was a well used concept elsewhere and it was viewed as the solution to the ratings issues.

But here is the problem: It is very hard to play the same game as other organizations when you have only a fraction of their budgets. As we talked earlier, big networks are exploring hundreds of concepts each year and are producing around 20 pilots each and most years, they will generate no big fat hit series. Sometimes one out of all those efforts. This is also a costly proposition. An average "drama" pilot cost over $5 millions[25] to produce. So, each network invest about $100 millions a year to produce pilots! That is just the pilots, if you pick a show and order a series than it will cost you at least $30 million for a 22 episode series. This is only one show and not necessarily a hit.

As a reference, at the time, the total programming budget for Current TV was $20 million a year. For that

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[25] According to the "Hollywood Reporter" http://www.hollywoodreporter.com/news/tv-pilot-production-increases-as-574337

price you have to program a full 365 days a year, 24 hours a day schedule. Was it impossible for them to find that "big fat hit series"? No, but it would have been almost like winning the lottery if they did.

In the case of Netflix, they decide to bypass the pilot and to order directly the "House of Cards" series for two season (total 24 episodes) but for a reported price tag of $100 millions.

For an organization to succeed on the Internet with that kind of model, you need to have much resources. Trying to establish a brand in the Interned with a "Big Fat Hit series model" is almost unthinkable unless you are an established big media player or if you have a very, very deep pocket.

An established player like CBS who already has a number of hits and an large audience would likely be able to transition progressively to the Internet and bring its audience and programming style with it. They have already started that in fact since they are offering their content to the US audience on the Web and with a mobile app. Bringing their brand worldwide would require them to keep the rights for their content and to start using their hits to draw that audience progressively.

An organization with deep pockets like Apple, Google or Amazon can also use that strategy. They could invest in content until they find enough hits to build an audience. The fact that they are well known brand also help them in promoting those hits, once they found it. It may not be the wisest model for them to follow, but they have the capabilities to implement it.

Oh! Just to close on the "Big Fat Hit Series" and Current TV, would you guess that they never found it? They tried. They changed their model. They tried. Saw an opportunity when Keith Olbermann became available.

They tough that it would work for sure since he had a successful show before on CNBC. Ratings did not follow it's star. They tried again… and eventually sold the channel to Al Jazeera.

The deep content library

Creating new content and having a big hit is always a tricky task. The amount to be invested are high and the success is far from being guaranteed. An alternative approach is to have a deep content library. To have the rights to present a large variety of existing content that can still be entertaining to an audience.

While this does not have the same mass appeal than a brand new episode of a "big fat hit series", it has the benefit of providing a relatively safe bet. If the content library has enough past hits and is deep enough to cater to a wide audience then it can be a successful model.

On the book selling side, Amazon have provided evidence that a deep inventory can generate significant revenue. This is what is referred as the "long tail". Content that taken individually is not very significant but if you aggregate all those niche products together, it becomes very significant.

The problem of implementing such a deep library of video content on the Internet is securing the rights to that library. Today, it is possible to "syndicate" content to a variety of players in the world. The same content can be sold for a time window in difference countries and different regions. However, a distributor that want to be successful based on a deep library would want it to be available worldwide and exclusively. But to gain such rights would also be expensive if the content is valuable. Non exclusive agreements are possible but if you do that,

then the deep library becomes less of a reason for viewers to subscribe to your service on its own merit.

Obviously, well established content owner who already have a deep library would be best positioned to implement such a strategy. Time-Warner with its Warner Bros, HBO and Turner subsidiaries would be an excellent example of an organization that can draw considerable audiences with its library. They would off course need to keep expanding and refreshing that library over time but they have a strong case.

We can also say that YouTube have a deep library but the content so far is far less valuable. People are gladly sharing and watching content on YouTube for free but it is not clear at all that they would pay for that content.

Desirable content, in a deep library that keeps expanding is certainly a viable model.

Default Destination

Yet another business model is the "default destination". A good example of that on cable television are the live news networks like CNN. These are destinations that you will select by default when you feel like watching something and there is nothing really specific that you want to see.

For a long time, CNN was my personal default destination, especially in business trips. On September 11, 2001, I was working for Miranda Technologies and I arrived in Amsterdam for our participation at the yearly International Broadcasting Convention. My KLM Montreal-Amsterdam flight arrived at the airport around 7 am local time, that's 1 am in New York City. I went to my hotel and got a few hours of sleep since I don't sleep on planes. I asked for a wake-up call at 2 pm (8 am in NYC) so

that I could shower and then go to the RAI exhibition center to help setup the booth. As I do in those cases, I turned on the TV on CNN just to look at what is happening in the world while I prepare myself. I was just out of the shower when I saw CNN going into "Breaking News" mode and beginning coverage for what would become an increasingly terrible event. I called my cousin in Québec City on my GSM phone and we were talking together when we saw the second plane crashing into the World Trade Center south tower. I don't want to recall the whole sequence of event here but I just want to illustrate that this event was probably the first time that people around the world, regardless of their location were able to live through a global event, watching it live at the same time and talking about it. This is how powerful television and mobile phone had become. This is also cable news at the peak of its influence. CNN had gained its claim to fame during the first gulf war in 1990-1991 and its impact would fade during the first decade of the 21st century due in part to the rise of the Internet.

Today, TV is rarely my default destination. The Internet is where I now go by default. Would I "tune" to a specific destination on the Internet if there was a constant live stream of news? I doubt it.

If I was more inclined to watch sports and there was an online live sport channel maybe I would develop an habit of going there, but I don't know. Maybe some reality TV can have 24/7 coverage and become a default destination?

All good questions and certainly a model that could worth exploring but it will require creative concepts to establish a solid default destination for the next generation of video viewers.

Don't get me wrong here. I think that a "default destination" model is extremely valuable. I still have some

default destinations today but it is mostly on talk radio. The idea of having a semi-background default destination that I can tune to and is live and in the moment is something appealing to me. Most of the time, it is not compelling at all but if something happen, I will know about it right away. For the Internet, it is most certainly something that organizations will want to explore and possibly, find some very successful default destinations models.

Revenue models

So far we looked at three different models from a programming standpoint. Now lets take a look at the various ways to financed the content providers after the "end of television".

The first one is to have an advertising supported model. This is the traditional model used by the US networks. Presenting the content to the widest possible audience without charge in exchange of having them watch commercials that financed the show they are watching. This model could work but the conditions needs to be there. The Internet infrastructure needs to be able to support live steaming to millions of simultaneous viewers and the revenue model for advertising online need to bring in more money. At this time, advertising on the Internet is bringing far less revenue than on network television. Once we reach the tipping point and the Internet becomes the dominant distribution conduit, this may change. It is a requirement for that model to work to draw large audiences. It also require that the audience is still willing to watch ads.

The second model is the one already used by Netflix, subscription based. In this model, the program distributor

is selling a monthly subscription to the viewers for an unlimited access to the content library. In this model, in order to keep the revenue stream, the distributor needs to keep the programming fresh and provide enough variety of content to have enough subscribers to pay for the distribution infrastructure and the content licenses.

A third model is the "a la carte" model. This is what is used primarily by the Apple iTunes store. In this model, the content library is available for single title or for a season of a show. It can be for "buying" the title, which means downloading it and watching as many time as you want or "renting" it which the renter can watch over a twenty-four hours or three day period etc.

Another general model is to have content distribution that it is financed as public service by governments or other entities. The BBC's model is partially based on that as it as a secured revenue stream that comes from a tax.

Then we can see all kind of variations and permutations of those general models. Partial subscription, partial advertising etc. For example we can imagine that a distributor could create a point system where the viewer can watch advertising-free content as long as it has enough points. The viewer could get points by having watched content with advertising in the past and gained extra point by interacting with said advertising. Alternatively, they could buy some points and bypass the advertising as long as they have points.

CHAPTER ELEVEN

Some significant players

In this chapter we will take a look at some significant players in the world that may have a significant impact in the coming years in the content domain. I am not trying to do a large enumeration, this is basically a perspective on some very meaningful participants.

Google

We really can't talk about video on the Internet without talking about Google.

If we go back 20 years in the past, we can see that the early Web was an easy place to get lost. Unless you had the address of your destination, it was hard to find it. At the time, it was quite important to "bookmark" the addresses of interesting locations that you would find, otherwise you would have to spend time find it back. It was a time when it was a good business to build directories. The nature of the Web with its hypertext structure was making it easy. Web sites would be created just for that.

Early search engines began to appear but it was quite inefficient. In fact, they adopted a form of commercial model that was similar to print with banner advertising, charging per "impression". Because of that, the more inefficient they were the more they got revenues. If you spent more time on their sites and load multiple pages of search results, you would see more banner ads and generate more revenue for them. It was pretty much

importing a business model from another media, print. You can bet that after spending an hour going through pages after pages of search result from Alta Vista[26] that once you found the link to the information you need, you would bookmark it so that you can come back without spending so much time again. On the flip side, it was a good way to keep someone busy!

Google really appeared on the Web around 1999 and changed the Internet significantly. The whole point was to bring the most relevant information to you in the quickest and simplest form. Since the Internet access of most people was still slow at the time, having very simple text result made the whole experience much better. Additionally, they used advanced algorithm to give you the result that you were looking for, as quickly as possible, ranking the results of a search based on numbers of links and eventually, which result were clicked more.

When you think about it, from a short term point of view, this didn't seem to make a lot of sense business wise. Sites like Alta Vista were generating millions in banner-ads by not giving very good result. Would you have invested in a business that would have told you "We are going to change the Web by having a very plain text interface and people are going to have the results that they want the first time without spending time on our site". I think that given such a pitch, a lot of people would not have bet on them.

However, their efficiency at finding "stuff" on the Internet made it quickly a very popular destination and with time, it became so efficient that it is now quicker to

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[26] Alta Vista was an early Web search engine that was significant between 1995 and 2000. It was initially developed by Digital Equipment Corporation (DEC).

run another search rather than to find a bookmark in your browser!

Google also developed a new way to sell advertising. Instead of selling impressions of a banner ad, it would sell keywords. Whenever someone would search a specific keyword, a simple text-based ad related to the search would appear on the side and later, also on top of the results. The other innovation it did bring is that rather then using a typical sales force, it sold its ad on the Web through a bidding system where people would bid small amount of money for a certain number of impressions related to a keyword.

Google's approach to Web searches and advertising have been so different than what was the common wisdom that it allowed then to not only change how people used the Web but also to basically control the Web. How a business is ranked on Google's results of a keyword search have became so significant to organizations that it created a whole field called "Search Engine Optimization" (SEO) where specialists are hired to try to trick "Google Search" into giving it an higher ranking that it would otherwise.

The fact that people use the Web now mainly through searches rather than links and bookmarks has given Google significant power and significant revenues. Google does realize that you can not control something like the Internet forever and that it is threaten by efforts from other search engine players (like Microsoft's Bing) and by people who want to steer users away from the "open Web" and towards their platforms (like Facebook's social network or Apple's mobile platform where apps access the Internet without the Web). So for years now, Google have tried to offer multiple services, mostly at a lost, in order to diversifies its model or keep people on the "open Web". So far, they were not very successful in generating significant

revenue outside of the search business. However, its control over that key component of the Internet has given them a very dominant position. This is an example of the significance of controlling a key part of the distribution chain.

In fact, Google's logic is something like "the more people use the Web for any reasons, the more they are likely to go through Google Search" and for the most part it has been reason enough to offer services at a lost.

Perhaps the biggest and most expensive bet that Google took is "YouTube". They paid $1.6 Billions for it while it was not profitable! It is not Google largest acquisition but given the risk involved, it's the biggest gamble.

Google doesn't release if their YouTube business is making a profit but I doubt that it does. If it did, I am pretty sure that they would say so, loudly. But more than that, it is a very expensive service to run. They need to pay for lots of disk space, big network connections and most of all, lots of power! It is a much more costly operation than searches and they don't charge a lot more for it[27]. It is certainly a valuable operation for them since it drives a lot of Web traffic and in turn makes more request on Google Search.

It is also doubtful that YouTube will become a very profitable operation anytime soon. The trend is at more volume of video uploaded. The more video there is, the more storage they need and the more power they use to keep it all online. Yet, more volume of uploaded video don't mean an equally higher viewing increase, so more fragmentation of the content viewed. It does not change

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[27] It is very hard to compare rates of online advertising since some are based on keyword bids.

much Google revenue to have more fragmentation of viewing but it has an effect on the ratio of storage needed over the revenue. For sure, each time that the size of hard-disk storage increase it lower the cost per gigabytes of data but with time, energy cost will tend to rise.

Still, from a strategic point of view, YouTube is by far the biggest destination for video viewing and people want to watch more and more video on the Web. How significant is that? Well, the 20th century has been the first century where we have visual archives of all the important events of the century, from the perspective of the media and filmmakers. Thanks to video cameras, phones and YouTube, the 21st century will be the first century of human history where we will have video archives of ALL the events from anyones point of view! That is very significant for future generations and historians!

If we look back at the main components of the media chain that are content and distribution, Google has already a commanding presence in both. Content and distribution.

YouTube for content, although not necessarily the most sought after content for any individual piece of content viewpoint but this can evolve with time as they are experimenting with different production models and watching what others are doing.

For distribution they actually are controlling various aspects. YouTube is also a content repository and Google Search is the most powerful content directory. In addition, they have also begun to provide their own connection service directly to user called "Google Fiber".

Such a control on the content and on the complete distribution chain could give Google a level of power on media that has never been seen before.

Netflix

Netflix is certainly one of the most talked about media company as I am writing this in late 2013. It first started as a competitor to video rental stores, renting movie by mail-order agains a monthly subscription. It then evolved that model to the Internet. At first, there was not a lot of attention put to it as streaming movies over the Internet was still hard in 2007 in some areas. However, with consumers getting widely access to broadband in the next few years, Netflix with the help of other sources of online content was able to totally destabilized the video rental market and most stores have now closed.

In 2013, Netflix began to produce original series for which it owns all the rights. The first series was "House of Cards" and it helped establish Netflix as a challenger to premium cable outlets such as HBO and Showtime. In fact, a lot of people were so impressed by the few series that they have produced so far that many see Netflix as "the new HBO".

How successful Netflix will be in the next few years is still certainly a question mark but they are doing the right moves to establish themselves as a distributor of choice in this new content world without television.

Their distribution is purely on the Internet, they have access to a library of content through some distribution deal and increasingly through their own productions. They provide multiple ways to access their content: From the Web but also from video consoles and mobile devices. With their Web portal and applications, they have a great shelf to present new content and to promote their own productions.

The significance of owning the rights to their own production is great. On, these products, they have

exclusivity and they can market that to any country that they chose to enter. With content that they don't own, they have to make separate deals for each country and that does limit their expansion.

We can certainly expect that now that Netflix have made its mark in the marketplace that others will want to explore that model as well. For one, HBO have begun to offer an online streaming option, requiring a cable subscription for now but it could well do the move to direct subscriptions in the future (contract with cable distributors most probably prevents them from doing so right now). Also, John Malone, chairman of Liberty Media and cable pioneer, commented that the cable industry should join and create their own alternative to Netflix[28].

Now that Netflix's model has been established as successful, the technology to enable established players to enter is not that hard. The hard part is securing enough interesting content and to market it. At that game, content owners have a place of choice in the contender list but distributors have the direct links with the customers. For a cable company, to offer access to online library is just another option on the customer's weekly bill (one that could be offered instead of a traditional TV bundle). It is far simpler than a different subscription. Netflix certainly realize that as well and they are actually beginning to reach deals with cable operators so that they can make Netflix's service available to their customers[29]. At this time,

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[28] As reported by Reuters on October 10, 2013 http://www.reuters.com/article/2013/10/10/us-liberty-netflix-idUSBRE9990OC20131010

[29] As reported on "Advanced Television" site http://advanced-television.com/2013/11/01/netflix-adds-3rd-cable-partner/

there is only a few operators that made such a deal but this is a direction that Netflix is exploring.

No options are as attractive as Netflix at this point in time and whether or not other players will find ways to compete will determine how significant Netflix will be on the long term.

Comcast

Comcast is the largest cable operator in the US. It is also, not surprisingly, the country's largest home Internet Service Provider. As distributors goes, it is huge.

But it is also a very important content owner. It owns NBCUniversal, which includes one of the largest Hollywood movie studio, Universal, one of the four big US television network NBC and a number of cable channels.

Comcast is probably the best example of how significant controlling the distribution is in the media world. It started as a traditional cable company but its size and power did enable it to acquire a content owner as significant as NBCUniversal.

It is not standing still. Comcast has already a product called Xfinity Streampix that is similar to Netflix and offers content to its subscribers. So far, it has targeted mainly its clients that are also subscribing to its television service but it is making small steps towards opening it up a bit more. In October 2013, it made a joint announcement[30] with HBO that they will let its broadcast Internet subscribers the possibility to subscribe to the HBO content without a TV subscription.

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[30] As reported by Gizmodo http://gizmodo.com/comcasts-hbo-internet-plan-is-the-one-youve-been-wa-1452189413

While this is a limited trial and a small step generally, it clearly points out in the direction of increasingly using the Internet for media delivery and it is a trend that can only accelerate in the next few years. Comcast is developing the infrastructure to make it possible for itself but it certainly could market it to other ISPs in territories where they are not in direct competition.

The direct relationship that Comcast has with its customers makes it a strong contender to dominate the content market in the next few years.

Apple

Talk about a company that already has a track record in changing an industry! It is really Apple with its iPods and later iPhones combined with its iTunes music store that changed the music business forever. It was bound to happen eventually but it is really Apple with Steve Jobs that convinced the big music labels to make their products available online at reasonable prices. Doing so did certainly accelerate the move from physical music CDs to digital file download but it also proved that there was a market for doing so legally. File-based music distribution was already happening but it was mainly though pirated, illegal file download. The big music labels were attempting to stop the phenomenon through legal actions but this proves to be very challenging on a global, distributed network such as the Internet.

Apple has since added distribution of video content on its iTunes store but while popular, it is not a game changer as much as it was for music. Don't get me wrong, Apple is

very significant in that market. A recent study[31] estimates that Apple control over 65% of electronic versions of movies and TV shows sold in the US and 45% of Internet video-on-demand rentals.

With such numbers, why do I claim that it is not as much as a game changer? For one, there are numerous other still successful distribution models of video content. Television, movie theaters, cable channels and other types of on-demand services (such as products from Comcast).

Apple is certainly in a very good position to play an even bigger role in the future. It has a direct relation with a significant part of the audience through it sales of iPhones, iPods and iPads. Apple can offer users a seamless, integrated, end-to-end solution to watch both audio and video content.

One area where Apple is still not very successful is the large screen "TV set" market. While its "Apple TV" provide a useful bridge between the Internet and a large screen, it is a product that just did not fit the needs well enough to be embraces by the masses. There is ample speculations that Apple will enter the large screen TV set market eventually and maybe finally bridge that gap. But regardless if they do it with a clever new screen or with a better device, if they succeed in fully integrating the group watching experience with the rest of their chain, they will be in a very good position.

Another area where they will need to make progress is providing a better experience for live events (free, pay per view or by subscriptions). So far, their live events streams for their own events have not been something that can

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[31] According to a study by the NPD group published in April 2013 https://www.npd.com/wps/portal/npd/us/news/press-releases/the-npd-group-apple-itunes-dominates-internet-video-market/

compete or compared with live television. It will need to reach that point before we can talk about a real game changer for television.

It will require that the Internet support more advanced technology and this is somewhat independent of Apple since they don't control Internet distribution. If Apple decide to intervene by creating links with ISPs, they certainly have the resources and knowledge to help that technology to be deployed faster and in doing so, to speed up the end of television.

Will Apple continue to just distribute content like it has been doing so far or will they want to start owning content like some of its competitors? Given the focus and size of the company, it may be more valuable for them to limit itself to end user devices, the distribution chain and to forge strong alliance with content owners.

CHAPTER TWELVE

The end of television in 2020?

Let me address in this chapter why do I think that the end of television will happen in 2020.

First, let me say that I am focusing mainly on the situation in the US as there are several factors that will influence when will this happen in different countries. However, the fact that this is happening in the US will most certainly have significant impact all over the world.

Second, the end of television means that television will cease to exist as the dominant media and that the remaining use of television will be fairly insignificant. There will be some form of television remaining for various usages including remote areas and to serve people that can not have access to the Internet.

But otherwise, as the mainstream media in the US, the television should be history by 2020 and here is the main reasons why I see it that way.

Access to broadband and connection speed are constantly evolving and is a key enabling factor. According to Akamai[32], the average connection speed in the US has gone from just under 4 Mbps in 2007 to nearly 9 Mbps in 2013, more than doubling in 6 years.

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[32] Data gathered from Akamai "State of the Internet" section of their website http://www.akamai.com/stateoftheinternet/
Akamai is the one of the largest content delivery network in the world.

USA average connection speed
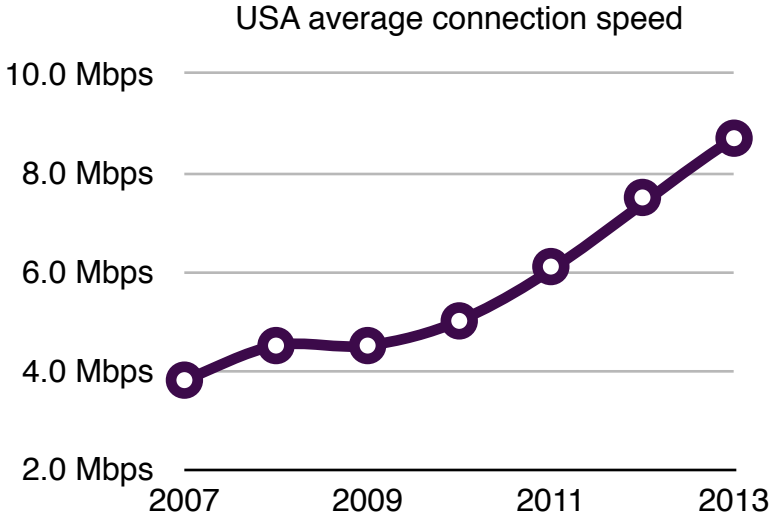
Also according to them, the percentage of US users connecting to Akamai with a broadband connection of 4 Mbps or more have gone from about a third in 2007 to over 70% in 2013. Those data are consistent with data gathered by Pew Research[33] who have found that in addition, in 2013, 85% of Americans adult uses the Internet. Looking at what happened in the last six years and since there is no factor that may indicate a reverse in these trends, it is very likely that all the household that want to watch video content will have an Internet access and with speeds enabling them to do so by 2020. In comparison, total bandwidth of an HD channel in the US is 19 Mbps but they typically use far less for their main channel as they choose to use space for additional content. The Internet also allows for the use of more efficient codecs since it's easier to upgrade the players than a television set.

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[33] Data gathered on Pew Research site at http://www.pewinternet.org/Trend-Data-(Adults)/Internet-Adoption.aspx

USA connection speed higher than 4 Mbps
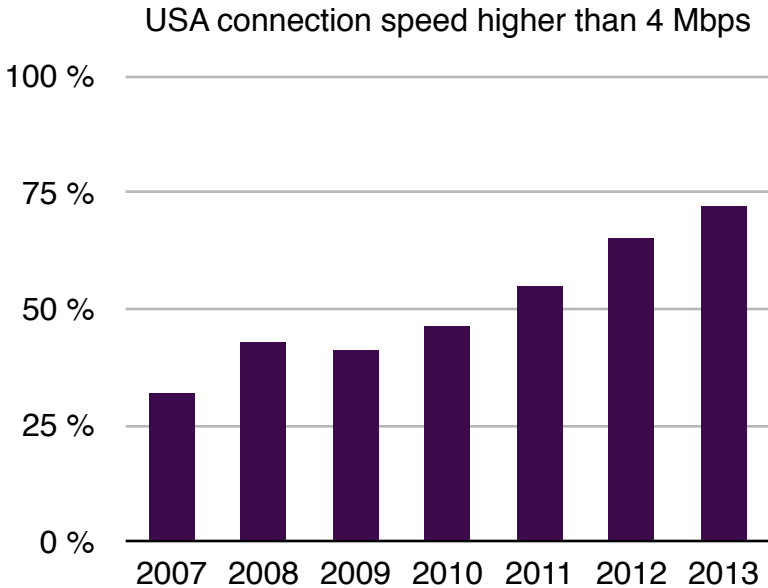
The technology behind the Internet will also evolve and it is likely that the ISPs will work with other parts of the distribution chain to allow live content to use multicast technology thus enabling more efficient and lower cost of operation on the distribution of those contents.

Enabling the Internet to compete efficiently with dedicated delivery mechanisms is only part of the equation off course and the availability of television on dedicated infrastructure could still remain for a long time. However, for terrestrial "broadcast" delivery to continue, we need to factor-in the demand for spectrum. As we did explore previously, consumers are using mobile devices increasingly and that create pressure for more bandwidth to be allocated to those applications. Once most people have access to video content on the Internet and once it

become their primary source, then the pressure will grow to reallocate the bandwidth.

As of 2013, it is estimated[34] that about 56% of American adults own a smartphone, up significantly from 2011 when it was 35%. This is a category that did not really existed a decade ago. Furthermore, it is estimated[35] that 63% of mobile phone owners uses it to go online. With that in mind, consumers will continue to rely increasingly on mobile Internet and put pressure on mobile networks and therefore on their carriers to push for more bandwidth of the RF spectrum to be allocated for that use. In fact, the need to allocate more spectrum for mobile Internet application is already a subject that is part of a White House report[36] where they referred to the fact that "wireless data traffic in North America is likely to increase 100-fold between 2009 and 2016" and that "it is unlikely that wireless carriers will be able to accommodate this surging demand without additional spectrum". They are also saying that they already took some measures to reallocate some of the spectrum including some from the TV spectrum. However, if this is already the case for the short term (until 2016) we can extrapolate that even more pressure will be present by 2020 with such a growth in mobile usage.

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[34] According to Pew Research http://www.pewinternet.org/Trend-Data-(Adults)/Device-Ownership.aspx

[35] According to Pew Research http://www.pewinternet.org/Reports/2013/Cell-Internet.aspx

[36] White house report "Four Years of Broadband growth" by the "Office of Science and Technology Policy & The National Economic Council", June 2013, page 18

So, on one side, people are able to get high quality HD video content easily on the Internet and on the other, they want to access the Internet at high speed. This look as great conditions to get rid of terrestrial TV transmission and 2020 looks right if we extrapolate the data.

A more subjective aspect is the ease of access to the content. How easy is it for the average consumers to access video content that they want to watch on the device where they want it. The main device to watch long form video content is still the TV set. However, since Apple launched the iPad in 2010, the popularity of tablet have soared. As of 2013, one third[37] of Americans now owns a tablet compared to 18% a year before, almost doubling in one year.

A tablet is a great way to access media content on an individual basis and it is already affecting viewing habits. But, for times when more than one person wants to watch a show together, tablets and phones have limited appeal. This is when a TV set or large screen is the most appropriate.

Netflix have already demonstrated that it is possible to create a seamless experience. With their support for various platforms, it is possible to watch shows on phones, tablets, computer and game consoles. While it is possible to connect a device like a computer, a tablet or even a phone to a large screen, it is often not the most practical way to "tune" into a show. A game console is often a better option at this time as demonstrated for instance by the Netflix application on PS3.

But, in the next few years, it is likely that solutions will appear to bridge the gap between the Internet and large

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[37] According to Pew Research http://www.pewinternet.org/Reports/2013/Tablet-Ownership-2013.aspx

screen with better and easier solutions and that will accelerate the shift from TV to online video further. By 2020, I expect that the experience will be seamless and that it will be easy to transfer any content found on a tablet or phone to any large screen in a house.

Another quite popular way to watch television in 2013 is through a distribution platform. These comes in the form of cable, telco and satellite provider. Even if broadcast terrestrial TV is ended by 2020, that doesn't necessarily spell the end of those other means of distribution of TV.

The reasons to watch TV on those platform will be a lot less obvious than now however. For one, watching the broadcast channels is still a significant part of TV watching on those platforms and those channels will have a lot less incentives to keep a linear feed if their broadcast infrastructure is shutdown.

Also, the cable and telco operators will have less incentives to keep a dedicated television distribution infrastructure if they can make as much money or more with the distribution of premium video packages[38] through the Internet.

It is also beneficial for them to be able to use all their available bandwidth to offer more Internet speed and to be able to charge more for it and increased their profits. So the only distributors that would still have a strong incentive to push and finance linear TV channels would be satellites as

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[38] The creation of a premium video package have been discussed in the chapter about "Netflix" in this book.

they will be the only remaining one-way distributor[39] of video content.

It is unlikely that by 2020 a significant number of TV channels will derive enough revenue from satellite to keep traditional linear TV feeds but it is likely that the most popular ones will keep feeds available for that use.

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[39] The Internet is a bi-directional content delivery mechanism. Traditional TV delivery is uni-directional. Satellite is most efficient in uni-directional delivery even though by-directional access is somewhat possible.

CHAPTER THIRTEEN

Regulators and political power

If it was only about the technology and the free market, it would be a lot easier to predict and draw conclusions on the end of television. However, as with any media, television has a deep cultural impact and is very significant in the political sphere.

Because of that, television has been regulated to varying degrees around the world. The US had more regulations in the past but has still a fair amount of rules for broadcasters and distributors. Those rules are tools that enable the exercise of a certain level of control on television. While this is not as direct as it is in other parts of the world, a broadcaster will self-regulate and match certain expected behaviors to stay in good terms with the regulators.

The nature of the specialized distribution infrastructure required by television makes it fairly easy to control. On the other hand, the Internet is much less regulated and is harder to regulate. The content flow in any direction and if someone try to regulate that content, there are all kinds of means to go around it.

If the regulators in a country wants to keep a firmer grip on the flow of information, they might try to delay or prevent the end of television. They have various ways to do that. One is to prevent the development of high bandwidth connections to the Internet. They can also forbid the use of technology that would allow the Internet to match the level of service possible with a dedicated

television delivery service such as Quality Of Service (QoS) and multicast. They can also prevent the large content owners from distributing their content on the Internet and being proactive in establishing policies that prohibits sharing of content and punishments for those who violates those rules.

While those kind of regulations may seem counterproductive as people are creative in the ways they find go around those measures, it may certainly delay the end of television in specific countries, if not globally.

The general political trend in the US is not towards more government regulations and interventions. Also, the media are keeping a certain distance from regulators. For these reason, it is unlikely that the US regulators will take drastic measures to protect television for a long time. It is unlikely that they will limit the technology progresses of the Internet and prevent it from being able to compete actively with television.

On the other hand, a country like China that has more direct control on the media and television networks are state-owned, have a lot to loose politically in giving up such a powerful communication tool. It is therefore likely that in those country, television will remain the dominant media for quite a bit longer.

We can therefore draw the general conclusion that the tighter the links between television networks and regulators, the longer that television will remain a powerful media there.

CHAPTER FOURTEEN

Preparing for the end

Writing this book, I sometime have the impression that I am one of those prophets that announce the end of the world. While this certainly may sound like it to some people that have vested interest in keeping the status quo, my intent was not to push any interests. As a media specialist with both creative and technical outlooks, I felt that it was important to share my analysis with the rest of the industry.

In fact, the current well established TV brands are in the best position to transition to an Internet-based model successfully. They often own a library of content and have a recognizable brand, two very important factors.

But they can't stand still. They have to analyze their specific situation, what are their position in their market, what are the assets on which they can capitalize and when to make strategic moves to ensure that they will be successful during the transition phase and after.

One organization should have it's strategy, invest in it, and execute it correctly while adapting to the changing market conditions. This will not be easy and it will likely be even harder for public companies that often have a hard time executing a multi-year strategy due to the stock market influence and the quarterly reports.

It is a particularly hard challenge for local affiliates stations. In the US, once a network like CBS stop its broadcast delivery, it does not need the local station as distributor anymore. This could cut affiliates from the

lion's share of their programming and revenue streams. Not only that, but in the local market, they will face new competitors online like the local newspaper.

Increasingly, newspapers are moving online and adding video content. They are often not as good at video than the TV stations but they are already in the transition phase. Each year where they are making progresses while the local stations don't, they are developing a better edge.

If nothing else, I hope this book helps people understand what is at stake and the timeframe of those changes. In than in turn, make organizations conscious of how important it is to prepare for those changes.

CHAPTER FIFTEEN

The end of US television and the rest of the world

After the end of television in the US, the rest of the world will be affected at various level. It will have a profound impact in some countries while the impact will be minor in others. It is largely a factor of how much the US productions are important in each market and how much local productions are watched.

In this chapter, I am trying to anticipate the impact of it in some meaningful markets.

China

The presence of American shows in China is very low. Television is almost exclusively owned by various level of the state (on national or provincial levels) and the programming is almost entirely Chinese. For those reasons, the end of television in America will have a small impact on television in China, unless there are completely unforeseen changes.

The Chinese government control of television is also very important for them politically and it would be a big surprise to see it want to loosen control.

At the same time, China is also trying to put limits and controls on the Internet. Even if US content providers would make their content available in China, the viewers there will still represent a small percentage of video viewing. With those factors in mind, it is likely that

traditional television will live for many years in China, and still many years after most countries in the world.

India

India is one of the largest producer of movies and television content in the world. The presence of american shows there is a relatively small number. For that reason, the short term impact of the end of television in the US will be low.

Internet in India has a relatively small penetration still and mostly through mobile devices[40]. It is estimated to be around 164 millions users but of those, 7 out of 8 are accessing the Internet from their mobile phones. While 164 million is an impressive number, it is less than 15% of the population. If we narrow it further to those who have access to broadband, which Akamai[41] estimate at 2%, we can see that the number of people that have the possibility of switching from television to the Internet for video programs is a tiny percentage.

Lets compare that to the number of TV household (the previous number are individual user). It is estimated[42] that there is 146 million TV household in India. Even if we factor in an average of only 2 person per household, that is

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[40] According to data gathered by "The Hindu" http://www.thehindu.com/sci-tech/technology/internet/india-is-now-worlds-third-largest-internet-user-after-us-china/article5053115.ece

[41] Information from Akamai presented on medianama.com http://www.medianama.com/2013/10/223-akamai-india-slips-to-79th-position-in-broadband-adoption-lowest-speeds-in-asia/

[42]From http://jaabaali.com/2013/01/cable-tv-news-cable-tv-connections-in-india/

nearly 300 million viewers compared to about 3 million with access to broadband internet (numbers from 2012-2013).

The conclusions that we can draw from that are: India will still watch a lot of traditional television for at least a couple of decades; As the number of Internet connections grows, the US content providers will be able to generate new revenues from making their content available directly to the more affluent section of the Indian population.

United Kingdom

Unlike the US, the UK as a very large state-financed television organization, the British Broadcasting Corporation (BBC). It is financed mostly by a tax on television receivers called "television license". This tax is levied on any devices that can be used to watch live events regardless from where it receive that signal. Because of that, the BBC will still get financing even if the audience switch completely to the Internet to watch video content.

This situation can go either way. That can lead the regulators in the UK to move away from a terrestrial broadcast distribution model and reallocate the RF spectrum to other usages. Or on the contrary to keep the television broadcast for a very long time, even if the number of viewers is small.

Since a large portion of the BBC and ITV programming originates from the UK, the end of US television will probably have a low impact on those channels. However, other UK channels gets significant audiences from the presentation of US series. In the advent that the end of US television means that the US content providers keep their rights and make the content available directly to UK

customers, this can have a significant impact on those channels and possibly cause their demises.

So, will UK see the end of television anytime soon? It is very hard to guess and is linked mostly with politics and regulations. Depending on how the situation evolve on those fronts, that could be as quick as in the US but most likely, we will still see at least some television service in the UK for a few decades, although their significance will decline.

France

France has a mixed of strong private and public television broadcasters. By regulation, they ensure that a large percentage of the prime-time and general schedule of french networks are reserved for french and european content. However, a significant portion of the highest rated shows are from America.

The end of US television could have a significant impact on France's television scene if the American content owners decide to keep the rights of those program and make them available online with a french language track on original release. If that is the case, it could accelerate significantly the shift of viewers from traditional broadcast to the Internet.

As it is the case in the UK, politics and regulation will certainly play a significant role in how long the dedicated television infrastructure will survive in France. However, given how the government has embraced the digital technology in the past, it is well conceivable that the transition to a full Internet-based delivery of video content will be quicker than in the UK and may even be done close to 2020.

Canada

The Canadian television landscape has always been shaped by the one of its big neighbor (the US). Same television standards and to a large extend, same market.

There are some differences off course. Rights for Canada are sold separately than those in the US but there is generally no difference in terms of presentation. There has been in fact a regulation for substitution on distribution systems. For instance, if cable company Videotron carries a US station affiliated with CBS (WCAX in Burlington, VT), like it is the case here in Montréal, and a Canadian station (Global Montréal) carries the show NCIS at the same time, then Videotron needs to "substitute" the Canadian station in the position of the US station. In other term, if the show is presented at the same time, the viewer will watch the Canadian channel regardless if he had selected the channel position of the Canadian or the US station. If the show is not presented at the same time, then the US signal will be carried. This is off course not the case if a viewer is watching with an aerial antenna (like I do).

Because of those differences in rights, the US networks don't own the right for presentation of content in Canada. If we try to watch a US show on the Internet from a US source, it will generally not be available and we will need to watch it from a Canadian site.

In the english speaking part of Canada, all the top rated shows are the ones from the US[43]. There is no significant difference in ratings from the US. So, if the end of television in the US has the consequence of having the US networks keep all the international rights for content, Canadian television networks would loose almost all their top rated show and that would change the TV landscape dramatically.

Unlike the US, Canada has a national state financed network, the Canadian Broadcasting Corporation (CBC). This can be a factor that would extend the life of television in Canada beyond the one in the US. However, many Canadian governments have tried to cut repetitively the budget of the CBC and it would be surprising that Canada does continue to broadcast for very long after the US.

Quebec is a little bit different as the american TV shows are drawing far less ratings in that french speaking section. However, if the US networks make their content available also in french and at the same time as in the US, it is unclear if that would affect the viewing habits significantly.

Regardless, the regulators have a significant impact on the TV landscape and their decisions will certainly have a major role on he lifespan of traditional television in Canada. But if we base our analysis on past actions, it would be really surprising if the course is much different than in the US.

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[43] BBM is the agency that does TV rating estimates in Canada. Looking at the "Top 30" of the week of October 14 2013 (the latest available while I am writing this), the only Canadian shows there are "Hockey Nights in Canada", CTV News bulletins and two reality shows of the CBC tied at the 30th position. http://www.bbm.ca/_documents/top_30_tv_programs_english/2013-14/2013-14_10_14_TV_ME_NationalTop30.pdf

CHAPTER SIXTEEN

Putting it all together

As we did explore in this book, there are a lot of variables when we want to consider how television will evolve in the next few years. It is tricky to try to make predictions but I think there is enough hard evidences already to at least have a clear idea of where it is going.

Traditional television have been the most powerful medium since the early 1960s and this will stop in this decade. At least in the US and Canada, and most likely in western Europe.

Broadcast television will likely cease to exist in the US by 2020 due to massive desertion of the audience and pressure of the public to have more mobile services on their smartphones and tablets.

The raise of the significance of the Internet as global distribution platform will push the US content owners and distributors to "go global" and keep the rights for their content, distributing it to end users regardless of their locations.

This will have variable impact depending on the region and how much US content are being watched there. The impact will be high in Canada, significant in many english language countries and various others, but lower in India and China.

The infrastructure of the Internet will evolve in the next few years and will enable it to compete effectively with dedicated delivery infrastructure (broadcast, cable, satellite...) by 2020 opening up the possibility of ending

traditional TV transmission. This will be enabled by both quantitative (broadband everywhere) and qualitative (selective multicast and Software Defined Networking) improvements.

At the time when the Internet reach that point, the conditions for the end of television are going to be in place. Regulations, market conditions and rights negotiations are the factors that may delay it.

Historically, specialized platforms have an early edge on general ones. But over time, the economies of scale of general platforms makes it more competitive. The Internet will become the platform of choice for media delivery. The question is when will that be the case in your region?

Depending on the type of organizations and its geographical markets, the tipping point for the end of television may be sooner or later. Regardless, if that organization needs to secure content's rights, then it needs to plans years before as acquiring rights in new distribution models usually takes years of negotiations and planning.

Local and regional players will face the biggest challenges. They will have a harder time finding content to license and will have to find a different, more local model in order to survive the transition.

The impact will be significant and it will change the game significantly for some players. Some will emerge stronger and some will disappear. Evolution, adapt or become extinct.

APPENDIX A

How to delay the end of television

I.   Invest massively in lobbying toward the governments and the regulatory agencies.

II. Insure that the regulators are putting technical limitations to home Internet Service Providers. Limit the speed available to the consumers, limit the advanced features of networks such as multicast, broadcast and Software Defined Networking.

III. Make campaigns to explain to the citizens how important free to air broadcast is to the safety of the nation. How having access to news, information and culture is key to the country and to citizen in poor neighborhood who can't have access to computers and the Internet. Mobilize the citizen to pressure governments and regulators to keep a strong broadcast television service.

IV. Keep strong local news services on television channels and involve the community.

V.   Explain how it is important to have redundancy in case of catastrophes and how important the broadcast service is. Should the Internet comes down, what would happen if there is no broadcast television?

VI. Sign long term contracts for content, ensure that popular content in not available easily on the Web or if it is, only after the broadcast premiere.

VII. Develop a lot of live content. Reality programming, news and sport that is only available on live television at first, keeps television strong.

APPENDIX B

How to accelerate the end of television

I.   Invest massively in lobbying toward the governments and the regulatory agencies.

II. Insure that the regulators are adopting programs to push the home Internet Service Providers to provide affordable broadband to every citizen, even in remotes and poor neighborhoods.

III. Make campaigns to explain to citizens how important an open, broadband Internet is to keep your country competitive worldwide. How making computers and the Internet accessible to citizen in poor neighborhoods empower and educates the population. Mobilize the citizens to pressure governments and regulators to move the nation forward in terms of Internet service for both broadband and wireless.

IV. Provide local news and event coverage on the Internet on a locally branded site.

V.   Insure that wired and wireless Internet are redundant and can still provide vital information in case of emergencies.

VI. Acquire Internet rights for popular content.

VII. Be proactive in promoting live broadcast capabilities in home Internet Service Providers and sign real-time distribution agreements.

APPENDIX C

How to prepare your organization to succeed after the end of television

I. Create strong. long terms links with Internet distributors (Internet Service Providers, content libraries etc.).

II. Acquire the worldwide rights to popular content and concepts on all media.

III. Create and build a strong recognizable brand or build on an already existing one.

IV. Invest in technology development to support innovative distribution models.

V. Invest in continuos developments in cryptography, watermarking, codec and player technology.

VI. Sign strategic deals with Internet Service Providers to be able to use advanced broadcast and multicast distribution infrastructure to be able to distribute live content efficiently and reliably at lower cost.