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The challenges of digital convergence for television[1]

EMILI PRADO

Professor of audiovisual communication and advertising at the Universitat Autònoma de Barcelona. Director of the Grup de Recerca en Imatge So i Síntesi (GRISS)[2]

emili.prado@uab.cat

Abstract

This work looks at the task of mapping out the technological transformations involved in the convergence process, establishing the current state of affairs in technological terms and the extent to which digital convergence has occurred. It concentrates on the changes that this implies for the communication system and the consequences in the areas of production, distribution and consumption of TV content. Finally, it tackles the consequences of these transformations at a social and cultural level and the effects on communication policies. These are facing a huge challenge because their effectiveness to date has been founded on a channel-based structure of the audiovisual system, while the system resulting from convergence will be based on a structure that, although it will include channels, will be network-based.

Key words

Digitalisation, convergence, network, television, communication policies, adoption of innovations, identity.

Resum

Aquest treball aborda el mapa de les transformacions tecnològiques que intervenen en el procés de convergència tot establint un estat de la qüestió tecnològica i del grau de plasmació de la convergència digital. Es fixa en els canvis que això implica per al sistema de comunicació i les conseqüències en el camp de la producció, la distribució i el consum de continguts televisius. Finalment aborda les conseqüències d'aquestes transformacions en el pla social i cultural i els efectes sobre les polítiques de comunicació. Aquestes es troben davant d'un desafiament de primera magnitud perquè tota la seva efectivitat històrica es fonamentava en una estructura del sistema audiovisual constituïda sobre la base de canals, mentre que el sistema resultant de la convergència es fonamentarà sobre una estructura que, tot i incloure els canals, ja no es fonamenta en aquests sinó en una base en xarxa.

Paraules clau

Digitalització, convergència, xarxa, televisió, polítiques de comunicació, adopció d'innovacions, identitat.

Digitalisation characterises our times because it marks a change in era with the shift from analogue to digital technologies. It is thanks to digitalisation that three industrial branches that have been able to maintain perfectly independent lives – telecommunications, information technology and the media – are now embarking on a process of convergence which has led to all manner of prophecies, some of which have already been stubbornly refuted by reality, such as the death of television. But prophets' mistakes should not make us lose sight of the enormous magnitude of the change initiated by digitalisation.

First of all, convergence must not be seen as a state but as a process and, as such, a changing phenomenon; its development must not only be evaluated by taking technological innovations into account but also, and especially, its social appropriation. On the other hand, its consequences can be felt on different planes, depending on whether it is considered from a business or technological perspective or on the basis of its content. Cultural and social consequences result from interaction between all three dimensions that make the whole observation of this process relevant.

In this study, we will focus on the consequences for the audiovisual sphere, thereby not looking at some technologies involved in convergence and many other activities, both in business and in converging services. From this perspective, we will analyse the most relevant transformations caused by digitalisation and convergence with respect to audiovisuals. Digitalisation in technological terms is very advanced and affects all industrial stages: the production, transmission and reception of content.

Production equipment: between sophistication and banality

Sound and image recording devices have increased the features they offer, as much in the quality of the signal as in their usability and cost, flooding the market with a huge variety of

professional- and consumer-based models that record images at different degrees of definition, from standard quality to high definition, and suitable for different screen sizes. Audio and image processing equipment have also become lighter and both digital editing, mixing and generation devices have reduced costs and increased features, making them much easier to use. The domestic version of these devices is guaranteed by software packages that imitate the functionality of professional equipment, found in personal computers and laptops. Consequently, all of this has increased, and in unprecedented numbers, the availability of professional production infrastructures and production devices among home users.

Taking a mature market such as the North American one as a point of reference, according to data produced by the *Consumer Electronics Association* (CEA 2008),[3] the number of video cameras sold each year increases, and sales from the last two years reached around 5.9 million in 2007 and 6.1 million in 2008. Other camera sales should be added to these figures, such as digital cameras, which can film short video clips: an average of 9 million have been sold each year in the last two years (CEA 2008) On the other hand, 9% of North Americans with mobile phones use them to take short video clips (OFCOM 2008).[4] Around 83% of North American homes have a computer (LGR 2008)[5] and, therefore, the possibility of using video editing programs.

Transmission and distribution support: more capacity, more speed, more...

From a transmission point of view, digitalisation is already very advanced and its innovations are of great significance. The first concatenated consequence of all these innovations is the exponential increase in transmission capacity or available bandwidth. Digitalisation supposes, firstly, a more efficient use of the airwaves and of bandwidth available on the transmission media, since a digital signal, in itself, occupies less space than an analogue one. Moreover, once digitalised, the signal may be subjected to different processes that further improve the channel's performance, such as compression, which in essence eliminates redundant information, and multiplexing, where more than one signal can be interlaid along the same channel. All this leads to a significant rise in the transmission capacity of different supports, both via airwaves and physical supports.

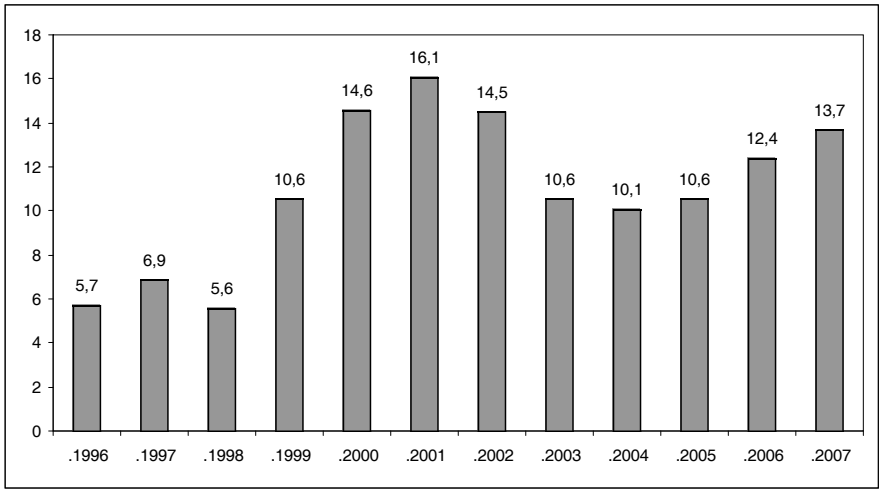
The digitalisation process for transmission media has essentially affected terrestrial, satellite and cable television broadcasting networks and has enabled the establishment of networks as an audiovisual support.

Cable: the most capable network

Cable has completed the digital upgrade of its installations where it had spread via analogue technology and has introduced new installations in markets where it was less present with fibre optic or hybrid fibre-coaxial networks. It has increased its capacity to transmit television channels and services and has introduced some interactive services with intrinsic return path, as well as high definition. It has also extended its operations into new areas where it had hardly been active before, such as telephony and internet broadband connections, so that it has now become what is called a *triple player*.

In the United States (US), cable innovation has been constant ever since the *Telecommunications Act* came into effect in 1996, the new regulatory framework that would open the door to cable operators in all telecommunications services, as well as television services. Up to the end of 2008, US operators had invested more than 130 billion dollars in technological upgrading that has allowed them to provide sophisticated television services, such as VOD (Video On Demand), high-definition tel-

Table 1. United States of America. Investment in infrastructure by cable operators (in thousands of millions of dollars)



Source: own, with data from Kagan Research LLC.

evision (HDTV), advanced digital telephony services VoIP (Voice over Internet Protocol) and high-speed internet connections.

Part of this investment effort has allowed the adoption of two vital innovations, with the aim of guaranteeing the most sophisticated usage. These are Wideband and Switched Digital Video.

Using DOCSIS 3.0, a new generation of Data Over Cable Service Interface Specifications, cable operators can put together different channels in a bundle and convert broadband into wideband, which increases internet connection speed exponentially. In a bundle of four channels it is possible to achieve speeds greater than 150 Mbps, and bundles of many more channels can be made. Compared to the typical 6–15 Mbps broadband speed delivered by cable, and the 3–6 Mbps of ADSL, this innovation is already progressing towards the "Third Internet Revolution", which would be possible on an infrastructure such as the one offered by US operators, which can cover 92% of homes (NCTA 2008).[6]

No less important is the other innovation, Switched Digital Video, which allows cable operators to transmit channels to a specific point according to clients' needs, instead of occupying bandwidth by transmitting to points where there is no demand. This release of bandwidth will make more wideband and high-definition or interactive services available, meeting the demands for more sophisticated services.

Digital Terrestrial Television (DTT): ultimately nothing more than replacement technology

Television broadcast on the Hertz wavelength has also followed its own digitalisation process and is currently at different stages of implementation, depending on the country and geographical area. In developing countries, with certain small differences, analogue is scheduled to end between the first and second decades of the third millennium. Digital Terrestrial Television (DTT) enjoys the same advantages that digitalisation has brought to other media: a better-quality picture and an increase in the number of broadcasting channels. As it is a digital medium, it can transmit data, local interactive applications or applications with extrinsic return path (CMT and CAC 2002;[7] Prado 2003).[8]

The USA, the first country to start the transition from analogue to digital, albeit after various postponements, is now in full countdown to the digital switchover, forecast for 12 June 2009. Some countries have already switched off, such as Holland and Sweden, and others are due to do so soon, such as Germany and Spain in 2010, Canada, Japan and France in 2011, Italy and the United Kingdom in 2012, and so on. Finally, there are still many other countries that have no set date and are still discussing which of the three standards to choose (the North American ATSC, the European DVB or the Japanese ISDB), in the midst of great debate based more on the conflict of political and industrial interests than the intrinsic qualities of each of these standards. Certainly, the existence of three standards is a clear demonstration of the powerful brakes to convergence, motivated by geo-techno-strategic and economic interests more than technological ones. In any case, from a communication point of view, what matters is not so much which standard is used, or which is relevant from the point of view of industrial policy, but which implantation model to adopt.

One of the most touted advantages of DTT has been the improvement of image quality. While its standard quality marginally improves on the quality of analogue television, this increase is much more perceptible in high-definition television (HDTV). However, the choice of high definition has not been uniformly available in all geographical locations.

In the USA, although not predetermined, the regulator left this option in the hands of the operators, giving each a multiplex with the possibility of managing it dynamically, which essentially means that each operator can use the bandwidth of their multiplex channel as they like, be it to transmit data and different Standard Definition Television (SDTV) channels, be it to emit a high-definition channel and data or a combination of the two at different times of the day. In practice, the preferred option has been high definition.

High definition has not been a priority in Europe and, in general, the use of each multiplex channel for the broadcast of four SDTV channels has been favoured, reserving 20% of multiplex capacity for data transmission. Consequently, this has led to a multiplication of the number of channels and a notable delay in the introduction of HDTV through digital terrestrial television on our continent and, in turn, has also slowed up the availability of high definition on other platforms, such as satellite, cable or IPTV.

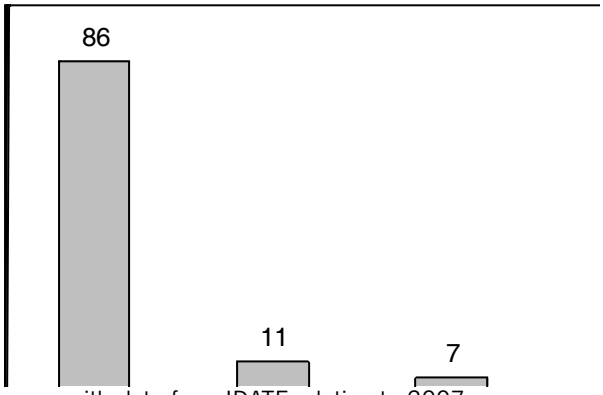
Meanwhile, Japan opted for a combination of the two formulas, offering from the start digital terrestrial television in SDTV and HDTV.

The other main DTT innovation is mobile reception. The European DTT standard has developed this option from the start (DVB-H), but it has not been a priority in the implantation stage. The Japanese ISDB system also relies on this availability and, in fact, has already implemented it. In contrast, the North American ATSC standard did not have this option defined and has only just (on 26 November 2008) announced preliminary approval of a DTV mobile standard.

Satellite: dealing with the triple player handicap

It could be said that satellite has completed its digitalisation process and, even though some analogue satellites are still operating, their use is subsidiary. Digital satellites have increased the number of channels transmitted, have introduced local interactive applications or with extrinsic return path (telephone, ADSL, etc.) and are now increasingly focusing their

Table 2. HDTV channels offered via satellite



Source: own, with data from IDATE relating to 2007.

interest on data transmission and on the introduction of high-definition services. In fact, in the USA satellite broadcasts the most HDTV channels, something that is generally repeated in Europe, although at much less significant levels. One exception to this is Japan, where the availability of HDTV channels is led by cable, offering seven times more HDTV channels than satellite.

Satellite's main competitive problem against its key multi-channel rivals is that it does not offer triple-player capability, even though it has tried to do so virtually. The USA has offered triple-player packages, taking out agreements with telephone companies in some markets, but the entrance of all telephone operators in the television and broadband arena has made this strategy ineffective. Now satellite is concentrating on exploiting its competitive edge in offering high-definition channels and on making the most of its capacity to transmit data downstream. The implementation of intrinsic return paths for their introduction into the domestic market remains stalled, although there are some interactive services with an intrinsic return channel aimed at business markets.

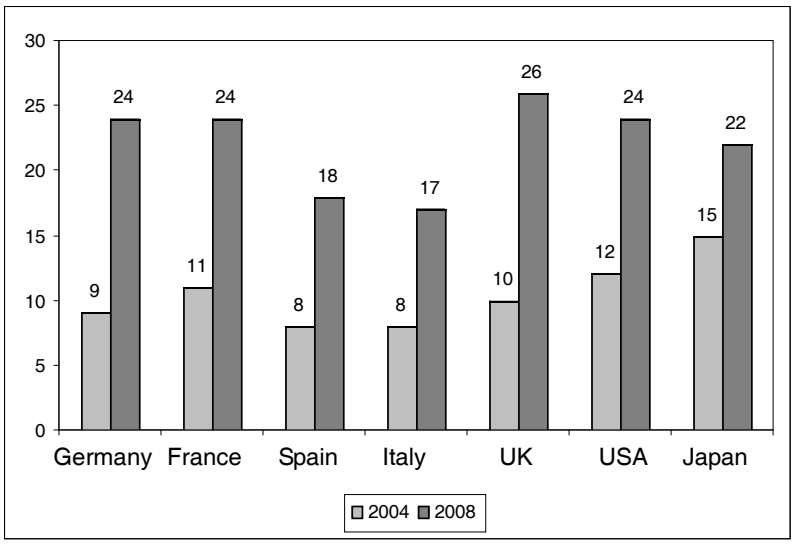
IP Television: with all-digital, all-internet on the horizon

Broadband must be added to these three multi-channel distribution platforms, resulting in the appearance of growing audiovisual traffic. Even though the different video circulation formulas on the internet offer many varieties, two main options should be differentiated at present: user-generated content professionally generated content. The latter includes IPTV platforms, which have actually monopolised this label, using it inappropriately as a synonym of an ADSL supported multi-channel platform.

In fact, within the overall context of the liberalisation of telecommunications, telephone companies will choose this route to make their triple player offers (telephone + broadband + television) in order to compete with cable. The dynamic that results in the supply of HDTV on rival platforms (satellite, cable and now DTT) becoming increasingly more central, apart from the increase in VOD popularity, reveals ADSL's limitations on the telephone network to guarantee a positive user experience. Telephone companies are therefore opting to make large investments in order to implement their own fibre-optic networks. Meanwhile, the capacity to compete with cable in countries with a high level of penetration, such as the USA, currently means it is runner-up in the multi-channel television market, dominated mainly by cable (64.9%)[9] and by satellite, which has already reached 31% of subscribers.

IPTV platform initiatives are possible thanks to the increase in broadband connections, which have seen a spectacular rise in recent years, as much in capacity as in availability. Despite this, in more advanced countries only one in every four people benefit from connections providing access to the most sophis-

Graph 3. Percentage of inhabitants with broadband connection



Source: own with IDATE figures, Ofcom and Ministry of Industry.

ticated services, including internet television. But this fact, however, can be seen another way: namely that, even in the most developed countries, three out of every four people have no access to sophisticated internet applications.

Thanks to the growth in users who enjoy broadband connection, apart from the multi-channel platform mode, audiovisual network activity is becoming more prevalent among all the traffic generated on the internet. This explosion is due to the type of content generated by users (UGC or user generated content). The best-known are YouTube and Dailymotion: websites where users can add video content and, to a lesser extent, also take part in social networks, the most well-known being Facebook and Badoo. Added to this is the feverish exchanging and downloading of videos from industrial cinematographic and television production, more or less legally.

Television operators, after some resistance, are gradually putting their own content for public view on the internet, either via streaming (real-time reproduction) or downloads, or both. Access to content varies between free access and conditional access. Pay-per-view is an example of conditional access, e.g. iTunes by Apple and Canal Play, the French Canal + group's downloading system, as is subscription access, paying a monthly subscription to access things like L'Equipe TV Live or DK4 livestream. Free-access systems are financed by fee-payers, such as the BBC's I-Player, or funded by advertising, such as ITV or the American networks (ABC, CBS, Fox and NBC). There are also mixed options, e.g. with RAI, TVE or, in Catalonia, Televisió de Catalunya, a pioneer in exploring all forms of internet presence, from different types of streaming to downloads (Prado and Fernández 2006).[10] After a period in which conditional and free access were combined, free access with mixed financing has now been chosen.

Apart from television channels, other businesses have appeared that provide audiovisual content from the film industry and television channels. This is the case of Hulu, a business run by NBC Universal and News Corp (Fox) which supplies VOD programmes from different North American channels. As well as NBC and FOX, it also offers programmes from Comedy Central, PBS, USA Network, Bravo, Fuel TV, FX, SPEED Channel, SciFi, Style, Sundance, E!, G4, Versus and Oxygen, as well as offering films from different studios, such as Universal, 20th Century Fox, MGM, Lionsgate Entertainment or Sony Pictures. It uses Flash Video technology to ensure SDTV features and also has some programmes in HDTV. The distribution of this content is legal because Hulu has acquired the internet rights and access is free for users because it is funded by advertising.

A similar case is Joost, a company started by the founders of Kazaa and Skype, which also gives access to television programmes, whose rights it has acquired from CBS, Showtime, Last.fm, Wallstrip, Moblogic, Viacom, BET, CMT, Comedy Central, LOGO, MTV, The N, Nickelodeon, Spike and VH1, Sony Pictures and Warner Bros. It uses Flash-based technology and is developing its own P2PTV. Joost uses some tools from social networks, offers free access and is also financed by advertising.

The BBC promoted a similar initiative in an agreement in which ITV and Channel 4 also participated, which had aimed to promote content from British operators. Currently, this initiative, nicknamed Kangaroo, has encountered regulatory restrictions which have delayed its entry into operation.

All these internet distribution formulas for audiovisual content show to what extent the internet experience is moving increasingly towards audiovisuals. In fact, traffic figures show the great importance this content is acquiring and forecasts point to exponential increases.

Mobile television or television on mobiles?

By mobile television we mean television that can be received on mobile terminals: disseminated over Hertz networks follow-

Table 1. Internet traffic in the USA. Petabyte (PB) per month

Internet traffic in the USA. PB (Petabyte) per month				
	2007	**2008**	**2009**	**2010**
Web, e-mail, transfer	186	249	325	425
P2P	370	439	507	526
Games	15	19	23	28
Video communications	4	4	5	7
VoIP	5	7	9	11
Internet video on PC	139	240	346	449
Internet video on TV	48	155	301	492

Source: own, with data and forecasts from Precursor LLC.

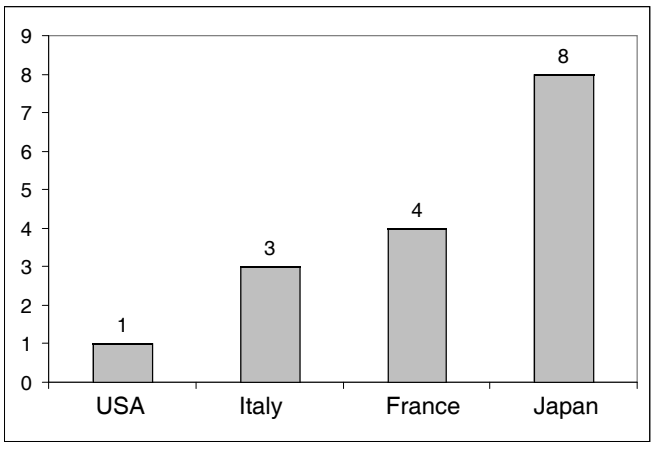
ing a broadcasting system (from one to many) using digital standards such as DVB-H, ISDB-T and ATSC, or others such as MediaFLO, DAB or MBMS, received in mobile devices (telephones, PDA, MP4, video consoles, portable TVs, etc.).

Mobile television is still in its infancy. In Europe, the only country where this technology is of relative importance is Italy, which embarked on the experience in 2006 with three operators offering a variable number of free-access or conditional-access channels, using DVB-H technology. The operator 3Italia is the most established and offers 12 channels, combining free access with subscription and pay-per-view. The other two operators – Telecom Italia Mobile and Vodafone – have opted for the subscription model and offer eight and nine channels, respectively. Japan started in 2004 with the subscription service MoBaHo!. Using S-DMB satellite technology, from 2006 a consortium of broadcasters and operators launched a free-access service with ISDB-T technology, their standard of digital terrestrial television. In the USA, Verizon Wireless launched its mobile television service in 2007 and AT&T Wireless in 2008, with MediaFLO technology. In both these cases, the model chosen is subscription and they offer nine and ten channels, respectively. However, in spite of the expectations raised, the business model is not clear.

Television on mobiles is called *unicast* (one to one). It uses the mobile telephone network and is received on 2.5G, 2.75G, 3G or 3G+ devices. Practically all operators offer some service of this type, but they have mostly opted to offer television channels that are already broadcast on other media or with slight adaptations. Currently, the availability of products specifically conceived and developed for mobiles has not moved beyond experimentation. The business model, as much in this case as in the previous one, raises many questions about its viability.

Given this scenario, the percentage of mobile-phone users who actually watch TV on their phones is almost surprising. As you can see from the graph below, the country with the greatest usage is Japan, a pioneer that did not launch this service in vain. Even so, no more than 8% of users watch live television on their mobile.

Graph 4. Use of mobile for watching live television (in %)



Source: own, with data from Ofcom, 2008.

There are still clear possibilities for exploration and a lot of regulation is required to enable a new concessional process capable of opening up the horizon to new business models that meet public demands.

Receivers: dispersion and confluence

Digitalisation presents all kinds of novelties in terms of devices used as receivers. Here various trends intersect. The first is the variation in screen size, varying from miniature to giant *videowalls*; the second is multi-functionality (television reception, viewing offline products, surfing the internet, etc.); the third is process and memory capacity; the fourth is how tactile the device is; the fifth refers to connectivity and there is also a sixth, mobility. All of this leads to tremendous dispersion, contradicting the convergent prophecy of the "combo". All screens serve many different purposes, although each one, depending on its size, brightness, definition and location, will be more suitable for one function or use than another. In any case, it is the end of an era in which the receiver and the medium were synonymous.

TV: loss of identity and confusion

If we look at TV, all these trends become evident within a context of confusion brought about by many simultaneous changes: flat screen, digital standard, interactive capacity and high definition. The first and most visible is the replacement of cathode ray tube TVs with flat-screens (plasma, LCD, TFT). This process started before digitalisation and consequently filled houses with analogue receivers on the eve of digitalisation. These new analogue receivers will delay the take-up of DTT and will mean that owners have to acquire an external tuner to be able to see digital broadcasts, reconverting the signal into analogue. Moreover, in many European countries, and notably in Catalonia, since there are no regulations to prevent users ignoring the limitations arising from this option, they mainly choose to buy simple tuners, known as *zappers*, which do not have MHP (*Media Home Platform*), the standard that allows the enjoyment of interactive services (Franquet *et al.* 2008).[11]

While these types of screens are still being marketed, digital televisions – with an integrated receiver – are coming onto the market. In this case, with no regulatory rules for them to follow, companies also sell receivers that do not have MHP. As a result, the number of digital TV receivers able to operate the interactive services associated with DTT is not rising. Consequently, the market conditions are delayed, *sine die*, that should stimulate the supply of interactive services that bring the so-called information society services to certain segments of the population, one of the acclaimed virtues that were meant to accompany the switch from analogue to digital television. Finally, the other change coinciding in time is that of high def-

inition. The majority of flat-screen TVs that are updating the receivers in Catalan and European homes are of standard definition, some are *HDTV Ready* and only some have *Full HDTV*.

In Europe, and in Catalonia in particular, HDTVs have caused confusion. In the first place, there is a widespread belief among users that TVs have HDTV capability so everything they see will have a better-quality image and will be in high definition. Secondly, they also believe that *HDTV Ready* means the receiver is high-definition, when in fact it will need adapting to be so. Finally, they also believe that a TV with *Full HDTV* capability will allow you to watch high-definition digital definition, when in fact it will only let you see programmes made in HDTV in high definition. A whole range of misconceptions that do nothing but generate frustration and lack of confidence in consumers, yet they represent another delaying factor in the digital convergence process.

But HDTV is one of those 'totem' concepts that tend to be used in technological marketing, a fact that creates all manner of disappointment everywhere. In the USA where, as already stated, broadcasters have clearly chosen HDTV and all multichannel operators (satellite, telephone, microwave) have a wide range of channels and VOD in high definition, the adoption of HDTVs is accelerating. According to figures from the LGR (2008),[12] 34% of North American homes have at least one high-definition TV, a percentage that has doubled over the last two years, which confirms growing consumer demand. In absolute terms, this means that there are 40 million homes that can receive high-definition emissions in the USA, but the same study states that confusion also reigns in the country concerning high definition, since 18% of homes with an HDTV receiver believe they are watching high-definition television when they aren't, in spite of having a receiver capable of providing this.

STB: more and less

STBs (Set Top Boxes) have been key devices in accessing the supply of multi-channel systems, as much with satellite as with cable, in the analogue age. These devices, separate from TV sets, allow access to the signal of these platforms and manage conditional access, according to the subscription the user has taken out, as well as other offers, such as pay-per-view (PPV) or interactive television (iTV). With digitalisation, STBs have increased their processing capacity and have been key in giving users new and more sophisticated access options: VOD, interactivity management and ultimately access to HDTV channels and, in some cases, triple player benefits. Moreover, STBs are increasingly merging with another device that changes the user's conditions of consumption, DVR (*Digital Video Recorder*), when not replaced by TVs with Tru2way technology. This technology, developed by CableLabs and previously called OpenCable™, allows access to all the benefits of cable without needing a STB. These sets allow conditional access, VOD, PPV and interactivity simply via a subscription card that is inserted directly into the set. The first sets with this technology have been launched recently onto the market in an agreement with Comcast, the most important North American cable operator (14,738,000 subscribers to 3Q in 2008), and Panasonic, which has fitted this technology into some of its well-known VIERA plasma-screen models.

DVR: after all the fantasies, will it not have a window of opportunity?

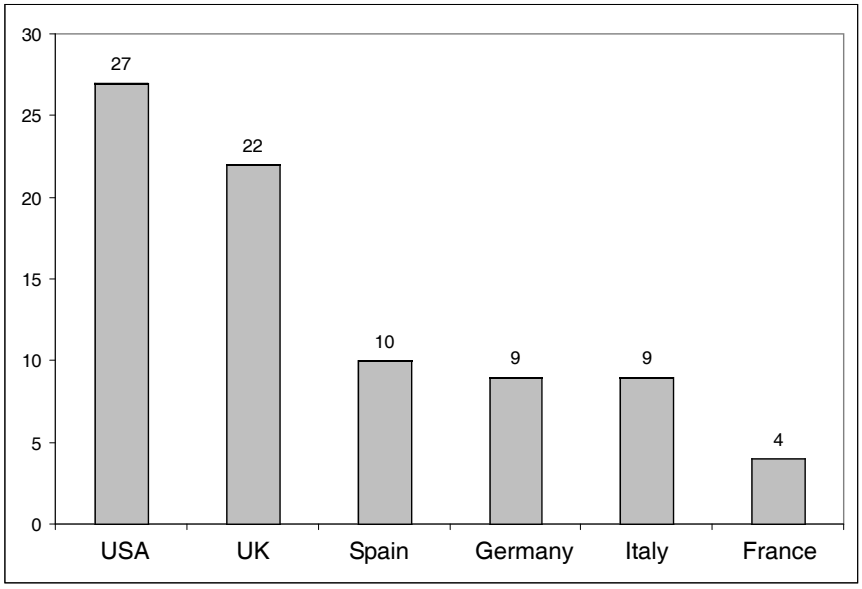
DVRs (*Digital Video Recorders*, also known as *Personal Video Recorders* or PVRs) are devices that were meant to replace domestic VCRs (*Video Cassette Recorders*). They offer the same functions but, instead of using tape, they have a hard disk that allows them to record up to 400 hours. DVRs contain software that allows users to navigate between available channels, to record, store, classify – by default or user-created criteria –, and easily recover the programmes recorded, as well as a *Time Shifting* function, which allows a live broadcast to be paused and then taken up again and the time recovered during the next advertising break. This is one of the most highly regarded functions by users, who can skip adverts when they watch recorded programmes. DVR can also learn users' preferences and offer them a selection of programmes likely to interest them, as well as schedule the recording or even record one that might match the user's tastes and afterwards inform them of the recording the first time the user connects, giving them the option of watching, storing or erasing the programme.

Since the introduction of DVRs at the end of 1990s, rivers of ink have run on its capacity to transform television consumption habits[13], on releasing TV viewers from programming and from the tyranny of having to synchronise with what is being broadcast, as well as its capacity to self-programme and the independence of freeing itself from the omnipresence of television advertising. These characteristics would threaten the medium's survival, whose essence is tied to lineal-flow broadcasting, to the programming of a sequence of programmes, and would also work against the business model based on advertising revenue.

In spite of everything, users have adopted this device very slowly: in the USA a limited market share penetration has been achieved in 27% of homes and in Europe it is much more modest, except in the United Kingdom, where it has reached 22%.

But the survival of DVR as a singular device is strongly threatened. The first threat comes from the aforementioned fusion with digital STBs: most of the platforms have all DVR functions included within their own digital STBs. But another threat comes from their conversion into virtual DVRs, which can be installed in any kind of computer and, by default, any computer card used to tune a television contains software that turns your computer into a TV and DVR at the same time. Finally, another threat comes from the aforementioned trend, followed

Graph 5. Penetration of DVRs in the United States of America and Europe (in %)



Source: own work, with data from Forrester Research, Inc., by 2Q in 2007 in Europe and by LGR by 2Q in 2008 in the USA.

by television operators and those providing TV content (Hulu, Joost), to make this content available online and accessible on VOD, making local storage totally unnecessary, which is the main function of DVR.

Social appropriation of the digital experience

We can draw some conclusions from an analysis of the state of the affairs regarding the introduction of digital innovations applied to communication. To start with, the capacity to produce and manipulate images and sounds is now greater than ever.

This situation has consequences in the professional production industry, since it allows business initiatives with more affordable technological investment costs than in the age of analogue technologies. However, professional production costs are still high and threaten to be higher still if it becomes a general requirement that all professional production is in HDTV. FOX has just announced that all its broadcast channels and multi-channel offers will only be produced in high definition by 2010[14]. This maintains a situation that has been growing since the start of the multi-channel age: the capacity to produce original content is growing more slowly than the capacity to transmit it.

A large capacity to record and manipulate sounds and images also has consequences on an individual's ability to produce content. Image and sound production have become commonplace. Image has become ubiquitous. It does not seem possible that any area of reality can escape the gaze of a camera as a consequence of broad ownership of popular consumer electronics.

This situation of personal ownership of recording devices is not a recent phenomenon, having a precedent in the analogue era, but the products obtained found it very difficult to undergo any post-production and, as rough pieces, were quite limited in terms of entering the chain of communication. Now the dissemination of non-linear publishing on personal computers and sound and image processing software, as has been seen, have enabled a growing number of individuals to produce and post-produce pieces worthy of communication. This has led to the hypothesis of the advent of an unprecedented democratisation in audiovisual production and limitless freedom of expression. Such content's capacity for dissemination on the internet has backed up this hypothesis, especially with the growing popularity achieved by such UGC sites as the aforementioned YouTube or Dailymotion.

However, we are already seeing signs pointing to a decline in the centrality of UGC video on the internet. While other forms of UGC carry on growing, such as photographic or social networks, video inputs have slackened off in more developed markets, while access to television programmes through the internet has risen, especially in countries with the arrival of media aggregators providing programmes from different channels, such as the aforementioned BBC iPlayer or Hulu, which have helped to increase the *streams* per capita of free-access programmes by 69% in the United Kingdom and by 85% in the USA.

In any case, in most countries the percentage of internet users who watch videos rather than television programmes online is still higher, but this also depends on the duration and the different requirements for a good quality connection for these two types of audiovisual content.

Anyhow, the future of aggregators of user-generated videos is still not written in stone; the volume of products stored and the traffic they generate is starting to encourage debate on their viability.

On the other hand, all manner of initiatives are emerging to put a value on this content from an industrial perspective. One

trend that we might call "undue appropriation" consists of television programmes that are funded totally or partially through user-generated videos, incorporating them into their value chain without paying copyright. Another trend is to place these productions within an industrial initiative whereby user generated content is provided in different proportions to go to make up the supply. In this case the content is selected using editorial criteria and the content actually broadcast entails some rights for its author. The most successful case is that of Current TV, a channel promoted by the former vice-president of the United States, Al Gore, which has consolidated its position in North America and has started to expand into Europe, first in the United Kingdom and more recently in Italy.

All digital and all internet: a fixed deadline and episodic realisation

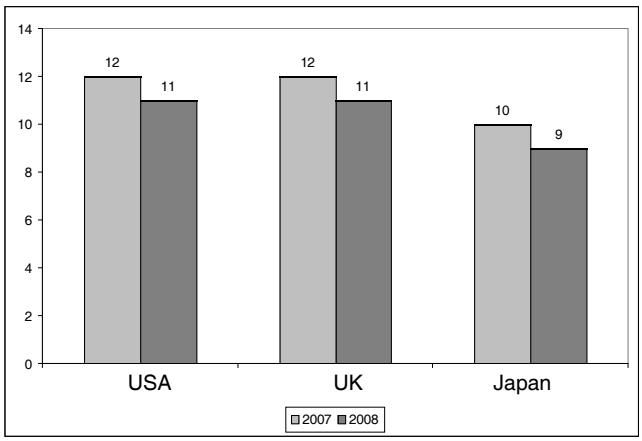
As we have seen, transmission capacity has also grown exponentially and, it would seem, without limits. Despite this, there is strong resistance to network integration. From a technological point of view, all transmission media could be integrated as network resources that would allow effective convergence and the consequent improvement of available broadband per capita. The interests of network operators have slowed up this convergence, since each seeks to capitalise on the competitive advantages they have achieved by making multi-million investments, as we have shown. Nevertheless, despite understanding the need to recover their investment, the convergence of media that must lead to 'all-digital, all-internet' will not be possible if a deadline for the so-called *net neutrality* is not established, which would avoid discrimination in terms of signal transmission quality, independently of the service provider. Meanwhile, the different capacities of different networks will continue to provide one type of service or another more efficiently.

Many difficulties persist in the run-up to convergence. The first relates to discrimination in the capacity and coverage of internet access, which keeps 78% of the world's population without access, and a tendency for the gap between developed and developing countries to widen.

The second difficulty relates to quality of access: a high proportion of people cannot access broadband, not only in developing countries but also in developed ones, where only one in every four internet connections is made through broadband (see graph 3).

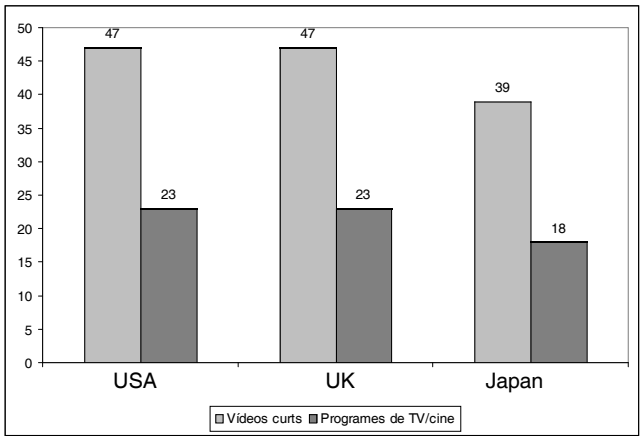
The third difficulty is marked by the fact that, among those who do have broadband access, transmission capacity varies a great deal depending on the type of connection used, which depends on their financial situation and, irrespective of being able to afford the cost, depending on the availability of some infrastructures or others. In general, those that have a broadband connection through digital cable operators can enjoy much higher bandwidth speeds than those who use ADSL lines, whether wireless or not, or with third-generation mobile phone connections which, as we have seen, can triple the typical connection speed, excluding the possibilities of cable with *wideband* which brings transmission speeds up to 50 times higher than those typical of ADSL.

Graph 6. Use of the internet for uploading videos onto a website (in %)



Source: own, with Ofcom figures.

Graph 7. Use of the internet to consume audiovisual content (in %)

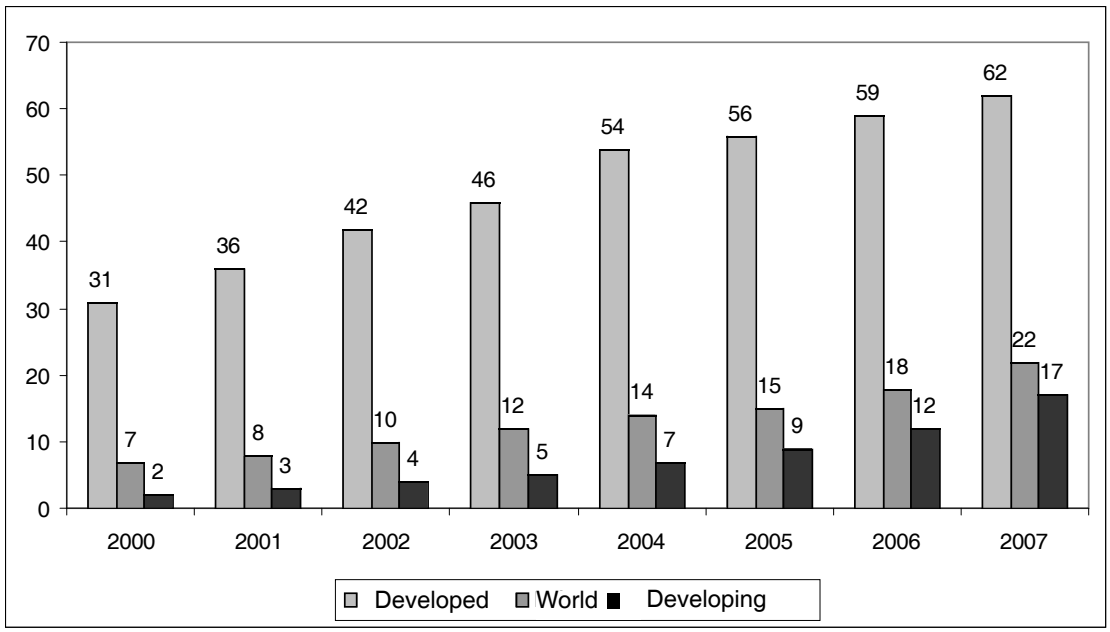


Source: own, with data from Ofcom, 2008.

A Great Virtual Universal Store, more virtual than universal, for now...

Obviously the type of connection determines the degree of access to the most sophisticated applications, both with video signals in general and television signals in particular, especially in the case of high definition, as well as services requiring a greater degree of interactivity. Therefore, if we consider this on a global scale, the advent of 'all-digital and all-internet', which would give way to a Great Virtual Universal Store (GMUV in Catalan) (Prado 1997)[15] to provide people with all types of

Graph 8. Internet users per 100 inhabitants



Source: own, with data from the ITU.

information and cultural products, remains in the more distant future. This GMUV would not be based in any geographical location but distributed in the magma of the internet and would be free to access, both by the user and the producer. It could be entered with the sole condition of having the necessary connection technology and the knowledge required to surf, and it would contain products of free access and others with more limited access. But if we consider this on a more local level, for those who have broadband access, this starts to be a reality, reflected in the data we have given about internet traffic in the USA (see Table 1).

If we look at how internet users use audiovisual products in the most developed countries, GMUV starts to take shape.

These figures allow us to see a reality that is a consequence of digital convergence. The capacity to protect borders against the circulation of audiovisual products and, in general, of products from cultural industries, which was possible in the analogue era, is now impossible in the all-digital, all-internet scenario. Citizens can access GMUV and establish their own consumer menu without paying any attention to the chosen product's identity card, by virtue of the value it has and not because of its nationality.

If we accept that audiovisual consumption plays an important role in the transmission of values, in the health of a language, in the defence of cultural and national identity and in social cohesion, then alarm bells must sound urgently.

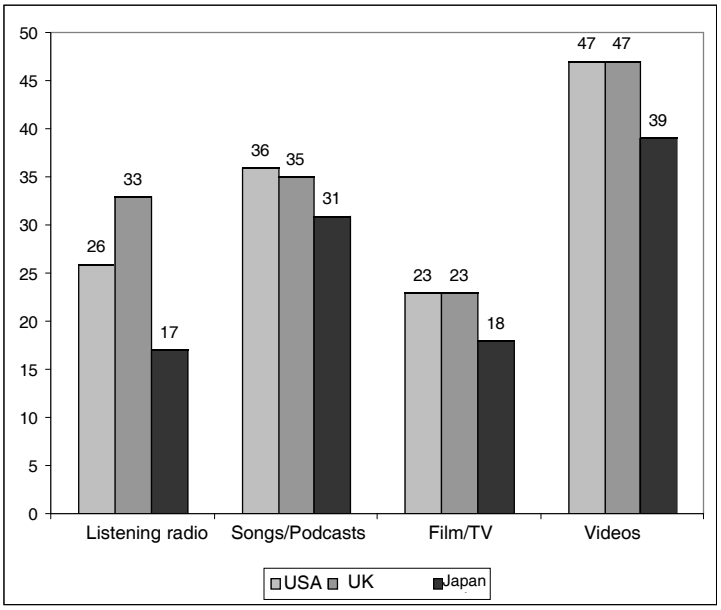
Communication policies, more necessary than ever

Communication policies owe too much debt to the capacity to place boundaries on media coverage and the effectiveness of restricting the circulation of content. In the all-digital, all-internet scenario, these two supports have lost efficiency and communication policies must therefore resort to other measures. The first is to shift the focus from policies of dissemination to production.

It is necessary to provide the GMUV with competitive products so that it can continue to fulfil the functions of identity and social functions held by audiovisuals in the recent past. One must invest, therefore, in the consolidation of a competitive national industry, invest in training creative talent and in the presence and visibility of national GMUV devices. Given the growing proportion of audiovisual consumption on the internet, it is necessary to encourage national channels to make all their content available on the internet, both live and on demand. In this respect, we must follow the example of the Corporació Catalana de Mitjans Audiovisuals and support the effort made to find a space in the GMUV through all possible openings. One must also undertake cooperative initiatives between different operators to boost the presence of national products. In this way, the British initiative Kangaroo, an aggregator providing content from the BBC, ITV and Channel 4, boosts the presence of British production on the internet and is a way that can be followed by new policies. One must also stimulate the national business initiatives of media aggregators, which can secure economies of scale on the internet for national products and can explore avenues to raise their value externally, with the dual result of making national identity visible outside the country and expanding the market for content producers.

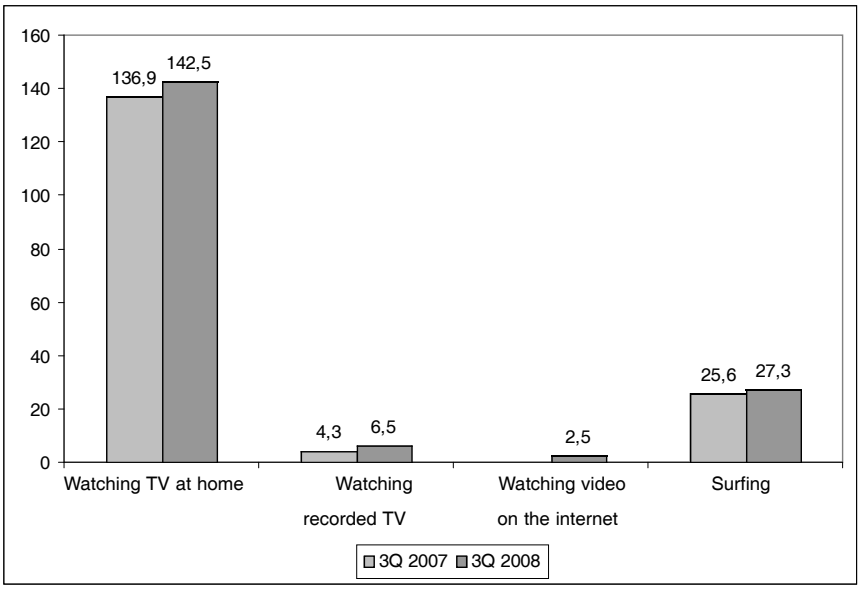
Communication policies must also revolve around training user skills in navigating the GMUV and in knowing how to find quality products to make up their own consumer menu, with

Graph 9. Use of the internet to gain access to audiovisual content



Source: own, with figures from Ofcom's *Understanding International Communications Behaviour research*, October 2008.

Gràfic 10. Hores mensuals invertides per persona als Estats Units d'Amèrica



Font: elaboració pròpia amb dades de Nielsen.

the hope that the combination of these two skills, creativity and user skills, will lead to the consumption of a significant proportion of products with a specific brand.

The challenge is not small, but the brakes to completing convergence still allow an effective reaction because, despite the growing importance of internet usage, classic audiovisual consumption has not diminished, and part of the time spent on internet consumption has gone to TV, a fact that debunks the idea that the internet would kill television.

In the United States, time allocated to television consumption has not fallen despite time given to the internet. Time given to real-time television viewing in the home increased by 4.1% in the last year, in spite of the fact that the consumption of programmes recorded on DVRs has significantly increased (52.5%), although in absolute terms this figure is low. Neither has television consumption been negatively affected by the time spent surfing the internet also increasing by 5.7% in the same period. These figures indicate television's robust health, not only with more real-time TV viewing but also the fact that a part of the time spent by users surfing the internet is used for watching television programmes. Moreover, the time spent watching programmes recorded on DVRs must also be added

to TV consumption. We should also point out that some internet users have multi-tasking habits and often split their consumption simultaneously.

But these figures must not let us lose sight of the changes underway and the powerful trends indicated. It is important to remember that many of the possibilities affecting television are only available to those who have broadband access, something that will gradually change as availability spreads. We must therefore identify the dangers to plan solutions and detect opportunities.

Notes

1 This article contains some of the findings from research project SEJ2006-10067.

2 GRISS is a research group consolidated and financed by the Catalan government (2005SGR-00846).

3 CEA. "Digital America 2008". *CE Vision Magazine*. Arlinton, 2008.

4 OFCOM. *The International Communications Market 2008*. London: Ofcom, 2008.

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7 CMT-CAC. *La televisió digital terrestre a Espanya. Situació i tendències*. Barcelona: CAC, 2002.

8 PRADO, E. "Visiones, futuro y funciones de la TDT en la sociedad de la información". In: *Telos*, no. 57, Madrid: Fundación Telefónica, 2003.

9 NCTA at <http://www.ncta.com/Statistic/Statistic/BasicSubs.aspx> [Consulted 15 September 2008].

10 PRADO, E.; FERNÁNDEZ QUIJADA, D. "The Role of Public Service Broadcasters in the Era of Convergence. Case Study of Televisió de Catalunya". In: *Communications & Strategies*, no. 62. Montpellier: IDATE, 2006, pages 49-69.

11 FRANQUET, R.; RIBES, X.; SOTO, M.; FERNÁNDEZ QUIJADA, D. "La información en la TDT interactiva: una oferta incipiente para unas prácticas periodísticas en transformación". In: *Trípodos*, no. 23. Barcelona: Facultat de Comunicació Blanquerna, 2008, pp. 15-29.

12 LGR. *HDTV 2008: Consumer Awareness, Interest and Ownership.* [Online]. <http://www.leichtmanresearch.com/press/111208release.html> [Consulted 13 October 2008].

13 A good analysis of this fantasy is found in William Boddy's article "Redefining the Home Screen: Technological Convergence as Trauma and Business Plan", at <http://web.mit.edu/comm-forum/papers/boddy.html> [Consulted 3 September 2008].

14 This announcement was made on 8 December 2008, at <http://www.multichannel.com/article/CA6620568.html?nid=4682&source=link&rid=5959977> [Consulted 8 December 2008].

15 PRADO, E. "Nuevas tecnologías e interactividad: Gran Almacén Universal Virtual". In: *Diálogos de la Comunicación*