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Technological convergence: a state of the art on the issue

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Abstract
The audiovisual industry is one of the country's major assets. Convergence of networks and terminals and ubiquity of access is leading to an intensive use of audiovisual media in electronic communications, whether in their traditional or new formats. In this regard, next generation networks will generalise high capacity access, leading to new uses and new ways of acting.

To bring about this new scenario and to maintain and establish the audiovisual sector we have today, the country must be able to offer it a sufficiently attractive environment in which to experiment with and apply these new uses and then export them elsewhere. There must be new networks if we are to generate markets where these new environments, modes of consumption, options and tools can be tried out. To allow local industry to conceive, experiment with and validate models. This is where governments can also help by carrying out projects that help to consolidate the sector.

Key words
Technological convergence, telecommunications network, interactivity, IPTV, mobile TV, audiovisual conssumption.

Resum
La indústria audiovisual és un dels grans actius del país. La convergència de xarxes i terminals i la ubiqüitat en l'accés ens porta a un ús intensiu de l'audiovisual dins de les comunicacions electròniques, tant en els formats tradicionals com en els nous. En aquest sentit, les xarxes de nova generació permetran la generalització dels accessos de gran capacitat, la qual cosa ens durà a nous usos i noves maneres de fer.

Per fer realitat aquest nou escenari i mantenir i arrelar el sector audiovisual de què disposem, cal que el nostre país li pfereixi un entorn prou atractiu on experimentar i fer realitat aquests nous usos, i poder-los exportar després arreu. Cal disposar de les noves xarxes per generar mercats on experimentar amb aquests nous entorns, modes de consum, possibilitats i eines. Per permetre a la indústria local concebre, experimentar i validar models. Les administracions poden ajudar fent realitat els projectes que ajudin a consolidar el sector.

Paraules clau
Convergència tecnològica, xarxes de telecomunicació, interactivitat, IPTV, televisió per mobilitat, consum audiovisual

1. Telecommunications infrastructures: strategies

1.1. The importance of ICTs

A country's backbone is provided by its infrastructures: its roads, its railways, its power grids, etc. and also its telecommunications networks. Modern times dictate the use (both quantitative and qualitative) these are put to.

Individuals, companies and public administrations are trying to find ways to adapt to a present that is changing so quickly that it almost instantly becomes the past. A revolutionary present in post-modern terms in which concepts like *now* and *then* are constantly redefined through binary communication systems.

These days no-one would deny that telecommunications as a tool are basic to a country's competitiveness. In fact, the experience of the Nordic countries, leaders in this as in other fields, has demonstrated that there is a clear correlation between investment in education and telecommunications and the rise in a country's competitiveness.[1] This gives new technologies a vital role in the development of modern societies and their competitiveness. As well as being seen as basic infrastructures on a par with electricity, water and gas, they are simultaneously across the board in areas like education and employment relations, and in the increased competitiveness and evolution of a country's production model towards a new model with higher added value.

1.2. Deployment of infrastructures: public intervention required

In spite of recognising the importance of these technologies, for the last ten years ICTs[2] have been seen as the preserve of private initiative, resulting in an unequal territorial distribution of opportunities to access these new services. Private initiative has only addressed those areas that offer the best chance of return on investment, that is, with large concentrations of population or high levels of economic activity. This *private* deployment of infrastructures has therefore left large areas without any electronic communications service cover.

Faced with this situation, it has nonetheless been observed that, in societies seen as benchmarks in the field, it is public administrations that act as their driving force, with policies that foster the creation of infrastructures, services and content and make efficient and effective use of new technologies to improve service to citizens and businesses. There has therefore been a volte face towards making public initiative responsible for creating the conditions to finally put an end to the digital divide between territories. In this respect, different administrations (the European Union and national, regional and local governments) have begun to launch a raft of programmes to bring ICTs into all sectors, and at all levels.

Similarly, electronic communications services and others including energy, transport, social and health services make up what are known as the *general-interest services*, one of the pillars of the European social model. Within the European Union, general-interest services are fundamental in guaranteeing social and territorial cohesion and economic competitiveness.

Individuals and companies quite legitimately expect the same access to quality general-interest services at affordable prices throughout the territory. For individuals, such access is an essential part of their standing as European citizens and is necessary for the full enjoyment of their fundamental rights. For companies, the availability of these services is an indispensable prior condition in any business environment that will favour competitiveness.

Thus a supply of general-interest services, in particular electronic communications, is an important factor in achieving the Union's strategic objective, proclaimed by the Council of Europe in Lisbon: "to become the most dynamic and competitive knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion."

Electronic communications are among the general-interest services that have seen the greatest transformation, and from this privileged position can therefore serve as a model for other services. To ensure that the stated objectives of cohesion and competitiveness are met, general-interest services must be provided subject to certain principles, among which is the key concept of *universal telecommunications service*, the right of everyone to have access to certain services (basically landline telephone and functional access to the Internet) considered to be essential.

Both on its own volition and as an integral part of the European Union, Catalonia shares these objectives of social and territorial cohesion and competitiveness. But the Catalan government's actions go one step further, pressing for universal service to be extended to cover mobile telephone service, broad-band internet and public digital terrestrial television, a wish repeatedly expressed to the European Union and other bodies. The obligation to provide electronic communications services, with their requisites of quality, reliability, safety and consumer and user protection, presupposes appropriate availability of the networks that underpin these services.

1.3. Deployment initiatives of the Catalan government

To ensure the availability of telecommunications and infrastructures, the Catalan government is concentrating on two lines. One in the short-term, through the Pla Catalunya Connecta,[3] which in its first phase to 2010 aims to bring at least mobile phone, broadband internet and DTT television access to centres of population in Catalonia with over 50 inhabitants. A second line that is being worked on in the mid and long term is to incentivise the introduction of next generation - essentially fibre optic – networks to provide the bandwidth required for future electronic communications.

But the deployment of infrastructures is not an end in itself. It could even be referred to as a *necessary evil*, in the same way as knowledge is not just an accumulation of data but what we do with it. The Catalan government's goal is to lay the foundations that will support the size and diversity of content required by society and the new business models. These structures are the scaffolding that must sustain the flow of information, which is after all the raison d'être of the Knowledge Society and the so-called New Economy that we wish to achieve. In other words, the infrastructures' sole aim is to allow individuals, governments and companies to benefit from electronic communications services at all times.

Irrespective of whether these infrastructures are deployed by public or private bodies and of the services they may support, it is increasingly clear that there is an inexorable trend towards technological convergence, both in networks and in services and terminals.

2. Technological convergence

2.1. Background

What we call *technological convergenc*e is the result of combining data transport networks with the digitalisation of their content. This will only affect the market when the networks have sufficient capacity and their content is completely digital. If one of these factors is missing, then its affect on the market is much less.

These days, any home has several electronic communication networks. Radio arrives via its receiver antenna (or the domestic installation); television (analogue or digital) arrives via radio frequency (through the television aerial) or by cable via a telecommunications operator; telephone by copper cable via a telecommunications operator, and internet access via the same copper cable (if ADSL) or the coaxial cable of the operator in question.

This setup is already changing. The new electronic communication networks are integrating services previously carried on different networks, converging them into one. Our homes will increasingly have just one inlet for one telecommunications operator, who will supply telephone, internet access, radio and

television services (and at a quality far superior to present standards, with new and improved services).

For historical reasons, television will probably follow one of two paths in Spain. Given the extensive deployment of aerials and cover throughout the country, much greater than for other electronic communication services, it seems unlikely that cable access technologies will overtake traditional radio frequency channels, at least in the short term. Indeed, the fact that the public administrations and radio broadcasters have both opted for digital terrestrial television (DTT) clearly indicates that radio frequency broadcasting technology (digital, of course) has by no means reached the end of its life cycle. However, it will soon have to start to compete with other broadcasting channels, which will come in gradually and slowly begin to gain ground.

In any case, this change affects the whole value chain of what until recently were separate markets. Content distribution networks are changing, as are players and access points; even agents who up to now were providing content and the means for its consumption. However, an analysis of these changes is beyond the scope of this article, which will be limited to providing a more technical explanation, without entering into market research or reconfiguring the value chain.

Because this change is caused by a technological change, the new environment must be understood before we examine its consequences. This technological change is what is known as technological convergence, the convergence of networks, accesses and devices.

Technological convergence arises from the digitalisation of information and its transmission. As soon as information has been digitised it can be transferred much more efficiently in information packages (known as IP technologies), the origin of the internet. In fact, the IP effect is one of the major revolutions in this market.

IP technology is not new, but it is only now, when network speed has evolved sufficiently to allow its capacities to be exploited, that we are able to digitise images and videos with high enough quality and efficiency. To make this change, both processes have had to coincide and mature for all their potential to be usable. Today, both conditions for initiating these changes are in place.

Although DTT can provide limited interactivity, only after it has been combined with a return channel following technological convergence can its new capacities be exploited. However, the increase in quality and capacity of the channels broadcast and the large installed base of reception systems give it significant margin for growth.

Conversely, the case of DAB ("digital audio broadcasting" or digital radio) is an example of improved quality that has not taken off in our market although it has penetrated other markets because formulae have been found to make users listen to digital radio in DAB format. In any case, the future of radio lies in digitalisation, although it has hung on to its existing technology pending a jump to other technologies or a development in this technology (for example, direct streaming by wireless IP technologies). In spite of this, listeners can currently enjoy a good range of digital radio broadcasters on DTT.

2.2. Digitising content

Digitising content has been discussed since the 1990s. It was the first step towards what today has become consolidated in most productions for the general public. Recordings are now made using digital technology and can be easily transmitted via large-capacity networks.

Until recently this was the extent of debates by technology gurus. But today, when new networks have started to distribute such content and it is reaching consumers, and advanced consumers are already well versed in the use of new technologies, a new *crisis* is appearing in digital content, specifically concerning the formats in which this is distributed.

Everyone assumes that content must be digitised for its transfer and consumption, and so the debate is focussing on formats: people now want to interact with content, not just be passive consumers. So the debate has moved on to the consumption of content, how and where it is consumed and in which device, since these issues affect its creation, consumption and method of distribution.

Here it is worth taking a look at the first initiatives launched in different markets. For example, the series *24: Conspiracy*, adapted for mobile phone consumption (24 one-minute mobisodes, Vodafone & Fox Entertainment Group, 2004). (Other examples of mobisodes are *Lost*, *Prison Break* and *Doctor Who*, or cases like *When Evil Calls*, with 20 mobisodes of approximately 2 minutes, accessible on O2, T-Mobile and Orange as well as YouTube and MySpace). This case study[4] shows that not only are adaptations required in production (to adapt it to terminal screens, creation of close-ups instead of wide shots, direct, clear dialogues, etc.), but also in pace (short episodes, for easier downloading, with fast action but incorporating images based on clear fixed shots etc.).

Another aspect is television on mobile phones, for example DVB-H, which uses content already created for other broadcasting channels, less concerned with impact on production than on new consumption habits.

Furthermore, the consumer is no longer a passive link in the chain and now wants to decide what to view and when to view it. And not only with *à la carte content* but also the place and the device. The need, already expressed by spectators, to interact with content must be borne in mind. Now people don't want to be a mere *spectator*, a figure waiting for the distributor to give them what they want (although this does not mean that this facility will disappear). This is a new *actor*, not just a spectator wanting to interact. The first examples of this phenomenon have been via decoders, by means of the telephone line, but uncertainty about the economic cost made most users disconnect the line from the decoder.

However, the success of SMS messages as a return channel (and the business generated) has created new expectations and

new promises still to be met. In addition, now that the market has changed and flat rates and permanent internet connection have become the norm throughout the country, new initiatives may appear in order to take advantage of these changes (now that flat rates no longer attract the suspicion mentioned above).

So new uses of the internet also influence audiovisual consumption. Young people (the *Cut & Paste* or *Google Generation*, as they are known) prefer interactive systems, turning their backs on the passive consumption of information. According to a report by University College London[5] on the use of networks among young people, they prefer visual to textual information. However, an interesting debate has arisen on the impact of the internet on reading and whether it is affecting the ability to concentrate.

In particular, the article by Nicholas G. Carr[6] "Is Google Making Us Stupid?: What the internet is doing to our brains", published in the magazine *The Atlantic Monthly*[7] July/August 2008, has created a debate on the blogosphere that has even reached scientific journals like Edge.org. Specifically, the question raised is whether new habits of searching for information are affecting out ability for deep concentration. Putting to one side the negative posture of Carr, the debate has gone beyond this and is now analysing how searching for information is evolving.[8]

Although the appearance of the calculator affected most people's ability to do arithmetical calculations, new abilities with search engines seem to affect both memory (why retain information if you know where to find it if you need it?) and consumption of information (the UCL study analyses user behaviour on two research websites –one of the British Library, and the other of the Joint Information Systems Committee- and it concludes that users –of research!– were glancing at information and jumping to the next item, instead of studying it properly).

This change in habits is also affecting the audiovisual field, where products must be lively to attract and retain the spectator. And of course, advertising, which has to find new ways to keep its target's attention.

2.3. Next generation or convergent networks

New commercial offers currently entering the market are considerably increasing the access speed of electronic communication networks. These offers are the result of operators' efforts to renew network technology, efforts that were previously internal to the network and are now reaching users. The renewal of network architectures must allow for:

- Network convergence
- Greater efficiency in network management, operation and maintenance (cost savings for operators)
- New capacities for users

2.3.1. The new capacities

The new networks have great capacities for data access and are seen as the natural evolution of ADSL, but they also include other tools like facilities to offer services managed by others or symmetrical speeds for uploading and downloading information. One of the biggest limitations affecting current commercial DSL technology available in our market (apart from access speed) is that information can be downloaded from the internet at 6, 10, 20 or 30 Mbps, but the speed is much slower when uploading the user's information onto the internet. This is not so in other markets, which have DSL technologies with symmetrical up- and downloading speeds (it was the operators' market decision to introduce unsymmetrical access speeds).

The new networks are expected to improve speeds and to increase symmetrical connections for uploading and downloading information on the internet. Although up to now most users have used the internet to download information, the new applications, where the user is the active party in the communication (Web 2.0 applications, including social networks, user publications or collaborative work) now require the user to be able to supply information to the network and not just obtain it. This is an important change in use in the domestic area, while in the business area (above all concerning collaborative work) this was already happening.

At first, when modem connections were being used and speeds of 256 Kbps being reached, it was said that ADSL did not have much of a market, because only a small part of the market was prepared to pay more to take advantage of increased speed and quality. These days, curiously, the same arguments are being made, but the technologies referred to are xDSL and FTTH. If we compare what we were paying for 256 Kbps access a few years ago with what we pay today for 3 Mbps access, we can see (after updating for inflation and flat rates), that the cost is equivalent. It is to be hoped that, although offers with the greatest capacity target businesses and advanced users first, there is an adoption curve similar to that of ADSL, and the price will then quickly even out.

The basic connection, which today might be 3 Mbps, is expected to be updated and to increase to 10 or 50 Mbps. This will give enough domestic connectivity for high capacity broadcasting/reception of video and audio, which could bring a real change of scenario. Together with flat rates (the *always on* option), this is expected to influence consumption habits and to make multimedia on IP and Web 2.0 applications the norm.

2.3.2. Convergence in fixed and mobile networks

One important aspect of convergence is the cost savings it represents for operators. Even allowing for investment to modernise equipment and the core network, it has been calculated that cost savings in operation and maintenance could amount to between 70 and 80%.[9]

This technological change also lets operators manage both fixed and mobile networks, and so we may soon start to see commercial deals combining the two technologies, or services exploiting the resources of both networks. Vodaphone's takeover of Tele2/Comunitel is already moving the market in this direction.

Another factor is that mobile data services increase the

capacity requirements of mobile operators' infrastructures, and fibre optic must be brought to communications towers and aerials. This means that management of fixed and mobile networks will become increasingly integrated.

What is happening, then, is a technological convergence resulting from network convergence, and at the same time a diversification of final access (DSL technologies, fibre optics or mobile access, either by classic mobile telephone networks like Movistar, Vodafone or Orange; or via new entrants like Iberbanda, which offers WiMAX access). One factor to be borne in mind is that final access, known as the *last mile* or *last metre* in the telecoms industry, is the most expensive part of a network. In this regard, mobile alternatives may become important agents in the market over the next few years. Although mobile access is currently no substitute for fixed access, in future the cost savings in installation and other advantages may raise the profile of mobile technologies still further.

2.3.3. Mobile access

The first offers in *mobile broadband* from mobile telephone operators are just starting to appear. And although current rates are not yet comparable to those for fixed broadband, it is a first step.

The reason why *mobile broadband* offers are not comparable to fixed broadband is that their capacities are not yet comparable, and because their quality suffers when connection volume exceeds a specific threshold. But the technology is making progress in this direction to increase capacity.

From digital mobile telephone service (GSM) we went over to mobile telephones that permitted data connections at a slightly lower capacity (GPRS) and third generation (UMTS), which already allows for mobile data. This is currently improving because these mobile data connections have greater capacity and quality. In fact, now UMTS installations are being replaced by the improved HSPA, and new and more ambitious technologies are already being planned (e.g. LTE).

Apart from this, coming from the IT market we are seeing the evolution of wireless connections: from Wi-Fi to WiMAX, high-capacity wireless access comparable to DSL technologies. We now have a new entrant for resolving the *last mile* problem, not from the mobile phone market but from the computer market. In Catalonia this technology is used by Iberbanda, which operates the Catalan government's broadband network. And already the WiMAX Mobile, a development of the current WiMAX with new mobile facilities, is also planned.

Mobile access is therefore rapidly developing towards greater capacity and allows for systems and accesses that are evolving towards mobile broadband, already encouraging serious efforts to take advantage of services with audiovisuals in mobile networks.

2.4. The impact of convergence on audiovisual consumption

As we have seen, network convergence will mean an increase in the consumption of electronic communications caused by the increase in capacities and new uses. A mass market like the audiovisual field cannot miss out on this change in use and must employ and exploit the new capacities to its advantage.

2.4.1. Passive consumption

Additional channels have already been activated to reinforce traditional consumption. Some television channels are advertising their websites where they offer exclusive episodes or extra information and services using the brand image of the channel's own productions. That is, new channels are already being used to attract consumers and strengthen the link created with the brand.

But contrary to the most progressive views, it is generally accepted that passive consumption of content will continue to be the public's preferred mode of consumption for at least some time to come (see our opinion on DTT).

In spite of this, the passive consumption business model is increasingly seen as out of date. What will probably happen is that alternative channels will increasingly come to reinforce new proposals, since it is on these channels where income will show most growth over the next few years, and they may become the decisive factor when undertaking new productions.

But we should also discard the most negative forecasts. The current deployment of aerials and penetration of radio frequency channels means that the model of television channels as the main content distributors is still seen as dominant for the foreseeable future.

Finally, there is steady progress in demand for consumption not bound by broadcasting time but by consumer preference. Although this used to be resolved by repeating the content at other times (for example, at weekends during low viewing hours), now there are other platforms where this is possible, like the internet or the mobile.

2.4.2. The new models of active consumption

Although active consumption began on (and for) the internet, it is hoped that it will soon extend further, taking advantage of the new domestic platforms.

Initiatives like YouTube have created a trend but are still far from being a major channel of information like television. But moves by operators like the Corporació Catalana de Mitjans Audiovisuals, who are exploring interactivity with *3alacarta* <http//:www.3alacarta.cat>, reveal the first attempts at this.

But the capacity to view earlier broadcasts (like the *3alacarta* initiative or the clips broadcast by YouTube) is not the concept of active consumption. Active consumption is characterised by interactivity between consumers and content, whose course they can change or whose evolution they can influence. Two examples will clarify the idea.

One example is a video game, an example of total interactivity, where the player decides the result of the plot. Another example would be SMS voting during a television programme, where interactivity or the sum of interactions determines the

outcome of a contest or the majority position faced with a specific choice.

The internet is being used to explore different options from a range of possibilities. From initiatives where the spectator interacts fully with the producer of the content (videoblogs and readers' comments, for example, that make up a new global content that feeds back into the whole) to online games, where the producers of the content get together to play a game.

2.4.3. Terminals, a battle still to be addressed

Not so long ago, you needed a different gadget, device or terminal for each type of content you wanted to enjoy: television, playing music, radio, access to the internet, telephone, your location (GPS) or photographs, among others. And there were different gadgets for listening to music at home and while exercising.

Now all that has changed. The content we used to need several gadgets to enjoy is now converging into a single increasingly mobile terminal, where *mobile* means it can be carried and used everywhere. We are also seeing the opposite: gadgets devoted exclusively to one specific use in a specific situation (for example, the iPod or Walkman).

On the other hand, the computer is a mature appliance that concentrates a range of content traditionally only accessible separately: television, music, the printed press, games and many more.

Mobile phones have accustomed consumers to mobility, first with voice and SMS, later branching out as recorders (and creators), cameras that could send images, and now reaching beyond the scope of a simple telephone to become mobile appliances that can access all kinds of content by using their connectivity.

Consumers of content want all this, but they also want it wherever they are (ubiquity) and at any time: in the cafe having breakfast, on the underground going to work, on the beach while on holiday, etc.

So we are actually seeing a dual trend, a concentration but also a specialisation. Up to now this made sense, when it was associated with quality. We had the high fidelity music centre at home and the transistor radio when on the move. But today, quality has improved and is comparable in home and mobile situations, something that is quite new. And furthermore, not just the user's profile or mobility must be considered but also the environment in which the content is to be shared or otherwise, or whether people around are to participate.

As well as the challenges we have already noted – combining content, packaging services, sizing communication networks first for data volume and second for mobility - there is also the design of terminals that are either multi-technological and can display content from different channels, or can reproduce multiple content from a single channel.

The tendency is towards unification. The same multi-technology mobile terminal could be connected up to a mobile television network while also accessing the internet via another technology, sharing content through proximity technology and, of course, reproducing all existing audio and video formats and listening to the radio.

This terminal can also be simplified, however, and fitted with a mobile broadband connection through which all content is delivered, whether put together by a single supplier or located separately by the user.

The cocktail made up of content, technologies, access networks and terminals is starting to take shape. It is already possible to find mobile terminals that can reproduce multiple technologies, accessing the internet with broadband, locating one's position by satellite and maps, acting as a mobile office while being the ever-ready recording gadget: a camera, a video recorder, and with the connectivity required to share all this instantaneously on the internet using a social network.

It can be said that the technological challenge of integrating so many features into a single mobile pocket terminal has been achieved, given the scale of miniaturisation we have become accustomed to from terminal manufacturers. But this also requires users to be experts in the technology, as well as the highly intelligent management of available resources to provide the best solution in every environment.

One school of thought is that a single terminal will be too expensive and/or complex, and that it can be deduced from the arguments above that no single terminal will dominate the audiovisual market, but rather terminals will differ with the user's profile and where they are. Terminals will incorporate more than one kind of connectivity, and the most suitable will be selected. In fact, devices that had functioned *in isolation* from the world will start to share information with the world, thereby multiplying today's possibilities.

The challenges facing the electronic industry, then, are still very daunting, and it is difficult to predict a solution. But as we have said, the main challenges are to combine content, package services and offer them via a single network that connects with the consumer then connects with the mobile terminal that the consumer carries in his or her pocket; or to successfully determine the device for a specific user profile (echoing the success of Apple, for example).

2.4.4. The television of the future

Focussing on the home, a battle is being waged that will set the trends among new agents on the market. The battle between television and the computer. There are two opposing stances in the market that will have no option but to converge. On one side is the traditional television set, which via external decoders is progressing rapidly towards becoming a new, more interactive device with new capacities for recording content, opening up to the outside world and allowing new inputs (from memory sticks to an internet connection). On the other is the computer, which is incorporating multimedia and television reception capacities (or at least receiving television signals via the internet).

Furthermore, the new plasma or LCD screens already incorporate inputs to turn them into monitors for either of the two

systems, so the battle to decide which electronic platform is to prevail is now in earnest.

But this is not a battle that will be decided in Catalonia: the electronics industry is sufficiently globalised for it to be decided in the headquarters of the multinationals involved. And we cannot rule out a new hybrid apparatus that will draw from the advantages of both devices combined (for example, the games console).

While those of us with twentieth-century mindsets are used to consuming quality television, the next generation, more influenced by the twenty-first than the twentieth century, are tending more towards YouTube, which has many advantages but quality is not one of them. So to consume content on large panoramic screens we will have to improve the quality of content on the internet or introduce new methods (it has been calculated that, at speeds of 10 Mbps, good quality films can already be downloaded from the internet in real time, so we may be in for some surprises in the near future).

Added to all this is the tremendous impact of the next technological evolution: high definition, which represents an unprecedented leap forward in quality. The user's experience on first seeing an audiovisual in HD is like discovering a new world and a new way of experiencing audiovisuals.

Although traditional broadcast channels will still dominate audiovisual communication for some time to come, consumption will start to grow on alternative channels (the internet, mobiles, devices with connectivity, etc.). So new business models will appear, as may productions specialising in particular alternative channels developed for specific user profiles.

It can be predicted that the increase in channels (in DTT but also in the other media) will lead to a new, more fragmented user (consumer) and a specific kind of consumption. But as these alternative business models emerge, production will increasingly have to cater for the new channels and develop marketing oriented to these new, more precise profiles.

What is certain, however, is that users have changed. They are no longer last century's TV viewers, sprawled on the couch. Users are now content consumers with a single terminal in their pocket from which they wish to communicate, who want to enjoy what interests them at all times without considering where they are or sacrificing their mobility, without depending on any preordained broadcast time, and when they want information it has to be here and now. But they may also want another, higher quality service, with a panoramic screen, as an alternative kind of recreation.

2.4.5. The mobile phone of the future

When physical diaries were in common use, some people preferred small pocket diaries to do their planning on the move, while others preferred large book format models in which they could take notes at meetings. The trend in mobile phones is following the same line of development, defining user profiles and adjusting to their needs (and this may also be a guide for the television of the future).

So we have small, lightweight devices with standard features for people who only want their phone to make calls and be contactable. Others will adapt to the profile of older people, with simple ergonomically designed keypads for use even without glasses and easy to carry around. While at the opposite extreme, there are specialist terminals whose owners want a portable office or portable multimedia (either in the business or leisure profile).

So the mobile phone of the future will not be any one phone in particular but multiple phones adapted to the different profiles of demand. What will certainly be true, though, is that multimedia options will come into general use, particularly as they get cheaper and mobile data connections become widely available.

Special reference must be made here to television by mobile. There are markets where this kind of mobile television already exists due to the increase in capacity of terminals, substantial improvements in terminal screens and technology (DVB-H standard, which allows DTT to be viewed on a mobile, to put it in layman's terms).[10] Users' experience is very positive: although the screen does have its limitations, it lets users consult content live (as it is broadcast, for instance news broadcasts) or follow their favourite series when they are not at home. But the use of mobiles to watch television is really a substitute for when you can't be at home, and not for the broadcast channel itself, since the small screen bears no comparison to today's panoramic screens. So although this could be an interesting market and will certainly affect advertising, for example, consumption of broadcast television on the mobile is still seen as a substitute and for occasional consumption.

2.4.6. A camera with broadband internet?

But there is one emerging group of new devices that will also have broadband access and that is not yet available on the market. Can you imagine a camera with access to the internet? That is what the industry's multinationals are planning. This particular example is taken from Intel, whose Barcelona Intel Labs are coordinating world research on chips that will bring connectivity to these devices, which are expected to appear on the market in the near future.

A camera with broadband access might seem strange to those of us born last century, but it could allow our photo shop to print up our photographs and send them straight to our home, or let users upload photographs directly to the internet (to Facebook, for example) and share them almost in real time. In fact these days, most mobile phone terminals are already cameras linked up to the internet.

Experts believe that the change will happen when these chips have been miniaturised and their price has come down to US$30. They could then be included in any product as a basic option, as already happens with computers that include Wi-Fi (soon to be WiMAX) as a basic option. It has been calculated that this could happen in 2009, and they could be on the market by 2010.

So the market will very soon have a whole range of gadgets equipped to share their information through multiple technologies, and we will be able to choose between them depending on our operator or our current situation.

3. A view of the future

The audiovisual market must make a turnaround in the near future. This may come from technological change, the convergence of networks, but also because convergence will allow services to be distributed on more channels (which may or may not require formats to be adapted).

The connectivity model and how consumers are targeted are also changing. Advertising campaigns can be directed through multiple networks and accesses (through TV, but also through Bluetooth or WiMAX in large shopping centres). Such invasive marketing may seem strange today but, if we imagine a boy who is hooked on a certain TV series, his modes of consumption may vary and he may accept invasive advertising so as to find out about the new merchandising for the series while he is walking around a shopping centre.

We have already said that the passive consumption of television (the broadcast model, whether on the screen at home or on a mobile) is thought to have a long way to go. But young people are increasingly adopting models of consumption based on interactivity, and it is not surprising to find advertising popping up during video games, or wanting to decide the end of a series by interacting with it, or requesting certain events to be included in the production by the series creators.

So there is not only technological uncertainty here. There is also the uncertainly of how users will interact (or want to interact) with these new possibilities and the new business models they will be offered. Will operators of telephone and internet networks, either fixed or mobile, open up to new agents or will they want to maintain their present vertical integration? Will broadcasters become producers of content for the different broadcasting windows? Will producers be able to incorporate and adapt to these new requirements for interactivity, or will the users themselves take over? There are still many questions with very open answers, auguring an even more fascinating future.

Notes

1 Study by the International Monetary Fund, IMF, 2007.

2 Information and Communication Technologies, ICTs.

3 <http://www.catalunyaconnecta.cat>

4 <http://en.wikipedia.org/wiki/List_of_24_(TV_series)_media>; <http://en.wikipedia.org/wiki/24:_Conspiracy>

5 UCL forms part of the University of London (<http://www.london.ac.uk>) and the report can be found at <http://www.bl.uk/news/pdf/googlegen.pdf> (January 2008).

6 <http://en.wikipedia.org/wiki/Nicholas_Carr>

7 <http://www.theatlantic.com>

8 Users jumped from one article to another, read one or two pages and clicked on the next one, normally without going back. The average time devoted to the reading of an electronic book was four minutes, eight in the case of an electronic newspaper.

9 Data from the Public Consultation of the European Commission on next generation access networks, 2008.

10 It should be noted that, in oriental markets, for example Japan, DBV-H is not used since broadcasting follows other standards.