Interactive television: a reality in construction. Report to the Consell de l'Audiovisual de Catalunya

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Abstract

This article presents a summary of a research report into the state of interactive television and the different systems for interaction with television developed by the regulating authority in Catalonia (Spain). The context of the study is the European continent and it covers theoretical, technological and programming issues. The authors propose an operative definition of interactive television as a tool for developing their field of study and an original typological proposal that can classify and analyze the whole range of the present offer of interactive programs and services. Also presented throughout the article is an analysis of the different interactive services in the European continent.

To end, the authors propose a whole series of recommendations for the regulating authority as measures for promoting these types of services and applications, with particular emphasis on the role that Digital Terrestrial Television could play as a universalizing platform for access to the new services of the Information Society. Mention is made of the specific case of Catalonia as an example of the measures that should be observed for the full and integrated development of the services that are generically known as interactive television.

1. Introduction

This article is a summary of a report made by the Grup de Recerca en Imatge, So i Síntesi (*Image, Sound and Synthesis Research Group* - GRISS) at the Universitat Autònoma of Barcelona into interactive television. The report was commissioned by the Consell de l'Audiovisual de Catalunya (*Audiovisual Council of Catalonia* - CAC), the regulating authority in the autonomous community of Catalonia. The one-year study was made by a team led by Dr. Emili Prado and Dr. Rosa Franquet, and ended in the summer of 2005.

This report takes a holistic perspective. The CAC wanted to find out about different aspects of interactive television before establishing its position in the debate about the regulation of material in the different processes to have been opened on a Spanish and European scale. To achieve this objective and offer a complete vision of the current panorama, the report covers theoretical, historical, regulatory, technical and programming aspects of interactive television and systems for interaction with television.

This study, therefore, serves a similar function to the *Study on the regulatory treatment of interactive television*, commissioned by the European Commission to a consortium formed by Forrester and Baker McKenzie and which is still pending publication. This study has to supply the tools for the European Union to provide a standard regulating body that can enable member states to establish regulations that facilitate the development of interactive television.

This holistic vision is nothing new in the study of interactive television, as we also have the previous example of the *Report on Interactive Television Services* published by the Canadian Radio-Television and Telecommunications Commission (CRTC) in 2002, which served very similar purposes.

The GRISS has extensive experience in the study of interactive television. In the early 1990s its members developed the first experimental projects into interactive television in Spain and have published previous research on the subject. The group also has knowledge of such highly relevant areas as multimedia applications, information and communication technologies and television programming. The application of this knowledge base to this report has proven highly effective.

In a first phase, the research team made a bibliographical and documental collection of the existent material in the main academic fields of reference and some market studies made by private organizations. Data about the penetration of interactive television into different markets was related to this set of information in order to establish a forecast of the universe of users that interactive television will deal with.

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After this, different key aspects were identified. Given the still embryonic state of the development of interactive television, a lack of information in some key areas of the study was detected. This meant that this void needed to be filled through the proposition of a new approach, specifically in the definition and classification of the different genres of programs in the world of interactive television.

In the final period, the group proposed a series of recommendations to the regulating authority in order to help define and consolidate its position in the debate on the issue.

The objective of this article, then, is to share some of the main conclusions reached by this report with the academic community.

2. The need for a definition

The concept of interactive television has become a polysemic catchall for describing a wide range of technological applications and communication practices that in some way involve audience interaction. It therefore includes, as well as interactive television itself in the truest of senses, different forms of interacting with television.

Similarly, the term interactive television has been indiscriminately used as a marketing tool by the biggest companies in the sector, in such a way that it has developed into a concept that refers to both technologies and communication practices. This polysemy makes it difficult to identify the services and policies that should contribute to the so-called "killer application" that has to become the driving force of a comfortable transition from analogue television to digital television.

The concept of interactive television has already been explored with analogue television, but has been subjected to a major relaunch with the birth of digital television and modern telecommunications networks and most especially high-speed Internet connections. However, this development could get even more intense in the current context of technological convergence, which should lead to a global network as the result of cooperation and symbiosis between the different network resources available.

So, the definition of the term interactivity has become an obligation in all academic forecasts regarding the matter, given that scientific research requires clear, precise concepts.

From the perspective of the convergence of new information and communication technologies, some theorists have defined interactive television as a technological characterization that determines reciprocity through a return channel (Pagani, 2000, 2003).

Other authors believe that the properties of interactive television are more complex and are determined by technological evolution itself, as 'interactive television is not a single technology or service but a family of diverse systems and applications that trace their history to the very beginning of television' (Carey et O'Hara, 1995, p. 220), understanding the history of interactive television itself to be the path to understanding its future.

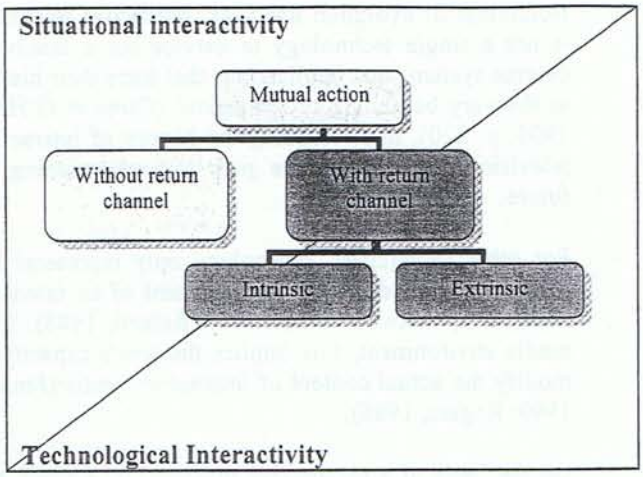
For other researchers, technology only represents the platform required for the development of an intensive relationship between individuals (Rafaeli, 1988). In a media environment, this implies the user's capacity to modify the actual content of interactive media (Jensen, 1999; Rogers, 1986).

On the basis of a perspective proposed by Rafaeli, the origins of which go back to a perspective based on the actual process of communication proposed by Bretz (1983), this report shuns the technological determinism of some of these contributions, as we understand that technology cannot define the development of an exchange relationship between subjects. Technological possibilities have to be separated from the system by which users consume interactivity, among other reasons because the definition of a communication process cannot be linked to a technology that at the time is subjected to continuous developments, updates and improvements.

The concept of interactive television is not, then, unanimous or agreed, and in practice serves to designate extremely varied realities. This research has aimed to reduce the polysemy that the term has come to have in order to make it operative. In this sense, a proposal is made to differentiate between technological interactivity, which implies the existence of a return path, and situational interactivity, which is characterized by the existence of mutual action and can exist whether or not there is a return path.

The mutual action can be between individuals, between human or machine conversers, between users and the heads of networks, and also between people and services, applications or programs in some of these suppositions in order to operate a mutual action that does not require a return path. All interactions with the local set-top box environment, for example, enable this mutual action without recurring to a return path, a possibility exploited to the maximum in such cases as that of Freeview Digital Terrestrial Television in the United Kingdom, which has developed a whole series of systems for interaction with television designed for a set-top box that does not include the possibility of connection to a return path.
So, interactive television is not a specific support and neither is it an isolated technology. It is a set of contents designed for different opportunities for action by the receiver, that can run on different platforms and require or not what has been dubbed technological interaction, but which must always enable what is known as situational interactivity.

Types of interactivity



3. Technological support

At the moment, interactive television uses all of the major technological platforms available for television broadcasting: television cables, direct distribution satellites and Digital Terrestrial Television. These are the standard three major television platforms, but nowadays we also have to consider such other options as the ADSL platform supported by the telephone network or wireless cable systems. And on the horizon we have the whole family of xDSL technologies, of which the popular ADSL is just the first and most basic form, and the UMTS that have only just been commercially launched and that are the first forms of mobile television. Each of these platforms has different features with respect to their interactive capacities and while some contain intrinsic return paths, others have to activate extrinsic return paths by recurring to complementary technologies.

Implementation of return channels

		Emission				
		Satellite	Cable	DTT	xDSL	MMDS
Return	Satellite					
	Cable					
	xDSL					
	Telephone					
	MMDS					
	GSM					
	UMTS					

Although platforms might enjoy technological interactivity, this does not mean than any television that uses them can be classed as interactive television. This name is reserved for television that offers services, applications and programs that are designed to enable situational interactivity. So, in order to talk about interactive television, it must comply with the "sine qua non" condition that there be the possibility of some type of interaction between the user and the system or between the user and the content.

From this perspective, it should be pointed out that interactivity is not an absolute value and that it can appear on different levels, which will depend on the capacities of the platforms, the design of the applications and the objectives of the product.

A clear example of this tendency is the case of the United Kingdom, which has the most dynamic interactive television market in the world. There, the two major promoters of interactive services, BBC public television and satellite broadcaster BSkyB, have joined forces for the launch of DTT with the constitution, along with Crown Castle International, of the Freeview platform. In doing so, both companies are showing that they are interested in a multi-platform environment that makes a priority of interactive applications and content rather than a specific technology.

4. Types of services

Emphasis should be put on the fact that interactive television is an articulated package of isolated services on different levels of interactivity and a distinction should be made between interactive television services in the strictest sense, which are those that refer to contents, and other associated ones that are derived from the fact that interactive television, at the moment, is supported by digital platforms, which we generically call telecommunication services. In this latter category we distinguish between two types: Navigation Services (NS) and Electronic Communication Services (ECS).

The category of content services includes three main types: Autonomous Interactive Services (AIS), Program Associated Interactive Services (PAIS) and Interactive Audiovisual Programs (IAP).

Articulation of interactive television services

Interactive Television Services	AIS: Autonomous Interactive Services	
	PAIS: Program Associated Interactive Services	
	IAP: Interactive Audiovisual Programs	FIAP: Flow Interactive Audiovisual Programs
		SIAP: Stock Interactive Audiovisual Programs
Telecommunication Services	NS: Navigation Services	
	ECS: Electronic Communication Services	

The offer of interactive television services can therefore be grouped into these three major types to which the contents available on the market or under experimentation and in different phases of implantation can be ascribed. This classification and its characterization are no more than a grouping and theorization of the interactive television that is presently on offer in the main markets.

Autonomous Interactive Services exist in their own right, and are available whenever the viewer wishes to access them and they are authorized either by the broadcaster responsible for the channel or by a supplier of external services. They can be accessed directly from the basic application of the interface, or by being grouped in what is known as a walled garden. These are often only accessible to subscribers and some of the services may also need paying for. So, **Autonomous Interactive Services** involve three states of access: universal, subscriber and paid services. A large number of these require the availability of return paths, although there are also several that do not require them.

Program Associated Interactive Services have been developed to be synchronized with the programs to which they are associated. Most were designed to enable users to be able to interact with programs that were designed to be seen in a linear way, but where there is the additional benefit of complementary services that provide added value. **Program Associated Interactive Services** are only available to the viewer while the program they are associated to is being broadcast and often only during certain time periods of the same, depending on the degree of synchronization of the service designed. The majority of the services in this category do not require a return path, but at the same time there are a wide variety of types of **Program Associated Interactive Services** that do need one.

Interactive Audiovisual Programs are television programs that were conceived, designed and produced for viewer interaction. An essential condition of **Interactive Audiovisual Programs** is that the actions performed by viewers configure an individual or collective scripting, or put another way, what they do should have an effect on the configuration of the product they are watching.

A differentiation must be made between Flow Interactive Audiovisual Programs (FIAP) and Stock Interactive Audiovisual Programs (SIAP). **Flow Interactive Audiovisual Programs** can be programs broadcast live or recorded but their design and architecture are designed to run the interaction between all spectators at the same time as the emission. The timing of the program and the timing of its consumption are coherent and this coherence cannot be altered by the interactive actions of the viewer. Depending how more or less complex the architecture is, there can be more or less complex intervention by the viewer and this may or may not require a return path. **Stock Interactive Audiovisual Programs** are always accessible and are designed to run the interaction from the moment the user decides to access it. The timing of the program will vary depending on the user's rate of interaction and the choices they make. They always require a return path, even to access the service, and the bandwidth of the same will condition the level of complexity of the interaction.

To recapitulate, interactive television is a package of contents that are articulated with a common protocol. Using the old concepts of station and channel, we consider that an interactive television station achieves its full goals when its package of contents includes the three types of service.

From an analysis of the offer and experiments in progress we have been able to show that right now the offer of content is highly uneven. The most mature market is the British one, although in other countries in Europe, Asia and America different types of services are being used and applications are being developed both on an experimental and market level.

Quantitatively, there are more AIS and PAIS applications than IAP, but in all three groups there is a wide variety of different types. For the two former we have been able to identify eleven genres, of which the former uses all and the latter currently seven. Within the IAP group we have been able to distinguish five genres containing as many as 14 formats.

The most common AIS genres are information services, games, gambling, e-commerce and electronic program guides (EPG). First among PAIS are participation programs, followed by games, gambling and e-commerce. As for IAP, there is a dominance of the different formats of multistream, and the camera angle section. Transversally to the three categories there is also the presence of interactive advertising. Evidently, the reality that this offer reflects is conditioned by two primordial factors. First, the market's mass criticism, or better said, the absence of it. Second, the features of the technological platforms that support interactive television.

As for telecommunication services, we find two well defined categories: Electronic Communication Services (ECS) and Navigation Services (NS).

The former are are signal transport services in the form of that messages, chat or Internet access supply services. They can be offered by means of a walled garden or open systems. By nature, competition for these services depends on telecommunication regulation authorities.

Navigation Services are a key element in the world of interactive television. EPG are the most well known of this set of applications, as they act as the gateway for users into the whole set of services available on the platforms, and to which the role of gatekeeper has been attributed. The way they can interoperate though such open standards as MHP represents the main challenge for telecommunication regulators.

However, EPG have another dimension, as they can also be considered content services. Once the technical interoperability of different EPG systems has been guaranteed, different content suppliers can offer EPG services to different platforms, guaranteeing competition and the ability for the user to choose. This latter dimension is a content service, and its regulation must therefore remain under control of the content regulating authority.

5. Conclusions and proposals

The concept of interactive television is not unanimous, and neither has any consensus been reached for its characterization and in practice it serves to designate a wide variety of realities. We have aimed to reduce the polysemy that the term has come to have in order to make it operative. So, iTV is a set of contents designed to foresee different opportunities for action by the viewer, which can be run on different platforms and require or not what we have called Technological Interactivity, but that should always enable what we have called Situational Interactivity.

In so far as iTV is not a specific support nor technology, but, as we have just stressed, a package of services that is run on any platform that enables its implementation and that responds to the requirements of interactivity that each application requires, the immediate future of interactive television is undeniably linked to the degree of implantation of the technologies that support it.

The main technological platforms for television broadcasting with the capacity to support interactive television are cable, satellite and Digital Terrestrial Television. In Europe, most digital homes are so via satellite, a support that right now does not have any intrinsic return path. Digital cable does have one, but has penetrated some European countries to a far lesser extent than satellite and its growth rate has been limited by high costs.

The third focus for an increase in of digital homes depends on the speed at which analogue disappears and DTT is definitively installed. In any case, Digital Terrestrial Television has no intrinsic return path either, so the most plausible scenario for the next few years in Europe is the development of interactive television applications that have fewer requirements for return paths.

Neither the future implementation of intrinsic return paths in satellites nor the recent habilitation of ADSL as a support for television broadcasting with intrinsic return paths will cover the deficiency of other platforms in the generalized terms of short term return capacity. So, work must but done on a scenario in which the development of interactive television in Europe depends more on the engineering of contents rather than the engineering of supports. Put another way, the degree of sophistication of interactive features via television will depend on the ability to design applications that make maximum use of all of the possibilities for situational interactivity that can be taken from the degree of technological interactivity of the platforms available right now.

A situation that is also contributed to by the absence of enough mass criticism with access to this package of interactive services and the lack of sufficient stimuli for the users of different platforms to use the services available. A good example is BSkyB, the platform that has taken the strongest interest in interactive services in the United Kingdom, the most well developed market. Despite their efforts, income from interactive services was only 8% of their total turnover in 2004 (BSkyB, 2004).

So, the stress must go on the engineering of contents, in two different senses:

a) Development of a program of applications that can take full advantage of the data transmission capacities of each support and that make it possible to compose sophisticated content and create increasingly more complex services, from texts to graphics, from photography to moving images, and that finally enable a high degree of user activity.

b) Development of programs and services with a high level of situational interactivity, which enrich the experience of television consumption, giving the viewer a new interactive role and opening the doors to their integration in the Information Society.

Attention has to be drawn to the central role of Digital Terrestrial Television in this process. DTT will lead to digitalization as a universal service for the whole population, while other platforms, be that because of their area of coverage or be that due to the conditionality of access to the same, will not fulfill this requirement. Consequently, for DTT to be able to play an effective role in supplying the whole population with the benefits of the Information Society, at least three of the elements of policies for implanting this technology need to be improved:

a) To reserve more bandwidth for data transmission in each multiplex.

b) To make the implementation of a wide range of interactive services a requisite in the offers of authorized suppliers.

c) To entrust public television companies, as specifications of their program contract, with the offer of a wide range of freely available quality interactive services, without excluding the implementation of others that have to be paid for. Consequently, public television companies must benefit from a reserve of transmission capacity that can meet this requirement and adequate financing for supplying these services in an efficient way.

Obviously, this is a transitory stage, given the present state of technological convergence, which is slower than had been expected. A situation in which resistance to the integration of different supports in a cooperative way as resources within a global network has clashed with the resistance of the interests created, of the defense of the dominant position achieved in each specific market of one or other platform. Here we have another of the Gordian knots in the development of interactive television and the Information Society as a whole. To untie it, regulating activity must play a fundamental role and from the point of view of interactive television make total demands for open standards and interoperability, which need to go much further than the feeble recommendations we have now, presented in the summer of 2004 (Commission of the European Communities, 2004) and based on the Universal Service Directive of the European Union itself.

In the field of regulation, many more challenges derived from convergence have emerged, and interactive television provides unquestionable evidence of that. Once again, neither mass criticism obtained from the interactive television market, nor the effective degree of technological convergence, have been enough to put pressure on the regulator to clarify the panorama globally, even though both on a European level and on that of the member states work has begun on evaluating the situation and some regulatory items have been produced, which in all cases are insufficient. Therefore the consultations, evaluations and studies are continuing, which should culminate in the reform of the Television without Frontiers Directive and the creation of a new regulatory framework that is adequate for the digital era.

A first and fairly clarifying step was the 2002/21/CE Directive of March 7 and its complementary directives referring to Authorization, Access, Universal Service and Privacy. It establishes the doctrine for clear separation between the field of telecommunications and that of information and communication. The former corresponds to the transport of signals and the latter to the content. This differentiation seems capital and clarifying, also for establishing the limits of regulating authorities, and avoiding overlaps if not competitiveness and futile disputes, or worse, no man's lands resulting from dispersion.

Therefore, regulatory environments must also establish two references, that of the authority to regulate and control the transport of signals, and that of the authority to regulate and control contents, a differentiation that appears in many countries of the European Union, but with important exceptions such as the case for Spain, where the field of contents does not yet have any regulator on a national level and there are only bodies of this type in certain regions. In the latter case there is something else that needs to be done. The uncertainty created in the naming of services of the Information Society needs to be eliminated. This label, created in the regulatory doctrine in urgent response to a set of online e-commerce services that required the legal protection of the consumer, has been extended to all services of information and communication, creating both a conceptual and a legal confusion that needs to be sorted out.

In reference to information and communication services, and especially in reference to interactive television, both AIS, and PAIS, and also IAP are contents, independently of whether some of these may be derived or not from the unfolding of a transactional activity. Interactive television services are services of the Information Society, but they are contents and they should come under the banner of the corresponding regulating authority, which will monitor their compliance with regulations applicable to these activities. Moreover, as an example, in applications whose purpose is any type of transaction or commerce, the purely commercial part should be subjected to specific trade regulations and the protection of consumer rights.

Another sector that unmistakably belongs to the field of contents is interactive advertising. In any of the modalities where interactive advertising can be practiced it is a form of content that should be submitted to the general regulations of advertising. The regulating authority of the content must ensure compliance with the conditions demanded of advertising, in reference to the explicit differentiation with respect to other contents, misleading advertising, etc., regardless of whether this is lineal or interactive advertising.

Regulation of duration is a different matter, which in interaction can be, depending on the format, in the hands of the user. In reference to those interactive advertising applications that can culminate in an e-commerce operation, the specific transaction part should be covered by the general laws for regulating commerce and the defense of the consumer.
Although the horizontal regulation of all contents has not yet been assimilated and there is still some time to go before it reaches maturity, different elements allow us to imagine a regulated future that, in reference to interactive television, considers all of its communication activities as part of the area of content regulation, without differentiating between services, evidently taken from those that we have called telecommunication services. This appreciation is sustained in the underlying doctrine of the package of Directives related to the *Common regulatory framework for electronic communications networks and services* (2002/21/CE Directive and complementary directives) that establishes the distinction between transport services and content services, and on the other hand, in the considerations made in the EC final report titled *Communication from the Commission of 15 December 2003 on the future of European regulatory audiovisual policy* COM (2003) 784, which awards centrality to the Television without Frontiers Directive and complemented by those related to so-called services of the Information Society.

However, in the reforms that the Commission has started to implement, so many ambiguities need to be eliminated and work should be done on more unanimous concepts such as content services, e-commerce and communication services, moving away from the use of the concept of services of the Information Society, which is too polysemic to meet the demands for accuracy required of all regulatory items.

The position of Catalonia in the context of possibilities for the development of interactive television is ambivalent:

a) Due to its telecommunications and industrial policy not seeming to have been efficient enough in the provision of broadband infrastructures as a universal service throughout the territory, which acts as a barrier for the development of sophisticated interactive television services that can act as the driving force for the inclusion of the gross part of the population in the Information Society. The region also suffers from the consequences of the stoppage of DTT caused by a dreadful policy for deployment in the Spanish state (Soto & Ribes, 2003).

Right at the end of 2005 a new and apparently definitive impulse has emerged, for DTT, through the setting up of new exclusive channels for this platform, informative campaigns and the availability, at prices that are accessible to consumers, of digital tuners, such that the Christmas 2005 campaign is being seen as the real starting point for the commercial launch of this platform in Spain after the initial failure of Quiero TV.

b) Due to having had a dynamic public television station, Televisió de Catalunya, which has been able to anticipate its responsibilities as the driving force for regional policies for innovation, and has performed a series of experimental activities that must make a powerful contribution to the development of interactive television. A good example is the creation of a subsidiary company, TVC Multimèdia, which is a pioneer on a state level for the development of interactive applications.

Catalonia also has university nucleuses that have contributed, some in a highly pioneering way, to the experimentation and generation of know-how in the field of interactive television. It also has latest generation consortiums experimenting with the latest generation network, which are institutionally promoted and configured with different industrial and university actors that are exploring new possibilities. Finally, it has experienced audiovisual production and multimedia production industries that can cooperate in the generation of new contents.

In terms of regional communication policies, in reference to the development of interactive television there is a need to:

a) Urgently promote the extension of broadband to the whole territory and guarantee a bandwidth per capita for Catalans to efficiently enter the Information Society, a process in which interactive television has to play a first degree inspirational role, especially in relation to the segments of the population that are techno-excluded, be that for reasons of age, education or resources.

b) Establish a program for specific experimentation with interactive television that has enough resources, in which national television will play a central role and that integrates university and industrial groups, in order to perform decisive work in the field of R+D+i that we have called the engineering of contents and in the dual sense that we defined earlier. Success in this field will reap benefits in the process of implanting digital television in general and interactive television in particular, but most of all, in the socialization of the benefits of the Information Society.

So, the elements exist for Catalonia to play a leading role in the development of interactive television, both in terms of the necessary production abilities to supply content as in those of the social receptiveness that suggests an interest in discovering and enjoying the advantages of DTT and iTV.

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