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Analysis of the application of augmented reality technologies in Spanish mass media productive processes

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Abstract

Introduction: Augmented reality technology is a combination of the real world and the virtual world through a set of processes based on software and multimedia documentation storage possibilities provided by the new information and communication technologies. **Methodology**: This article focuses on the analysis of the use that Spanish media are making of this innovation. Firstly, we have examined the pioneering experiences of the newspaper *El País* (through its publication *El Viajero*) and the magazine *Fotogramas*, mainly based on the QR technology of two-dimensional codes; next, we have proceeded to study the phenomenon from the development apps on mobile devices such as tablets and / or smartphones (in Apple, Android and Windows environments), highlighting their actual reach to date from today; and, finally, we have analysed the short and medium-term experiments based on this innovation that are being carried out in the main Labs belonging to Spanish journalistic companies. **Results and conclusions**: The results of the research show that augmented reality is still taking its first steps in information market, both on an international scale and even more pronounced in Spain. The vast majority of these experiences do not encompass the complex technological infrastructure

necessary to launch such projects, so, its real development in information industry will be possible with a new generation of physical devices that, in combination with more powerful hardware platforms and specifically designed software, will achieve the integration of real and virtual elements. However, in the medium and a long term it is outlining a scenario in which it is necessary to quantify what is the true deontological impact that the implementation of the augmented reality has in the flow of informative contents generated by information companies, as well as which will have the levels of protection of the data supplied by users of this technology to companies that provide contents and services.

Keywords
Augmented reality; mass media; journalism; technology; Spain; Information Society.

Contents

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1. Introduction

The term augmented reality is used for the first time in scientific literature by Caudell and Mizell (1992: 659), even though its strategical fundamentals were already mentioned on studies that researchers such as Heilig, Sutherland or Krueger, among many others, did back in the sixties (Höllerer and Feiner, 2004: 188).

Authors such as Drascic and Milgram (1996), Azuma (1997) or the already mentioned Höllerer and Feiner (2004) coincide in conceiving the augmented reality technology as a combination of the real and virtual world through a set of processes based in computerized programming and in the possibilities of storage of multimedia documentation that the new information and communication technologies provide.

This combination of the real and the virtual is what makes it different from virtual reality, which focuses exclusively in an unreal environment despite managing objects and scenarios of real outlook where the user has the feeling of being immersed therein through a single or several external devices such as glasses, headsets, gloves and even special suits. Virtual reality applications include quite uneven productive sectors such as education, tourism or entertainment although perhaps the most popular cases correspond to environments such as the failed Second Life by Linden Lab or the last two videogames generations (Parra *et al.*, 2009).

From the strictly technological perspective, four are the essential elements required to constitute an augmented reality environment: a camera that captures the image of the reality seen by users, a physical

platform where to project the mixture of real and synthetized images, a processing infrastructure that interprets the real world information the user receives and generates the corresponding virtual content and a component triggering the augmented reality (Fundación Telefónica, 2011: 11).

After some starts marked by uncertainty, where it was eclipsed by virtual reality, mainly due to the need of having a strong financial support considering the complexity of these kinds of projects and the doubts about its commercial possibilities, augmented reality starts demonstrating its possibilities by the end of the nineties.

In 1998, the first edition of IWAR (International Workshop for Augmented Reality) takes place, gathering researchers and scientists, technology developers, device manufacturers and providers of products and services from around the world. After two editions (2000 and 2001) where it was also known by the initials ISAR (International Symposium on Augmented Reality), after 2002 it changed its name to ISMAR (International Symposium on Mixed and Augmented Reality) and started to integrate telecommunications operators, vertical applications developers, content providers and representatives of the artistic world, besides the sectors mentioned earlier.

Already in the XXI century, the business possibilities of augmented reality seem linked to two essential strategical aspects. The first one is related to the development of a new generation of mobile devices such as portable game consoles, electronic tablets and smartphones, with increasing penetration levels among domestic users around the world. From 2009, the first mobile applications specific for this environment start to appear.

And the second aspect to consider is referred to the already very famous Web 2.0 environment, a NTIC ecosystem that promotes the collaborative generation of all kinds of contents and their subsequent sharing and which has been thoroughly analysed from the initial contributions of authors such as DiNucci and his requalification of the traditional notion of Internet (1999: 32) or O'Reilly and the perception of the manual semantic network (2005).

An application such as Tagwhat, created on 2009, tries to put together contents generated by users with augmented reality, betting on a multiplatform strategy. On its part, initiatives such as Recognizr, released in 2010, offer the possibility to recognize the face of a person through the creation of a three dimensional model and access personal data said person has decided to show through his or her different profiles on social networks such as Facebook, Twitter or YouTube.

Gradually, its implantation is perceived in different fields of action and production sectors: marketing, leisure and entertainment, tourism, education, health, automotive, aeronautic, look for information on real time, etc. Private companies and universities constitute the two large innovation focuses, often collaborating closely.

This expansion process ends in the second decade of the XXI century. In a short time period there coincide commercial launches of socioeconomic repercussion like Project Glass by Google (2012) or Pokemon Go by Niantic (2016). To all this, a group of applications with a greater sophistication level is added, framed within the concept of immersive augmented reality, of non-commercial nature and

not targeted to the domestic user but instead generally linked with the military area, some of them still of confidential nature.

2. State of the art

2.1. Strategic issues

Media stand before a noticeably changing and complex productive scenario where a series of circumstances of the most varied nature concatenate and which can be grouped under three conceptual categories: structural, formulation of a business model and the relationship with the audience.

From the structural perspective the journalistic company must face facts such as: the consolidation of the specific weight of new information and communication technologies in the production, storage and distribution of contents of the most diverse nature; the digital transformation that influences in all kinds of sectors and industries and which effective implantation requires the presence of facilitators such as solutions in the cloud, information in value, automation of procedures and extension of digital identity among others (AMETIC, 2016: 12); a deep economic crisis at international scale that impact the totality of productive sectors and which true effects must be analysed in the middle term; and an increase of the information consumption in social networks that has made the diffusion and acceptance of post-truth easier.

In close relationship which was indicated before, the reformulation of the business model of the information company is influenced by the following aspects: the gradual conversion of the information business in an offer market before the traditional demand market of past decades; the questioning of the paradigmatic business model of journalism, which income structure was strongly influenced by incomes coming from the space/ time commercialization made available for sponsors; and the plurality of solutions before the challenge suggested that range from the complete abandonment of the business to the exclusive bet for the online format, moving through the compatibilization between printed and digital versions and/ or the adaptation to the new generations of mobile platforms (mainly comprised by smartphones, electronic tablets and hybrid devices) either with dedicated applications or through responsive designs (WAN-IFRA, 2015).

And regarding the relationship with the audience, we noticed issues such as: the arrival of a new generation of consumers of journalistic contents which learning patters is markedly audiovisual and multimedia, in opposition to the classical procedure supported by the reading of printed text; the displacement of the information consumer in benefit of the contents prosumer figure (Toffler, 1980 and 1990; Bruns, 2006 and 2009; Bird, 2011), more and more critical with the activity developed by media and with information professionals working in them; or the consolidation of the figure of zoon tecnologi.com (Parra and Álvarez Marcos, 2004: 41), a subtype of consumer characterized by features such as universal access to a formidable volume of all kinds of contents in constant growth, the constant mobility or the preference for simplification in the browsing experience through different electronic and telematic devices managed.

In an environment of these characteristics, the information industry has started to detect the possibilities of augmented reality in a triple facet: as strategic instrument in service of a new narrative that looks to move closer to the new generations of consumers of informative contents, whose

browsing experience is markedly multimedia and, just as it has been mentioned; as reinforcing element of a business model striving to offer added value to contents, in order to meet conditions to charge for them, aligned with the corporate policy performed from media such as *The New York Times* (Leonhardt *et al*., 2017); and as marketing element associated with values such as modernity, infoentertainment and innovation.

However, this strategic bet can be hindered by hurdles of different nature. Perhaps the most evident are those of deontological nature, that are related with the identification between augmented reality and the creation of an environment where information and virtual objects are fused with real-life objects offering the generation of a peculiar experience in the user, who can even forget about the technology he is using and confuse extremes.

Authors recognize the legitimacy of technology but they are cautious about its use. Canavilhas shows doubts about "where to place the boundary between information and entertainment, but this is a matter to include equally on discussions of more ethical and deontological tenor" (2013: 519), while López Hidalgo, mentioning Ortiz, highlights that "the immersive journalism is submitted to the same ethical restrictions of conventional media, that is, to present objective facts free from nuances and prejudices so to achieve that the public gets their own conclusions" (2016: 247-248).

On his part, Real mentions the possibility of "transforming the 'how', 'where' and 'when' of journalism, but the 'what', 'why' and 'what for' of this noble profession remains unaltered" (2005: 506), while Pavlik (2013) highlights the need of an ethical attitude in decision making as one of the basic principles of journalism on which to sustain innovation.

A second aspect to consider is related with personal data protection of users, an issue of complete relevance since a good part of augmented reality applications require them for its efficacious functioning. In this sense, the *Organic Law 15/1999, dated December 13, about Personal Data Protection* and its subsequent *Regulations developed by Royal Decree 1720/2007, dated December 21*, constitute a noticeably restrictive juridical framework in Spain, with fines for whom infringes laws in effect promoted by the Spanish Agency of Data Protection.

This environment becomes even more severe, if at all, when the following law is in effect: *Regulation (UE) 2016/679 of the European Parliament and the Council of April 2016, on the protection of natural persons with regard of personal data and on the free movement of such data and by which the Regulation 94/45/CE (General Data Protection Regulation) is revoked*, in effect from March 25, 2018, in all countries of the European Union without the prior need of juridical transposition to the corresponding local regulations.

And the third issue to consider is rooted in the deterioration of the economic balance of a considerable portion of large Spanish journalistic companies, especially those that sustain their income in printed press, as a consequence of the drop in publication sales and income coming from advertisement. Authors such as Campos and García Santamaría manifest the magnitude of the weakening of its exploitations accounts and the difficulty to perform additional investments of any kind in an environment of massive dismissals, job precariousness in recently hired professionals (or massive use of interns), closure of editorials and increasing outsourcing of processes.

For him, "the account of global results of the Spanish press moved from registering 293 millions of benefits in 2007 to 64 million in losses in 2012" (Campos, 2015: 127), with a decrease in the circulation of newspapers of almost 60 percent in just five years and losses in invoicing about 50 percent in that same period of time.

In the case of the second one, it goes beyond that and refers to "the kidnapping of media by banking Powers, due to the constant financing and successive re-financing of their debts" (García Santamaría, 2016: 197). In fact, diffusion data about press newspapers provided by the Justification of Diffusion Office (OJD) emphasize that El País is already the only newspaper of generalistic information which daily sales are placed above the psychological threshold of 100.000 units (OJD, enero 2017).

2.2. Diachronic evolution of Augmented Reality concept

Although it is true that since the end of the decade of the eighties of the XX century there were specific strategic baselines for the implantation of augmented reality, it will not be until well advanced in the XXI century, when the necessary convergence and integration of a series of technologies is produced, making its consolidation and subsequent expansion easier, as well as its use in different productive sectors, including the media industry. From those four components mentioned before (camera, projection platform, processing infrastructure and trigger component), the last two (specially the fourth one) are the ones that really mark its particular diachronic evolution.

The enormous progress of the hardware capacity and the software functionalities have emerged as essential strategic axes in the improvement of processing infrastructures and in their capacity to interpret in a more efficacious manner the information of the real world the user receives, generate its corresponding virtual content and proceed to the mixing and management of both elements. The new systems offer added values such as speed and reduction of the level of mistakes that are indispensable to understand the potentiality of this reality.

Regarding the hardware evolution, the strict compliance of the Moore Law these last 45 years, which indicates that every 18 months the number of transistors that fit in a microprocessor is doubled, has allowed moving from a chip with 2.300 transistors in 1971 to the current generation that includes more than 1.000 million per unit (Waldrop, 2016: 146).

The innovations offered by the different manufacturers of microprocessors in the edition of the electronic and technological fair CES held on January 2017 refer to milestones such as the systematic production of chips at a scale of 10 nanometres and the imminent arrival of those of 7 nanometres before the end of the second decade of the XXI century (Intel, 2017), aspects that will be essential when it comes to implant advanced and immersive augmented reality projects.

But is in the evolution of the triggering component of augmented reality where the key of the evolutive process of this technology resides, as well as its potential applications to the field of media. Said component entails the combination of two types of elements: on one hand, advanced geolocalization systems and accelerometers, which identify in real time the user's positioning; on the other hand, the markers based on tag technologies by radiofrequency (RFID) and QR coding (or bidimensional codes),

which mission is to provide the user an equivalent information to the one received by a robotic machine with sensors.

Regarding the advanced geolocalization systems, which starting point is the famous Global Positioning System (GPS) developed by the Department of Defence of the United States in the sixties and completed afterwards by other systems such as GLONASS (Russia), Galileo (European Union), BeiDou (China) or IRNSS (India), augmented reality demands improvements that increase the current levels of reliability of all these browsing tools (Grewal et al., 2013). Initiatives of advanced encrypting like third generation GPS, the control system Raytheon OCX or the programme MGUE may contribute to optimize their benefits, not only optimizing its performance, but even significantly reducing the incidences due to physical interferences, cyberattacks or identity theft.

Accelerometers comprise the second element of geolocalization. It is about sensors that are not limited to provide a response before external physical stimuli but instead, additionally they transform actions, such as accelerations or speed changes into electrical signs. Typical examples, for instance the functioning of the car's airbag, what enables a mobile phone to fall from a height of several floors without losing information contained even though the screen and case get severely damaged or an application that measures physical exercise. In the case of augmented reality, aspects that are starting to be investigated such as the use of multiple sensors and the combination with physiological sensors (Santos-Lozano and Garatachea, 2012: 29) could optimize all these possibilities.

In the case markers, the current tag technologies by radiofrequency (RFID) facilitate the classification of objects that comprise the environment of augmented reality, without the need for contact and in a remote manner, through the use of an optic reader and a communications infrastructure through operative radiofrequency in a bad of dedicated frequency. Each one of the objects incorporates a combination of active, passive and semipassive tags and each one of them has its own chip with a unique series number and a memory for data storage and a printed or coiled antennae to communicate with the reader (Derakhshan *et al*., 2007).

The technology of the quick response code (QR) is not more than advanced version of the bar codes, an innovation that stores information in a dot matrix. In the case of augmented reality, a QR technology of high capacity is required (177 x 177 squares compared to 21 x 21 of the first generation). The systems functioning is based on five types of elements: positioning symbols, alignment symbols, dimension lines, variable information and body. The two first allow the constant location of elements, the third is used for marking tasks and the last wo provide the tools needed for decoding, recognition and recovery of stored contents (Ashford, 2010: 527).

From this technological evolution we can differentiate three future stages of augmented reality: firstly, the use of advanced holographic techniques in combination with physical devices; secondly, its overlapping in projects related to the Internet of Things; and, lastly, the projection of synthesized information over the human body. While the first two aspects are under development process, the third one is comprised within the field of futuristic speculation.

The use of holographic techniques to sustain augmented reality is linked to the Holoportation technology, developed and patented by Microsoft in 2015, within its initiative Project HoloLens, which

combines the use of a multicamera system (that includes 360-degree cameras) with an object capturing software that transforms the into tridimensional models. This technology is already managed by the operative system Windows 10 and will be available in the market from 2018.

The implication of augmented reality in the emerging concept of Internet of Things, which bets on the digital interconnection between the network of networks and the objectives of daily life, will provide additional platforms for the implantation of augmented reality projects in different fields of application such as it is indicated in the studies of authors like Bower et al. (2014), Lie et al. (2015) or Ilic and Fleisch (2016), among others. For 2020 it is calculated that the number of devices connected to Internet around the world will oscillate between 34.000 (Business Insider, 2016) and 38.000 million (Juniper Research, 2016).

Regarding the third stage, we indicated that, instead of being considered a future development short and long term, it could be considered more in the field of fantasy. However, during 2016 some experiences were carried out that could make us have doubts about the convincing nature of said statement. Among them, there are the integration of circuits to the human skin and it includes wireless capacities or the development of a new generation of exoskeletons based on the electrostatic adherence technology which reduces its weight and the energy it consumes (Fundación Telefónica, 2016: 54-55).

Perhaps doubts may arise, not due to operative reasons but due to ethical reasons instead, when the implantation is not done at cutaneous level but at subcutaneous level instead or inside the organism through synthetic biology procedures (for instance, with the projection of synthetized information directly over the retina through the implantation of a chip either in the optic nerve or in the primary visual cortex)

In short, as deduced from this diachronic evolution, the design and development of augmented reality projects show its first examples by the end of the last decade of the XX century, experiences a sustained increase during the first decade of XXI and starts an emergence moment from the year 2011, with the already mentioned initiatives Project Glass by Google (2012) and Pokemon Go by Niantic (2016) leading thanks to their sociocultural and economic repercussion, or with the presentation in April 2017 of a functionality destined to the community of developers and programmers by Facebook.

Within the specific field of the printed media industry of communication like *The Times*, *The Guardian* or *The Daily Telegraph* in the United Kingdom, *Los Angeles Times* or *Esquire* in the United States and *Metro News* in Canada were positioned in international avant-garde, by betting on an augmented reality that "potentiates the entertaining component and provides additional contents through virtual and audiovisual scenarios that arise from the printed plane, reproducing on the device screen, immersive situations and surprising spatial contexts" (Meneses and Marín, 2016).

Regarding the increasing commitment of the information sector with the augmented reality, authors such as Thornton (2010), Hill (2011) or Pavlik and Bridges (2013) profile a scenario characterized by the exploitation of the possibilities of mobile devices and the attempt of journalistic companies to move closer to a profile of consumer who is evidently younger than the typical user of their products.

3. Methodology

This paper focuses its attention in the analysis of the use of a technological innovation such as augmented reality by Spanish media. The main objective is to confirm to what extent its use is being generalized sustaining on aspects such as looking to get closer with the new generations and the contribution of added value to contents or, on the contrary, if the potential hurdles mentioned previously are leading to infra-using its possibilities.

For this, firstly we reviewed the scientific literature that exists about the issue, allowing to understand the context where a technology such as augmented reality originates, evolves and expands, both globally as well as in the specific field of the Spanish industry of information.

This bibliographic review includes the study of project of pioneer authors in this field (Azuma, Caudell, Drascic, Feiner, Heilig, Höllerer, Krueger, Milgram Mizell, Sutherland), as well as the contributions from international congresses in their respective denominations of IWAR (International Workshop for Augmented Reality), ISAR (International Symposium on Augmented Reality) and ISMAR (International Symposium on Mixed and Augmented Reality).

At the same time, we have particularly considered the noticeable scientific progresses inherent to augmented reality that take place from the second decade of the XXI century and that are providing to both providers and users, a series of possibilities and benefits that were difficult to imagine barely two years ago, with innovations of special transcendence in sectors like marketing, leisure and entertainment, tourism, education or health, among others.

The case study of the use of augmented reality by media in Spain is structured from three differentiated elements. Firstly, we have examined pioneer experiences carried out by the newspaper *El País* (through its publication *El Viajero*) or the magazine *Fotogramas*, mainly supported by the QR technology of bidimensional codes. It is about the first examples of this technology applied to media in Spain (year 2010).

Next, we studied the substantiation of the phenomenon from the development of *adhoc* apps in mobile devices such as tablets and/ or smartphones (in Apple, Android and Windows environments), emphasizing what is the actual reach today. Therefore, we have tracked the totality of online stores (or market places) corresponding to each one of the three operative systems.

And lastly, we have performed the analysis of short and middle term experimentations based in this innovation that is being carried out in the four Labs belonging to Spanish journalistic companies (by the end of June 2017, they are the only existing Labs).

To a great extent, the differences in the use in these three levels have a lot to do with the distinct stage of evolution of augmented reality and its drastic innovations in a relatively reduced period of time.

The review of use cases considers not only the formal aspect of it before end users but also what is involved in the productive structure of the different information companies analysed in aspects such as education of its human resources, diffusion towards potential consumers and commercialization of

contents generated through this innovation. In coherence with this proposal, we decided to perform an additional qualitative analysis of some of these experiences of augmented reality in each one of the three areas exposed beforehand, highlighting its main strategic and tactical aspects and emphasizing its true reach over time.

4. Results

4.1. Pioneering Experiences

The first experiences of augmented reality in Spain start on 2010, with the newspaper *El País*, through its thematic publication *El Viajero*, and the journal of cinematographic information *Fotogramas*. It is convenient to specify that in both initiatives the proposal of augmented reality is part of an innovation that is not of disruptive (Chistensen, 1997) but instead of incremental nature (Henderson and Clark, 1990). That is, it is not looking for a technological replacement but rather an evolution betting on new informative narratives with the hope of reaching new niches of users.

Despite said circumstance, coinciding with what happens in the information market internationally, there would fully apply to the mentioned examples, the category of innovation in terms of "a process of creation or modification of the product or service that media offer through the integration of new technologies, routines and business models" (Cabrera, 2016: 26).

In the case of *El Viajero*, the newspaper *El País* releases on April 2010 a free application, exclusively available for iOS and Android smartphones, developed by the Dutch company Layar. Through the camera of his or her mobile phone, the user can proceed to the localization of a selection of hotels and restaurants, each one of them with an identifiable icon and a brief description.

The content of the layer of data was typical from the media, based on information of the *Guía de Hoteles y Restaurantes* of El País-Aguilar, belonging to the same editorial group. The application also allowed a traditional visualization without the combination of real objects and informative contents.

Scarcely a few months after, September 2010, the magazine *Fotogramas* released a special edition about augmented reality although with a system slightly less intuitive and not sustained in a mobile application: to be able to view a total of seven contents distributed on its pages, we needed to access a web link specifically for it and from there, focus over any of the different bidimensional codes based on QR technology with the computer webcam. The functionality included a brief explanatory documentary of the initiative (Fotogramas, 2010).

Both cases evidence a rather limited application of augmented reality, centred exclusively in the conversion of printed version into multimedia platform, through the combination of the mobile phone webcam and of content stored in the website of the media, although without producing a systematic integration between the real and the virtual as a consequence of the still very scarce development of the component triggering augmented reality.

4.2. Apps for mobile devices

Like happens in other countries, in the case of Spain the interrelation between mobile devices and augmented reality is produced from a convergence of "three basic technological resources that occasionally complement between them: patterns of software trigger, geolocalization and interaction with Internet" (Fombona *et al.*, 2012: 204).

The starting point for the systematic use of apps for mobile devices lies in the end of 2012. On December that year, magazines *Elle* and *Muy Interesante* achieve a collaboration agreement with PlayAr, a mobile application of Spanish origin, available for phones and electronic tablets iOS and Android and based in Aurasma technology, one of the main companies of augmented reality, which at the same time, is a branch of the multinational Hewlett Packard. That same line is adopted by the magazine *Fotogramas* from May 2013, although in its case, combining it with promotional and advertisement actions of movies.

In all cases, it is about initiatives that are free and similar in their functioning as the ones supported by the Layar technology, where interaction of users is based in the photography of QR codes through smartphone or tablet that make easier the access to videos, links to other contents and animations.

Precisely in August 2013, Layar takes a step forwards with new and relevant improvements in its bet on augmented reality targeted to media for tablets and Android and Apple mobile phones (barely a few months after the company was purchased by Blippar, owner of a platform of image recognition very used in advertisement). This fact was also made the most of by the Spanish journalistic industry to continue betting for a model sustained in three strategical axes: platform, developer and contents provider.

The market of platform owners on which the application works is dominated by multinational companies. The three main providers of augmented reality applied to the communication industry are Aurasma, Layar and Qualcomm.

The second link of the chain is related to the application developer. Different from the previous one, it is about an environment dominated by local companies of small size and strictly national reach although with elevated qualification levels of its human resources structure.

And, in third place, we have the contents provider, the journalistic company, which is the one that stablishes information susceptible of being scanned and turned into multimedia elements. In many occasions this strategic bet requires the participation of additional partners, essentially for the commercial exploitation of advertisement contents. An exception to this rule is the Spanish edition of *The Huffington Post*, which develops its own application for Android environment, offering augmented reality videos and combines this technology with an additional library of 360 degrees.

In the end of 2015 there was the withdrawal of Qualcomm from the market of augmented reality, where it operated through its platform Vuforia, acquired by PTC, who integrates it with its platform Creo, available for Android, Apple and Windows. Today, this platform lacks relevance in the Spanish journalistic sector.

Is true that a significative part of Spanish journalistic companies have bet on the use of augmented reality, always under the criteria of looking for new consumer segments and under the premise of the consideration of this technology as a trend of future of multisectorial nature and with excellent perspective of future in the short and middle term (Orbani, 2016). However, it is worth mentioning that in this list of apps there are no initiatives inserted in the Windows environment detected (neither for smartphones nor for electronic tablets).

As critical element of the process described here, on May 2017 the newspaper *El País* offers a new step forward, with the presentation of an application based in the F8 concept of Facebook introduced a month earlier. Available in the systems iOS, Windows Phone and Android, the service works through the Messenger application of Facebook. Through the option "Scan code", the smartphone or tablet camera focuses over the code above the text and receives updated information automatically. The functionality, initiated because of French presidential elections, will be widened to other sections of the newspaper through the second semester of the year 2017.

4.3. Augmented reality in Labs

The generic denomination of Lab is understood as an in-house innovation laboratory of media itself. It must not be confused with the research and technological development units, a concept presents in some journalistic companies in the sixties of the XX century and that consisted of the gradual incorporation of computing, electronics and telecommunications in its productive structure, in the form of implantation of the first computers, the development of electronic editing and the remote delivery of printing plates in the case of written press, respectively. In Spain, said reality was particularly weak as consequence of "an impoverished industrial fabric, not very competitive, where technological innovation has been introduced considerably slowly compared to the most advanced countries" (Parra, 1992: 268).

On the contrary, Labs are focused on "the experimentation and development of products and services, especially in the digital field" (Sádaba and Salaverría, 2016: 44) and start to incorporate from the start of the XXI century at international scale, with different United States' (*The Boston Globe*, *The New York Times*, *The Washington Post*) and United Kingdom's media in the lead (*BBC*, *The Guardian*).

Labs get in Spain in the second decade of the XXI century. Currently there are four entities of these characteristics working. By chronological order of creation, they are *Radio Televisión Española* (Lab RTVE, founded on 2011), *Diario de Navarra* (DN Lab, 2013), *El Confidencial* (ElConfidencial.LAB, 2014) and *Grupo Vocento* (Vocento Media Lab, 2014).

To a great extent, the creation of the different Labs is framed in a fact made explicit in the Barometer *Divisadero* 2017: "the upper management has started gaining digital consciousness about the changes in its units' needs, its clients and its future strategic plans" (Instituto de Empresa, 2017: 49).

Undoubtedly, out of the four Spanish Labs, *Radio Televisión Española* is the one which has demonstrated a greater activity, sustained in three key strategic aspects: the progress in more than two

years compared to its competitors; a higher financial capacity thanks to agreements with third parties; and more possibilities that, today, provides the television screen compared to the printed version.

Through these last six years, *Lab RTVE* has performed initiatives that manage augmented reality, from different perspectives. The first experience performed, in the form of pilot project, in October 2015, with the documentary eight-chapter series *Ingeniería romana (Roman Engineering)*. The user was offered the possibility to download a mobile application (both for smartphones as well as for tablets), only operative for iOS and Android environments, even though priority contents were focused in virtual reality and 360 degree videos.

Perhaps the app that has progressed further is the one belonging to the programme *Órbita Laika: La Nueva Generación*, available for iOS and Android and released on September 2016. It is not exclusively focused on augmented reality but instead, provides additional functionalities with 3D objects, 360 degrees' videos, contents of the programme that have not been broadcast, questions and answers questionnaires related to the theme of each programme and even a live chat with programme collaborators. A similar proposal has been established for the informative coverage of general elections held on June 2016.

From the *Lab RTVE* the possibility to work in that same line with other mobile applications currently in the market is indicated, like the ones referring to meteorological information of from programmes such as *El Ministerio del Tiempo* or *Saber y ganar* (currently just use virtual reality).

On its part, *El Confidencial* releases on the beginning of June 2017 the beta version of an application for mobile environments iOS and Android that, predictably, will have capacity for augmented reality contents. However, we would need to wait to see the technological evolution of the development of ElConfidencial.LAB.

In the cases of *Diario de Navarra* (DN Lab) and *Grupo Vocento* (Vocento Media Lab) augmented reality projects have not been detected, neither through specific apps nor through pilot programs or beta versions.

Additionally, it is necessary to consider the performance of Immersive Journalism Lab, the first laboratory of immersive journalism in Spanish created on January 2016, which counts on the boost of Designit, The Appe Date and The VRain and among its collaborators there are included newspapers (*Abc*, *El Mundo*, *El País*), radio broadcast stations (*SER*), television chains (*RTVE*, *Cuatro*, *La Sexta*), cybermedia (*El Diario*, *Yorokobu*) and editorial groups (*Vocento* and *Zeta*).

Although it is an educational centre instead of a contents production unit, in its bet for the concept of immersive journalism, a part of its initiatives are related to the use of augmented reality as conceptual baseline of new models of journalistic narrative. For the moment, its proposal has not been concreted into specific action projects.

5. Conclusions

First. Augmented reality is still taking its first steps in the market of information, both internationally and in a stronger manner in the case of Spain. The majority of the so-called experiences of augmented reality do not comprise the complex technological infrastructure necessary to onset projects of this nature, mainly due to lacks in the triggering component (which entails the combination of advanced geolocalization systems and accelerometers and markers based on the tag technologies by radio-frequency and QR coding of bi-dimensional codes).

Second. The deep economic crisis affecting the market of information is Spain is slowing down to start projects of this nature, despite the conviction that it is a technology that can make the access to specific groups of users easier, and who currently have turned their backs to journalistic companies. Examples such as *El Viajero* of *El País* or *Fotogramas* were not more than episodic experiences that did not have continuity over time.

Third. In the case of apps for mobile environments, all those are free and only available for iOS and Android environments; on the contrary, no mobile applications for Windows were found (neither for phones nor Tablet devices). In any case, the operativity of these apps is conditioned, just as it happens in other productive sectors, to the constitution of a value chain comprised by platform owners, developers and contents providers.

Fourth. The activity carried out strictly in the field of augmented reality by Labs in Spain is almost null, except for *Lab RTVE* by *Radio Televisión Española*, which is joining this technology with the ones belonging to virtual reality and 360 degree videos for the development of projects of experimental nature. Considering the beta version nature of the application developed by *El Confidencial*, any kind of evaluation about its actual incidence in this field is still premature.

Fifth. The true development of augmented reality in the information industry will come hand by hand with a new generation of physical devices that, combined with more potent hardware platforms and software specifically conceived for it, will achieve the advanced integration of real and virtual elements, characteristic of this technology.

Sixth. A future middle to long term scenario is outlined, where we should quantify the actual deontological impact that the implantation of augmented reality has in the flow of informative contents generated by information companies, as well as what must be the protection levels of data provided by users of this technology to the companies offering contents and services.

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