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Enhancing narrative innovation in Radio Televisión Canaria. The use of augmented reality in the news coverage of the La Palma volcanic eruption

Potenciando la innovación narrativa en Radio Televisión Canaria. El uso de la realidad aumentada en la cobertura informativa de la erupción volcánica en La Palma

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RESUMEN

Introducción: La realidad aumentada se ha introducido en el periodismo como una propuesta diferencial que ofrece nuevas posibilidades para el *storytelling* y para conectar con una audiencia desenganchada de los medios tradicionales. En concreto, en este artículo se estudia la utilización de esta tecnología en la narrativa audiovisual del programa "1 Hora Menos" de la *Radio Televisión Canaria* (*RTVC*) para la cobertura de la erupción del volcán de Cumbre Vieja en La Palma. Metodología: Se combina el análisis de contenido de las piezas de realidad aumentada emitidas en dicho espacio para informar sobre la evolución de la activad volcánica (n=50), concretamente desde que se decreta el estado de alerta por riesgo volcánico hasta un mes después de la erupción, con la clave para no restar naturalidad y realismo a la experiencia. **Discusión y Conclusiones:** La realidad aumentada aplicada al relato informativo representa una disrupción narrativa que permite renovar la forma de representar la realidad

y de aproximar los acontecimientos a la audiencia, a la vez que permite experimentar y entender las noticias de un modo que no sería posible con otros formatos.

PALABRAS CLAVE: realidad aumentada; periodismo inmersivo; narrativas periodísticas; narrativa audiovisual; televisión; periodismo visual; innovación periodística.

ABSTRACT
Introduction: Augmented reality has been introduced in journalism as a distinguishing proposal that offers new possibilities for storytelling and for connecting with an audience disengaged from traditional media. Specifically, this article studies the use of this technology as an audiovisual narrative tool in the *Radio Televisión Canaria's* programme "1 Hora Menos" for the coverage of the Cumbre Vieja volcano eruption in La Palma. **Methodology:** It was combined the content analysis of the augmented reality pieces broadcasted by the above-mentioned space to inform about the evolution of the volcanic activity (n=50), specifically from the moment when is activated the alert for volcanic risk until one month after the eruption, with semistructured interviews with professionals and managers from *RTVC.* **Results:** The results suggest that the informative ability of augmented reality turns it into a useful tool for informing the audience about complex issues, while at the same time it facilitates the understanding and assimilation of the information. Its use requires teamwork and careful planning of the virtual scenography, in which the interaction of the journalist will be key in order not to reduce the naturalness and realism of the experience. **Discussion and Conclusions:** Applied to the news story, augmented reality represents a narrative disruption that allows to renew the way of representing reality and bringing events closer to the audience, while allowing to experience and understand the events of the news in a way that would not be possible with other formats.

KEYWORDS: augmented reality; immersive journalism; journalistic storytelling; audiovisual storytelling; television; visual journalism; journalistic innovation.

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CONTENT
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Translation by **Paula González** (Universidad Católica Andrés Bello, Venezuela)

1. Introduction

In the continuous search for new ways of informing and connecting with the audience, augmented reality was introduced in journalism as a differential proposal that opens new avenues for storytelling and news transmission (Pavlik and Bridges, 2013), at the same time it is postulated as an alternative to reach and attract new audiences (Meneses-Fernández and Martín-Gutiérrez, 2016). Along with virtual reality and 360-degree video, augmented reality is part of the range of technologies that, applied to journalistic reporting, allows offering users a more immersive experience of news events (Doyle *et al*., 2016; Gynnild *et al*., 2020).

The use of augmented reality for journalistic purposes can be framed under the phenomenon called immersive journalism (Aitamurto *et al*., 2020). This modality was first defined to refer to the production of content based on the three-dimensional recreation of events or scenarios so that the user, equipped with glasses or a virtual reality system, experiences a certain reality in the first person as if he were

there and having the feeling of embodying a virtual body (De la Peña *et al*., 2010). However, technological evolution and development have led certain authors to extend this label to the use of other technologies, such as augmented technologies. Among them, is Hardee (2016), who conceives immersive journalism as a broader phenomenon, "a continuum from low to high based on how well the narrative creates presence and manages the time, space, and causality of the narrative" (p. 682), so it includes various levels of immersion.

Given the growing popularity of augmented reality regarding the production of journalistic content and the possibilities it offers from the point of view of the news consumption experience, the objective of this article is to examine the impact of this technology on the audiovisual narrative, based, specifically, on the case study of the coverage of the eruption of the Cumbre Vieja volcano in La Palma (Canary Islands, Spain) by the show "1 Hora Menos" of *Radio Televisión Canaria*. This research aims to study this technological-narrative experimentation from the perspective of both the innovation involved in the use of augmented reality in an informative show and the use of an informative situation of such characteristics to enhance its use.

1.1. Virtual, augmented, and extended reality

Although the main peculiarity of virtual reality technologies is that the user is isolated from his or her physical reality to be transferred to another and that he or she has the feeling of "being there", augmented reality refers to a set of technologies that allow superimposing real-time computer-generated objects and digital information about a real environment (Fundación Telefónica, 2011). In this way, users continue to "see and hear the world around them but with additional sights and sounds that are synchronized with the exact location relative to their three-dimensional (3-D) position regarding a geographic location" (Pavlik and Bridges, 2013, p. 6). Thus, and compared to other technologies, what characterizes augmented reality is that the dominant environment is always the real one, acting as a point of reference (Domínguez, 2017) despite having been enriched, reinforced, or complemented with new layers of digital information (Elmqaddim, 2019).

When classifying the different realities, one of the reference proposals is that of Milgram and Kishino, who in 1994 coined "the reality-virtuality continuum". It is a kind of scale that ranges from real environments —understood as the physical world, reality itself— to virtual ones —those completely generated by computers—, with two forms that we could call mixed reality standing between the two: augmented reality and augmented virtuality. In the case of the latter, reality increases virtuality as a result of introducing elements of the real world into a virtual environment. And precisely this is the main difference compared to augmented reality, where the virtual enriches or increases the user's sensory perception of a real physical environment. Likewise, it should be noted that the concept of extended reality (or XR for its acronym in English) is used to refer to all those technologies that both increase and replace the real environment with virtual objects or digital information, so that under this label, forms such as virtual reality (VR), augmented reality (AR), or mixed reality (MR) can be included.

Figure 1: Milgram and Kishino virtual reality continuum.
Source: own elaboration from the original figure of the reality-virtuality continuum of Milgram and Kishino (1994).

Regarding augmented reality itself, which is the object of study of this work, its emergence as a new medium has been favored by the high penetration of mobile devices in the digital society:

> "The widespread availability of smartphones in the last 10 years has redefined augmented reality and mixed reality, which were previously confined to the laboratory. Smartphones and tablets have become the platform for a variety of apps in which digital text, images, video, and audio are superimposed on the screen and appear to be present in the space around the user" (Engberg and Bolter, 2014, p. 3).

In fact, the smartphone, understood by Hardee and McMahan (2017) as "a portable window to a world made up of the surrounding real world and virtual objects" (p. 9), represents the main means of access and use of resources of augmented reality. However, this technology was not originally conceived as a mobile platform (Pavlik and Bridges, 2013). On the other hand, it should be noted that, among the alternative forms of consumption, there are also augmented reality glasses (Microsoft's HoloLens, Magic Leap One, Nreal Light, etc.).

1.2. Augmented reality for storytelling

The researcher Ronald Azuma (2015) estimates that one of the potential uses of augmented and mixed reality technologies is storytelling, as it opens up new possibilities for narrating, telling, and visually presenting stories. In fact, three-dimensional augmented reality visualizations allow more information to be transmitted than other conventional forms (Aitamurto *et al*., 2020) and, also, "provide more contextualized information" (Pavlik and Bridges, 2013, p. 4).

According to Meneses-Fernández and Martín-Gutiérrez (2016), augmented reality "promotes expressive and narrative innovation" of journalists, "which facilitates the exposure as well as the optimization of the narration, by allowing them to incorporate visual content and audio, whose sensations are difficult to transmit only with writing" (p. 10). It is for this reason that Pavlik and Bridges (2013) consider that augmented reality fulfills a function similar to that of journalistic stories, to the extent that they contribute to increasing people's experience with the real world and, ultimately, inform them. An affirmation that is connected with the results of an experimental study with users carried out by

Aitamurto *et al*. (2020), who concluded that the immersive properties offered by this technology can "contribute to the double objective of journalism of informing and involving people" (p. 18), although they have not been able to confirm that the acquisition of knowledge is greater compared to other types of visualizations.

Among the applications of augmented reality for communication purposes, Ikonen and Uskali (2020) identify eleven different forms of storytelling: geolocated news; geolocated guides; situated documentaries; QR codes in print media; augmented reality extension in paper providing images, videos, and links; augmented live events; augmented elements in television studios; stories with virtual objects superimposed on the user's real environment; virtual objects superimposed on the physical world of people; informative videos within an augmented reality; or augmented reality as a journalistic tool to, for example, anonymize sources through filters. Apart from the renewed options that augmented reality offers for the narration of journalistic stories, Pavlik and Bridges (2013) point out other applications with communicative purposes, such as the use of geo-synchronized graphics or images in the news to offer greater context or, among others, the use of information related to the location available through augmented reality or social networks to identify information sources for news stories.

In terms of user experience, Tejedor-Calvo *et al*. (2020) point out that augmented reality in its application to journalism is presented as "a technology that allows greater interactivity with information, both by immersion and by augmentation, taking advantage of elements of portability, ubiquity, geolocation, and connection offered by mobile devices such as smartphones, tablets, and phablets" (p. 7). In fact, portability and ubiquity stand out as the main advantages of these technologies for their use in newsrooms: "the augmented reality worlds of news will allow anyone to engage in information through their smartphones in multimedia story formats from wherever they are" (Pavlik and Bridges, 2013, p. 41).

1.3. Augmented journalism: beyond the QR code

Authors such as Ikonen and Uskali (2020) place the beginning of experimentation with augmented reality technologies in the media around 2010. In what we could refer to as a first stage, newsrooms focused on fundamentally exploring the possibilities of QR codes -a module for storing information represented by a two-dimensional bar code or a dot matrix- in their printed versions. One of the pioneers was Esquire magazine, which in November 2009 presented a special issue with a cover and a series of articles that could be expanded on using a mobile app (Esquire, 2009; Pavlik and Bridges, 2013).

Parallel to the development of technology, other media also began to examine the possible applications of augmented reality in journalism, looking for new ways to bring news closer to the public and promote understanding of complex issues (Gaztaka, Azkunaga, and Eguskiza, 2020). To date, some of the media that have valued and tested the potential of augmented reality are: *ABC News, The Wall Street Journal, USA Today, HuffPost, CNN,* or *The New York Times* in the United States; *The Times, BBC,* or *The Guardian* in the UK; *SZ magazine, Stern, Welt der Wunder,* or *Auto Bild* in Germany; *Il Tireno* in Italy; *Glacier Media* or *Toronto Star* in Canada; or *Fotogramas, Antena 3,* or *Radiotelevisión Española* in Spain, among other examples in more countries (Azkunaga, Gaztaka, and Eguskiza, 2019; Ikonen and Uskali, 2020; Meneses-Fernández and Martín-Gutiérrez, 2016; Pavlik and Bridges, 2013).

Currently, one of the media outlets that stands out the most is *The Weather Channel*. Since 2015, this channel has incorporated augmented reality technology in its weather forecasts to simulate possible meteorological effects and consequences from a virtual television set, thus creating an immersive scenery whose purpose is to reinforce the understanding and assimilation of information. In Spain, there is the example of *Antena 3*, a network that since the end of 2018 has been incorporating

augmented elements in its news broadcasts (Azkunaga *et al*., 2019), using augmented reality technology as an informative tool. Likewise, since 2020, *Antena 3* has also regularly used QR codes in its news programs, resources that lead the viewer to an extension of the news published on the web (Antena 3 Noticias, 2020). Among the Spanish audiovisual media, *RTVE* also stands out, a broadcaster that began experimenting with augmented reality on its news set at the beginning of 2021 (RTVE, 2021). Added to this is *Radio Televisión Canaria*, precisely the object of study in this article, whose use of technology in the virtual set of the show "1 Hora Menos" acquired notable popularity after its application in the coverage of the eruption of the Cumbre Vieja volcano on the island of La Palma (Vertele, 2021).

However, augmented reality journalism is still in a very incipient phase of development, in which new opportunities for digital storytelling emerge, as well as challenges that the media must weigh. Looking ahead to the coming years, Parra, Edo, and Marcos (2017) estimate that "it will be necessary to quantify the true ethical impact of the implementation of augmented reality" on journalistic content, "as well as what the levels of protection of data supplied by users of this technology to content and service providers must be" (p. 1684).

2. Methodology

This research deals with the study of the use of virtual and augmented reality technologies in the show "1 Hora Menos" of *Radio Televisión Canaria* (*RTVC*) to cover the eruption of the Cumbre Vieja volcano on the island of La Palma (Canary Islands, Spain). As stated in the introduction, the main objective of this research is to analyze the impact that this technology has on the audiovisual narrative of the television space, both from the point of view of innovation and information treatment. A series of more specific objectives are extracted from this:

1. Warn what purpose is pursued with the introduction of this technology in the news coverage of the volcanic eruption.
2. Identify the advantages that augmented reality offers compared to other conventional journalistic forms for the coverage of a natural catastrophe of these characteristics.
3. Examine the function that virtual recreation fulfills regarding the news.
4. Define the particularities of the reality or event represented using technology from the point of view of information treatment.
5. Determine the role of journalists in their relationship with the content generated with augmented reality.

To carry out this research, we start from a methodological design in which quantitative and qualitative techniques are combined, as well as methodological triangulation to "reinforce the validity of the results" (García Galera and Berganza Conde, 2005, p.34).

In the first place, it starts with an exploratory study to identify the "1 Hora Menos" shows that can be analyzed. Having delimited the universe —made up of those broadcasts where augmented reality was used to report on the volcano of La Palma—, the analysis sample is selected, which, specifically, advocates limiting the first virtual recreations after the augmentation of seismic activity in mid-September 2021 and the first month after the actual start of the Cumbre Vieja volcanic eruption on September 19th, 2021. In this way, a total of 26 shows broadcast between September 13th and October 19th, 2021, bringing the total number of pieces of augmented reality extracted from each identified broadcast to 50.

Secondly, to extract the main characteristics of the selected virtual recreations, content analysis is carried out. This method, which is among the most widely used to study media production (Wimmer and Dominick, 2013), is characterized by being "systematic, quantitative, highly flexible and adaptable, easy to use (but also easy to abuse), and especially suitable for discovering trends and patterns in large amounts of communicative and symbolic content" (Hansen and Machin, 2013, p. 85), at the same time that it constitutes a "research technique aimed at formulating, based on certain data, reproducible and valid inferences that can be applied to their context" (Krippendorff, 1990, p. 28). To this end, an analysis sheet is designed following the objectives pursued and also taking proposals from other authors as a reference (see Table 1). The following variables are collected in this instrument: show minutes; duration of the augmented reality piece; duration of the news that justifies the virtual recreation; a brief description of the news; function of virtual recreation —aesthetic, informative context, informative expansion (Azkunaga *et al*., 2019; Gaztaka, *et al*., 2020)—; journalist's interaction with virtual recreation —no interaction, limited interaction, and high interaction (Azkunaga *et al*., 2019; Gaztaka *et al*., 2020)—; the presence of information sources on the virtual set; degree of interaction of the sources with the virtual recreation; and multimedia resources —text, audio, image, video, animation, illustration, effects, labels, graphics, others—.

Table 1. *Content analysis sheet.*

Technical dimension
- Show minutes - Duration of the augmented reality piece - Duration of the news that justifies virtual recreation - Topic of the news
Narrative dimension
- Function of the virtual recreation: (1) Aesthetics: the recreation fulfills a merely ornamental function on the virtual set, in such a way that it does not contribute to reinforcing or expanding the information presented by the presenter. (2) Informative for context: the recreation serves to spatially locate the viewer in the place where the events take place. (3) Informative for extension: the recreation offers more information than what the presenter presents. - Journalist's interaction with the virtual recreation: (1) No interaction: the presenter does not interact with the recreation, nor do they rely on it when presenting the information. (2) Limited interaction: the presenter mentions or alludes to the recreation but does not rely on it to amplify or reinforce the information. (3) High interaction: the presenter actively uses the recreation as an explanatory device. – Presence of information sources on the virtual set – Degree of the interaction of sources with the virtual recreation
Multimedia dimension
- Use of multimedia resources: Text, audio, image, video, animation, illustration, effects, labels, graphics, others.

Source: Own elaboration with contributions from Azkunaga *et al*. (2019) and Gaztaka *et al*. (2020).

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Thirdly, and to both complement and enrich the interpretation of the quantitative data obtained, the technique known as semi-structured interviews is also used, whose peculiarity is that it provides greater flexibility by not depending on "a standardized form" (De Miguel, 2005, p. 253), so that the script can be adapted based on the responses of the interviewee (Wimmer and Dominick, 2013). Specifically, two interviews are conducted with two key professionals regarding augmented reality in "1 Hora Menos". On the one hand, to Francisco Moreno, Sole Administrator of *RTVC* and main promoter of the introduction of this technology in the show. On the other, to Victorio Pérez, presenter of this informative format. Both interviews were conducted in November 2021. Both interviewees have been informed of the nature of this study and have given their consent to be cited.

3. Results

3.1. The commitment to narrative innovation in *Radio Televisión Canaria*

3.1.1. Introduction of augmented and virtual reality technologies in programming

The introduction of augmented reality in the *RTVC* broadcast grid takes place within the program "1 Hora Menos", broadcast from Monday to Friday at 9:30 p.m. since September 2020. It has a duration of 60 minutes in total, of which around 45 minutes are of content, completing the remaining time with commercial breaks. The use of this technology stems from the personal commitment of the Sole Administrator of the broadcaster, Francisco Moreno García. According to Moreno himself, after taking office in November 2019, he began to explore the possibility of making augmented and virtual reality technologies part of the news story. To do this, he began by observing its use in other national television channels, which at that time were limited to the production of mere contextual elements such as "making a plane pass through a news set, or making the AVE pass".

However, the Sole Administrator himself closely followed the use of these narratives in the American channel specializing in meteorology, *The Weather Channel*, paying more particular attention to two of its pieces: one on the explanation of the formation and effects of a tornado and another about the spread of forest fires and their consequences. Taking these products as a reference, the chain began the process of searching for a production company that would be capable of taking on the challenge of designing, producing, and broadcasting a similar space on *Radio Televisión Canaria*. The challenge posed was assumed by Videoreport Canarias SA, which in September 2020 begins the production and broadcast of "1 Hora Menos", led by the journalist Victorio Pérez, who defines the objective behind the use of augmented reality as follows: "we intended to give that extra disclosure at the time of night we are in after the grid has focused on pure and simple information".

The Sole Administrator of *RTVC* indicates that the goal pursued with the introduction of this new way of narrating information was to continue telling stories but seeking added value that could make the program a different option from any other proposal that might exist at the national level. However, the implementation of this new narrative occurs gradually:

> "At first it was a little frustrating because, like all these kinds of things, the first ones seemed very cheap compared to what *The Weather Channel* was and it seemed to us that it was very low-budget. The presenter looked a bit blurry, didn't appear as sharp as HD, etc. We spent practically a year like this, from September 2020 to September 2021, developing that" (Francisco Moreno).

Both interviewees point out some of the benefits that, according to their experience, the introduction of augmented and virtual reality technologies in a format of the nature of " Hora Menos" can bring.

Victorio Pérez emphasizes its capacity as an instrument for dissemination, allowing the use of a very visual journalistic story used fundamentally to tell the information and expand new data, providing a more global vision of the space in which these take place. For his part, Francisco Moreno points out that the use of these narratives allows a connection with the younger public, which is not used to having television among its main channels when it comes to getting information, thanks mainly to the aesthetics of augmented reality —"very similar to that of video games", in the words of the Administrator himself—.

All in all, the commitment to this way of producing news content is not exempt from challenges, both logistical and in the field of the necessary procedures in communication through the medium of television. As can be seen in figure 2, the set of "1 Hora Menos" is a completely virtual stage, so the presenter is the only real element present on it. The studio also has robotic cameras, directed by remote control. Furthermore, each of the recreations requires a meticulous realization and staging so that the presenter's story fits perfectly with the virtual image projected on the set of the show.

Figure 2: Set of the show "1 Hora Menos". On the left, you can see the virtual recreation on which the presenter Victorio Pérez is placed. On the right, is the real scene —chroma key— in which the action takes place.
Source: Videoreport Canarias. https://cutt.ly/7YCQYKM

Thus, in short, the program team highlights the need for coordination and the importance of joint work when carrying out this type of broadcast. Likewise, they underline that, although the basic precepts of television communication are maintained, elements such as gestures take on greater importance when positioning oneself in the environment or pointing out certain parts of the visualization that is offered to the audience. All this, taking into account that through augmented reality an informative event of great value is presented so it is essential to avoid unnecessary artifice or sensationalism.

3.1.2. Augmented and virtual reality technologies in the news coverage of the volcanic eruption on the island of La Palma: decision making and challenges

News coverage of a phenomenon as disruptive as a volcanic eruption is always a challenge for any journalistic team. But this challenge may be greater if it is decided to add to the complexity that already exists, that coming from the commitment to innovative narrative techniques. In the case studied in this article, that of *Radio Televisión Canaria*, the approach to this news event began in the days before

the beginning of the eruption, strengthening the network's presence in the territory and expanding its live capacity from the place of the events.

However, from *RTVC*, they acknowledge that one of the distinctive elements in the coverage of this event was its treatment through the use of augmented and virtual reality technologies in "1 Hora Menos". As reported by the Sole Administrator of the entity, at the time of the eruption —September 2021— the show had been running for a year, a period in which the team introduced this technology, perfecting the procedures both in its production phase and in the broadcast. Although the nature of the space was to explain matters related to climate or meteorology, Francisco Moreno himself affirms that they had never considered communicating about volcanic eruptions. In fact, this caused the show team to face certain shortcomings when preparing the first materials related to the eruption since in the libraries used for the production of virtual and augmented objects there were no textures such as lava or recreations of volcanoes:

> "There weren't many of the elements that the '1 Hora Menos' team itself has built, which has then placed them in the library and which is now allowing others to use those elements of augmented reality" (Francisco Moreno).

Victorio Pérez assures that, in the beginning, in "1 Hora Menos", they had some misgivings about how the audience would react when reporting on such an important event using this narrative technique. All in all, Francisco Moreno points out that the decision to break down everything related to the eruption of the Cumbre Vieja volcano through this visual formula ended up being a differentiating aspect compared to the coverage carried out by other television stations. Although they never thought that a natural catastrophe of such characteristics could occur, they sought to take advantage of the commitment to augmented reality made a year ago to disseminate and inform about this event.

Another of the differentiating factors that stand out from *RTVC* is "the speed with which the show team learned to build augmented realities" (Francisco Moreno). In general, the design and materialization of this type of animation is a process that can take several days or even weeks, but the constant updating required by the coverage of the volcanic eruption made the "1 Hora Menos" team manage to develop the ability to adapt the augmented reality narrative to the demands of daily journalism.

3.1.3. Impact on the audience, repercussion, and future evolution of augmented and virtual reality narratives on *Radio Televisión Canaria*

Despite the initial uncertainty about how viewers would react, the coverage of the Cumbre Vieja eruption showed that augmented reality could be used as an informative tool if it was used rigorously and its use was justified from a journalistic point of view. Thus, the fear that the audience would dismiss the work of "1 Hora Menos" as "virtual sensationalism" (Victorio Pérez) disappeared when it received a positive acceptance from the public. A response that *RTVC* attributes both to the narrative disruption represented by the use of virtual recreations in coverage of these characteristics and the informative capacity that augmented reality possesses: "it is impossible to put an editor on top of a volcano, but with the augmented reality you can enter, see what is happening inside the lava" (Francisco Moreno).

According to the Sole Administrator of *Radio Televisión Canaria*, it has been the viewers themselves who have highlighted this potential regarding the recreations on the volcano of La Palma, although he also values it as the main benefit of this technology in its application to the journalistic story, because from the user's point of view it opens new ways to experience and understand the news: "it has an enormous capacity to be able to see what cannot yet be captured with images [...]. That capacity that animation once had brought to reality" (Francisco Moreno).

From the broadcaster, they recognize that augmented reality, among other factors of an editorial nature and technical means, has contributed a differential and innovative value to their brand image compared to what the rest of the channels were doing regarding the informative treatment of the eruption of the volcano. A differentiation that, in the words of Francisco Moreno, provides the "realism of what you are seeing seems real", which is what has been recreated virtually.

RTVC has focused its efforts on incorporating augmented and virtual reality technologies into its informative narrative, which has given way to what Victorio Pérez conceives as a "new way of making television", unique and visually innovative. However, Francisco Moreno warns that its use is not suitable for every topic or coverage and that to preserve its differential character it should be used when it really provides the news story with a value that other conventional formats cannot provide.

From "1 Hora Menos", they conceive that the path already traveled in the exploration of augmented reality as a narrative formula is only the beginning of a process of experimentation and innovation in which they hope to continue advancing to offer the audience a rigorous product, justified from the informative and valuable point:

> "This is only the first step for, once the volcanic eruption is over, to continue deepening, continue giving a different quality value, a plus to the information that we give from public television and to disclosure. And I believe that if we continue in that line of not falling into clichés, of not doing eccentricities, of not recreating scenarios with virtual reality that are unnecessary, only necessary ones… I think we will achieve it and that we will continue doing interesting things" (Victorio Perez).

Although the production of content with augmented reality is still a new and differential element on television grids, Francisco Moreno judges that, once the audience gets used to it and becomes familiar with it, it will end up forming part of the range of resources available to the media to represent events and bring reality closer to viewers: "in the future, augmented reality will be integrated into the general narrative, it will not be a specific piece".

3.2. Informative treatment of the volcanic eruption of the island of La Palma through augmented reality

3.2.1. Descriptive data

The first reference to the Cumbre Vieja volcano in La Palma in the show "1 Hora Menos" occurs on September 13th, 2021. Eight minutes into the broadcast, the presenter refers to this information as follows:

> "It is the news of the day. The Government of the Canary Islands has activated the Special Plan for Civil Protection and Attention to Emergencies due to volcanic risk in the Cumbre Vieja area of La Palma."

At that moment, what would be the first use of augmented reality for the treatment of this informative topic begins, in this case, six days before the start of the eruption. Figure 3 collects a screenshot of the piece used at that time in which a 3D bubble graph is presented on an illustration of the island of La Palma that serves to show the location and intensity of the earthquakes recorded in the place. From that moment on, the informative treatment of this event begins, both from the island itself and from the set through augmented reality. Thus, between Monday, September 13th — the day the alert was activated — and Friday, September 17th — the day of the last broadcast before the eruption — a daily piece

based on this narrative was produced. Furthermore, these were growing in importance within the discourse of the show itself, since, while the one broadcast on Monday the 13th had a duration of 36 seconds, the one made for Friday the 17th was present on the screen for 122 seconds.

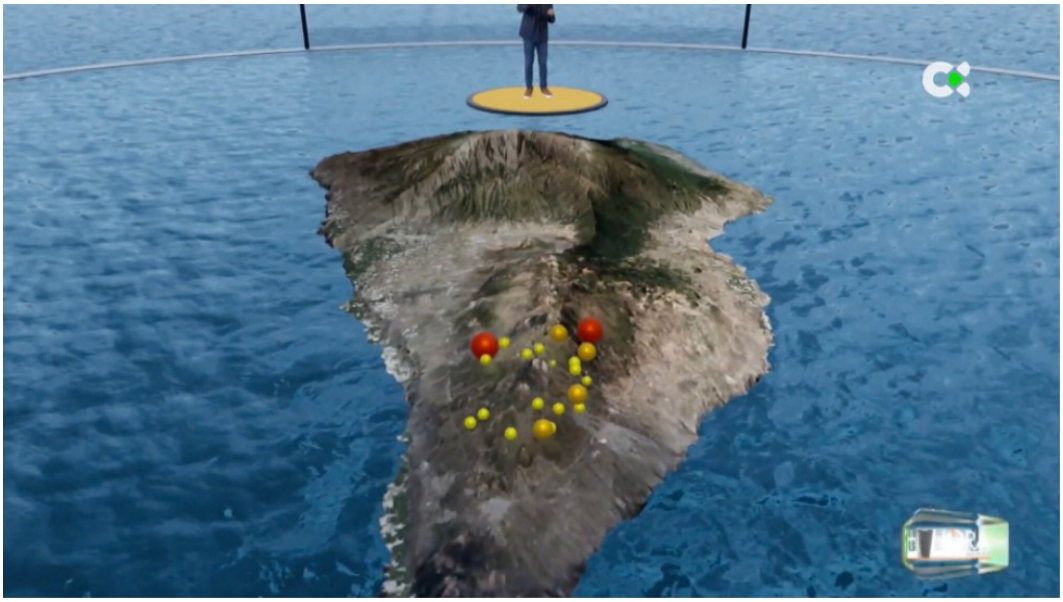

Figure 3: Screenshot of the first example of augmented reality for processing information on the seismic and volcanic activity on the island of La Palma.
Source: "1 Hora Menos" (13/09/2021). https://cutt.ly/AYCIy0U

The eruption of the Cumbre Vieja volcano takes place on September 19th, 2021, so the first emission occurs the following day. At that moment, a more exhaustive treatment of the information related to the volcano begins, since during the first days after the eruption it occupies the entire "1 Hora Menos" show. In this context, there is an even increase in the number of pieces of augmented reality that become part of the story of each of the programs. Thus, for example, on September 20th, 2021, there are four occasions on which this way of presenting information is used to explain the functioning and evolution of the volcano, the characteristics of the lava, the particularities of a fissure eruption, and existing eruption types for a total of 309 seconds.

The duration of the show itself was also affected during the weeks reviewed throughout the research. As shown in Table 2, the screen time of "1 Hora Menos" was extended beyond 100 minutes on several occasions. However, the longest broadcast was on September 28th, 2021, with 186 minutes, which served to report live the arrival of lava in the Atlantic Ocean. As shown in this same table, the trend towards the presentation of more than one example of augmented reality for the informative treatment of this subject is maintained during practically all the shows broadcast during the first month of eruption, reaching its maximum on September 22nd with five examples and a total of 460 seconds on screen.

Table 2. *Data regarding the reviewed shows for the first month of the eruption and the presence of augmented reality elements in them.*

Date	Duration of the show (in minutes)	Number of AR pieces	AR duration in the show (in seconds)
20/09/2021	101	4	309
21/09/2021	44	3	265
22/09/2021	106	5	460

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23/09/2021	105	3	225
24/09/2021	Not available		
25/09/2021	108	3	226
26/09/2021	110	2	254
27/09/2021	122	2	236
28/09/2021	186	2	134
29/09/2021	89	1	88
30/09/2021	56	2	135
01/10/2021	64	2	126
04/10/2021	47	1	139
05/10/2021	Not available		
06/10/2021	47	1	167
07/10/2021	48	2	181
08/10/2021	47	2	147
11/10/2021	49	1	64
12/10/2021	46	2	111
13/10/2021	84	2	121
14/10/2021	50	1	86
15/10/2021	47	2	114
18/10/2021	Special broadcast “Todos con La Palma”		
19/10/2021	51	2	120

Source: own elaboration.

3.2.2. Characteristics of the emitted materials

The general rule in the broadcast of augmented reality pieces within the news coverage of this volcanic eruption in the show “1 Hora Menos” is to make this narrative technique the one that occupies the entire news story. Thus, when comparing the recording of the duration of the augmented reality screen presentation with that of the total duration of the news in which they are integrated, it is possible to observe that, generally, this presentation is the news. After viewing the 50 pieces resulting from the sum of the five produced since the establishment of the alert in the area together with the 45 registered for the first month of eruption, it is possible to observe that eight of them constitute only part of the informative story.

An example of this approach can be the material produced for broadcast on September 25th, in which the effects of ash falling on banana crops on the island are explained. The augmented reality piece remains on screen for 75 seconds. However, the story of the consequences of the ash on the banana plantations extends beyond seven minutes, as it is completed with a live interview with a producer of this fruit, which continues the thread of the story behind the augmented reality.

Regarding the topics addressed regarding the volcano, it is possible to classify the materials emitted during the days before and the month following the eruption into four blocks:

1. **Seismic activity** These are the most frequent presentations during the emissions before the beginning of the eruption. However, some of the pieces produced later focused totally or partially on the existing seismicity on the island.
2. **Volcano status update.** Daily after the start of the eruption, a large volume of pieces had the mission of accounting for the current state of the volcano and the evolution of lava, smoke, and ash emissions at the time. Part of the works framed in this block are made from the review or modification of an existing template so that the necessary changes are introduced to show the situation of the land at the time of the issue.
3. **Effects.** In this third group would be the works aimed at accounting for the effects of lava, smoke, and ash on the population, air, sea, and land traffic, fishing, forests, or the seabed. The materials included in this block have a high capacity that is not exclusively informative but also to spread awareness.
4. **Generic presentations on volcanism and geology.** In a similar way to the contents on the effects, during the first weeks of the volcano's eruption, the "1 Hora Menos" team was the one to produce works not strictly related to the event that occurred in La Palma, since that specific eruption was not addressed, but they dealt with topics related to volcanism and geology from a general point of view. Taking advantage of the prominence acquired by this informative event, augmented reality content was broadcast in which it was used to address the formation process of the continents, the Canary Islands themselves, or the volcanic activity on the planet. Although all these contents are related to the field in which this news event is framed, some of them were not directly aimed at the treatment of the La Palma volcano but serve as a context to understand this type of process.

In terms of sources, the pieces of augmented reality reviewed in this research do not refer to the origin of the information in the visual presentation. However, there are two occasions in which "1 Hora Menos" makes use of the geologist José Mangas, who shares the weight of the visual story with the presenter, Victorio Pérez. This way of proceeding takes place on September 27th and October 6th, 2021, to talk about the underground functioning of the volcano and the effects of lava on the seabed, respectively. In the first case, the expert is presented on a —virtual— base located on a recreation of the Earth's mantle. In the second, collected in figure 4, José Mangas is presented inside a capsule in the environment that recreates the seabed.

Figure 4: Screenshot of one of the interventions of the geographer José Mangas in an example of augmented reality.
Source: "1 Hora Menos" (06/10/2021). https://cutt.ly/IYCOIHZ

As the last aspect within the description of the characteristics of the produced augmented reality materials, we pay attention to their components. As described in the methodology, the analysis sheet prepared looked for the presence of elements such as text, audio, image, video, animation, illustration, effects, labels, or graphics within the reviewed pieces.

Table 3. *Elements that constitute the revised augmented reality works.*

Text	8	**Illustration**	50
Audio	21	**Effects**	0
Image	0	**Labels**	18
Video	1	**Graphics**	5
Animation	46		

Source: own elaboration.

Table 3 shows the presence of each of the nine elements searched for. As can be seen, illustration is the most frequent since the 50 pieces reviewed include objects that are built through computer recreations, without these being based on real images. In second place would be animation, a technique that becomes part of a component in 46 of the 50 examples seen. Thus, practically all of the augmented reality presentations related to the eruption of the Cumbre Vieja volcano have movement and animation of the recreated and shown objects —as we have seen.

The second block in terms of presence would be audio and labels, present on 21 and 18 occasions, respectively. The function of audio is fundamentally contextual since it is usually used as an element of sound location through effects such as explosions during the eruption, or the inclusion of water sounds typical of the seabed when the scene changes from the earth's surface to this site. As for the labels, their main function in the informative treatment of this subject is to place on the maps and proposed scenarios the name of the different populations or small informative pills that refer to data such as the depth within the terrestrial mantle or the height of the smoke column of the volcano.

It is also worth mentioning the more residual role played by elements such as text or graphics. The text takes part of the narration in some of the projects in the form of short sentences that serve as a context for the information and the contribution of data, while the graphics are used only when accounting for the position and intensity of earthquakes, in the way already described in figure 3. Finally, only video is included in one of the observed examples. It is an explanation of the main active volcanoes in the world, giving an account of their position on a—virtually recreated— world map on which videos of their most recent eruptions are displayed.

3.2.3. Role of the content and interaction

The function of visualization in augmented reality is similar in the 50 examples studied. This narrative technique fulfills an informative function in all of them. Within this, it is possible to distinguish between the works that expand the data provided by the journalist and those others that serve to locate the viewer spatially or to offer them a visual context, without expanding the data offered by the journalist. In this case, we are facing the second of the assumptions since in the treatment of augmented reality in "1 Hora Menos" the weight of the explanation falls on the professional who is on screen, the visual piece being an element of support or contextualization of what is already being narrated through oral discourse.

Regarding the place that the journalist occupies in the space recreated with augmented reality within the show, he is presented within the staged environment in 19 of the 50 pieces reviewed, that is, in 38% of the occasions. While in examples such as the one seen above in figure 2, the presenter of the show appears next to the recreation carried out, explaining it, in others he is part of the stage, presenting it on the seabed that he explains or on a helicopter from which he observes the island, as shown in figure 5.

Figure 5: Screenshot of one of the examples of augmented reality in which the presenter is part of the recreation.
Source: "1 Hora Menos" (28/09/2021). https://cutt.ly/BYCPDnv

The degree of interaction of the presenter, for whose categorization what has been described by Azkunaga *et al*. (2019) and Gaztaka *et al*. (2020) has been followed, presents disparate results. The most frequent formula is that of non-interaction —present in almost half of the occasions—. In these cases, the journalist narrates the information orally, while it is also presented through the visual story of augmented reality but without referring to it or appealing to any of its elements. The cases of limited interaction are, in total, 11 within the fifty examples seen. In them, the presenter of the show mentions the content in augmented reality, although he does not actively use it to explain the data that is being narrated at that moment. Finally, the high degree of interaction is used in 16 cases, being the second most repeated formula. This would be the case of the pieces in which the journalist makes active use of augmented reality as one more element within the explanation, helping to illustrate and reinforce certain passages of the communication that is carried out at each moment.

Regarding the formulas used to mention the content presented through this technique and the times they are used to draw the public's attention to it, it has been possible to count a total of 33 references to the content in 27 of the 50 pieces reviewed. Expressions such as "Look at all those little dots" —September 13th—, "We are going to place ourselves on the map thanks to virtual reality" —September 20th—, "Here you are seeing it" —September 21st—, "There you see them" and "There you see it in the middle" —October 1st—, or "I am in the Atlantic Ocean" —October 12th— are generally used. Normally one or two references of this type are produced during the exhibition through augmented reality, and its use serves to emphasize certain aspects presented in the visualization or to claim the attention of the audience at specific moments.

Furthermore, it should be noted that these verbal interactions are completed with abundant gestural interaction on the part of the presenter. This usually takes place in two main ways. On the one hand

as a gestural accompaniment of the existing movement within the broadcast materials. For example, if it is said that lava rises through the mantle, the journalist usually accompanies that reference with an upward movement of his hands. On the other, as a way to direct attention to certain points of the presentation. In these cases, some specific areas are usually pointed out, seeking for viewers to focus their gaze on them to subsequently provide specific information about them.

4. Discussion

Augmented reality technology makes its way into journalism as a narrative disruption that offers new possibilities for storytelling and enriches the news consumption experience. Some television networks have seen the potential in a tool that can be integrated into the sets during live broadcasts, although each set design or virtual recreation is carried out in advance, and entities such as *RTVC* are experimenting in terms of storytelling to serve both the purpose of informing and connecting with viewers.

The commitment of the Canarian public broadcaster focused on the show "1 Hora Menos", seeking to provide a differential value and innovation to an informative format. Although augmented reality can fulfill various functions projected on the television studio, in the case of this show, mere aesthetics is dispensed with and, instead, the use of this resource is aimed at reinforcing and complementing, through a virtual recreation carefully planned and designed, news information introduced by the presenter.

In this way, the informative narrative with augmented reality that they apply constitutes a highly visual formula that allows expanding and providing greater context to the data exposed by the journalist, who through this resource is supported by a three-dimensional and enveloping recreation in which they represent scenarios, events, or elements that could hardly be shown and exposed through other formats. Likewise, from the perspective of the audience, the potential of augmented reality as an informative tool lies in the fact that it allows viewers to be spatially located, to provide them with a more complete image of the space or event that is presented, and to allow them to discover distant places or places that are difficult to access that they probably wouldn't be able to access otherwise. It is precisely for this reason that audio is positioned as one of the most relevant multimedia resources in narrative construction, since, used as an element of environment or accompaniment, it can contribute to stimulating the viewer's immersion and reinforcing the realism of the representation.

However, the application of augmented reality in the informative story must be duly justified from the journalistic point of view since its abuse could overshadow the differentiation and singularity that it provides to the journalistic story. Its use must make sense in exposing the news and add value to the story that other forms of storytelling cannot provide. Reasons that precisely motivated its application in the coverage of the eruption of the Cumbre Vieja volcano in La Palma, since, integrated into the audiovisual narrative of "1 Hora Menos", it allowed simplifying the understanding and assimilation of a complex event.

Although *RTVC* showed that augmented reality can have a place in daily journalistic production, as a result of a long prior experimentation process, its journey with this technology also shows that, for virtual scenery to work and make sense from a narrative point of view, teamwork is required that must be understood both in a multidisciplinary and collaborative way.

Besides serving the mission of journalism to inform and train the viewer, augmented reality represents a technological-narrative innovation that helps attract the attention of audiences unhooked from traditional media and connect with new audiences, especially young people and digital natives, who find the virtual and augmented narrative familiar by the influence of the video game rhetoric. At the

same time that it opens new avenues for engagement, it also contributes to reinforcing the image of *Radio Televisión Canaria*, positioning this public service medium as an innovative entity that takes advantage of the informative capacity of technology to carry out objective and rigorous journalism.

5. Conclusions

The research has made it possible to identify the main peculiarities of the introduction of augmented reality in the television narrative of the regional broadcaster that is the object of study. In this sense, *RTVC* takes advantage of the visual and immersive nature that technology offers to inform and publicize about a complex event in which traditional image capture tools are not enough to explain everything that happens around the eruption and that, therefore, the audience understands it. Thus, the story of the news is based on a virtual and augmented recreation that allows the narrated reality to be represented with relative precision and spatially transfer the viewer to the place where the events take place. In this type of piece, the role of the journalist acquires greater importance, given that their previously choreographed and planned interaction will be essential to provide realism to their immersion in the three-dimensional scene.

The use of augmented reality as a support element then provides added value compared to other conventional journalistic forms, since these computer-generated visualizations superimposed on the virtual set not only provide more visual information, that can also be enriched with the use of other multimedia resources, but also a greater contextualization of the news story.

The interest in experimenting and implementing this technology in news coverage has grown remarkably in the last five years. However, the development of this type of three-dimensional recreation requires time and teamwork, which makes it difficult to use as a daily complement. The exception is precisely *RTVC*, which, exceptionally, focused its efforts on taking advantage of the possibilities of augmented reality in each of the broadcasts of the "1 Hora Menos" show to facilitate the assimilation and understanding of a natural catastrophe caused by the volcano eruption.

In short, augmented reality is introduced in the media as a technological innovation that gives way to a new way of narrating, experiencing, and understanding the news in a way that would not be possible through other formats. Thus, its informative potential stands as a differential element when exposing and explaining complex issues. However, its introduction into the informative narrative is not exempt from challenges. The fine line that separates journalistic seriousness from the spectacularization of a news event becomes one of the main challenges. For this reason, it is essential that their employment be based on respect for the ethical principles of journalism, working responsibly and honestly so as not to compromise the impartiality of the story.

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