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Rise and fall of 360 degree video: evolution and features of immersive content production in European public service media (2015-2023)

Auge y declive del vídeo 360 grados: evolución y características de la producción inmersiva en los medios de servicio público europeos (2015-2023)

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Abstract

Around the year 2015, newsrooms began to explore the potential that 360-degree video could offer in narrating and representing news reality. Thus began a stage of immersive experimentation on a global level wherein media outlets sought to investigate the possibilities of the format from both a narrative and a user-experience perspective. European public service media have not remained aloof and have also embraced this form of content production, commonly referred to as immersive journalism. Specifically, this study examines the production of non-fiction content with 360-degree video in European public broadcasters between the years 2015 and 2023 (N = 814). The research is guided by three main objectives: to examine the evolution of spherical piece creation, extract their formal characteristics, and analyse the user's role in the immersive scene. A mixed-method approach is applied based on content analysis and in-depth semi-structured interviews. The study's findings lead to the conclusion that a gradual decline in interest in the format began from 2019, influenced by the complexity of its sustainability. This decline would have been accentuated along with the onset of the COVID-19 pandemic. On the other hand, the produced content is notable for being brief, simple in multimedia terms, and not adhering to the specificities demanded by both immersive language and spatial narratives.

Keywords

Journalistic innovation; public service media; immersive journalism; virtual reality; 360-degree video.

Resumen

Sería en torno al año 2015 cuando las redacciones periodísticas comenzarían a explorar el potencial que el vídeo 360 grados podría ofrecer para narrar y representar la realidad noticiosa. Comienza así una etapa de experimentación inmersiva a nivel global, en la que los medios de comunicación tratan de investigar las posibilidades del formato desde el punto de vista de la narrativa y de la experiencia del usuario. Los medios de servicio público europeos no se han mantenido al margen y han abrazado también esta forma de producir contenido comúnmente denominada como periodismo inmersivo. En concreto, este estudio examina la producción de contenido de no ficción con vídeo 360 grados en las radiotelevisiónes públicas europeas entre los años 2015 y 2023 (N = 814). La investigación parte de tres objetivos principales: examinar la evolución de la creación de piezas esféricas, extraer sus características formales y analizar el rol del usuario en la escena envolvente. Se aplica un enfoque metodológico mixto basado en el análisis de contenido y en la entrevista semiestructurada en profundidad. Los resultados del estudio permiten concluir que a partir del 2019 se produce una paulatina pérdida de interés en el formato, favorecida por la complejidad de su sostenibilidad. Este declive se acentuaría en paralelo a la irrupción de la pandemia de la COVID-19. Por otro lado, los contenidos producidos destacan por ser breves, simples en términos multimedia y no ajustarse a las especificidades que tanto el lenguaje inmersivo como la narrativa espacial exigen.

Palabras clave

Innovación periodística; medios de servicio público; periodismo inmersivo; realidad virtual; vídeo 360 grados.

1. Introduction

The particularities of immersive journalism with 360-degree video have opened up new possibilities for bringing reality closer and transporting the viewer to the scene of the events presented in the news story (Soler-Adillon and Sora, 2018). The chief singularity of content in this format is that, thanks to the use of virtual reality (VR) headsets, the user can place himself/herself in the middle of the scene, action or reality shown, and can observe the events or spaces from a first-person perspective. The role of the user is redefined in these types of pieces, as they abandon their traditional role of mere spectator so as to observe the scene or circumstances as if a direct observer or witness (Paíno and Rodríguez, 2019; Slater and Sánchez-Vives, 2016), in some cases even as a protagonist in the story itself. Consumption then becomes a kind of experience where first-person experience emerges as a differential element compared with other forms of conventional journalism (Maschio, 2017). This immersive journalism is also attributed with the capacity to generate in the user the sensation of being present in the place where the events occur (De la Peña et al., 2010).

Since the use of immersive technologies began to spread in the international media landscape in the mid-2010s, several studies have addressed the particularities of their application in journalistic storytelling, from the perspectives of both narrative and user-experience. Researchers have delved into aspects such as its introduction and evolution in the media (Benítez and Herrera, 2018; López Hidalgo et al., 2022; Rodríguez and Paíno, 2022), the characteristics of the content produced (De Bruin et al., 2022), the impact in narrative terms of virtual reality and 360-degree video in the creation and production of journalistic content (Caerols et al., 2020), the effects of immersive journalism on user-perception and experience (Greber et al., 2023; Paíno and Rodríguez, 2021; Pjesivac et al., 2022; Vázquez-Herrero and Sirkkunen, 2022), the gratifications associated with the consumption of narratives produced with immersive technologies (Hernández-Rodríguez and García-Perdomo, 2023; Kim and Lee, 2022; Nielsen and Sheets, 2019), or even the ethical and normative challenges that these technologies pose for journalistic practice (Benítez de Gracia et al., 2021; Wu, 2022).

However, these issues have mainly been addressed from the point of view of commercial media, leaving the importance of experimenting with 360-degree video or virtual reality technologies for public service media largely unexplored. Against this background, this study aims to examine the immersive spherical video production of European public service broadcasters - specifically, those contents published between 2015 and 2023 - in order to identify the evolution of experimentation with the format, to extract the main formal characteristics of the published pieces and to analyse the role of the user in these contents.

1.1. Immersive technologies applied to journalism

The emergence of what De la Peña et al. (2010) called immersive journalism opened a new stage of immersion in the news story. This journalistic trend, which consists of "the production of news in a form in which people can gain first-person experiences of the events or situation described in news stories" (De la Peña et al., 2010: 291) and which is fundamentally materialised in 360-degree videos and computer-generated virtual recreations, enables the viewer, thanks to the use of VR headsets, to go beyond the screen (Domínguez, 2017) and feel that they are actually in the reality represented.

In particular, the period between late 2015 and early 2016 marked the beginning of widespread media exploration of the possibilities offered by 360-degree video for non-fiction storytelling (Doyle et al., 2016). Its eruption in the journalistic media responds to the technological industry's eagerness to bring virtual reality to the mass market (Marconi and Nakagawa 2017; Sánchez Laws, 2019), as well as to the continuous search for new and innovative ways of delivering information (Van Damme et al., 2019), on this occasion, in a highly competitive media scenario in which "innovating is essential for the survival of the media" (García-Avilés et al., 2018: 370). According to Hassan (2022: 196), the media adopted "the discourse of VR as a way to stanch declining print sales and to remain relevant as public sphere actors in the age of social media".

The degree of development of immersive technologies, the reduction in cost of 360-degree video recording systems and the proliferation of commercial virtual reality headsets created a favourable scenario (Pérez-Seijo and López-García, 2018; Mabrook and Singer, 2019; Watson, 2017) in which to start experimenting with what was presented as a new format that facilitated a renewal in the way news stories were told, distributed and even consumed.

Spherical video and virtual reality were presented in the journalism industry as affording a kind of competitive advantage (Nielsen and Sheets, 2019) that could not only serve to reconnect with the audience, but also to act as an attraction to reach younger, digitally native audiences (Van Damme et al., 2019; Watson, 2017). This is why Jones (2017: 172) considers that immersive journalism "addresses the fragmented audience by offering content that is shared socially on mobiles, available instantaneously and is telling a story in a new way".

The union between journalism and immersive technologies introduced a new way of displaying reality that, according to Toursel and Philippe (2019), must be understood from the perspective of both technological innovation and of the changes it introduces in user-experience, an issue that we address in depth in the following sections.

1.2. Experimentation in European public service media

In parallel to the irruption of immersive technologies onto the market and the incipient experimentation with the 360-degree video format in the main commercial media in the mid-2010s, several European public service broadcasters also began to explore what was presented as an emerging and innovative way of representing news reality (Pérez-Seijo et al., 2018). The European Broadcasting Union, appreciating the impact that these technologies had on production and distribution as well as on consumption, advocated supporting and stimulating production among its members (EBU, 2016). This support would mainly be channelled through its market research unit Media Intelligence Service (MIS) and the Media and Technology & Innovation departments. Through these services, it would provide broadcasters with data on the supply and audience of immersive technologies, facilitate the exchange of knowledge and know-how between broadcasters and key industry players, provide advice and training, present a platform for sharing ideas and discussing best practices or, among other initiatives, organise hackathons and workshops to accelerate innovation in immersive storytelling (EBU, 2017).

Unlike private media, which are driven by the economic imperative, public service media can take a greater risk when it comes to innovating and experimenting with new technologies, even contributing to opening and developing new markets (Rodríguez-Castro et al., 2021). On the other hand, Zaragoza-Fuster and García-Avilés (2020: 47) argue that part of the social function of public service media translates into "experimentation with technologies and their commitment to innovation in order to ensure the highest quality in their audiovisual products". Through their work, they also collaborate in media and digital literacy, as they bring new technologies closer to the audience, enabling them to get to know them and become familiar with them, among other tasks (Pérez Tornero et al., 2021).

Innovation laboratories and incubators emerged precisely to channel the commitment of some of these media to product and service innovation (Lombao et al., 2016). Several European public service broadcasters created these units or departments in order to track the latest trends in both non-fiction and fiction production, experiment with new technologies for production and distribution, test new narrative formats, develop disruptive tools and products, and seek ways to connect with young audiences. Some of these technological and narrative experimentation departments are Nouvelles Écritures and Transmédia at France TV, Lab RTVE at RTVE, WebCréation at RTBF and, among others, BBC News Labs, Connected Studio or Taster at the BBC (Pérez-Seijo and Benítez, 2018). In a changing, convergent and highly competitive digital scenario, the most dynamic public service broadcasters consider innovation as "a strategic instrument for improving positioning, audience and corporate reputation" (Campos Freire, 2016: 20).

2. Methodology

In this research we study the production of non-fiction content with 360-degree video in European public service broadcasters between 2015 and 2023. As stated above, this study is articulated around three main objectives: (O1) to analyse the evolution of experimentation and production of content in spherical format; (O2) to identify the main formal features of the pieces produced; and (O3) to examine how the user is represented in the scene. In order to respond to these aims, a mixed methodological design is used, combining quantitative (content analysis) and qualitative (in-depth interview) techniques.

First, in order to select the study sample, a universe was formed of all 360-degree video content published between 1 January 2015 and 31 December 2023 by 29 public service broadcasters in the European Union that are members of the European Broadcasting Union^[1]. As a result of this exploratory study, a database of more than 900 pieces available on the platforms of the media examined was compiled. Once the universe was defined, the analysis sample was selected on the basis of five criteria required of the content: it had to present a 360-degree video format, regardless of whether real or virtual images were used; it had to have been produced or co-produced by the broadcaster in question; it had to be journalistic or, failing that, non-fiction; it had to be accessible from Spain; and it had to be viewable without necessarily using VR headsets. After filtering the database, the sample consisted of a total of 814 360-degree videos published and produced/co-produced by 24 European public broadcasters: ARD, BBC, BNT, ČT, DR, ERR, France TV, LRT, MTVA, NPO, ORF, RAI, RTBF, RTÉ, RTP, RTVE, RTVSLO, SVT, TG4, TVP, TVR, VRT, Yle and ZDF^[2].

On the other hand, in order to extract the main characteristics of the immersive production of the public service media examined, the technique denoted as content analysis was applied. This research method, which represents one of the most widely used methods for analysing media content (Wimmer

and Dominick, 2013), is characterised as “systematic, quantitative, highly flexible and adaptable, easy to use (but also easy to abuse) and particularly suited to discovering trends and patterns in large amounts of communicative and symbolic content” (Hansen and Machin, 2013: 85). For this purpose, an analysis sheet was designed in accordance with the objectives pursued, and also taking as a reference previous proposals by other authors. This instrument includes the following variables (see Annex 1): radio television; year of publication; duration; type of image (Barreda-Ángeles, 2018); subject matter (Paíno et al., 2019); overprints (Benítez-de-Gracia and Herrera-Damas, 2018; Paíno et al., 2019); image effects; extradiegetic music; duration of music; sound effects; user-representation (Dolan and Parets, 2015); user-perspective (Paíno et al., 2019); co-presence (Benítez-de-Gracia and Herrera-Damas, 2018; and Sheikh et al., 2016); interactivity; camera height and angle (Benítez and Herrera, 2018); genres and formats (Benítez and Herrera, 2017; Gomis, 2008; Jones, 2017; Salaverría, 2005; Watson, 2017); and viewing mode.

To examine the degree of internal consistency of the coding process, intra-coder reliability was tested. For this purpose, the procedure known as test-retest was used which, in this case, consisted of first coding the entire sample then, three months later, re-coding 20% of the randomly selected items. Subsequently, Cohen's Kappa coefficient was calculated and the results showed all the variables to have values above 0.86, indicating high reliability (Landis and Koch, 1977). The data were analysed with SPSS v.25 software.

Finally, and with the aim of triangulating the results to reinforce their validity (García and Berganza, 2005), the technique of semi-structured in-depth interviews was used. Specifically, a total of 12 interviews were conducted with experts and specialists in immersive non-fiction narratives (see table 1). The script of the interviews was structured around three thematic blocks: characteristics and challenges of immersive non-fiction production, the value that the spherical format brings to the journalistic narrative, and user experience.

Table 1: List of experts interviewed

Code	Interviewee profile	Gender
E1	Journalist (Rádio e Televisão de Portugal, Portugal)	Man
E2	Immersive artist and specialist researcher	Man
E3	Researcher, TV producer (Globo, Brazil) and consultant on immersive narratives	Man
E4	Specialised researcher	Man
E5	Specialist researcher and journalist (IRIB, Iran)	Man
E6	Specialised researcher	Man
E7	Specialised researcher	Woman
E8	Executive Producer (BBC VR Hub, UK)	Woman
E9	Journalist (Lab RTVE, Spain)	Woman
E10	Immersive video specialist filmmaker	Man
E11	Journalist and producer specialising in immersive storytelling	Woman
E12	Television director (Lab RTVE, Spain)	Man

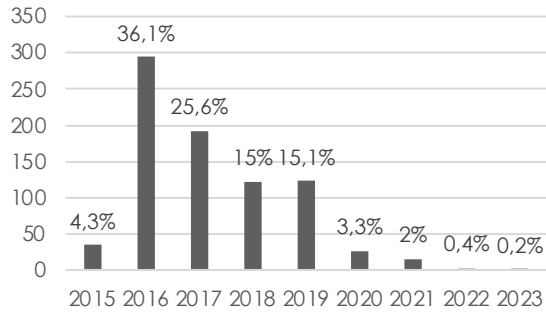
Source: author's own preparation

3. Results

3.1. Production between 2015 and 2023: interest in the format decreases

The results obtained regarding the evolution of the volume of immersive production between 2015 and 2023 reveal two outcomes: first, that 2016 was the year in which the largest volume of 360-degree video content was published by European public service broadcasters (36.1% of the total), coinciding with the boom in narrative experimentation with immersive technologies in the international media landscape; and, second, that since then the trend has been downward, both in terms of production and public service media interested in the format (see Figure 1). Between 2018 and 2019, a certain stabilisation can be observed, although the number of contents collected is, in both cases, below half of the total volume of pieces published in 2016 (N = 294). Thereafter, immersive production plummets. In 2023, only the BBC and RTVE publish, respectively, a piece in 360-degree video.

Figure 1: Evolution of 360-degree video publishing between 2015 and 2023



Source: author's own preparation

In terms of degree of commitment to the format, the BBC (N = 139) is the most active public broadcaster (see table 2), to the extent that its production alone represents 17.1% of the total number of videos published over the period analysed. The British corporation published its first immersive report in 2015, *Calais Migrants: What's it like in the "Jungle"?* with which it launched a stage of narrative experimentation led by Zillah Watson from BBC News Labs: "the decision was taken to have a small core team across the organisation to work on news with journalists, but also to explore the possibilities of virtual reality in other genres" (E8). Its members would also be responsible for developing relationships with technology companies such as Oculus and Samsung. Later, in November 2017, the BBC VR Hub was born, a multidisciplinary innovation team also led by Watson, with the remit to test and experiment with the possibilities of immersive storytelling. However, in October 2019, the closure of this unit was announced: "the decision was taken because the BBC had to downsize (...). As VR headsets were not mainstream, and wouldn't be mainstream for some time, it was less of a priority than other things" (E8).

Table 2: Top 10 broadcasters with the highest output

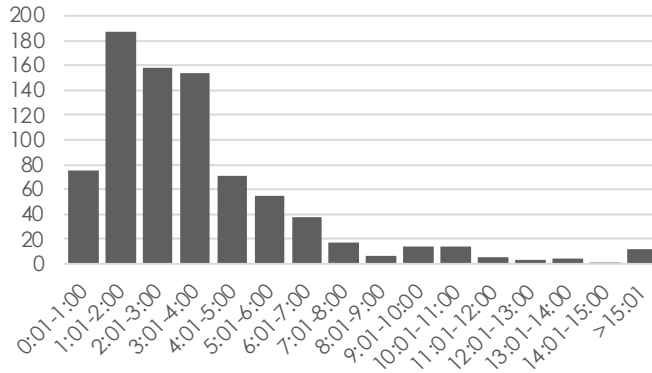
Broadcaster	Total
BBC	139
RAI	96
France TV	84
SVT	83
ZDF	77
ČT	61
RTVE	61
YLE	34
DR	25
RTP	23

Source: author's own preparation

3.2. Duration: short pieces predominate

From the duration of each of the 814 pieces that comprise the sample under study, it can be seen that the average duration of the videos is 3 min 39 s with a standard deviation of 3 min 12 s. In addition, the results show three aspects: firstly, that most of the content is no longer than five minutes (79.2%); secondly, that pieces of between 5 and 10 minutes are not very frequent (16%); and finally, that very occasionally videos longer than 10 minutes are published (4.8%). In short, there is a trend towards the production of short content in which the message or information is concentrated in just a few minutes (see figure 2).

Figure 2: Duration in minutes of 360-degree videos



Source: author's own preparation

If we examine the data in detail, we find that the largest volume of 360-degree videos is between one and four minutes in length. This is reflected in 61.3% of the sample, while only 9.2% have a duration of less than one minute. However, it should be noted that, when the pieces are longer than five minutes, they are generally reports or immersive experiences created for consumption with VR headsets, as would be the case with works such as *Tras la estela de Elcano* (RTVE, 2019) or *Das Weiße Haus des Exils* (ZDF, 2019).

The interviewees agree that technology still acts as an important conditioning factor when designing pieces longer than 5-10 minutes, given that the longer the duration, the greater the likelihood that the user will experience fatigue, eyestrain and/or motion sickness when viewing the content with VR headsets: "today it is not a question of the narrative itself, but of the discomfort provided by the technological device we use to watch" (E3).

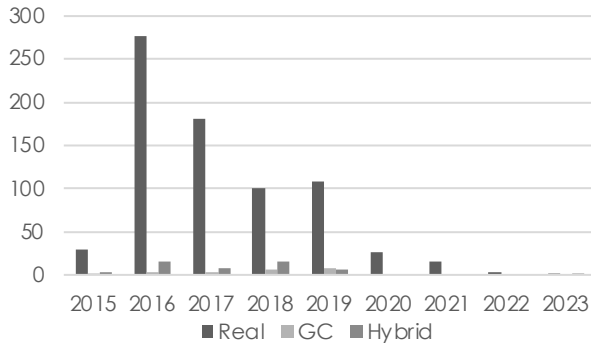
Some experts indicate that, in certain cases, the duration will be conditioned by the time and consumption habits of online users: "we are at a time when capturing the viewer's attention is increasingly difficult, so keeping someone's attention for more than one or two minutes on a piece of content is very complicated" (E2). Although others also point to access devices: "we found that for first-time users watching more than five minutes was difficult [with VR headsets] (...). We realised that shorter was better and we could get more people to enjoy the experience" (E8).

3.3 Type of image: capturing reality rather than virtually recreating space

Data on the type of image in 360-degree videos reveal that European public broadcasters prefer to produce real image content (91%) – e.g. the report *Planica 360 – Polet s helikopterjem* (RTVSLO, 2018). By contrast, only 2.7% of the cases are computer-generated experiences – e.g. *Vulkane in 360°* (ZDF, 2015). The remaining 6.3% are hybrid image pieces: videos in which, to a greater or lesser extent, both real and synthetic images are used and/or combined – e.g., *Thomas Pesquet's Dans la peau: L'entrainement* (France TV, 2018). Although there is not an abundance of content that includes virtual images, it is worth noting that their use has mainly been for the production of content on historical episodes.

In terms of evolution, it is noteworthy that the production of computer-generated experiences is increasing, albeit subtly, over time. In other words, there is a growing interest on the part of broadcasters in creating and publishing this type of content. However, 2019 is the last year in which a production of these characteristics has been recorded (see figure 3).

Figure 3: Type of image and evolution by year



Source: author's own preparation

3.4 Multimedia construction: simplicity to avoid artificiality

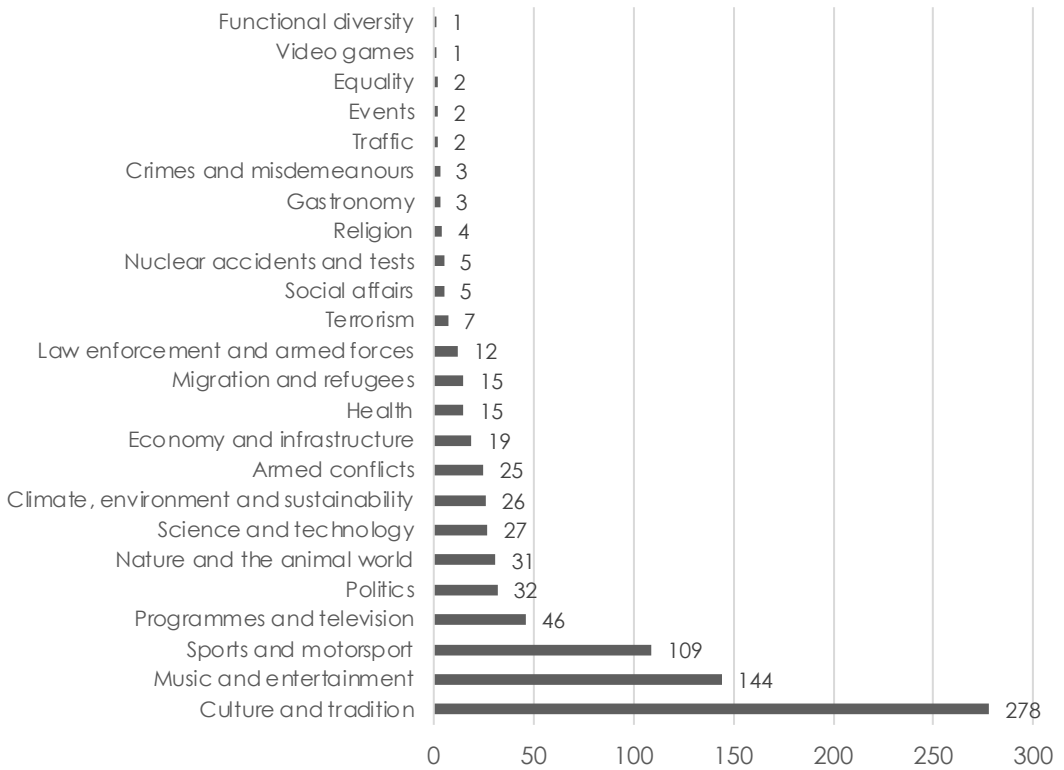
Regarding the use of audiovisual resources in the 360-degree videos analysed, the data reveal that most of the content excludes overlays (38.1%) or extradiegetic music (33%), and that the use of image effects (13.4%) and sound effects (9.6%) is infrequent.

Specifically, the most prevalent overprints are logos (19.1%), text boxes (18.8%), job titles (11.2%) and identification labels (10.4%). As far as image effects are concerned, the so-called fast motion (7.7%) stands out in particular. As for extradiegetic music, mostly instrumental in nature (31.2%), there is no consensus on its use in the story: while in 15.3% it is found only at specific moments, in 17.7% it remains constant throughout the piece, as in *Paris caché: visitez une ancienne station électrique en 360°* (France TV, 2018). Finally, the sound effects used most frequently were those signalling a change of scene (5.5%) and those informing of the appearance or disappearance on screen of an overprint (3.1%), as in *Hamburg in 360 degrees* (ZDF, 2018).

3.5 Themes addressed: interest in culture and tradition

With regard to the topics covered by the 360-degree videos examined, the results of the analysis make it possible, on the one hand, to classify the content into 24 different categories and, on the other, to establish that three topics account for 65.3% of the sample (see figure 4). The first place is occupied by culture and tradition (34.2%), highlighting the fact that the production of content in spherical format on history, art, architecture, literature, historical heritage or even folklore has captured the interest of more than half of the European public service broadcasters examined – e.g. *Prezidentský vlak* (ČT, 2018). In second place is the music and entertainment category (17.7%). In this case, SVT stands out in particular, as its broadcasts of concerts and musical performances alone account for more than half of the pieces included under this label. In third place come sports and motoring content (13.4%). France TV (6%) has produced and published the most pieces on this subject, including its special reports dedicated to Roland Garros and its transmedia project *Le Goût du Risque* (2016), produced in collaboration with Radio Télévision Suisse.

Figure 4: Themes addressed in 360-degree videos

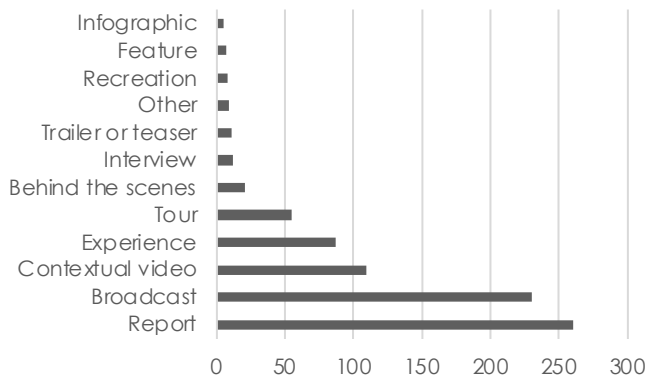


Source: author's own preparation

3.6 Genres and formats: new ways of representing reality

The results reveal the presence of pieces that could hardly be framed under the label of a conventional genre or format, which makes it necessary to rethink the existing categories in an effort to classify the forms identified in this study, some of which are the result of both the remediation of practices and hybridisation between genres. For this reason, a taxonomic proposal has been designed and defined in order to classify the pieces, taking into account both their purpose and their formal similarities and differences. The aim is to offer an initial categorisation of formats that acts as a guide and reflects the diversity of forms that European public service broadcasters have used to approach reality under the umbrella of immersive journalism (see figure 5).

Figure 5: Immersive formats identified in the sample



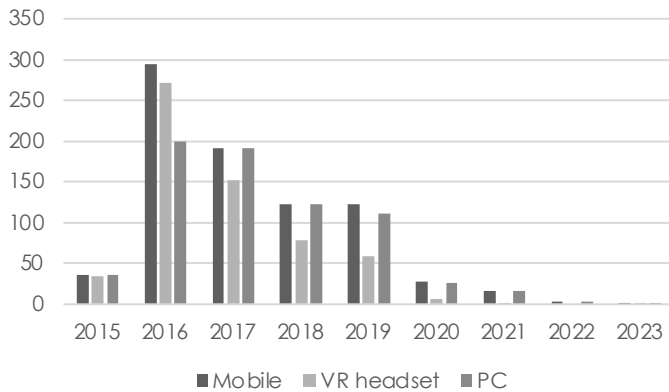
Source: author's own preparation

The most recurrent forms were news reports (31.9%) – e.g. *The last days of the flats* (RTÉ, 2016) – and live or delayed broadcasts (28.3%). This is followed by what, in this study, have been denoted as contextual videos (13.4%), which are intended for the user to simply observe and explore a certain environment, place or landscape – e.g. *Aktivisti přemalovali Lennonovu zed' v Praze* (ČT, 2019). In effect, they usually act as a reinforcement or complement to a news or multimedia report. They are real-image pieces, short – most of them do not exceed three minutes –, without a narrator and very simple at a formal level. They are followed by the so-called immersive experiences (10.7%), content designed for the viewer to experience first-hand what it would be like to carry out a certain activity, attend or participate in an event or even witness a restricted-access event – e.g., *Kitz 360 Super-G* (ORF, 2016). Given their characteristics, these pieces are primarily intended to be viewed with VR headsets.

3.7 Visualisation: mobile-first, less for VR headsets

The data reveal that consumption from mobile devices (100%), and even desktop devices (86.7%), has been prioritised over viewing with VR headsets (74.2%). In fact, instead of gradually increasing the number of videos adapted for viewers over time, which *a priori* would be the most logical evolution, the figure is progressively decreasing (see figure 6).

Figure 6: Evolution by year of number of videos adapted to each viewing mode



Source: author's own preparation

One aspect that the interviewees emphasise is that the type of viewing conditions the design and narrative construction of 360-degree video content. That is why they insist that, when producing in this format, the type of platform – website, mobile app or social network – or device – mobile, desktop or VR headsets – to which they are mainly addressed must be taken into account in order to adapt the content to the particularities of consumption:

What worked in virtual reality headsets, which is much slower and allows you time to look around and enjoy it, does not behave according to the rules that people expect social video to comply with (E8).

[It is necessary to] know what devices or what kind of installations or platforms you are going to enjoy the experience on, as not all types of 360 scenes work the same for all viewing options. It is not the same to enjoy it in VR headsets as it is to enjoy it on a screen through social networks, on a mobile phone or tablet or in an *ad hoc* 4D installation (E10).

In general, experts argue that different strategies are required depending on whether the aim is for the user to consume the piece using VR headsets, which enables them to experience the illusion of being in the reality depicted, or whether the piece is intended for distribution through social platforms: Beginning of form End of form

The one you are most concerned about is the one who consumes it in headsets, because in the end it is the one who has a much more immersive experience and the one who can be "affected" if you make a series of other decisions such as, for example, the duration of the shots, how often you make a cut, if you move from one space to another or the distance from the character. So, you have to be very aware of how you want your narrative to relate to the user. For example, one thing we did in *Tirano* was to speak directly to the camera, to the viewer (E12).

The BBC VR Hub videos were intended for VR headsets, although we sometimes put them in 360-degree video on YouTube to make them more accessible, but they could also be viewed through headsets via the YouTube app. For example, for *Damming the Nile* we additionally created a one-minute 360-degree video specifically for a social network. It had much faster cuts and was more exciting when viewed in a browser on your phone (E8).

Most of the videos I have produced are designed for mobile and computer, not for VR headsets, because in fact the consumption is not yet very high. Although, in some videos I try to think that if this is seen in 360 using headsets, it can have a lot of impact, and so I'm careful about how I position the camera in those circumstances. In *Pedrogão* [series of 360-degree videos] there are several where I had that concern (...). Everyone had heard about this place, so the idea was to take people there and go into the destroyed houses. And then I thought that was a place to see with VR headsets, because I could feel that I am there. So, most of them can be seen with headsets. Others have graphics, music and a higher tempo because they were clearly meant to be seen on the mobile phone or computer screen (E1).

In addition, some interviewees argue that, beyond the experience, public service media should reach all users, whether or not they have VR headsets, which is why it is considered essential to ensure consumption on mobile or desktop devices:

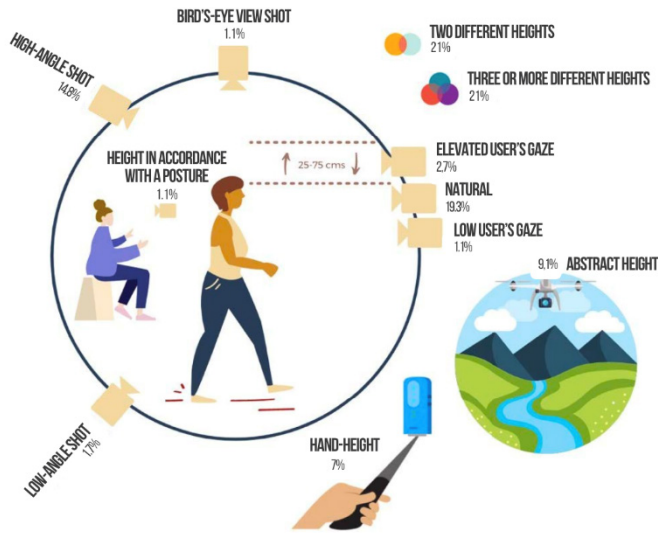
We think of everyone because as public television we have to reach everyone and it is a reality that today virtual reality headsets are neither popular nor cheap (...). There is still a long way to go before they reach the households, so we try to be on all platforms (E9).

3.8 Representation of the user: a disembodied observer-witness

The results reveal that the viewer enters the scene as an observer or witness in most of the pieces (99.4% – e.g. in *Congo VR: A Troubled Past* (BBC, 2019) – so that the possibility of representing him or her as a real or fictional character has been minimally explored, up to the point that, where this has been the case, the viewer practically only adopts the perspective of the protagonist at specific moments. Likewise, there has hardly been any attempt to simulate the user's presence in the reality represented by using an avatar, an anonymous real body or the physical body of the protagonist of the story (0.6%) – for example, one of the few contents in which this can be found is *Luovat huoneet – Noora ja Kimmo Schroderus* (Yle, 2018) –. Strategies to foster the illusion of co-presence or social presence were also not frequently deployed. In fact, in 71.3% of cases, no attempt was made to simulate the user's presence on stage through the people participating and/or intervening in the story.

As for the height of the camera, the data show the absence of a common criterion regarding its continuity in the scene (see figure 7): in 47.1% of cases it remains stable or fixed throughout the piece, while in 52.9% it varies depending on the scene. Moreover, it is not common for the recording device to be placed at eye level with the characters who intervene or appear on stage or, in their absence, with the viewer (19.3%). However, the interviewees stress that placing the camera at a natural height is fundamental to favour the sensation of being present in the reality represented and to provide verisimilitude to the experience. In the RTVE Lab, they work with an average height of between 1.65 and 1.70 m approximately (E12). However, sometimes they intentionally use other types of shots, such as aerial shots, for narrative purposes (E9). This idea is also shared by other specialists: "beyond the technical part, the narrative part must be taken into account. The position, height or movements must be justified according to the point of view played by the camera, i.e. the user" (E10).

Figure 7: Camera placement in 360-degree videos



Source: author's own preparation

On the other hand, and apart from the capacity for action or agency represented by the choice of point of view, we find that hardly any interactive functionalities have been used in the pieces analysed. Specifically, only 1.2% of the videos in the sample include interactive buttons to expand or discover information or navigate between scenes – e.g. in *Kristlikud lihavõtted ja jäneseid – millest selline seos?* (ERR, 2017). More precisely, interviewees agree that the challenge is to further integrate the interactive feature in these contents, although some experts consider that “360° interactive video is still a bit far away” (E4). To date, the ability to act to intervene in the narrative is largely limited to what is sometimes referred to as “immersive interactivity”: “interaction only from the point of view that requires a practical action to enjoy the video (...). I interact with the video because, when I do something, it changes: it changes because I can look up, down, sideways” (E1). Although there are voices dissenting from associating this concept with the control of the point of view: “you are not really interacting with the environment because you cannot move forward like, for example, you move forward in a video game. That progress through the environment is not yet achieved” (E7). An idea shared by other experts: “it’s not interactivity because I can’t change the story. Interactivity is to have an impact on something. If I am familiar enough with this technology, I will know that the journalist sits behind the sources and talks to them, not to me” (E5).

4. Discussion and conclusions

This study has sought to examine the particularities of the production of non-fiction content with 360-degree video in European public service broadcasters between 2015 and 2023. The results shed light on immersive experimentation from the perspective of public service media, as well as on the future of the format in newsrooms.

When immersive technologies burst onto the market in the mid-2010s, several public service broadcasters realised the potential they offered to connect with their audiences and began to explore their storytelling possibilities. The European Broadcasting Union did not stand on the sidelines and, appreciating the impact these technologies had on production and distribution as well as on consumption, advocated supporting and encouraging this experimentation among its members (EBU, 2017).

However, this study shows that the commitment of European public service broadcasters to spherical video as a format for representing reality began to progressively decline after the boom registered between 2016 and 2017 (O1). The increasing loss of interest becomes more evident from 2019 onwards, both because of the drop in production volume and the termination of immersive experimentation units, such as the BBC VR Hub. This is a situation common to other contexts, as has been recorded in particular in the Spanish media landscape (López Hidalgo et al., 2022) or at the international level in general (Rodríguez and Paíno, 2020). It should be noted that the outbreak of the COVID-19 pandemic and the lockdown in Europe forced the media to redefine their priorities in 2020, so that many of the innovation projects underway came to a standstill during this time.

On the other hand, the results of this research also allow us to conclude that, in terms of the specificities of 360 video content, the pieces produced by European public service broadcasters are characterised by being short, with real images and very simple at a formal level (O2). Firstly, two factors act as conditioning factors for the duration, as experts point out: distribution, as social media platforms are often used, which requires adapting the content to the brevity and consumption times that prevail in these spaces, as well as to mobile access; and the problems of cybersickness still generated by prolonged use of VR headsets, which has a negative impact on the user experience (Häkkinen et al., 2019; Melo et al., 2018).

Secondly, the prevalence of real-image pieces shows that these public service media outlets have opted for more accessible, less expensive and more user-friendly technologies, such as 360-degree cameras. Although the use of computer-generated imagery is limited, the findings of this research show that there is a tendency to take advantage of its possibilities to address historical issues in order to recreate events, spaces or elements of the past that the viewer would otherwise not be able to see or discover.

Thirdly, the potential of spherical video lies not in taking advantage of the fact that the scene is immersive to complement or add information through additional multimedia resources, but in generating in the viewer the sensation of being present in the scene so that, through a first-person perspective, he or she can better understand a space, place, event or reality (De la Peña et al., 2010). Hence, as specialists point out, when designing content, a balance must be sought between the multimedia construction and the user's own sensory experience, so as not to introduce artifice and to highlight mediation.

On the other hand, European public service broadcasters have taken advantage of the differential and innovative value of the spherical video format to promote culture, to make tradition and folklore visible, to dynamise the arts and even to represent national history and heritage (O2). In general, when it comes to producing content with spherical video, cultural themes have also been widely accepted in commercial media newsrooms (Benítez, 2019; De Bruin et al., 2022).

Under the umbrella of immersive journalism, European public service broadcasters have used a wide variety of forms to represent and approximate to reality (O2). Four main formats have been used: the report, a traditional genre that adapts to the spatial and immersive narrative; the live or delayed broadcast, providing the user with a more complete perspective of the events thanks to the spherical video; the contextual video, whose general purpose is for the user to simply observe and explore a certain space; and the experience, a type of piece with a greater experiential charge.

Although the classic genres adapt to the specificities of 360-degree video (Benítez and Herrera, 2017), new formats are also emerging with a marked experiential dimension and, on occasion, even of a social nature (Jones, 2017), as is the case in what is known as contextual video. However, these forms are still immersed in a process of remediation (Soler-Adillon and Sora, 2018). Influences from cinema, television, theatre, interactive documentary and even the rhetoric of video games in certain cases are evident, resulting in both remediated and hybrid forms.

When it comes to representing the user, the potential of embodiment strategies to simulate their presence on stage or to put them in the other's shoes (O3) have hardly been explored. In fact, the viewer assumes the role of witness or passive observer in most of the productions examined. Moreover, much of the content analysed does not respond to the specificities that both the language and the immersive narrative demand, in such a way that the possibilities of the format to make the user feel present in the place where the events take place are wasted.

As for the informative treatment, it is worth highlighting the weight that the first-person presentation of the sources or protagonists of the story acquires in this type of content, where the figure of the journalist sometimes even disappears. When this happens, the aim is to simulate a face-to-face encounter that distances the user from their role as a mere viewer (Pavlik, 2018) and turns them into a kind of witness who listens in the first person (Nash, 2018). However, this type of practice conflicts with the conventions and ethical principles of journalism, especially because of the user's capacity for agency and the journalist's influence on the scene depicted (Aitamurto, 2019).

Experimentation with VR and 360-degree video technologies responds to the public service media's commitment to innovation (EBU, 2012), which is introduced as a strategic line aimed at strengthening the corporate reputation and positioning of broadcasters vis-à-vis commercial media (Campos Freire, 2016). Part of this innovation translates into the use of new tools and platforms, exploring the possibilities of disruptive and emerging technologies and experimenting with new media and narrative formats to develop content, services, experiences or products that are innovative, improve the quality of existing ones and make it possible to reach new audiences.

However, this study shows that, once the initial phase of novelty and technological and narrative experimentation is over, European public service media are beginning to question the viability of using 360-degree video as a sustainable format for telling non-fiction stories and connecting with audiences.

In conclusion, spherical video burst into the journalistic media as a technological and narrative innovation that offered a new way of recounting and representing the news reality. This format allows the user to be at the centre of the experience so that, feeling as if present on the scene, they can better understand a certain reality, put themselves in someone else's shoes or even visit or access distant or otherwise inaccessible places. However, the future and viability of this immersive journalism supported by 360-degree video is being questioned, fundamentally because of the difficulty of resolving the challenges already identified when immersive technologies first appeared in newsrooms (Pérez-Seijo, 2023): the high cost required to produce content, the low penetration of virtual reality headsets, the low demand in terms of audiences and the obstacles in terms of return on investment. While its sustainability is being debated, other formats are emerging as more viable alternatives. This pertains in the case of augmented reality which, as it is better adapted to ubiquitous and mobile consumption (Tejedor-Calvo et al., 2020), appears to be a more sustainable technology than spherical video or true virtual reality.

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6. Declaration of conflict of interest

The author declares that there is no conflict of interest.

7. Responsible declaration of use of Artificial Intelligence

I have not used Artificial Intelligence tools in any section of the text.

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Notes

1. The search was conducted on the websites of each broadcaster, on their corporate and news and information profiles on Facebook, on their corporate and news and information channels on YouTube and on the mobile apps available in the iOS and Android shops.

2. The full sample is available in an archive published in open access on Mendeley Data. It contains the titles of all 360-degree videos reviewed, together with the European public service broadcaster that produced or co-produced it and the year of publication. Available at DOI: 10.17632/s7tzipz613d.1

Annex 1. Analysis sheet

Blocks	Variables	Categories of analysis
Identification	1. Title	[Title of the piece]
	2. Broadcaster	[Name of the public service media]
	3. Year	[Year of publication]
	4. Duration	[h, min, s]
Consumption	5. Display mode(s)	5.1. Virtual reality headsets (content available on platforms or apps compatible with the use of headsets)
		5.2. Mobile vision (content available on mobile apps, websites or social platforms)
		5.3. Table-top device (content available on websites or social platforms)
Immersive technologies	6. Type of image (adapted from Barreda Angeles (2018))	6.1. Real
		6.2. Fully computer generated (CG)
		6.3 Hybrid [and proposed typologies]
Content	7. Thematic (own proposal with adaptation of categories from Paíno, Rodríguez and Ruiz (2019))	7.1 Nuclear accidents and tests
		7.2. Social affairs
		7.3. Science and technology
		7.4. Climate, environment and sustainability
		7.5. Armed conflicts
		7.6. Crimes and offences
		7.7. Law enforcement agencies and armed forces
		7.8. Culture and tradition
		7.9. Sports and motorsport
		7.10. Functional diversity
		7.11. Economy and infrastructure
		7.12. Gastronomy
		7.13. Equality

	7.14. Migration and refugees
	7.15. Music and entertainment
	7.16. Nature and the animal world
	7.17. Politics
	7.18. TV-shows and television
	7.19. Religion
	7.20. Health
	7.21. Events
	7.22. Terrorism
	7.23. Traffic
	7.24. Video games
	<hr/>
	8. Genres and formats
	[Own classification taking into consideration proposals by Benítez and Herrera (2017), Gomis (2008), Jones (2017), Salaverría (2005) and Watson (2017)].
	<hr/>
Multimedia resources and continuity	9. Overprints (own elaboration based on the proposal of Benítez-de-Gracia and Herrera-Damas (2018) and the classification of Paíno, Rodríguez and Ruiz (2019))
	9.1. Credits
	9.2. Photographs
	9.3. Navigation icons
	9.4. Infographics
	9.5. Logos
	9.6. Signs
	9.7. Subtitles
	9.8. Text (plain or block)
	9.9. Titles
	9.10. 2D videos
	9.11. Other
	9.12. No overprints
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	10. Image effects
	10.1. Black and white
	10.2. Slow motion
	10.3. Fast camera
	10.4. Freeze-frame
	10.5. Split-screen
	10.6. Other
	10.7. No image effects
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	11. Extradiegetic music
	11.1. Instrumental
	11.2. Song
	11.3. Vocal or singing

		11.4. Combination of two or more types
		11.5. No extradiegetic music is used
	12. Duration of music	12.1. From beginning to end
		12.2. At specific points in time
	13. Sound effects	13.1. Change of scene
		13.2. Selection of options
		13.3. Appearance/disappearance of overprints
		13.4. Appearance/disappearance of persons on the scene
		13.5. Appearance/disappearance of objects and computer-generated images
		13.6. No sound effects are used
Representation and user role	14. Representation of the user on stage (from Dolan and Parets (2015))	14.1. Avatar of an active character
		14.2. Avatar of a passive character
		14.3. Anonymous, ungendered, passive avatar
		14.4. Anonymous, ungendered, active avatar
		14.5. Real body of an active character
		14.6. Real body of a passive character
		14.7. Bodyless
		14.8. Depends on the scene
15. User perspective (based on Paíno, Rodríguez and Ruiz (2019))	15.1. Witness or observer	
	15.2. Character or protagonist	
	15.3. Variable role	
16. Co-presence (the proposals of Benítez-de-Gracia and Herrera-Damas (2018) and Sheikh et al. (2016) are grouped together)	16.1. Simulated user presence	
	16.2. Non-simulated user presence	
	16.3. Depends on the scene	
17. Selective interactivity	17.1. Buttons to expand or discover information	
	17.2. Navigation arrows	
	17.3. Menu	
	17.4. Other	

Camera location

18. Height and angle
(extension of the proposal
by Benítez and Herrera
(2018))

18.1. Natural height or user's gaze

18.2. Natural height or low user's gaze

18.3. Natural height or elevated user's gaze

18.4. Hand-height of person carrying the camera

18.5. High-angle shot

18.6. Low-angle shot

18.7. Bird's-eye view shot

18.8. Height in accordance with a posture

18.9. Abstract height
