Knowledge Articulation in Creative Media. Interactive, transmedia and immersive productions developed at the Federal University of Rio de Janeiro

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Articulación del conocimiento en medios creativos. Producciones interactivas, transmedia e inmersivas creadas en la Universidad Federal de Río de Janeiro

ABSTRACT RESUMEN

Interactive, transmedia and immersive nonfiction creations gain projection in Brazil from 2018 on, with the academy as a great ally. Universities, as spaces for innovation, manage to foster projects of excellence, despite the scarce and high investments required, bringing together people, technological resources and strategic partnerships. In the XR (extended realities) ecosystem of the Brazilian creative industry, the Federal University of Rio de Janeiro, one of the most prized, largest and oldest public institutions of higher education in the country, through its Post Graduate Program in Creative Media (PPGMC) becomes a reference center. The institution launches innovative and experimental creations, which would hardly receive private funding, due to the adverse economic situation that the creative sectors are currently facing. This article presents and analyzes recent productions in terms of thematic approaches, technologies and languages. Applied methodologies for the creation of interactive and immersive works are also discussed, from the perspective of how these creative methods have been fostering the practice-based research output at PPGMC, and the currently achieved results.

Las creaciones de no ficción interactivas, transmedia e inmersivas ganan proyección en Brasil a partir de 2018, con la academia como un gran aliado. Las universidades, como espacios de innovación, logran impulsar proyectos de excelencia, a pesar de las escasas y elevadas inversiones que se requieren, aglutinando personas, recursos tecnológicos y alianzas estratégicas. En el ecosistema XR (realidades extendidas) de la industria creativa brasileña, la Universidad Federal de Río de Janeiro, una de las instituciones públicas de educación superior más apreciadas, grandes y antiguas del país, a través de su Programa de Posgrado en Medios Creativos (PPGMC), se convierte en centro de referencia. La institución lanza creaciones innovadoras y experimentales, que difícilmente recibirían financiación privada, debido a la coyuntura económica adversa que atraviesan actualmente los sectores creativos. Este artículo presenta y analiza producciones recientes en términos de enfoques temáticos, tecnologías y lenguajes. También se discuten las metodologías aplicadas para la creación de trabajos interactivos e inmersivos, desde la perspectiva de cómo estos métodos creativos han estado fomentando el resultado de la investigación basada en la práctica en PPGMC, y los resultados alcanzados actualmente.

KEYWORDS PALABRAS CLAVE

Creative Media; XR Ecosystem; Experimental Creations; Creative Industry; Research in digital humanities.

Medios creativos; Ecosistema XR; Industria Creativa; Creaciones experimentales; Investigación en humanidades digitales.

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1. Introduction

In a timeline, it is from 2013 that the production of nonfiction in interactive creations begins at the School of Communication of the Federal University of Rio de Janeiro (UFRJ). From 2016 to the present, creative experiments emerge in immersive narratives and transmedia growing exponentially every year. One of the factors behind these events is the achievement of an educational license for the Klynt software, through Professor André Paz. Another factor on a larger scale is the creation of a pioneering course in Brazil, the professional master's degree in the Postgraduate Program in Creative Media (PPGMC). The course is the first in this modality and area of knowledge to be offered by a public higher education institution in the country.

The professional master's degree is a *stricto sensu* course, which values prospective applied research, that is, aimed at creating products, processes, methods or techniques. Thus, the course brings to the academic environment artists and professionals interested in high-level training designed to articulate practical and theoretical knowledge. The result could be none other than multidisciplinary creative experiments. This article analyzes these creations from the perspective of the activation of languages and technologies that they promote to address themes of great social, cultural and political impact. The word activation is proposed here to replace "innovation", already considered obsolete in the post-digital era.

Experimentation in creative media is often part of a research methodology that is activated from creation. According to Owen and Sawchuk (2012, p.19) research conducted through creative processes "includes experimentation, but also analysis, critique and a deep involvement with theory and method issues". In this sense, the first experiments with interactive documentaries (I-docs) at UFRJ emerged from attempts to explore languages of audiovisual journalism, within the scope of the online newscast of the School of Communication. In June 2013, students who were part of the TV news team actively participated in popular demonstrations that took thousands of citizens to the streets and provoked political and social debates.

Events were recorded in a large number of images and sounds. How to gather and organize the plurality of photographic and videographic essays that emerged from the protests? I was researching interactive media at the time and concluded that the I-doc offered a way. The Korsakow software, which until then was free, was used in the creation of *(Des)Ocupações* (2013). Unfortunately, due to lack of financial support, the production could never be exhibited online, but at least was exhibited at the School of Communication and fostered further research on the field.

Interactive documentaries are structured at the intersection between audiovisual, design and programming. Most of them

have websites as support and, therefore, they are also called webdocumentaries or webdocs. In these works, as Paz and Maciel (2019, p. 47) point out, the narrative takes place through the interface, and through the choices of the person who interacts with the informational structure assembled from various previously produced media: texts, videos, animations, infographics, among others. The interface graphic design is, therefore, fundamental to organize the narrative experience, since it establishes how to access the database that composes the work. Previous knowledge in audiovisual journalism and cinema, therefore, soon proved to be insufficient to develop more complex nonfiction experiments. The initial team at UFRJ noticed the need to examine and become familiar with themes in the area of design such as: user experience, design thinking, interactivity design, modeling, prototyping, among others.

Each webdoc usually has a unique design and a specific theme, even if it is composed of episodes – aggregated content units. In short, it is a non-linear multimedia work, with an in-depth thematic approach and an interactive interface. One can understand it as a visual and informational database, the metadata converted into an interactive interface. (...) The spectator-actor-agent has before his eyes not the codes of a system, but information placed in such a way as to allow a fluid but not pre-established understanding. The viewer is given the freedom of choice as to what to watch, in what order and for how long. (Rigueto and Maciel, 2015, p. 3)

The more the team delved into the field of design and narrative elaborations, the programming challenges increased. In addition to Korsakow, other free apps, such as Helloeko and Scratch, were tested, but more robust creations in terms of programming could not move forward without designers and developers on the realization team. Klynt software emerged as an alternative bringing a slightly broader range of narrative possibilities, with greater complexity of design tools and less need for programming. The app and the collaboration of Dr Inês Maciel, a design specialist, were pivotal for the creation of the interactive documentary *Bons Ventos* (2016).¹

Anchored in ideas of the diffusion and preservation of digital memories, as proposed by Levy (1998), the work seeks to give visibility and keep the Grael Project's digital memory alive. This is a social project that has been offering education, through nautical sports, for children and youngsters from public schools in Rio de Janeiro for over 20 years. The *Bons Ventos* I-doc was developed from the analysis and selection of media available on the Projeto Grael website (the project's digital memory) and the video recording of activities and interviews.

All the content was organized in "memory capsules", that is, small interconnected units of video, text and photos that tell a little of the history of the Grael Project and update the data, showing how it works today and who are the people who make the project happen. In addition, some of the "capsules" of the interactive documentary

invite the viewer to participate by sending support messages and sharing the information on social networks to help spread the project. (Alves et al, 2016, p.5)

The virtual environment enables a proactive attitude of the consumer, nowadays *prosumer*, that is, the one who not only consumes, but participates in the production and dissemination of media contents. Engagement of the public is an idea also tested in the interactive documentary *Rio Frescobol* (2018)². The work was collectively created, under my direction, by students of the unit "Digital Communication Languages" at PPGMC. In this experiment, methodologies of design thinking and practice-based research were applied. Owen and Sawchuk (2012) argue that the research *for* creation methodology implies that artistic creation may generate research data that serve to understand different cultural dynamics.

The I-doc *Rio Frescobol* invites lovers of the genuinely Brazilian sport to send photos and exchange information about places around the world for playing frescobol.³ As discussed in Maciel and Maciel (2017), by creating this webdoc the students could test the dynamics of participatory films, in which viewers compose the work by sending content that can be photos, testimonials, videos, among others. The lack of financial funds for a supporting marketing strategy, however, proved a too high barrier to climb, and despite the team efforts the work was never really successful in its attempt to attract online collaborators. The experiment has shown that participation is not only linked to a niche market, but it is also deeply dependent on a solid marketing investment.

The logic of knowledge articulation in creative media is similar to a creation laboratory, the space where risk is encouraged, and the process takes precedence over the results (Carrelli, 2021, p. 28). This does not mean that the final products are works of low artistic quality, but rather that reflecting during and about the creative process is an inseparable practice from the act of creating. Following this trend, and even without having programmers on the team and with only a limited knowledge of the available apps, the team of researchers-producers at PPGMC advanced in the creation of interactive and immersive nonfiction experiments.

In addition to Inês Maciel and me, other PPGMC professors from different areas have been involved in virtual production projects: Dr. Luciano Saramago (computer graphics), Dr. André Paz (production engineering), Dr. Afonso Figueiredo (music), Dr. Aida Marques (film studies), Dr. Cristina Rego Monteiro (journalism), Dr. Elianne Ivo (cinema), and Dr. Gerson Cunha (computing science). These researchers-producers have worked with us and in creative partnerships with master's students with diverse professional skills. They are writers, journalists, designers, filmmakers, animators, musicians, gen-

eralist developers, art directors, digital marketing specialists, audiovisual editors, photographers, among others.

The multidisciplinary environment in which our works have been created is also favored by the possibilities of articulation between centers of excellence at UFRJ and beyond. Among them, there is the Laboratory of Computational Methods in Engineering (LAMCE/COPPE), the UFRJ Technological Park, the Post Graduate Professional Program in Music (PROMUS), the Federal Center for Technological Education Celso Suckow da Fonseca (CEFET/RJ), the National Arts Foundation (FUNARTE), the XRBR Association – a Brazilian Hub For X-Reality, the NGO Cinema Nosso, and production companies such as IDEOGraph and SuperUber, to name just a few. From these collaborations, more than 30 interactive, immersive or transmedia nonfiction works, developed at UFRJ, emerged from 2016 to 2021.

It is important to point out that this achievement resulted from the persistence and resilience of these researchers-producers in the face of adversity. On the one hand, the lack of financial incentive and, on the other, the disbelief of academic colleagues who judged digital cinema, and perhaps still insist on a prejudiced view, as a disqualified and less valuable production. Currently, given the volume of work released by creators linked to the PPGMC, which includes national and international publications, the holding of scientific events (conferences, exhibitions, workshops) and the works themselves, it is undeniable that this group has contributed to setting the UFRJ as a center of excellence and reference in the area of creative media in Brazil, and Latin America.

Furthermore, as a consequence of the pandemic for Covid-19, and although some may currently feel intoxicated by the screens, it is a fact that virtual production has been consolidated and is nowadays an essential part of our life in society. Therefore, it is a field of knowledge that deserves detailed and careful attention. What are the topics addressed in virtual productions and how are they addressed in terms of languages and technologies adopted? What are the impacts of interactive, transmedia and immersive narratives? What are the production tools? How is the production pipeline for these works? How to approach and understand dynamics of exhibition, distribution and audience engagement in this field? In a very plural universe of creations and a field in constant mutation, guided by artistic appropriations of technological advances, it is impossible to answer all these questions, but it is possible to observe and point out some trends.

In his critique of digital cinema, Lev Manovich (1995) observes that cinema is moving away from its nature based on material evidence, as proposed by Russian filmmaker Dziga Vertov. For Manovich, techniques that in the not-too-distant past were avant garde, are now part of the technological design booklet of digital cinema. In the era of computer simulation and digital compositing, the culture of the moving image has been redefined. Special effects have become the norm. The

logic of substitution, characteristic of cinema, gives way to the logic of addition and coexistence. The editing, like the sound, gains a new spatial dimension to be analyzed, that of the virtual environment. Digital cinema consolidates itself as a field of technical-artistic discoveries, and a return to pre-cinematic techniques, such as the illusionism of optical effects, graphic collage, and painting (p.28).

In addition, researcher Erika Balsom (2013) in her criticism of the growing spectacularization of the museum space, warns that digitization, new exhibition situations, fragmentation and large scale projections, for instance, have fueled an immersive spectacle that has "banalized cinema, broken it down into pieces and destroyed the rituals attached to its exhibition" (p.29). Balsom argues that "one must take care to interrogate the multiple specificities of this scattered cinema and question the ramifications of each component of it" (p.31).

These critical perspectives, however, can be productive when technologies and languages are articulated to communicate, through artistic creations, themes of great social and cultural impact. In this scenario, there is a striking aspect that deserves to be highlighted:

(...) co-creation reappears as an alternative to the single author view, incorporating the subjects approached as active participants in the creative process. In these cases, the creation processes take place within communities and with people, rather than being done for or about them.

In the words of Rose (2017, p. 49), "not media about, but media with". (Carrelli, 2021, p.37)

Co-creation is a path that presents itself as a way of keeping sight of the human dimension, a way of listening to what the other has to say, how individuals see themselves and how they want to be enunciated. It might as well be a way of keeping pace with, and mitigating the increasing mediatization of everyday life. As Balsom points out, while analyzing architectures of exhibitions of contemporary art, each moving image production nowadays is also a document, a testimony, a trace of collective memories. She recalls Bellour's notion of 'entre-image' to argue that in the current sphere of contemporary art there is a space for a kind of moving image practice that, although reflecting on and interrogating cinema's historical institution, is possibly opening "pathways into the future" (p.37).

This debate offers some level of security in a minefield, marked by languages that are in the process of maturing. When analyzing recent virtual reality creations, Salles and Ruggiero state that:

We are at the dawn of a new technology which has still not created its own language. And language is important. Language opens and destroys barriers of the possible or imaginable. Language allows us to give name to our

Figure 1. Interior of the São Francisco de Assis Church in *Viva Ouro Preto VR*. Photo by Eduardo Martino.

dreams and fears and through this process, construct what is possible. (Salles and Ruggiero, 2019, p.74)

Due to technical and financial constraints, interactive, immersive and transmedia nonfiction creations carried out within the scope of the PPGMC are forcefully anchored in what is possible for now, but in tune with the search for activating future possibilities. Some of these creations are analyzed below. The works discussed here were selected according to three criteria: they have been exhibited at national and international events; are multidisciplinary experiments; and they approach themes of social, cultural and/or environmental impact.

2. From the *Mostra BUG* (BUG Exhibition, 2018) to *Metaversidade* (Metaversity, 2021)

A milestone in the timeline analyzed here was the BUG Exhibition held in 2018, and its fringe event, the BugLab International Conference. The BUG Exhibition presented more than 50 interactive and immersive works from different nationalities that occupied 4 floors of the Oi Futuro Flamengo Cultural Center, in Rio de Janeiro, for one month, attracting an estimated audience of ten thousand people. According to André Paz, the event "was the first and most comprehensive exhibition in Brazil on the broad field of interactive and immersive narratives". The I-docs *Rio Frescobol* and *O que a baía tem?* (2018)⁴, from the team of UFRJ creators, were launched at the event. In parallel, the BugLab Conference promoted workshops and brought together specialists from Brazil and abroad. As a result of these international events, a bilingual book *BUG: Interactive and Immersive Narratives*, edited by Paz and Gaudenzi (2019), was launched in partnership with the British Academy. The book features the BUG Exhibition catalog and it consolidates the knowledge articulated in the BugLab Conference, with articles by participating researchers. Furthermore, the publication nowadays is a reference work in Brazil.

In 2019, an innovative project named *Toca-O-Quê* (What-Does-It-Play) is launched, based on an ongoing investigation into how art and technology might be combined in order to activate the dissemination of scientific knowledge. The idea was to create a multi-sensory device to display hypermedia content in virtual reality (VR) and collaborative augmented reality (AR), aiming at drawing the attention of the general public to current research projects carried out at the university. The idea was to display the device free of charge in public places with great circulation, aiming to promote engagement through a playful and interactive experience, exploring creativity and technological innovations to give greater visibility to high-level research. The lack of funding did not allow the project to be completed. However, the creators received an invitation to apply the original ideas for the *Toca-O-Quê* device in favor of the dissemination and appreciation of the Brazil-

ian artistic and cultural heritage. Thus emerged the visual and musical performance *Viva Ouro Preto VR* (2020).⁵

In this creative experiment, virtual reality was applied for allowing, "the replacement of the interface between a subject and the physical environment, by the interface between a subject and a simulated environment" (Lanier, 2017, p.47). The idea was to activate the admiration for the historical and cultural heritage of the city of Ouro Preto. The film crew managed to capture the 360° footage shortly before the first lockdown caused by the pandemic and later remotely edited the video. *Viva Ouro Preto VR* presents imagetic illusions and computer graphics visual effects, which create an immersive narrative that differs from most of existing virtual tours. The work is available on YouTube. It seeks to radiate to people "a sense of enchantment" by the historical and cultural heritage seen in a new and unusual way (Lanier, 2017, p.12). Still in 2020, the PPGMC sets a creative partnership with the production company SuperUber, which results in the creation of 12 immersive chat rooms.⁶

The rooms on the SuperViz platform were showcased at the XIV Congress of the Brazilian Schools of Film and Audiovisual Forum (FORCINE).⁶ The immersive chat rooms presented research on immersive narratives in progress in the professional master's degree in creative media. For instance, the virtual tour of the UFRJ Geodiversity Museum, an experiment created during Ronaldo Ranzenberger's research on the production pipeline and editing of 360° videos; and the research projects by Creuza Gravina and Eduardo Calvet, dedicated to rescuing the memory and cultural heritage of street cinemas, among other experiments.

Another initiative that stands out in 2020 is the collaborative creation of the I-doc *Como será o amanhã?*,⁷ a work proposed by researchers from the Bug404 network. People of different ages, ethnicities and social backgrounds were invited to submit videos via social networks, revealing their post-pandemic expectations and dreams. The videos had an image treatment to gain a visual identity, and form a body of work which illustrates what Gaudenzi (2013) proposes as a "living documentary". That is, a relational work, as the author suggests, from representing reality to co-creating reality. Gaudenzi proposes this term in order to explore the multiple ways in which we participate, shape and are shaped by participatory interactive documentaries. According to the Bug404 website:

The production team is currently raising a second wave of video testimonials with people who participated in the project in 2020. This material will be incorporated into the project's digital archive and used in new documentaries on different platforms. Still in 2021, Bug404 will bring news about the release of the installation already in production "Quarantine: what will tomorrow be like?". (Bug404, 2021, p. s/n)

Figure 2. Print Screen of the *FORCINE 360* Chat Rooms web portal.

Other participatory nonfiction experiments explored Instagram as a platform for artistic experimentation and engagement with the public. *Rio Recrio* (2019), created by Julio Trindade, for example, is a multidisciplinary project that contrasts chronicles about Rio de Janeiro, written by well-known Brazilian authors João do Rio, Olavo Bilac and Machado de Assis, with old photographs and new portraits of the city in still photographs and moving images, inviting people to be part of a collaborative record of the city, through #riorecrio. *Memo-riascopio* (2020), by Leonardo Coelho, proposes an album of living memories to investigate how the current paradigms of transmedia and interactive content production can expand and enrich the creative possibilities in the hands of a photographer. The author colours and reframes negative and positive photographs found in second hand stores and antique shops in Rio de Janeiro. He uses the carousel photo arrangement feature to create the experience of revealing how each photo was artistically crafted and re-signified interactively.

The ongoing project *Intervalo - O Filme* (2021), by Paula Ferreira, is an interactive and collaborative webdoc about the impacts of Covid-19 on the Brazilian educational system. The film asks: How has the pandemic affected your school year? And invites people to submit a video telling their stories. The idea is to select the videos, excluding those with aggressive content or out of the project's purpose, and post the selected videos on the project's social networks, as well as in a webdocumentary that will be the final product of this entire experience.

From 2018 to the present, a total of 8 I-Docs, 3 interactive documentary experiments, 13 cinematic VR works, 2 interactive VR works, 1 game, 2 animations, 3 virtual reality works in animation and photogrammetry, 3 immersive audio VR experiences

and 1 metaverse exhibition were developed at UFRJ. Another 2 games and about 6 works in X-Realities, including installations and performances, are currently under production or in post-production. Through an online questionnaire sent to the creators, it was observed that in a total of 25 respondents, 60% of the creators had the collaboration of colleagues from the master's degree in creative media. The vast majority (72%) worked with their own equipment and accumulated functions, mostly as producers and directors (64%). The data confirms the importance of the academic environment for strategic partnerships in carrying out practical projects. In addition, among the completed works, 32% were launched in 2020, which confirms the growing interest in virtual production, accentuated by the Covid-19 pandemic. Quoting Coeckelbergh (2020), Carrelli reflects on the impacts of the pandemic and argues: "During this global crisis, the process of digitization of education, work and other areas was forced to accelerate. The experience of social isolation showed that our lives literally depend on digital tools" (Carrelli, 2021, p. 26).

In 2021, UFRJ launches the second edition of its Knowledge Festival. This year the event's theme was "Possible Future". A group of professors and students from the PPGMC was invited to reflect on this theme by creating an experience in X-Reality. The resulting virtual exhibition named *Metaversidade* (Metaversity) was directed by Marlus Araújo, curated and produced by Ana Cunha, Creuza Gravina, Eduardo Martino, Inês Maciel and Katia Augusta Maciel. *Metaversidade* was set in museum.xyz, a space based on Cryptovoxels, a virtual world built on the blockchain Ethereum.⁸

The exhibition attracted more than one thousand visitors and presented for a week some of the most successful recent metaverse productions in Brazil. The exhibition included, among other experiences, the Monobloco band virtual carnival in the GTA V game; the online edition of the Performance and New Media Festival - PERFÍDIA, which featured experiments through Mozilla's Hubs platform; the Criolo XR Live Concert, which according to the Twitch platform, was the first extended reality musical concert in Brazil and last, but not least, the unique project of the São Paulo Museum of Modern Art in Minecraft, in which it is possible to visit the museum, build or reconstruct works of art and learn about the history of Brazilian contemporary art.

In the context of digital culture, what we are experiencing is the expansion of the term metaverse overlaying "virtual reality", in order to designate immersive virtual environments of different aspects which establish human interactions in their social, cultural and even economic aspects, often through avatars. This is a still incipient field in research and product development. However, the Covid-19 pandemic showed us that we must focus on this universe in order to seek our leading role in its modeling and design, ensuring justice and social participation in building the society we want to live in. (Cunha, 2021, p. s/n)

The *Metaversidade* closing event was a live music performance by DJ Galalau and a debate with XR specialists on these issues. There is a consensus among experts that metaverses arouse as much curiosity as controversies, but they are undeniably becoming spaces for connections, collaborations, and the production and dissemination of knowledge. The exhibition therefore placed the Federal University of Rio de Janeiro at the forefront of virtual production in the country.

The current metaverse hype, as Lauren Goode (2021) argues, has both the world's largest tech companies, game developers and smaller players hopping "aboard the meta-train". The metaverse has been pointed out as the next big phase of the internet. Current discussions about this virtual ecosystem gained even more public attention due to Facebook CEO Mark Zuckerberg's remarks at the Connect 2021 conference. His vision of the future, mocked as "the meta-berg", suggests an even more omnipresent Facebook, bringing the metaverse to life and supposedly helping "people connect, find communities and grow businesses" (Zuckerberg, 2021). For critics of the company, however, there is nothing more alarming than the idea of one sole enterprise holding control over the metaverse, a place where some enthusiasts expect within the next decade to be able to experience a seamless and endless virtual existence. In this regard it is pivotal for both prosumers and researchers in digital humanities to question the implications of this new frontier.

Everyone has a slightly different idea of what the metaverse should be. Some, like Facebook, have emphasized greater human connection - yes, even while wearing a computer on your face. Others are focused on gaming. Niantic CEO John Hanke has warned that using technology to escape from real

life, rather than relying on digital layers to augment it, would be a terrible dystopia. (Goode, 2021, p. s/n)

Based on these ideas, it becomes clear that uncertainties and risks in this field shall not be underestimated, but it is also important to acknowledge that there is a huge potential for educational purposes in the metaverse, and that is the lens through which creatives at PPGMC are looking ahead.

3. The XR ecosystem at the Federal University of Rio de Janeiro

In the current scenario of the creative economy in Brazil, the role of technological and artistic knowledge articulation in the university has been, on the one hand, to experiment and analyze creative processes and, on the other hand, to map how the XR sector has been structured in the country. As known, the acronym XR designates a universe of creations (Virtual Reality, Augmented Reality and Mixed Reality) that explore the relations between virtuality and the concrete world, through cinematographic language, design and computer graphics (MACIEL et al 2019).

The XR ecosystem in Brazil was mapped in 2019 by researchers from the PPGMC and the Federal University of São Carlos (UFSCar). The mapping analyzed the challenges, threats and perspectives of this segment, seeking to obtain data to demonstrate the potential of XR creations for the development of key segments of the creative industry in the country, such as cinema, audiovisual and games. The mapping had the partnership of reference bodies and associations such as SPCine, BRAVI, ICAB, ABRAGAMES and XRBR. Maciel and Meleiro (2019) highlight that the study identified 138 companies operating in the XR Market in Brazil. Despite the usual economic instability in the country, 52.55% of the companies surveyed showed growth in 2019 and for more than 70% the sector had good possibilities for development. The sector's confidence has been challenged due to the post-pandemic financial crisis, despite the migration of businesses and enterprises to the virtual environment throughout 2020 as a result of the pandemic.

At the university ecosystem, marked by collaborative and low budget productions, it is vital to draw on institutional support that provides credibility and the technical-scientific knowledge in order to foster pioneering projects, such as the *Metaversidade* exhibition, despite lacking the needed financial resources. In Brazil, specific mechanisms for funding experimental creations in immersive, transmedia and immersive nonfiction narratives are still scarce. Masters students, in most cases, produce with their own equipment and resources, which is far from being the ideal situation. On the other hand, the difficulties inspire a deep community commitment to high-quality public education and the conscious choice of topics of great social, cultural and/or environmental impact.

Figure 3. Inside the *Metaversidade* Exhibition.

These trends are observed in recent immersive productions presented at the X-Realities International Congress.

The producer and post production expert in XR, Ronaldo Ranzenberger, curated the event's national exhibition and other recent events that confirm the argument (Rio Creative Conference, Gramado Film Festival, BUG Pocket Cineclube, Forcine Congress). Ranzenberger is also the director of a set of immersive multidisciplinary works. Between 2018 and 2020, he created in collaboration with Inês Maciel, Alberto Moura and other Masters colleagues, experiences in cinematic VR, which articulate theater and documentary. *Judia* (2018), for example, experiments with the 360 video language in the backstage of a play. *Contos do Jardim Imperial* (Tales from the Imperial Garden, 2019), also a cinematic VR production, presents different temporalities in the same long sequence, by contrasting the current Imperial Museum garden, in the historic city of Petrópolis, with the staging of a theater group, playing in epic costumes a walk by the Emperor D. Pedro II through the garden. The video was the most watched work in the Cinematic VR show at the Gramado Film Festival in 2019. In a third collaborative production, *HIVR* (2019), the immersion seeks to demystify the stigma that HIV positive people still carry. Evandro Manchini, also a Masters student, plays himself in the film, which proposes a delicate and up-to-date dialogue on the subject.

Tricard (2018) differs Cinematic VR from Interactive VR. Although both are immersive narratives in virtual reality and similar in terms of image capture, they have different script structures, interactivity design and post production. Cinematic VR is closer to film narrative than to games, and Interactive VR incorporates aspects of Game Design, but these categories can coexist in the same work. This is the case of a virtual tour of the Geodiversity Museum of the Geosciences Institute at UFRJ, created by Ranzenberger at Plataforma Superviz. The virtual tour was part of the aforementioned partnership between UFRJ and the company SuperUber for the creation of 12 immersive chat rooms on the Superviz platform, which opened to the public during the XVI FORCINE Congress, an event that commemorated the Forum's 20 years of operation.

Another creator, from the creative media masters program at PPGMC/UFRJ, who stood out at FORCINE was Creuza Gravina, who created an interactive VR experience at Superviz, aimed at rescuing the memory of street cinemas. Inspired by the statement, "The cinemas don't die. They become memories" (SCLIAR, 1986, p. 117), Gravina made an interactive tour through the streets of Rio de Janeiro, contrasting archival images of the city's great cinematographic palaces with current photographs of how these temples of culture are sadly nowadays transformed into department stores and churches. Eduardo Calvet approached the same theme from a different perspective. He has created in detail an immersive experience from a visit to the former Cine Metro. In his practice based research,

Calvet investigated the concept of virtual inheritance, as suggested by Stone and Ojika:

The use of computer-based interactive technologies to record, preserve or recreate artifacts, sites and actors of historical, artistic, religious and cultural significance; and to openly provide the results to a global audience, in order to provide formative educational experiences through electronic manipulations of time and space. (Stone and Ojika apud Aydin, 2012, p. 42)

In this way, digital cinema's immersive narratives shift from a mere entertainment option to an instrument applied to the, albeit partial, preservation of historical heritage (Calvet, 2020, p.21). Virtual reality enables a sensory experience, a way to "visit" in a new fashion a building, a museum or a monument that can no longer be seen on location. Another PPGMC masters student, Felipe Carrelli, also interested in issues of cultural preservation, has created a transmedia set of works to give a voice to *Saharawi* refugees, who face a long lasting political conflict at the border between Algeria and Morocco. Carrelli's transmedia output also focuses on disseminating these people's cosmovision and knowledge on astronomy.

His works draw attention to the urgent political and humanitarian agenda for the preservation of the *Saharawi* people. Carrelli's transmedia narrative includes: a 360° interactive docugame for web browser, *Procurando Estrelas* (Looking for Stars, 2021), a 360° documentary with 3DoF, *Estrelas do Deserto* (Desert Stars, 2021) and a 6DoF virtual reality documentary for Quest headsets, *Estrelas do Deserto VR* (Desert Stars VR, 2021). Three other products complete the transmedia experience: *Refúgio nas Estrelas* (a feature length documentary, under production), *GalileoCast* (a series of podcasts) and *Irfi: Desert Stars* (an artistic installation). The works bet on the complementary connection, in thematic and aesthetic terms, which they share, and which is an intrinsic aspect of a transmedia creation. The discovery of a work in a transmedia set leads the public to seek and consume others of the same narrative set. As Scolari (2013, p.33) points out, when different systems of meaning (verbal, iconic, audiovisual, textual) are aggregated in a complementary way and are expanded, there is a complete transmedia experience.

Carrelli and collaborators worked with photogrammetry, gamification, 3D audio, and finally, they created an artistic installation to transport the virtual experience to the physical world. The researcher claims that the transmedia narrative was created so that the project could reach a wide audience, including the *Saharawis* themselves, who have technological and infrastructural limitations. Through the various works it was also possible to explore different perspectives on the situation of the refugees and to propose other ways of public

engagement with issues portrayed.

By exploring different platforms and not being tied to a single authoring application, such as the aforementioned softwares, Carrelli was also able to minimize two frequent problems: the discontinuity of some softwares and the issue of updates that change interface settings and tools. Gravina's interactive VR tour at Superviz, for example, underwent irreversible structural changes, when the platform replaced functionalities with new narrative features. These changes were undertaken in order to improve the service offered by the platform, but the immersive experience that depended on the interactive features and on the previous configurations of the interface were harmed in the process.

4. Democratization of access

Another key issue of this debate is the issue of democratizing access to the works of the XR ecosystem. The democratization of access has three fundamental aspects, which can be noticed in the creations analyzed here: the interdependence between creators and platforms; the access to display devices; and audience's familiarity with the XR language. The first one concerns creative freedom and distribution capacity. In his research, Carrelli states that during the process of creating the game *Procurando Estrelas*, he tested several software: Wonda VR, KrPano, Pano2VR, Kuula, Klatpy and Orbix360 and none of them fully met his creative needs:

As they are designed for the development of virtual tours, these applications do not have many narrative tools. For example, some don't have the option to fade in/fade out for text or images. Others work with 360° spatialized sounds, but don't give you the option to link subtitles to

the audio. Some export the final product to the web, but not to virtual reality displays. (Carrelli, 2021, p. 94)

The 3DVista Virtual Tour, chosen by Carrelli, allowed the final product to be exported to different virtual reality oculus and/or a file, which can be easily accessed via web browsers such as Firefox, Google Chrome or Safari. The point, therefore, is to not depend on applications, but to creatively explore the capabilities of existing software and platforms according to the goals of each creative project. In Carrelli's case, the objective was to reach a wider audience, especially in places with less technological resources, creating an immersive non-fiction experience in which the participant does not need to have a head mounted display (HMD) to play. 3DVista Virtual Tour also allows designers to use multimedia elements such as photos, videos, sounds, floor plans, and 360° videos to create virtual exhibits. As seen, in 2020, as a result of the Covid-19 pandemic, these initiatives became a trend.

In order to ensure complete creative freedom, however, it is necessary to seek partnerships or join multidisciplinary teams with skills to develop the narratives, design the experiences and deal with the computer programming needed in XR creations. This is precisely what Rodrigo Soprana did, for his master's final practical project. He has launched in 2020 the first educational VR game, developed within the scope of the PPGMC. The game *Gandaia na Gaia* explores the sustainability theme, aimed at children from 7 to 12 years old. Soprana created the script and developed the game with a team of partner programmers and designers.

Afterwards, he tested the creation with a focus group of students from UFRJ's High School (Colégio de Aplicação). Soon after the launch the game was released for free download on

Figure 4. A scene from *Desert Stars* 360° documentary. Photo by Felipe Carrelli.

the Google Play platform. The game development was based on the cardboard virtual reality glasses as its display device. The VR cardboard glasses are the simplest of the category, and can even be handcrafted. Thus, the game experience has a democratic distribution and way of access, while instructing and entertaining at once. Since its launch, the *Gandaia na Gaia* game has been used as a pedagogical tool by professors at UFRJ's Colégio de Aplicação. The importance of democratizing access to the game is clear in Soprana's words, when defending his creative choices:

Faced with the new postmodern conception, intertwined by technological devices that structurally modify the way of teaching and learning, the school can no longer limit its strategies to traditional methods, under penalty of observing a double disconnect: distances between the student and the school environment and between education and future demands. (Soprana, 2020, p.13)

The choice of platform is essential for this debate, as it relates to the participants degree of familiarity with the XR language and the device's technological capacity to display the content. For people new to immersive storytelling, who don't own a head mounted display, or who just have a VR cardboard glass, or maybe only a mobile phone with gyroscope technology, it's only possible to experience virtual reality content via social media, such as YouTube, Facebook and Vimeo. For people like gamers and digital natives, used to interactive and immersive narratives, who own updated VR devices, such as HTC Vive, Rift or Oculus Quest, there are others, much more seductive, platforms of distribution, such as Twitch or VivePort, for example. The latter allows users to navigate content within a fully immersive environment.

The issue of access to digital productions developed at UFRJ generally results in a twofold approach, as is the case with the *Viva Ouro Preto VR* video. The work was created for virtual reality glasses and performs better when a headset is used, allowing the audience to perceive ambisonic audio. However, the video was finalized in the 360 equirectangular format, available for download in mp4 or via a link for online viewing. It can be experienced on players that support widescreen videos, on video players on HMDs, or viewed on YouTube, as well as shared via social media. Viewing can be either in widescreen 360 format or in flat mode.

Calvet and Carrelli also addressed the issue of democratizing access to their interactive and immersive works and reflected on the role of these creations today. Citing Salles and Ruggiero (2019), Carrelli states that VR gained strength in 2015 with the launch of the Samsung Gear Oculus, followed by the Oculus Rift in early 2016. The author considers that the gaming industry is one of the more interested in the development of this technology, due to the potential of virtual reality for the sector. Therefore, it is necessary to filter out overly optimistic statements about the potential of this technology and language,

remembering that there are commercial interests behind the enthusiastic speeches about the future of VR. A more balanced perspective is proposed by Janet Murray:

Like other once new representational media, VR offers us an opportunity to find more expressive ways to discover and share who we are, what we know, what we love, what we suffer, what we want and how we can together make a better world. It is not magic and cannot be a substitute for reality any more than books, movies or role playing games. But it could be another modality with new possibilities that can be built over time by the collective process of inventing a medium. (Murray, 2020, p. 25)

In the immersive experience *Cine Metro*, Calvet and his team modeled, through digital tools, the architecture of the former cinematographic palace Metro Passeio, in Rio de Janeiro, as well as its original projection room, decoration and other furniture pieces, which allowed us to visualize a simulation of the original appearance of the spaces with a high level of fidelity in VR. The project was developed in 360 video, with the objective of being visualized primarily in a virtual reality system from a physical device, but it can also be used through a smartphone or a personal computer (magic window).

The choice for 360 video was made because it is a format compatible with viewing platforms with wide international penetration, such as YouTube and Facebook. According to the author: "the audience accessibility to this work has always been a crucial requirement for its very existence, as it is embedded in the very concept of preservation of cultural heritage" (2019, p.116). Calvet emphasizes, however, that the device to be used in the visualization of the experience directly affects the feeling of immersion and "transport in time". This requires devices with good processing power, software compatible with the available file, high resolution screens and, when necessary, data transfer over robust and stable networks. Despite these considerations, the author argues that:

It is essential to make the immersive audiovisual experience available on 360 video viewing platforms with wide reach and technological feasibility. As important as the production of knowledge and technical-scientific development is its practical contribution to social, cultural and academic routines and processes. (Calvet, 2019, p. 20)

For the same reason, the virtual exhibition *Metaversidade* had two key moments of live transmission on YouTube.⁹ The first one on the day of the opening to the public and during the live music concert by DJ Galalau that marked the closing. The transmissions, lasting about 2 hours, allowed people who were unable, for technical reasons or for lack of familiarity with metaverses, to follow what was happening. The broadcasts were also attended by specialists debating the social, cultural, technological and educational implications of various immersive experiences recently carried out in Brazil. It was

Figure 5. A scene from the *Cine Metro* Immersive experience.

clear during the debate that UFRJ was pioneering in developing an exhibition of this magnitude.

5. Conclusions and future prospects

Despite these successful experiences, many challenges remain. The knowledge articulation in creative media, especially in public universities, faces the challenge of giving visibility to research and its creations. In addition, there is the enormous challenge of keeping investigations updated with the rapid technological and language advances underway. The systematic reduction of government investment in research, especially in the field of humanities, which has been happening in Brazil for over a decade, is one of the most worrying and discouraging factors.

As seen, the first I-doc produced at UFRJ was never exhibited online due to lack of financial resources. Other recent initiatives, thanks to strategic collaborations, were more successful in showcasing the PPGMC's research in digital humanities, such as the immersive chat rooms on the SuperViz platform, the Metaversity Exhibition along with the BUG Exhibition.

It seems that the path of collaboration is the best bet for UFRJ researchers at the moment, however, cutting-edge research is not produced without investments and relying only on collaboration agreements will obviously not be enough for the necessary continuous activation of knowledge in creative industries.

The emphasis on the term "activation" as opposed to "innovation" is an attempt to keep the focus on pushing boundaries of existing technological and artistic knowledge, fostering concrete contributions to the creative media field. A choice of words that helps understanding innovation as a means, a continuous process and not an end in itself.

This article points out the need to investigate the impacts of interactive, transmedia and immersive narratives to individuals, communities and in political, economic and environmental terms. As it is an evolving field of research, it is important to keep debating production tools, production pipeline, dynamics of exhibition, distribution and audience engagement with the creations. In this regard, the debate of the democratization of access to creations is first and foremost essential.

Endnotes

1. *Bons Ventos*. The work is available on: <http://bonsventos.net.br/>
2. *Rio Frescobol*. Available on <http://riofrescobol.art.br/>
3. Frescobol is a Brazilian sport, born in the 1940s on the beaches of Rio de Janeiro. The sport actually can be played anywhere you have some open space, and is also known as "Brazilian Paddle Ball" and "Beach Paddle Ball."
4. *O que a baía tem?* Available on <http://baia.net.br/>
5. *Viva Ouro Preto* VR. Available on <https://youtu.be/6mRGb6JWcFA>
6. *Forcine 2020*. Available on <https://forcine.superviz.com>
7. *Como será o amanhã?* A teaser of the project is available on: <https://www.bug404.net/blog/2020/06/21/documentario-colaborativo-e-multiplataforma/>
8. *Metaversidade*. A video showing the exhibition can be seen at: <https://youtu.be/5DXogzLfpQY>
9. Metaversidade live transmission on YouTube. Available on <https://youtu.be/oJTQqrmHYS0>

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CV

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