

tran·scen·den·tal





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movements underscore a philosophical search for meaning beyond physical limitation. On the occasion of the 2019 IEEE Games, Entertainment, and Media conference, we present a collection of creative and critical inquiries at the intersection of art and technology.

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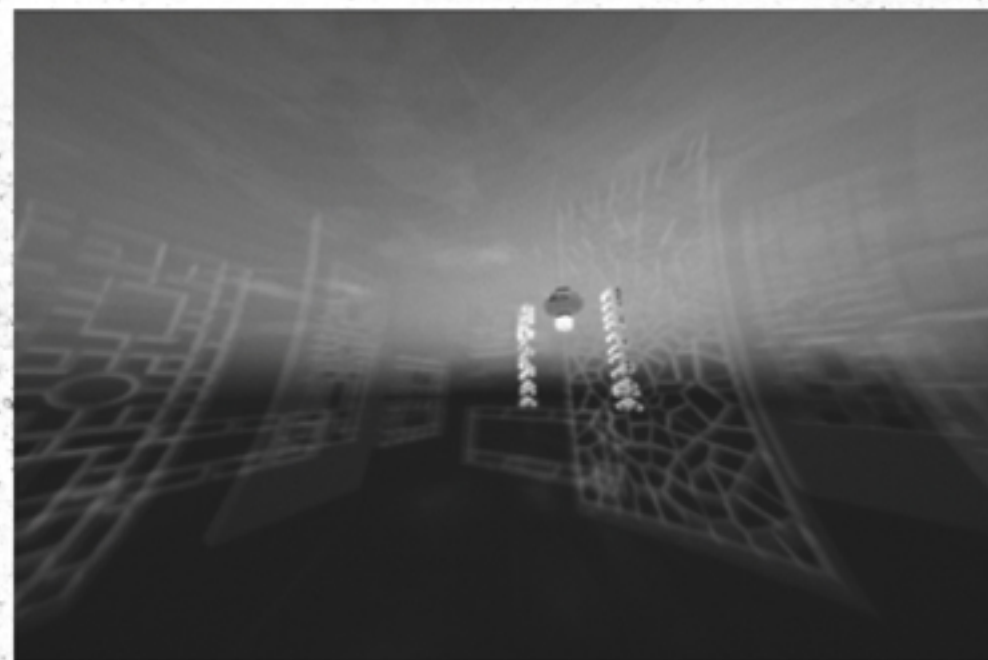
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It Is What It Is

Justin Berry

"It is what it is, and it ain't nothin' else... Everything is clearly, openly, plainly delivered. One might not think of light as a matter of fact, but I do."
- Dan Flavin

Dan Flavin's artworks are relevant for many reasons, but in the context of immersive and interactive media it is their use of industrial materials, reflective of the cultural context in which they were fabricated, and, as a consequence, their impermanence, that feels the most striking. Flavin's fluorescent light-based works challenge the traditional model of art as a static object, they are temporal in the sense that they are activated only when they are turned on, but they are also temporal in the sense that they eventually fade in their intensity and even, eventually, die altogether. They are only able to exist while the technology that supports them is in regular use. When there are no more light bulbs, and no more power sources, all that will remain of Flavin's work will be their photographs.

When Sylvania, the company that produced the bulbs for some of his light-based works, stopped making those bulbs, he was forced to buy up all of the remaining stock and even resorted to having new light bulbs custom crafted. While this proposition of maintaining the works, even after they have stopped reflecting the context in which they were fabricated, is contentious, it is also inevitable to some extent. Artists and makers have agency over the works that they create but it is the society that consumes the art that ultimately embeds them with relevance. It is the transference of agency from the artist to the viewer that resonates with particular power here. Is an artwork the object at the center of an experience, or is it the experience itself? Interactive and immersive works that rely on the industrially produced interfaces of a particular moment inherently grapple with the questions raised by Flavin's practice.

As artists working with contemporary interfaces we are collectively subject to the

structures and limitations imposed by these interfaces. Whether it is using versioned software to build an experience or utilizing a headset that might no longer be supported in five years, artists that are working with emerging technology are building on a long legacy of performance and installation practices that have tried to explore the fundamental questions of what makes art, art. While the question of what happens while these artworks are turned off remains relevant, it is the experience that we have with them while they are on that matters most. Artworks that are invoked by each unique user's interaction and engagement are the perfect way to explore the materiality of experience itself and the power of the viewer to transform the meaning of a work through their intervention and active agency.

Interactive and immersive artworks are ultimately not archival, they will age and disappear and only be accessible through devices scavenged from garage sales. This is not a weakness but rather a strength, and it is also a call to action. The time to experience these works is now, while they are an active reflection of our moment in time.



Margherita Bergamo



Matthew Keiff

THE END OF STORYTELLING: The Future of Narrative in the Storyplex

Stephanie Riggs

When Odysseus sailed to the ends of the Earth and crossed beyond the great river Oceanus that encircled the lands of Ancient Greece, he came to the place where Dawn rose out of the great fog. The End was a mystical and frightening place where demons living alongside gods. Even in those ancient times, the edge of that flat Earth was not an end. It was a beginning.

I began building and researching interactive immersive worlds over twenty years ago at Carnegie Mellon University under the guidance of the visionary computer science professor, Randy Pausch. Randy would be recognized by the world years later when he delivered his inspirational "Last Lecture" shortly before he passed away of pancreatic cancer. A video of the lecture went viral on YouTube and was subsequently turned into a best-selling book. At a time where few people had access to head-mounted displays or computers powerful enough to run them, I was creating bizarre alternate realities experienced through a device strapped to your face and haptic inputs soldered together - all running off a Pentium 3000 running Windows 98.

Since then, I have seen thousands of people experience immersive technology for the first time. Their breath is taken away; their expectations expanded; their disarmingly honest exclamation of "wow!" as technology defies the reality of the world they know. Yet,

when it comes to creating experiences that impress beyond the wow factor, developers have been struggling with how to wrangle a technology they can barely describe. Is virtual reality an "immersive film"? Is augmented reality a "game"? Brilliant academic professors, well-intentioned non-profit leaders, and confident mega-media executives have all expected to use familiar techniques and traditional standards in a medium that, for the most part, defies those standards. Storytelling is such a well-established paradigm that even considering the possibility of doing something other than telling a story with this technology seems incomprehensible.

To move the industry forward, we must recognize that as much as we are always evolving our technology, it is evolving us - and our stories. Look at the history of the written word: as our tools to record ideas evolved our language evolved from pictures to symbols to the alphabet. Rudimentary stories shared over a campfire have expanded into international theoretical debates. However, our tools up to this point have largely kept us separated from the content we create. Words on pages. Images on screens. Our content has been framed. Now, with immersive technology, the lines between what is real and what is not is blurring. It's one of the reasons that storytelling doesn't work in immersive mediums and why we must re-examine the language of story and our relationship to it.

Today's creators in immersive mediums are exploring a spherical world while looking back on maps of a flat Earth. They search the foggy edges of the not-so-distant future for answers on how to tell our beloved stories. But perhaps what is there is not the world we already know, but the world of our making. A place where the rules of today evolve to meet our new potential. The End of Storytelling is a book for the captains, the sailors, the craftsman, the scholars, and the dreamers who sail towards the ends of the known universe, unsure of what lies beyond the horizon - where stories are not told, but experienced in a dynamic network of humanity, technology, and narrative: the Storyplex.



Haein Kang



An Expanded Cinema of Attractions

Johannes DeYoung

Media theorist, Tom Gunning, describes an analog model of immersive media experience that may find renewed resonance in the current landscape of interactive and immersive media art. What Gunning describes as the pre-industrialized "cinema of attractions" [1] turns attention to a period before the narrative-driven nickelodeon boom of the early Twentieth-Century. Prior to 1910, moving-image was exhibited and experienced across wide-ranging modalities. During that period, we find a media landscape in which cinematic formalities and narrative-primacy have not been set.

We might consider Marshall McLuhan's seminal text from 1967, *The Medium is the Massage*, as a key for understanding the formal significance of the medium. Fundamentally, McLuhan offers a twist in classical form/content debate, suggesting that the instrument of a signal's transmission may be just as, if not more significant than the signal itself. Applied to cinematic filmmaking, we might recognize that cinematic storytelling paradigms were already well established across international fronts by the 1920s. The early-Twentieth Century marked a period of industrialized filmmaking — that is to say industries of labor were well established in the production, distribution, and consumption of cinematic storytelling. It is also a period of mass standardization. Technological industrialization yielded mechanically reproducible models for filmmaking instruments, as well as for the medium itself; narrative paradigms established classical storytelling structures and cinematic duration; distribution and exhibition models standardized the theatrical consumer experience at massive

scale. Roles for human labor were defined at every stage of the process, and by virtue of industrialization and its standardizing effects on the medium of film, the cinematic experience as we know it today was born.

What we might describe as pre-industrialized cinematic experience is looser and more challenging to classify. Is it even fair to use the term "cinema" in this context? How comprehensively do we include early instruments of moving-image like the phenakistiscope, the zoetrope, or the praxinoscope? Famously, Charles Babbage — polymath inventor of the Difference Engine, a predecessor to the electronic computer — described how a challenge by sir John Herschel yielded moving-image innovation [2]. Their challenge, to see both sides of a coin simultaneously, resulted in the invention of the thaumatrope, a disc of card stock suspended between two pieces of sewing silk that allow for the disc's rapid twirling rotation. Different images printed on alternate sides of the disc are unified when the instrument is actively spun — as if the separate images are visible in the same space, at the same time. This effect was thought to occur through a phenomenon called persistence of vision, a condition in which sequential images viewed in rapid stroboscopic succession are combined in the mind of the beholder. This concept guided development in much early filmmaking innovation; however, the Babbage-Herschel experiment yielded unexpected results. Opportunists seized upon the Babbage-Herschel novelty, and marketed the thaumatrope as a toy of wonder and illusion. The commercialization of moving-image was born long before industrialized cinema.

Significantly, early models of moving-image like the aforementioned instruments of animation were interactive and relatively solitary experiences. In a certain respect, the instruments of pre-industrial moving-image bear some kinship with contemporary virtual reality technologies and mobile computing devices. As Gunning notes, "rather than early approximations of the later practices of... classical film narration, aspects of early cinema are best understood if a purpose other than storytelling is factored in" [1]. The medium itself is meaningful in its effect on

human interaction. "Operated by hand and intended to produce a visual effect, these toys were both manual and perceptual. They not only united amusement with education, but also employed a mechanical device to manipulate human perception by coordinating the hand and the eye" [3]. Even at individualized scale, the interactive and immersive properties — that is, the properties that attract, captivate, and compel audience activity — become meaningfully foregrounded.

Theatrical models of the late-Eighteenth and early-Nineteenth centuries also find special resonance in our contemporary moment. Phantasmagoria was a theatrical enterprise popularized at the turn of the Nineteenth Century by Étienne-Gaspard Robert, better known by his stage-name, Robertson. As a predecessor to Disneyland's "Haunted Mansion," Phantasmagoria created a macabre Spiritualist theatrical experience through the use of kinetic projection design. Early forms of rear-projection via modified, focusable, and movable magic lanterns created the illusion of animated moving-image for audiences at theatrical scale. Spectral subject matter visually assaulted audiences as illuminated apparitions swooped into and out of view, transforming their scale and position in real-time, throughout the darkened theater space. Another pioneer in the phantasmagoric theater realm was English scientist, John Henry Pepper. "Pepper's Ghost" is a theatrical illusion popularized by the scientist, in which an angled piece of glass is placed on stage, reflecting the image of an actor or some other entity that is off-stage. For the audience, the result yields a real-time, seemingly holographic or spectral composite. The technique was famously deployed in Disneyland's Haunted Mansion amusement, which opened to the public in August 1969. The mansion's grand ballroom utilized one of the largest singular sheets of glass ever commissioned at that time to reflect ghoulish, off-stage animatronic illuminations.

Pepper's Ghost represents an effective and meaningful collapse of form and content. Like other stage illusions, its engine is audience desire to suspend disbelief. As Laurent Mannoni and Ben Brewster note, "[Nineteenth Century] phantasmagoria foreshadowed black

romanticism... This fantastic wave broke over France rather later, but phantasmagorias were in the air of the period: a new variation on superstition, a strange perversion of the scientific rationalism of the Enlightenment which so signally contributed to the improvement of the [magic] lantern" [4]. In many instances, live musical accompaniment adjoined the spectral display, heightening the immersion in otherworldly engagement. It's in Phantasmagoria's special emphasis on heightened collapse of multi-sensory experience that we find inclination toward Gesamtkunstwerk — the total, all-embracing work of art.

The notion of Gesamtkunstwerk is central to the works of early- and mid-Twentieth Century experimental filmmakers and animators, Oskar Fischinger, Norman McLaren, Robert Breer, and Stan VanDerBeek. Known for their works in animated visual music, Fischinger and McLaren painted directly into the optical soundtrack of film, generating hand-drawn soundtracks for cinematic experience that anticipate the sounds of electronic synthesizers. Robert Breer's experiments in animated moving-image emphasized material interaction, through his "Mural Flip Book" installation of the mid-1960s — a relative counterpoint to the increased electronic and computational directions of the medium at that time. Contrarily, VanDerBeek was an early explorer of computer animation, computational art, and Expanded Cinema practice. VanDerBeek's "Movie-Drome" utilized strategies of Phantasmagoria via multi-channel, immersive film projections cast onto irregular architectural structures. VanDerBeek proposed that these "Movie-Drome" installations should be positioned throughout the globe, networked via satellite in such a way that different installation sites could share, receive, and store the images they project. As Gloria Sutton remarks, "VanDerBeek's emphasis on two-way communication and data transfer introduced a telecommunications model for art production reflecting the larger transformation from a mechanical to an information age" [5].

Today's conversations around immersive computing draws upon many histories and fields of interest. It's easy to feel unmoored in

the turbulence of cultural change that so often slips historical anchor. A juxtaposition of historical terms might help stabilize focus. Gunning's Cinema of Attractions and VanDerBeek's Expanded Cinema provide resonant counterpoints to the narrative-primacy of industrialized cinema. Viewed in this context, particular models for interactive and immersive media art may be explored in relation to a longer thematic continuum. While these are certainly not the only models to consider, the expanded cinema of attractions find particular relevance in the contemporary art of immersion.

Works Cited:

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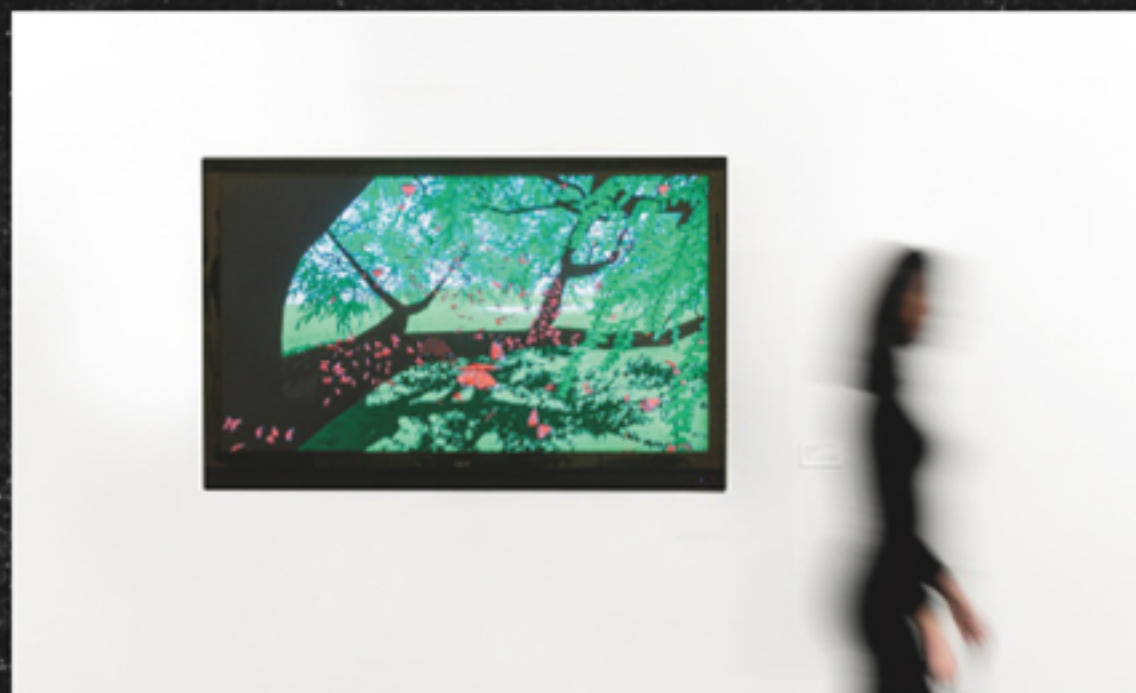
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Su Hyun Nam



Rafael Pajardo

What if?

Kay Meseberg

What concerns must be kept in mind throughout the next phases of Human-Centered Computing?

One of the greatest promises in emerging technology may be a rectification of human evolution. Since the naming of "geeks" and "nerds," people have laughed at technophiles in front of the computers. While the invention and mass adoption of smart phones and tablets has changed this dynamic profoundly, we keep our heads turned down towards our screens, rather than in the eyes of the people in front of us — we have yet to walk fully upright.

Recent developments in augmented computing promise to change this relationship through a field known as Human-Centered Computing. Have a look at the newest devices in augmented and mixed reality such as glasses, ear-sets, and headsets; they are already light and comfortable to wear, which may profoundly change lifestyles for the better.

There are other factors that will be crucial in forward progression — and while some will be grounded in structure, technology, and frameworks, others will rely on our infinite capacity for creativity. The most important issue may be perfecting a sense of security and technological trust, but we should also not forget the need to think more deeply about content. We cannot underestimate the power of art as a driving force in the evolution of society, one which has helped motivate peoples through creative content.

The vision of the Maestro Herbert von Karajan illustrates this primordial drive to use the arts to inspire. In five years' time, technology will be able to reproduce an almost life-size orchestra in a private space, and so what has historically only been accessible to a few will become a global commodity. Karajan predicted this around 1985. Today, algorithms can create completely new musical experiences out of existing pieces.

Another example of this phenomenon can be found in Bauhaus. The famous German school and philosophy left its mark on cities and buildings across the world and, through this, inspired a new, fairer vision of society. Or consider the art of collage as practiced by Braque and Picasso. Their visions and strategies for juxtaposition, seen through contemporary technologies such as mixed reality, are attempts at mixing existing materials to create something new.

Another important example in the field of architecture is the creation of artificial environments, which is also based on the construction of procedural systems and frameworks through technology. Two centuries ago, Daniel Burnham designed and planned buildings and cities like no other. Most notable for designing the Flatiron Building in New York, he created environments which created dialogue between the inside and outside worlds.

Recently, this method of thought seems to have been rediscovered. Architects are beginning to design buildings which integrate themselves into the natural environment. Not only is this fashionable, but these buildings represent a very human need to be in touch with nature, especially for urban dwellers — a reaction to the challenges of climate change. For instance, the National Library of France features a 130,000 square-foot courtyard forest in its center. There are pine trees and bushes growing inside this library collecting millions of media titles from books to films, from video games to VR experiences.

Taking this concept to a larger scale, Singapore integrates nature directly into its streets and houses in an effort to create more attractive cities. Similar are the approaches of world-class architects such as Sir Norman Foster in his design of Apple Park, and Frank Gehry for Facebook Building 21. It is beginning to seem like their integration of nature into daily life is an essential and responsible design choice. Their works stand as symbols to help us act more ecologically responsible.

Through exploring the interplay of responsibility and trust, we can learn how basic principles create common sense which

maintains order. We inherently understand these social pacts: look both ways before crossing the street; watch the sidewalk before stepping out of your house; let people exit before you enter. These behaviors are widely accepted, though technology is transforming simple tenets of everyday life into more complex situations.

Exploring this tension may help us adapt how digital systems might create more appealing user experiences, especially as devices become closer to the body. As our relationship to technology becomes closer through the internet of life, we will need to establish deeper trust with the systems in which we engage, more than simply an account based on an email address and a password. From the Middle Ages comes the phrase "Stadtluft macht frei" (English: city air makes you free). This saying describes the relative freedom of citizens living in cities as compared to serfs. This relationship should be considered when helping people embrace technological systems, as well as the media distributed through those systems. If spatial computing is to succeed, there must be abundant trust in devices we hold close to the body.

It is also helpful to explore various types of creative work when it comes to content. New technology and tools of expression demand an understanding of the creation and publication process. Still, everything we know is based on existing content forms. It is important to understand that listening to the radio is a different experience than to going to the cinema, or to a theatre. It is also different to go to a concert than to listen to the same recording at home, or while commuting. You can read a book for only a phrase, or you may also read it in one sitting. While it makes little sense to go to the movies and to watch only one frame, or to make only one click in a video game, to many people it makes sense to channel surf from one TV program to another.

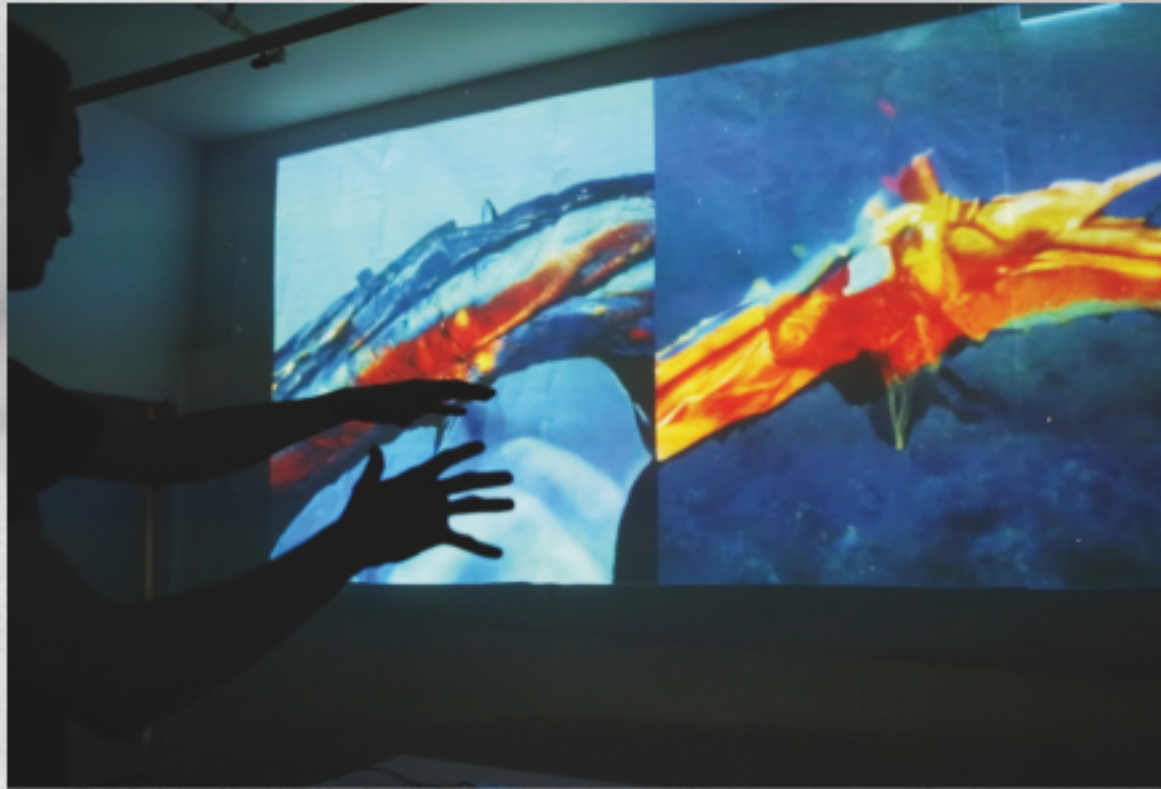
The latest VR experiences are very much in opposition to fast consumption. The vast majority represent experiences somewhere between the cinematic or theatrical, concert-going, and of course arcade games.

Looking through data provided by the ARTE360-app, it is clear that self-explanatory content receives more views than content which does not explain itself. For example, a video with a title explaining its subject is more likely to reach a wider audience than a video which does not trigger an immediate understanding. A similar phenomenon can be found among the list of the most downloaded apps. Here, apps like Vacation and Job Simulator, or The Climb and Beat Saber are among the most popular.

Video games follow a similar logic. Here, titles such as Tetris, Minecraft, Wii Sports, Grand Theft Auto, Super Mario, and Pokémon are less self-explanatory than the previously mentioned examples. This pattern continues with the most viewed movies of all time. Topping the charts are titles such as Titanic, ET, Wizard of Oz, Star Wars, Lord of the Rings, and Snow White. Most of these titles are self-explanatory given a certain cultural background, but rarely are they as widely understandable as the titles of the aforementioned 360° Videos or VR Experiences.

Immersive media gathers its audience on a global scale, especially distributed through communication networks, which explains the need for universally understood titles. Since first entering the marketplace, around five million VR devices have been sold in Europe. Thus, content must find a globally understandable language in order to reach a wider audience than with a local LBE.

It is imperative that we learn the results of the last steps of spatial stories. What we see today is but a blurry view of something on the horizon. Faster connectivity through 5G networks, as well as the expanding use of AI, will likely result in a great unknown. This must all exist in a delicate balance with our limited resources and need to create climate-friendly technology.



Gray Crawford + Aman Tiwari