3

Digital Transformations in Arts and Entertainment

ROBERT DEFILLIPPI

**PROFESSOR OF STRATEGY AND INTERNATIONAL BUSINESS,
SAWYER BUSINES SCHOOL SUFFOLK UNIVERSITY, BOSTON, EUA.
RDEFILLI@SUFFOLK.EDU**

Robert DeFillippi is Emeritus Professor of Strategy and International Business at the Sawyer Business School, Suffolk University, Boston, USA. Dr. DeFillippi is an international scholar in innovation, and he has held visiting scholar and/ or visiting professor appointments at Imperial College and Cass Business School, London; the Center for Research in Innovation Management at the University of Sussex, Brighton, UK; Polytechnico di Milano and Bocconi University, Milan; Queensland University of Technology, Brisbane, Australia; and University of Kyoto, Japan. He also has been a Fulbright consulting scholar at IMT in Lucca, Italy, and Freie Universitat, Berlin, Germany. Dr. DeFillippi holds an MA, MPhil and PhD from Yale University in Organisation Studies. He is a founder and emeritus director of the Center for Innovation and 'Change Leadership (CICL), Sawyer Business School, Suffolk University. He previously served on the Editorial Board of the Journal of Media Business Studies and was Consulting Editor and Associate Editor of the International Journal of Management Reviews.

His previous scholarship has included theoretical and empirical research contributions to the study of co-creation, industry clusters, project-based careers, temporary organizing and innovation in creative and cultural industries, including advertising, design, festivals, film production, music, publishing, stock photography and video games. He was co-editor of the book series Business Innovation and Disruption in Creative and Cultural Industries with Patrik Wikstrom. This four-volume book series was dedicated to understanding the disruptive forces that are reshaping creative industries and challenging conventional business models and business practices worldwide. He is

the author of over forty scholarly and applied journal publications and book chapters and twelve scholarly books.

ABSTRACT

This paper examines a series of digital transformations in arts and entertainment focused creative industries (television, recorded music, live concerts, museums, computer games) impacted by digital innovations arising within these industries. Our paper demonstrates how continuous improvement in semiconductor technology (based on the doubling of chip density every two years as predicted by Moore's law) has fostered advances in digital device capabilities, speed, portability, cost reduction and device integration that has made possible an array of innovative digital products, services and methods of engaging arts and entertainment audiences. Our analysis focuses on six innovative transformations: the digitization of the television set and transformation of television viewing and services, MP3 sound compression transformation of the recorded music industry, video streaming transformation of television programming, 3 D holography and hologram transformation of live concerts, multimedia, augmented reality (AR) and virtual reality (VR) transformation of museum audience engagement, and eSports transformation of video game industry participation and audience engagement. We also note the creative destructive impacts on non-digitized (analog) elements of some of these industries and identify transformational trends shaping the futures of these industries.

KEYWORDS: Moore's law, digital technology, transformational innovation, industry disruption, MP3, video streaming, holograms, multimedia, augmented reality, virtual reality, eSports.

INTRODUCTION

This paper examines a series of transformations in a subset of creative industries (music, film, television, performing arts, computer games) impacted by digital innovations arising within these industries. Insofar as our selected industries are engaged in providing an artistic and /or entertainment experience to their audiences, we characterize them as comprising an arts and entertainment subsector of the creative industries. In particular we will examine how digitalization of formerly analog tehnology based industries created the possibility for innovative products, services and methods of engaging arts and entertainment audiences. We also note the creative destructive impacts on non-digitized (analog) elements of these industries and identify transformations recently emerging in these industries.

HOW DIGITALIZATION AND MOORE'S LAW ENABLED SMARTER, FASTER, SMALLER, CHEAPER AND INTEGRATED DIGITAL ENTERTAINMENT DEVICES

Digitalization refers to the process of converting analog information into digital format, enabling the representation, storage, manipulation and transmission of data using electronic devices and storage systems (Mettler, 2017). In the context of arts and entertainment, digitalization has revolutionized the way we consume and interact with media, such as music, movies, games, and other forms of digital content.

One of the key driving forces behind the rapid advancement of digital entertainment devices is Moore's Law (1965), which is a term used to refer to the observation made by the late Gordon Moore in 1965 that the number of transistors in a dense integrated circuit (IC) doubles about every two years. Empirical support for Moore's law has held true during the succeeding years since its 1965 formulation and this sustained growth in semiconductor transistor density has been a driving force in the development of digital technologies that are smarter, faster. smaller, cheaper and more functionally integrated than their analog predecessors.

1. Computing Power (Smarter): Moore's Law has driven the continuous increase in the number of transistors on microchips, leading to exponential growth in computing power. As a result, subsequent generations of entertainment products and services, such as gaming consoles, multimedia devices, and streaming platforms, have become significantly more powerful. This has enabled complex graphics rendering, realistic physics simulations, and advanced artificial intelligence algorithms, enhancing the overall user experience and enabling smarter and more immersive entertainment offerings.

71

2. Data Compression and Transfer (Faster) With the increased computing power resulting from Moore's Law, data compression algorithms have improved significantly. This has enabled the efficient compression and decompression of multimedia files, such as video and audio, without significant loss in quality. Additionally, Moore's Law has facilitated faster data transfer rates through the development of faster network interfaces and storage technologies. This has enabled the seamless streaming of high-definition videos, fast downloads of games and media content, and smooth online multiplayer experiences in entertainment products and services.

3. Miniaturization (Smaller) Moreover, Moore's Law has contributed to the miniaturization of digital entertainment devices. As the size of transistors shrinks, manufacturers can pack more functionality into smaller devices. This has resulted in the development of portable devices, such as smartphones, tablets, and wearables (e.g. smart watches), which have become ubiquitous in our daily lives. These compact devices offer a wide range of entertainment options on-the-go, making it convenient for users to access their favorite content anytime, anywhere.

4. Cost reductions (Cheaper) Additionally, the cost reductions arising from   innovations in semiconductor design and manufacture have made digital entertainment devices more affordable and accessible to a broader population. As the manufacturing processes become more efficient and economies of scale are achieved, the production costs of digital devices decrease, resulting in lower purchase prices for consumers. This has led to the democratization of digital entertainment, allowing individuals from various socioeconomic backgrounds to enjoy the benefits of cutting-edge technology at affordable prices.

5. Convergence (Integrated) Technology convergence (defined as the tendency for digital technologies that were originally unrelated to become more closely integrated as they evolve) has amplified the capabilities of entertainment devices. Previously distinct devices, such as televisions, music players, gaming consoles, telephones, cameras and computers, have converged into multifunctional devices capable of delivering a diverse range of entertainment experiences. This convergence has been made possible by the integration of various components, including processors, memory, storage, and connectivity options, into

a single device. The result is a seamless and interconnected ecosystem where users can stream movies, listen to music, play games, browse the internet, communicate by text and phone messaging, take and share photographs and engage with social media, all from a single device.

The fusion of art and technology has given birth to awe-inspiring immersive experiences that captivate audiences like never before. Virtual and augmented reality have become powerful tools in the hands of artists, enabling them to create immersive worlds and interactive narratives. Audiences can now step into virtual realms, engaging with art in ways previously unimaginable.

Moreover, advancements in computer-generated imagery (CGI) and motion-capture technology have revolutionized filmmaking and animation, bringing both animated characters and breathtaking landscapes to life with astonishing realism. Additionally, streaming platforms and on-demand services have disrupted traditional models of content consumption, granting artists greater creative freedom and allowing diverse voices to reach global audiences. The rise of social media has also democratized the arts, enabling artists to showcase their work, build communities, and collaborate with like-minded individuals across the globe. This era of transformational innovation has not only expanded the possibilities of artistic expression but also provided unparalleled access to diverse forms of entertainment, enriching and inspiring audiences worldwide.

CREATIVE DESTRUCTION OF TRANSFORMATIONAL INNOVATION

Transformational innovations both create new possibilities and destroy earlier industrial orders. Schumpeter (1948) refers to certain types of innovation that contribute to *creative destruction*, by which the creation of an innovation based new industrial order occurs while hastening the decline of a predecessor industrial order.

For example, physical media, such as CDs and DVDs,(not to mention their previously obsoleted vinyl records ancestors }have been largely replaced by digital formats, allowing for instant access to movies, music, and books through streaming services, online stores, and e-books. One consequence of these physical media transformations is the decline of retail distribution outlets for analog (physical) movies, music and books.

However, it is also possible for transformational innovation to enable the coexistence of both analog and digital forms of industry practice. For example, traditional brick-and-mortar stores have expanded their reach through online platforms, while new digital-native companies (digital only distribution outlets) have emerged.

The Covid pandemic spurred innovation by prompting live audience cultural producers (museums, live music , theater and other performing arts) to seek virtual alternatives for their audiences. Many of these institutions, such as museums, initially offered virtual tours of their galleries, and festival organizers, such as the Sundance Film Festival, initially converted to virtual festivals (Webster, 2021). As the COVID pandemic threat receded and physical proximity to live performing arts entertainment were reintroduced, some of the virtual event technologies and platforms remained and were incorporated in hybrid offerings, This is illustrated by the development of hybrid music and other performing arts festivals in which both live performances and livestreaming or simulcasting of these performances co-exist and often are experienced by separate physical and virtual audiences (Mistek, 2021).

Our forthcoming transformational innovation industry cases will feature both the successful introductions of digital innovations and the opportunities and threats by these innovations to the established order of these industries.

TELEVISION: HOW THE SEMICONDUCTOR TRANSFORMED THE TELEVISION SET

The transformation of television sets through the use of semiconductors has revolutionized the industry, resulting in significant advancements in size and weight reduction , complexity, expanded services, voice commands and smart capabilities, audio quality and localization and cost reduction (Bellis, 2023; Raposo, 2021; Wilson, 2020). Here is specific evidence showcasing the impact of semiconductors on television:

1. Size and Weight Reduction: The transition from analog cathode ray tube (CRT) televisions to digital television sets, which utilize semiconductors, has led to a significant reduction in size and weight. Analog CRT TVs required a substantial amount of space due to the bulky cathode ray tubes and associated components, whereas digital TVs are much slimmer and lighter. This reduction in size has allowed for the development of portable televisions that can replace or supplement larger living room-type television systems. Portable digital TVs are now commonly available, providing viewers with the flexibility to enjoy their favorite programs on the go.

2. Increase in Complexity and Services: The introduction of semiconductors in television sets has facilitated the integration of advanced features and services. With digitalization, televisions have become more than just display devices. They now incorporate complex projection capabilities,

allowing for the transformation of black and white screens into color displays. Digital devices have also enabled convenient functions like on-off switches, channel changes, scheduled timed recordings, and the ability to save and replay saved program content. These advancements have enhanced the overall user experience and provided viewers with greater control and flexibility in managing their TV content.

3. Voice Commands and Smart Capabilities: Semiconductors have played a significant role in making televisions smarter. The integration of voice recognition technology has allowed viewers to control their televisions using voice commands, supplementing and eventually replacing traditional handheld remote devices. This smart functionality extends beyond basic commands, enabling features like personalized recommendations based on viewing habits and preferences. The increasing intelligence of televisions has transformed the way viewers interact with their devices, enhancing convenience and customization.

4. Audio Quality and Localization: The digitization of television has also had a positive impact on audio quality and localization. With digitalization, televisions can support high-quality audio formats, providing viewers with a more immersive audio experience. Additionally, the use of semiconductors has enabled the localization of audio within the television, allowing viewers to customize their audio experience based on their preferences. This localization feature ensures that viewers can enjoy audio in their preferred language or adjust the audio balance to suit their individual needs.

5. Cost Reduction: Over time, the cost of digital television devices has decreased significantly. As semiconductor technology has advanced, the cost of manufacturing televisions has declined. This cost reduction has made digital television sets more accessible to a broader audience, allowing more households to enjoy the benefits of digital entertainment.

While the impact of semiconductors on television has been substantial, future challenges remain. One such challenge is the exploration of wearable technology as a potential replacement or complement to traditional visual displays. Although previous attempts like Google Goggles did not achieve commercial success, the emergence of wearable visual technologies like Apple visors and competitor products holds the potential for reshaping the television experience.

In conclusion, the utilization of semiconductors in television sets has brought about transformative changes, including size and weight reduction, increased complexity and services, smarter capabilities, improved audio quality, and cost reduction. These advancements have personalized the television viewing experience and made digital television devices more accessible to a wider audience. The ongoing development of wearable technology poses an intriguing question for the future of television displays and further enhancements in the industry.

HOW MP3 TRANSFORMED MUSIC LISTENING AND DISRUPTED THE RECORDING INDUSTRY

The MP3 format revolutionized the way people listen to music and caused a significant disruption in the recording industry (Rose and Ganz, 2003). The advent of MP3 sound compression technology made it possible to create digital music files that could be easily stored, transferred, and played on various devices. This breakthrough, coupled with the rise of the internet and web technologies, facilitated the widespread sharing of music files among producers and consumers.

The transformation brought about by MP3 and digital music files had a profound impact on the business models of the music recording and music entertainment industries. Traditional models of producing, distributing, and consuming music faced disruption as the ease of creating and sharing digital music files bypassed traditional channels. This gave rise to a direct relationship between artists or producers and their audience, with fewer intermediaries involved.

The recording industry experienced significant challenges and had to adapt to the new digital landscape. With the ability to create and distribute music files independently, artists and smaller labels gained more control over their work. Conversely, new centers of online music distribution arose, as companies such as Spotify, Apple Music and Amazon Music grew their franchises and developed more user friendly relationships with music enthusiasts while simultaneously weakening the control of recording companies over their music artists. The traditional power dynamics between music producers, distributors, and consumers shifted, causing a reconfiguration of relationships within the industry (Tschmuck, 2016).

Furthermore, the rise of file sharing platforms and peer-to-peer networks enabled consumers to share and download music easily. This posed a major challenge for the recording industry, as it struggled to find effective ways to monetize digital music in the face of widespread piracy. The industry had to adapt its strategies and explore new revenue streams, such as digital music

sales, streaming services, and licensing agreements, to cope with the changing landscape.

The disruption caused by MP3 and digital music extended beyond the recording industry. It had a ripple effect on various aspects of the music ecosystem, including concert ticket sales, merchandise, and artist-fan interactions. Artists and musicians had to explore new avenues for revenue generation, such as live performances, merchandise sales, and partnerships with brands (Rieple, DeFillippi and Schreiber, 2023).

While the transformation brought about by MP3 and digital music files led to significant challenges for the recording industry, it also opened up new opportunities for artists and consumers alike. It allowed for greater accessibility to music, increased exposure for independent artists, and enabled music enthusiasts to curate their own digital libraries. The digitization of the music industry continues to evolve, with streaming services becoming the primary mode of music consumption and new technologies like blockchain offering potential solutions for artists' rights and fair compensation (Conway and Mansa, 2021).

In summary, the emergence of MP3 sound compression technology and the subsequent disruption caused by digital music files and internet-based sharing transformed the music industry. It reshaped business models, altered the relationships between producers, distributors, and consumers, and posed challenges for traditional revenue streams. While the recording industry had to adapt to the new digital landscape, the digitalization of music also brought new opportunities for artists and listeners alike, ushering in a new era of music consumption and distribution.

HOW VIDEO STREAMING TRANSFORMED VISUAL ENTERTAINMENT CHOICES AND ACCESS

Video streaming has had a transformative impact on visual entertainment choices and access, revolutionizing the way we consume and enjoy movies, TV shows, and other video content (Alsin, 2018). Here are the key ways in which video streaming has brought about this transformation:

1. Expanded Choice of Content: Video streaming platforms have significantly expanded the choices available to viewers. Instead of relying on traditional cable or satellite TV channels with limited programming options, streaming services offer vast libraries of movies, TV series, documentaries, and original content. Viewers now have the freedom to explore a wide range of genres, niche content, and international productions that may not have been easily accessible before.

2. On-Demand Access: One of the most significant transformations brought about by video streaming is the shift from scheduled programming to on-demand access. With streaming services, viewers can watch their favorite shows and movies whenever they want, eliminating the need to adhere to fixed broadcast schedules. This flexibility has empowered viewers to customize their entertainment experience and watch content at their convenience.

3. Personalized Recommendations: Video streaming platforms leverage sophisticated algorithms and user data to offer personalized content recommendations. By analyzing a viewer's watch history, preferences, and viewing patterns, streaming services can suggest relevant and tailored content. This personalized recommendation system enhances the viewing experience, introducing viewers to new shows and movies they may enjoy, and helping them discover hidden gems.

4. Accessibility and Portability: Video streaming has made visual entertainment more accessible than ever before. With internet connectivity and compatible devices, viewers can stream content on smartphones, tablets, smart TVs, and laptops from anywhere with an internet connection. This accessibility has democratized visual entertainment, breaking down barriers of geography and providing a global audience with access to diverse content.

5. Cord-Cutting and Disruption of Traditional TV: Video streaming has disrupted the traditional television industry by encouraging cord-cutting, where viewers opt to cancel their cable or satellite TV subscriptions in favor of streaming services. This shift has challenged the dominance of traditional TV networks and forced them to adapt by launching their own streaming platforms or partnering with existing services. The streaming revolution has given viewers greater control over their entertainment choices and led to a more competitive and dynamic landscape.

6. Original Content and Creative Freedom: Video streaming platforms have become major players in content production, investing heavily in original programming. This has allowed for the creation of innovative and high-quality shows and movies that may have struggled to find a home in the traditional TV or film industry. Streaming services have provided artists, writers, and directors with new avenues for creative expression and have given viewers access to a diverse range of original content.

In summary, video streaming has transformed visual entertainment choices and access by expanding content options, providing on-demand access, offering personalized recommendations, increasing accessibility and portability, disrupting traditional TV models, and fostering the production of original content. The availability of streaming services has fundamentally changed how we consume visual entertainment, giving viewers greater freedom, control, and diversity in their viewing experiences.

HOW HOLOGRAMS TRANSFORMED CONCERTS BY DISTANT AND EVEN DEAD ARTISTS

Holography is a technique for projecting a recorded image (whether static or dynamic) onto a space. The resulting holograms are freestanding 3D light structures. They aren't projected onto a surface (that would make them 2D). Typically, holograms are created with the aid of laser technology. The resulting image can be a representation of art or artists and the power of the enabling technology can render this image varying degrees of realism to the human eye. Holograms (3 D holography) have brought about a remarkable transformation in the world of concerts, enabling performances by distant and even deceased artists (Grow, 2019). Here are the key ways in which holograms have impacted the concert industry:

1. Virtual Presence of Distant Artists: Holographic technology allows artists to deliver live performances to audiences in different locations simultaneously. By capturing the artist's movements, gestures, and vocals through advanced imaging techniques, a realistic holographic representation can be projected onto a stage or screen. This has opened up new possibilities for concerts, as artists can connect with fans around the world without physically being present in each location.

2. Resurrection of Deceased Artists: Holograms have made it possible to bring back deceased artists for live performances. By utilizing archival footage, audio recordings, and detailed recreations, holographic representations of iconic musicians can be created. These holographic performances allow fans to experience the magic of seeing their favorite artists perform, even years after their passing. It brings a sense of nostalgia and creates an emotional connection between the audience and the artist's legacy.

3. Enhanced Visual Spectacle: Holograms add a new dimension of visual spectacle to concerts. The technology allows for stunning and immersive

visual effects, transforming the stage into a dynamic and interactive environment. Holograms can be combined with lighting, projection mapping, and other visual elements to create captivating and awe-inspiring performances. This not only enhances the overall concert experience but also pushes the boundaries of creativity in stage design and production.

4. Collaborations Beyond Time and Space: Holograms have enabled unique collaborations between artists from different eras. For example, a living artist can perform alongside a holographic representation of a deceased artist, creating a virtual duet or ensemble. These collaborations transcend the limitations of time and space, fostering artistic connections that would otherwise be impossible. It allows for the reimagining of musical collaborations and the celebration of artistic legacies.

5. Preservation of Cultural Heritage: Holograms have the potential to preserve and celebrate cultural heritage through music. By recreating performances of influential artists from the past, holograms can introduce younger generations to their music and legacy. It becomes a means of honoring and keeping the cultural heritage alive, ensuring that the impact of these artists continues to resonate with audiences for years to come.

However, it is important to note that the use of holograms in concerts has sparked debates and raised ethical considerations (Farde, 2019) . Some argue that it can be seen as exploitative or disrespectful to the memory of deceased artists. Others express concerns about the authenticity and integrity of holographic performances. These discussions reflect the complex and evolving nature of hologram technology in the concert industry.

In summary, holograms have transformed concerts by enabling performances by distant artists and reviving the presence of deceased musicians. The technology has expanded the possibilities for live performances, enhanced visual spectacle, facilitated unique collaborations, and preserved cultural heritage. While holograms have sparked ethical debates, their impact on the concert industry is undeniable, offering new ways for artists to connect with audiences and creating memorable and immersive concert experiences.

HOW MUSEUMS BECAME MULTI MEDIA AND AUGMENTED REALITY AND VIRTUAL REALITY EXPERIENCES

Museums have undergone a remarkable transformation, embracing multimedia, augmented reality (AR), and virtual reality (VR) technologies to

enhance visitor experiences (Agyeman, 2019; Coates, 2021). Here are the key ways in which museums have become multimedia and AR/VR experiences:

1. Interactive Exhibits: Museums now integrate multimedia elements into their exhibits, offering interactive displays that engage visitors in a dynamic and immersive way. These exhibits may include touchscreens, interactive projections, audio guides, and video presentations. Visitors can access additional information, listen to audio commentary, watch videos, and participate in interactive activities, allowing for a more engaging and educational experience.

2. Augmented Reality (AR): Museums have embraced AR technology to provide visitors with enhanced experiences. By using smartphones or tablets, visitors can access AR applications that overlay digital content onto real-world exhibits. This can include virtual reconstructions of historical artifacts or environments, 3D models, animations, or additional contextual information. AR enables visitors to see artifacts in a new light and offers a deeper understanding of the objects on display.

3. Virtual Reality (VR): VR has revolutionized the museum experience by immersing visitors in virtual environments that transport them to different times, places, or narratives. VR headsets provide a fully immersive and interactive experience, allowing visitors to explore virtual exhibits, walk through ancient ruins, or witness historical events. VR can recreate inaccessible or destroyed artifacts, bringing them back to life and providing a unique and immersive perspective.

4. Virtual Tours and Online Exhibitions: Museums have expanded their reach by offering virtual tours and online exhibitions. Through 360-degree panoramic views, visitors can explore museum spaces, view high-resolution images of artifacts, and access curated content online. This accessibility allows people from around the world to engage with museum collections and exhibitions, overcoming limitations of distance and travel.

5. Gamification and Interactive Learning: Museums have embraced gamification techniques to make learning more enjoyable and interactive. Through the use of gamified elements, such as quizzes, challenges, and interactive games, visitors can actively participate in the learning process. This approach appeals to a broader audience, including

younger visitors, and encourages a deeper engagement with the museum's content.

6. Collaborative Experiences and Social Sharing: Multimedia and AR/VR (Augmented Reality/Virtual Reality) technologies have also facilitated collaborative experiences within museums. Visitors can engage in group activities, share their experiences on social media, and participate in interactive installations that encourage social interaction. This social dimension adds an element of shared discovery and encourages dialogue among visitors.

The integration of multimedia, AR, and VR technologies in museums has expanded the possibilities for engagement, learning, and accessibility. These technologies offer immersive and interactive experiences, bringing artifacts and historical narratives to life in new and captivating ways. By embracing these technologies, museums continue to evolve, appealing to a broader range of visitors and enriching the overall museum experience.

ESPORTS AS A TRANSFORMATIVE BUSINESS MODEL FOR AUDIENCE ENGAGEMENT

eSports has brought about a profound transformation in video game participation and audience engagement, and it continues to shape the future of digitally immersive entertainment . Here are the key ways in which eSports has made an impact:

1. Competitive Gaming on a Global Scale: eSports has elevated video gaming from a casual hobby to a highly competitive and organized sport. Professional eSports teams and players compete in tournaments and leagues at regional, national, and international levels. This shift has created a new avenue for gamers to showcase their skills, pursue careers in gaming, and gain recognition on a global stage (Geyser, 2021).

2. Increased Audience Engagement: eSports has cultivated a dedicated and passionate audience base. Millions of viewers tune in to watch eSports events, either attending live tournaments or streaming matches online. The interactive nature of eSports allows spectators to engage with the gameplay, follow the narratives of teams and players, and even interact with their favorite competitors through chat platforms. This level of audience engagement has turned eSports into a spectator sport, comparable to traditional sports like football or basketball (Morrison,2018).

3. Emergence of Professional Gaming Industry: The rise of eSports has given birth to a thriving professional gaming industry. Sponsorship deals, advertising, and media rights have become significant revenue streams for eSports organizations, teams, and players. Major brands and companies have recognized the immense market potential of eSports and have invested in partnerships, endorsements, and sponsorships. This has further solidified eSports as a legitimate and financially viable industry (Geyser, 2021).

4. Technological Advancements and Innovation: eSports has driven technological advancements and innovation in the gaming industry. Game developers and hardware manufacturers are constantly striving to improve the gaming experience for competitive players and spectators. This includes developing high-performance gaming equipment, optimizing network infrastructure for gameplay, and integrating streaming capabilities into gaming platforms. These advancements benefit not only eSports but also the broader gaming community.

5. Community Building and Social Interaction: eSports has fostered a strong sense of community among gamers. Online forums, social media platforms, and dedicated eSports websites provide spaces for fans to discuss, share, and connect with others who share their passion. Local eSports events bring gamers together in physical spaces, fostering social interactions and networking opportunities. eSports has created a sense of belonging and camaraderie within the gaming community.

Looking ahead, the future of digitally immersive entertainment is likely to be heavily influenced by eSports. Here are some potential developments:

1. Continued Growth and Mainstream Recognition: eSports is expected to continue its upward trajectory, gaining even more mainstream recognition and acceptance. As the audience base expands and revenues increase, eSports will likely attract larger investments from media networks, advertisers, and investors (Geyser, 2021).

2. Integration of Virtual Reality (VR) and Augmented Reality (AR): The integration of VR and AR technologies into eSports holds significant potential. These immersive technologies can enhance the viewing experience, allowing spectators to feel more immersed in the game and interact with virtual elements. VR and AR may also introduce new

gameplay mechanics and challenges, further pushing the boundaries of eSports.

3. Cross-Platform and Cross-Title Competitions: With the advancement of cross-platform play and the increasing popularity of mobile gaming, eSports could see more cross-platform and cross-title competitions. This would enable players from different devices and games to compete against each other, creating larger and more diverse eSports ecosystems.

4. Expansion of eSports into Non-Traditional Games: While eSports has primarily focused on competitive multiplayer video games, there is potential for its expansion into non-traditional gaming experiences. This could include eSports tournaments and leagues centered around virtual reality experiences, mobile games, or even board games, broadening the scope of competitive gaming.

5. Inclusion of Interactive Elements for Spectators: eSports may further incorporate interactive elements for spectators, allowing them to have a more active role in the viewing experience. This could include voting systems, real-time predictions, and interactive overlays that virtually incorporate spectators into eSport competitions.

CONCLUSIONS

The above examples of transformational innovation across a half dozen arts and entertainment industries are further detailed in a co authored culture industry text (Rieple, DeFillippi and Schreiber, 2023), where we examine more than twenty five examples of transformational innovation in more than a dozen cultural industries. This article does not duplicate the content of our book but instead employs the analytic perspective of Moore's law to examine how advances in semiconductor technology have transformed digital entertainment by employing smarter, smaller, faster less expensive and more integrated digital tools.

An emergent technology game changer in digital entertainment is interactive artificial intelligence, where the ability of widely available interactive AI tools such as ChatGPT to generate creative content in all sectors of arts and entertainment pose both challenges and opportunities to creative authors and publisher alike.

Who owns the intellectual property of content produced by GPT? How is such content to be moderated by traditional gatekeepers of creative content? How will the expected proliferation of such content pose challenges to arts and

entertainment professionals ? How can labor contracts be revised to provide employment protections to arts and entertainment content creators. Will new models of human and AI co created content become dominant? These questions deserve new scholarship as our foundational models for content creation are challenged by interactive AI.

REFERENCES

Agyeman, K. H. (2019). *Top 10 museum trends you should know.* Medium. Retrieved August 20, 2021, from https://medium.com/museum-tech-trends/top-10-museum-trends-in-2019-3c5582ed8253

Alsin, A. (2018, July 19). *The future of media: Disruptions, revolutions and the quest for distribution.* Forbes. Retrieved June 6, 2021, from https://www.forbes.com/sites/aalsin/2018/07/19/the-future-of-media-disruptions-revolutions-and-the-quest-for-distribution/

Bellis, M. (2023, April 5). *Television History and the Cathode Ray Tube. ThoughtCo.* Retrieved June 16, 2023, from thoughtco.com/television-history-cathode-ray-tube-1991459

Coates, C. (2021, July 17). *How museums are using augmented reality.* Museum Next. Retrieved June 6, 2022, from https://www.museumnext.com/article/how-museums-are-using-augmented-reality/

Conway, L. and Mansa, J., (2021). *The 10 Most Important Cryptocurrencies Other Than Bitcoin.* Investopedia. Retrieved May 12, 2022, from https://www.investopedia.com/tech/most-important-cryptocurrencies-other-than-bitcoin/

Farde, E. (2019). *Touring goes beyond the grave: behind the business, technology and ethics of the hologram concert revolution.* Synchtank. Retrieved June 14, 2023, from https://www.synchtank.com/blog/touring-goes-beyond-the-grave-behind-the-business-technology-and-ethics-of-the-hologram-concert-revolution/

Geyser, W. (2021). *The incredible growth of eSports* (+ eSports statistics). Influencer Marketing Hub. Retrieved September 14, 2021, from https://influencermarketinghub.com/esports-stats/

Grow, K. (2019) Inside music's booming new hologram touring industry. Retrieved June 13, 2023, from https://www.rollingstone.com/music/music-features/hologram-tours-roy-orbison-frank-zappa-whitney-houston-873399/

Mettler, T. (2017). *Digitalization: Challenges and opportunities for IT management* [Conference Proceedings]. 50th Hawaii International Conference on System Sciences (HICSS) (pp. 1219-1228). IEEE.

Mistek, R. (2021). Why we need hybrid film festivals. Hyperallergic, September 9. Retrieved March 9, 2022, from https://hyperallergic.com/675747/why-we-need-hybrid-film-festivals/

Moore, G. E. (1965). Cramming more components onto integrated circuits. *Electronics Magazine*, 38(8), 114-117.

Morrison, S. (2018). *List of varsity esports programs spans North America.* Retrieved June 28, 2021, from https://www.espn.com/esports/story/_/id/21152905

Raposo, K. (2021). A brief history of the evolution of TV: From the 1920s to the 2020s. Retrieved June 14, 2023, from https://knowtechie.com/a-brief-history-of-the-evolution-of-tv-from-the-1920s-to-the-2020s/

Rieple, A. DeFillippi, R. and Schreiber, D. (2023). Transformational innovation in the creative and cultural industries. Routledge.

Rose, J. and Ganz, J. (2011). The MP3: A History Of Innovation And Betrayal. NPR. The Record. Retrieved June 13, 2023, from https://www.npr.org/sections/therecord/2011/03/23/134622940/the-mp3-a-history-of-innovation-and-betrayal

Schumpeter, J. A. (1942). *Capitalism, Socialism and Democracy*. Harper and Brothers.

Tschmuck, P. (2016). From record selling to cultural entrepreneurship: The music economy in the digital paradigm shift. In Wikstrom, P. & DeFillippi, R. (Eds.), *Business Innovation and Disruption in the Music Industry* (pp.13–32). Northampton, MA. USA: Edward Elgar.

Webster, A. (2021, February 3). The pandemic was inescapable at the 2021 Sundance film festival. The Verge. Retrieved May 12, 2022, from https://www.theverge.com/2021/2/3/22262520/sundance-film-festival-2021-pandemic-these-days-pink-cloud

Wilson, M. (2020). How TVs have changed through the decades. Insider. Retrieved June 14, 2023, from https://www.businessinsider.com/guides/tech/the-evolution-of-tvs-through-the-decades