EUROPEAN CULTURAL
AND CREATIVE INDUSTRIES
INNOVATION POLICY PLATFORM

Immersive Media: Reimagining distribution models for immersive experience

POLICY RECOMMENDATIONS
FROM POLICY LAB3

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Key Recommendations

The adoption of immersive technologies by Cultural and Creative Industries (CCIs) is facing challenges related to facilitating distribution and scalability, improving collaboration between creatives and technologists, as well as education and training gaps for the immersive sector. At European level, participants of the third ekip Policy Lab have identified several recommendations to overcome these challenges:

ADDRESSING CHALLENGES FOR XR DISTRIBUTION AND SCALABILITY

Develop a European cohesive vision and strategy for immersive media addressing sectoral fragmentation, cutting across cultural, innovation, entrepreneurial and educational domains.

- Foster the development of streamlined distribution practices specific to XR and immersive experiences
- Encourage formation of industry-wide networks and consortia
- Include end users and target audience of XR in its design and showcase the value of immersive media to create familiarity. This aspect should be complemented by further market research into current and potential audiences.

Coordinate funding strategies, such as investment pooling mechanisms for more effective multi-level funding partnerships between national authorities, EU institutions and private investors

- Align funding priorities, and ensure transparency in resource allocation across different stakeholders, giving space not just to outcome-driven priorities, but also experiment and innovation-based activities
- Create greater incentives for combined sources of funding such as public grants and private investment to create a more balanced financial ecosystem

Coordinate funding strategies, such as investment pooling mechanisms for more effective multi-level funding partnerships between national authorities, EU institutions and private investors

- Foster the role of intermediary organisations to act as connectors, with a focus on infrastructures for collaboration and knowledge production and sharing. These services should be geared toward the needs of small-scale immersive media actors
- Create framework guidelines that enable better collaboration in cross-border and cross-sector knowledge sharing platforms

Prototype new distribution models to identify scalable approaches for immersive technologies

- Encourage use of museums or unconventional venues (e.g. theatre backstage) as a critical area for experimentation
- Connect R&D efforts with real-world distribution practices
- Support of funding pilots and prototypes for immersive media distribution for the development of innovative venues and distribution strategies, ensuring alignment between R&D and market needs
- Exploration and transfer of knowledge from other sectors, such as film or digital media, to support distribution and sustainability of immersive media

ENHANCING COLLABORATION BETWEEN CREATIVE & TECHNOLOGISTS

Support & establish shared spaces such as incubators and accelerators where creative professionals and technologists can collaborate & find resources

- Identify stakeholders who are not part of existing incubators and make space for available for them
- Provide shared tools, resources, and mentoring to facilitate collaboration and bridge knowledge gaps
- Foster the development of a common language and shared understanding between stakeholders through the role of facilitators and community managers, enhancing mutual recognition of value

Invest in intermediary organisations (e.g. RTO, labs) to act as connectors across the XR value chain, mapping available resources, networks & infrastructures, and support the creation of cross-border consortia

- These organisations should also provide networking opportunities and facilitate crosssector partnerships
- Map available resources, networks, and infrastructures to identify collaborators
- Facilitate structured dialogues and develop funding mechanisms with key cultural agencies, such as arts councils, as well as final users of XR to raise awareness of XR technologies, secure financial commitments addressing specific barrier entries

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- Introduce entry-level funding schemes tailored for smaller creative organisations to encourage active participation
- As part of the funding mechanisms, mandate interdisciplinary collaboration between creatives and XR specialists and allocate resources for sustaining project results beyond lifecycle
- Implement both experiment-based results funding as well as outcome-driven funding to incentivise the innovation process and encourage collaboration

TACKLING EDUCATIONAL AND TRAINING GAPS IN THE IMMERSIVE SECTOR

Targeted education and training for creators and developers to address gap in education system regarding XR technologies

- Life-long learning and knowledge transfer to support skills development for immersive media actors
- Micro-credential programmes supporting technical and transversal skills needed for a career in immersive tech
- Support non-formal learning opportunities, mentoring, job shadowing, and matchmaking to facilitate knowledge transfer and stimulate better market access

Foster local talent retention by creating policies aimed at retaining XR talent through localised career development programmes

- Launch grassroots advocacy campaigns to raise awareness about XR potential and embed XR education and advocacy efforts into cultural programmes, festivals, and EU exchange initiatives
- Promote a pipeline of technology professionals for the immersive sector by supporting existing educational programmes which address skills, such as STEM courses
- Promote internships and early onboarding job positions in the domain of XR

Foster access to educational resources and avoid fragmentation by developing a shared repository of resources, such as knowledge, best practices etc.

- Open access to digital literacy and XR training, ensuring accessible education for all, leveraging partnerships with global technology providers

1 Introduction

Immersive technologies are transforming the ways people can interact with media. Their current maturation leads their growing integration into various facets of society and the economy. Cultural and Creative Industries (CCIs) play a major role in adopting and advancing immersive technologies. Their adoption promises benefits for industries such as film, music or performing arts, but also for museums and cultural heritage organisations. With a growing global market, the role of European CCI actors advancing and adopting immersive technologies can lead to significant benefits for the European Union. To do so, however, requires overcoming technological and structural challenges through policy initiatives.

How policy, in particular research and innovation policies, can support the CCIs in developing and using immersive technologies was the subject of an ekip Policy Lab on the topic **"Immersive Media: Reimagining distribution models for immersive experience".**[1] The objective of the ekip Policy Lab was to discuss the key challenges facing Europe's immersive sector at the moment. The ekip Policy Lab's outcome was in the form of **EU policy recommendations for Immersive Media in CCIs, which are reported in this document.** This document summarises key policy problems and opportunities, offering pathways to foster innovation policies that harness the potential of Immersive Media (Chapter 2). It also formulates a preliminary policy vision (Chapter 3) and maps existing policies and projects at EU and national level (Chapter 4). Based on the identification of current challenges in three key areas (Chapter 5), the final policy recommendations are presented (Chapter 6)..

2 Immersive Media as an emerging sector

2.1 DEFINITION AND SCOPE

Immersive technologies are transforming the ways people can interact with media. As a result, new, immersive experiences have the ability to deeply engage users in filmed, photographed, synthetic, or blended environments, creating a sense of realism and giving them the feeling of actually being present within the experience—commonly referred to as the sensation of "being there".[2] In this context, immersive media emerged as a new term and refers to **media experiences that transcend traditional forms, allowing users to engage with content in a multi-dimensional environment by integrating reality with advanced technologies.**

Key technologies driving the adoption of immersive media include **Virtual Reality (VR), Augmented Reality (AR),** and **Mixed Reality (MR)**. Virtual reality is a three-dimensional synthetic digital environment that surrounds a user and responds to an individual's actions through immersive head-mounted displays as defined by Gartner[3]. Augmented reality has a real-world element that makes it different from virtual reality. It can be best understood as the real-time use of information in the form of text, graphics, audio and other virtual enhancements integrated with real-world objects[4] . **Extended Reality (XR) encompasses all these spectrums and blend the physical and digital worlds.**

> *"EU policies and initiatives (Media & Audiovisual Action Plan, Horizon Europe, Digital Europe, EIT KIC) aim to support innovation, collaboration, and scalability."*

[1] Held on 20 November 2024 in Kosice, Slovakia.
[2] Kaplan-Rakowski, R., & Meseberg, K. (2019). Immersive media and their future. In R.M. Branch et al. (Eds.), Educational Media and Technology Yearbook (Vol. 42, pp. 143-153). Springer. https://doi.org/10.1007/978-3-030- 27986-8_13
[3] https://www.gartner.com/en/information-technology/glossary/vr-virtual-reality
[4] https://www.gartner.com/en/information-technology/glossary/augmented-reality-a

2.2 BACKGROUND AND HISTORY

The policy challenges associated with immersive media have gained increasing prominence within the European Union (EU) over the past few decades. While the conceptual and technological foundations of immersive media have been explored since the mid-20th century, it is only in recent years that these advancements have called for comprehensive policy responses. This evolution reflects **the maturation of immersive technologies** and their growing integration into various facets of society and the economy. The genesis of immersive media can be traced back to imaginative works of fiction and pioneering technological experiments. From Stanley G. Weinbaum's 1935 short story "Pygmalion's Spectacles"[5] to Ivan Sutherland's[6] seminal 1965 essay "The Ultimate Display"[7] , the vision of immersive environments captured the public imagination and laid the **theoretical groundwork for future developments.** Although the fundamental concepts of virtual reality emerged in the 1960s, significant progress remained incremental until **recent breakthroughs in graphics hardware, interaction devices, and increased computer performance and storage capabilities** converged with rising demand, making immersive VR interfaces feasible and mainstream today. Despite the early conceptualisation, immersive media technologies remained **largely experimental and confined to niche applications,** such as military training simulations and specialised industrial tools, throughout much of the 20th century.

As VR technology progressed into the 1990s and early 2000s, commercial interests began to shape the policy landscape. During this period, policies evolved to address data privacy and security concerns as VR devices increasingly collected user data to enhance immersive experiences. Regulatory frameworks were developed to protect consumers from potential harms associated with VR usage, including the establishment **of safety standards for VR hardware and guidelines to prevent misleading marketing practices.** Additionally, the decline in VR interest during the early 2000s, marked by the failure of several commercial ventures, underscored the need for policies that could support **sustainable growth and innovation in the VR sector.** Moreover, modern VR applications extend far beyond gaming, encompassing critical areas such as healthcare, education, manufacturing, and remote work. This expansion has resurged the need for **policies safeguarding user privacy and data security and addressing ethical considerations** related to content creation, user interaction, and the psychological impacts of prolonged VR use. While the EU technology regulations are anticipated to be pivotal in developing **next-generation virtual worlds,** The EU is actively regulating technologies anticipated to be pivotal in developing next-generation virtual worlds through initiatives such as the AI Act, Digital Services Act, and Digital Markets Act, alongside the Data Act and Data Governance Act, among other policy measures.

2.3 TRENDS

Immersive media is set to transform the entertainment industry, offering significant revenue potential and reshaping consumer experiences. Younger audiences are gravitating toward interactive, "lean-in" environments, and technological advancements like 5G are accelerating the adoption of these platforms, which promise new revenue streams through subscriptions, in-experience purchases, and targeted advertising[8]. Insights from social listening conducted by Nextatlas highlights five key trends shaping the future of immersive technologies, underscoring their potential and challenges as they become integral to daily life.

The creative world is embracing VR and AR as tools for artistic expression, with artists creating innovative works, such as VR-sculpted pieces and 3D digital displays. However, the accessibility of such virtual experiences remains an issue, as there remains a gap between creators and audiences in the adoption of these virtual spaces. Efforts in learning and exhibition spaces have been bridging this accessibility gap in recent years. The gaming industry offers significant potential for this trend, with many mobile games already integrating metaverse elements, offering users an accessible and familiar environment. Central and Eastern Europe are particularly active in discussions around this trend.

Next, as immersive experiences are becoming increasingly integral in CCI, more and more attention is paid to the **design and technology of VR, AR and XR,** with a focus on seamlessly integrating virtual and real-world realms. Adaptive tools replicating real-world sensory inputs like touch and smell create natural, immersive environments, significantly impacting industries where user interaction is central, such as gaming, architecture, and visual arts. Eastern and Central European countries are especially engaged in conversations around this trend.

[5] https://medium.com/@bellaotriv/history-of-vr-timeline-of-events-and-tech-development-779dad14833b
[6] https://www.technologyreview.com/2019/08/21/545/ivan-sutherland-phd-63/
[7] https://media.defense.gov/2021/Jun/29/2002751740/-1/-1/0/VIRTUAL_REALITY.PDF
[8] Bain & Company (2023) The New Era of Immersive Entertainment https://www.bain.com/insights/new-era-of-immersive-entertainment/

AR, VR, and XR are increasingly being integrated into the business models and processes of CCIs to boost efficiency and drive innovation. These technologies streamline various stages of work, including concept development, production, prototyping, and testing, making them essential tools for enhancing creativity and productivity. Fields such as architecture and advertising are adopting these tools as part of their everyday operations, and the most significant adoption and experimentation with these technologies is currently taking place in Northern European countries.

Immersive storytelling is redefining how users engage with virtual environments, prompting growing interest in the design of tailored immersive spaces. While sectors like gaming and advertising have readily adopted these innovations, cultural heritage is emerging as a key area of focus, leveraging immersive experiences to enhance access and interaction in cultural settings. However, public and social spaces encounter obstacles in implementing such technologies, largely due to their dependence on private digital infrastructure, highlighting a significant challenge for broader adoption. Western Europe leads in this trend, with Southern and Northern Europe close behind.

Developments in immersive technology also offer new possibilities for the performing arts. Reactive technologies, including motion capture, real-time sensors, and AI-driven responses, enable performers to interact dynamically with their surroundings, creating performances that are constantly evolving and interactive. Interest in these innovations is growing across Europe, particularly in Western and Northern countries.

In addition to the five key trends, Nextatlas has observed a growing interest in **discreet wearables**, such as smart glasses and AI-powered tools, which seamlessly integrate into daily life, providing personalized, real-time data while bridging digital and physical spaces. While these advancements foster deeper user connections, they also raise important questions about ownership and the broader implications of relying on such technologies.

> *"Challenges include skills shortages, high costs, accessibility issues, fragmented ecosystems, and distribution barriers."*

[9] VR/AR Industrial Coalition Strategic Paper. European Commission. 2022.
[10] Okanovic, Vensada & Ivkovic-Kihic, Ivona & Boskovic, Dusanka & Mijatovic, Bojan & Prazina, Irfan & Skaljo, Edo & Rizvić, Selma. (2022). Interaction in eXtended Reality Applications for Cultural Heritage. Applied Sciences. 12. 1241. 10.3390/app12031241.

2.4 CHALLENGES AND OPPORTUNITIES

Market research shows an expansion and evolution of XR technologies. At a global level, market forecasts point towards a boom across various applications, expected to add about EUR 1.3 trillion to the global economy by 2030[9] . The Extended Reality (XR) market is projected to experience significant growth, with its size expected to increase from €96.08 billion in 2024 to €429.86 billion by 2029. According to forecasts by Mordor Intelligence, this represents a compound annual growth rate (CAGR) of 34.94% over the forecast period.

2.4.1 Opportunities of immersive technologies across CCI

Immersive technologies open up new possibilities for immersive storytelling, interactive experiences, and creative expression across many of the cultural and creative industries.

In the film and television industry, the adoption of VR has gradually increased, particularly for producing immersive content that enhances viewer engagement. According to PwC's Global Entertainment & Media Outlook, the VR video segment was valued at approximately €1.1 billion in 2022, with projections indicating growth to €2.6 billion by 2026, reflecting a CAGR of 19.3%. This growth is largely attributed to a rising consumer interest in immersive storytelling, where audiences are not merely passive viewers but active participants in the narrative. For instance, VR documentaries and 360-degree videos have gained traction, offering viewers the opportunity to be "inside" the story, which significantly enhances engagement and emotional connection to the content.

XR can enhance the presentation of cultural heritage[10] through more interactive and digital formats, giving users the ability to travel back in time through elaborate reconstructions of cultural monuments and sites. Digital storytelling has, in fact, become part and parcel of many museum exhibitions, providing an educational and entertaining way to learn more about historical events, making the past come alive in an accessible and engaging manner.

The creation of interactive, creative and immersive virtual worlds is more and more present in **video games and gaming applications,** enabling in-depth first-person experiences, removing language barriers and giving way to AI-driven creativity. Smart cities further benefit from virtual reality applications in the fields of tourism, retail and culture, and optimising transport systems. (Communication on boosting startups).

In book publishing, XR allows new ways to engage the reader beyond the book by offering an immersive reading experience. The future digital reader might not want only to read a simple book[11]. They want to be part of the story. Applying AI on e-books has the potential to allow the readers to listen to voices while reading, to view the places in a film like setting and to interact with the story in a multitude of ways. This technology can support children to learn how to read but it also aids persons with a print disability to read and therefore improves their reading experience (for example, the audio can ease the burden of going through the same paragraph several times). Inkitt is a Berlin-based software company that offers a crowdsourced publishing platform and uses computer algorithms to predict book success based on reader behaviour. Their idea is simple: authors can post their manuscripts, readers can read them for free for a limited amount of time, Inkitt AI-powered tools analyse these user data and based on this direct reader feedback, the best-performing books will be further promoted (and their authors receive a publishing deal).

As part of news media, the integration of XR into Social Media (SoMe) platforms is another transformative trend. XR technologies enable the creation of virtual social spaces where users can interact with each other in ways that feel more natural and engaging than traditional text or video-based communication. For instance, platforms could evolve to support virtual gatherings where avatars represent users meet and interact in digital environments that replicate or enhance real-world settings. This represents a significant shift from the current model of social media, which is mainly two-dimensional and often impersonal, to a more immersive and personal form of digital interaction.

Linked to fashion and retail, the most relevant applications mainly exploit the possibilities offered by AR. Generally displaying more potential than VR, AR is applied primarily in **customer care, advertising and marketing.** Customers can use VR/AR applications to browse a store's content without physically visiting its facilities, try out clothes and other articles from home, and even see what a certain piece of furniture would look like in a room.

The potential of XR technologies is being explored by players such as the ARTE, Venice Film Festival, and Centre National du Cinema. Europe also benefits from skilled workers specialised in 3D modelling and VR animation. VR and AR content also have the potential to trigger innovations in other industrial sectors, such as manufacturing, product development and helping creative industries such as fashion and architecture develop new business models, make waste reduction more efficient, and enhance customers' experience [12]. However, the European VR/AR sector suffers from fragmentation across sectors, players, and applications.

2.4.2 Policy challenges

Integrating extended reality into cultural and creative industries (CCIs) comes with challenges such as the need for highly specialized skills, prohibitive development costs, and accessibility concerns, which must be addressed to fully harness its potential. Additionally, for XR technologies to gain widespread traction, affordable and user-friendly hardware solutions are essential. A **shift in mentality** is therefore necessary on the demand side and will be crucial for XR's growth, and by extension, the CCIs sectors that revolve around it.

When it comes to the XR hardware landscape, significant technological challenges exist, such as vendor lock-in and the conflict between open and proprietary systems. Current limitations in hardware diversity and compatibility hinder consumer adoption, with key players like Meta, Apple, and Sony using proprietary platforms. Furthermore, technological constraints like the availability of 5G infrastructure, necessary for rapid data transmission, also slow down XR's industrial scaling. And as technology progresses, Europe and the broader global market face **pressing skill gaps, shortages, and mismatches, especially in immersive media**—a field where SMEs, despite their dynamism, often lack the funding needed to thrive. This phenomenon is even more exacerbated on the market of immersive media and as technology grows. Moreover, the composition of the ecosystem is dominated by the small size of businesses, especially SMEs, which **lack funding** for startups. Other challenges relate to **privacy and security** concerns associated with XR devices, which are hindering the adoption of XR as well as health and wellbeing issues.

Beyond the technology developments themselves, the creation and production of content, one of the main obstacles to widespread XR adoption lies in **distribution models of immersive production.**

For immersive productions to thrive, they must be **accessible to more actors within specific CCI sectors, scalable** enough to reach a broader audience, and cost-effective enough to lower development expenses. However, the limited number of case studies available for potential adopters makes it difficult to gauge the benefits and risks of XR adoption. Developers often shoulder the cost of creating pilot projects, with limited showcasing opportunities to demonstrate their work's potential. Due to small audience sizes and the **lack of a standardized distribution network,** the market for XR remains uncertain. This **fragmentation, along with weak links between creative and technical professionals**, increases development costs, extends timelines, and may affect the overall quality of XR projects and outcomes.

[11] https://digital-strategy.ec.europa.eu/en/library/study-op tunities-and-challeng-es-artificial-intelligence-ai-technologiescultural-and-creative

[12] Communication on boosting startups and innovation in trustworthy artificial intelligence (COM(2024) 28 final. https://digitalstrategy.ec.europa.eu/en/li-brary/comtion-boosting-startups-and-innovation-trustworthy-artificial-intelligence

3 Policy vision

3.1 OBJECTIVES

The growing importance of immersive media technologies, including VR/AR/XR technologies), offers a critical window of opportunity for Europe to position itself as a global leader in Creative and Cultural Industries (CCIs). Immersive media has the potential to transform storytelling, audience engagement, and cross-industry innovation, yet its adoption faces persistent challenges. Distribution models remain underdeveloped, and the sector suffers from fragmentation, limited scalability, and the lack of a unified vision to integrate XR technologies into broader CCI ecosystems.

The European Union has already begun addressing these gaps through **European Media & Audiovisual Action Plan**[13] **(2021).** The plan positions immersive media as a promising yet largely unexplored field with potential across various industries. To promote immersive media, the plan introduces the establishment of a **European VR/AR industrial coalition** within the EU's digital media ecosystem. By encouraging innovation and collaboration, the plan seeks to integrate immersive media into sectors beyond traditional media, enhancing technological advancement and fostering cross-industry synergy. This plan is directly reflected in key funded programmes such as Horizon Europe, Digital Europe Programme or Creative Europe and steer their action.

Similarly, the **EIT KIC Culture & Creativity**[14] prioritises high-impact areas like audiovisual and gaming, focusing on innovations that can revolutionise how media is created and consumed. By closing skills gaps, expanding access to digital tools, and promoting venture creation, this initiative contributes to building a resilient and integrated CCI ecosystem that bridges the gap between XR development and adoption.

On a broader horizon, the European Commission's **Long-term Competitiveness Agenda**[15] identifies immersive media as a foundational pillar of Web 4.0, enabling interconnected, deeply interactive environments. The proposed Co-Programmed Partnership on Virtual Worlds will bring together public and private actors to address investment risks, tackle fragmentation, and position the EU at the forefront of global XR development.

Embedding **CCI-specific needs into the different strategic programming** and initiatives, particularly around distribution challenges, would allow Europe to fully harness the potential of immersive media to enhance cultural production and create sustainable economic growth within the creative sector.

Considering current strategies and programmes as well as the launch of new initiatives like the CoProgrammed Partnership on Virtual Worlds, Europe could further position itself as a global actor in immersive media innovation. However, this window of opportunity requires proactive alignment of CCI needs with these broader policy frameworks. By addressing distribution challenges—such as scaling, portability, and market readiness—strategic programming can ensure that immersive media not only advances technologically but also delivers measurable benefits to CCIs and the wider economy

3.2 STAKEHOLDER NEEDS

The policy challenges identified focuses on stakeholders across the **entire production and distribution chain of immersive media,** encompassing t**echnologists, creative professionals (artists and developers), venue operators, and distributors.** These groups represent critical nodes in the ecosystem, each with unique challenges that must be addressed to ensure scalable, accessible, and sustainable distribution models for immersive media. Policy initiatives should seek to engage technologists and developers to explore how R&I policy can support the creation of tools and technologies that enhance scalability and portability of XR productions. Similarly, they should address the needs of artists and creators facilitating the development of content tailored for broader audiences and diverse markets.

Venues and exhibitors' role as intermediaries between immersive content and end-users is also pivotal for ensuring wide-scale adoption. By addressing their needs—such as operational training, streamlined distribution systems, and tailored formats — future policy could empower venues to become key distribution hubs for immersive media.

Beyond the immediate stakeholders, the policies resulting from this lab are expected to impact **audiences and consumers,** who will benefit from greater accessibility and variety of immersive experiences. **Cultural institutions, funding bodies, and cross-sectoral networks** will also see indirect benefits, as enhanced distribution models foster collaboration, standardisation, and innovation across the Creative and Cultural Industries (CCI).

[13] Media Action Plan, https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0784&from=EN
[14] EIT Culture & Creativity – First calls for proposal 2023
[15] COM(2023) 168 final

4 Policy and project mapping

4.1 CURRENT POLICY STRATEGIES AND MEASURES

The recent Communication from the Commission, **"Long-term competitiveness of the EU: looking beyond 2030"**[16], identifies Web 4.0 as a ground-breaking technological transition towards a world where everything is seamlessly interconnected. Complementary to this, the European Council[17] has urged the EU to lead in Web 4.0 development. Web 4.0 marks a **paradigm shift in the digital ecosystem,** moving beyond the static, two-dimensional nature of Web 2.0 and the decentralised data-driven architecture of Web 3.0 to a fully immersive, intelligent, and interconnected web. At its core, Web 4.0 is powered by advanced technologies such as artificial intelligence (AI), blockchain, edge computing, and, crucially, immersive media technologies like VR, AR, and extended reality (XR). Immersive media is not only a component but the central enabler of Web 4.0, facilitating the creation of persistent, spatial, and deeply interactive environments. These environments allow users to engage with digital content in a way that mirrors physical reality, blurring the boundaries between the virtual and the real. **A strong regulatory environment**

In **Europe's Digital Decade**, virtual worlds are set to significantly impact how people live, work, create, and share content and how businesses operate, innovate, produce, and engage with customers[18][19].These immersive environments, built on 3D, XR, and AI-enhanced interfaces, redefine user interaction by providing a multi-sensory, real-time experience that blurs the boundaries between the physical and digital worlds. In Web 4.0, digital content becomes spatial and interactive, allowing users to engage with virtual objects, avatars, and entire ecosystems in a way that closely mimics real-world dynamics. However, the advent of immersive media in Web 4.0 introduces a host of legal and regulatory challenges that current frameworks need to prepare to handle including intellectual property rights, privacy and competition.

Europe's leadership, competitiveness, and technological sovereignty in this domain will be propelled by the EU's Single Market, its rich and diverse culture, creative content, strong industrial foundation, excellence in research, innovation, education, and a robust legislative framework.

[16] COM(2023) 168 final
[17] European Council conclusions, 23 March 2023
[18] Decision (EU) 2022/2481
[19] Council of the European Union, Metaverse – virtual worlds, real challenges, March 2022

The European Commission has established a forward-thinking legislative framework for virtual worlds and Web 4.0. Key regulations include the **Digital Services Act (DSA)[20] and Digital Markets Act (DMA)**[21], which enforce accountability and obligations for online platforms. The DSA is set to regulate operators of XR technologies, especially centralised platforms hosting immersive environments, such as Meta. XR technology deployers may also fall under the DMA if they qualify as 'gatekeepers', meaning they provide core platform services such as online intermediation, marketplaces, or operating systems, and meet specific market thresholds. The Data Governance Act[22] and Data Act[23] set comprehensive data-sharing rules, empowering users to control data from their connected devices.

In addition to the Commission's plans, the European Parliament has launched two separate initiatives concerning **virtual worlds and the metaverse.** Firstly, the Parliament's Internal Market and Consumer Protection Committee (IMCO) will seek to address the opportunities, risks, and policy implications of the metaverse for the Single Market. Meanwhile, the Legal Affairs Committee will concentrate on the policy implications of virtual world development, exploring its effects on EU policy areas such as consumer protection, infrastructure development, civil law, intellectual property frameworks, and industrial growth. It is important to note that these initiatives from the EU Parliament are not legally binding but rather reflect the Parliament's stance on particular issues. However, Parliamentary own-initiative reports are often regarded as significant precursors to legislative procedures initiated by the Commission.

IMCO's draft report underscores the importance of regular regulatory reviews to stay aligned with the rapidly evolving technological landscape. It also calls for **substantial investments in 5G and 6G network** capacity across Europe to facilitate the deployment of data-intensive metaverse platforms while prioritising accessibility and sustainability.

The draft report from the Legal Affairs Committee, adopted by the Parliament on 11 December 2023[24] , examines issues such as applicable law, liability, and intellectual property rights. It highlights that decentralisation presents challenges for **enforcing EU law within virtual worlds.** The report advocates for transparency in marketing virtual assets and implementing effective identity management systems. It also emphasises the importance of accessibility and digital literacy to ensure an inclusive transition to virtual worlds. Concerns are raised regarding the unclear application of territorial laws on jurisdiction within decentralised virtual environments, and the report stresses the need for EU consumer protection laws to remain enforceable in virtual transactions.

A strategy for immersive media – the European Media and Audiovisual Action Plan

The **European Media and Audiovisual Action Plan**[25], launched in 2021, aims to support the revitalization and transformation of the European media and audiovisual sector. It positions immersive media as a promising yet largely unexplored field with potential across various industries. To promote immersive media, the plan envisions the establishment of a **European VR/AR industrial coalition** within the EU's digital media ecosystem. By encouraging innovation and collaboration, the plan seeks to **integrate immersive media into sectors beyond traditional media,** enhancing technological advancement and fostering cross-industry synergy.

Among the plan's ten actions, only Action 5 specifically addresses immersive media, focusing on creating the VR/AR industrial coalition. Action 5 aims to **foster cross-sector cooperation and establish a VR Media Lab** to explore new storytelling methods. Overall, the Action Plan also aims to address the fragmented nature of the European VR/AR sector by **promoting cooperation and strategic alignment across industries,** with objectives that include unifying sectors, advancing Europe's leadership, and driving collaborative innovation.

The VR and AR industrial coalition[26] serves as a **platform between the EU and VR/AR ecosystem for structured dialogue**. Its objectives include informing policymaking, promoting investment, fostering engagement with stakeholders, and identifying critical challenges and opportunities within the European VR/AR industry. The coalition has taken multiple actions to achieve its goals, including organising a Citizen Panel, publishing a Strategic Paper on the European AR/VR ecosystem, and developing a roadmap for the future of VR/AR in Europe.

The Citizen Panel[27] organised by the industrial coalition gathered 140 European citizens with the aim of gathering public input on the topic of virtual worlds, and more specifically on what visions, principles and actions should guide the development of desirable and fair virtual worlds. The panel resulted in 23 recommendations for future Commission proposals, which advocate for virtual worlds that are i**nclusive, accessible, transparent, and sustainable,** prioritizing green energy, data privacy, and the active involvement of diverse stakeholders from academia, industry, and government.

The citizens' insights are intended to inform the Commission's broader strategy on Web 4.0 and virtual worlds, shaping an EU-led, democratic approach to the next technological transition.

The Roadmap[28] **for VR/AR** is a statement to support the European VR/AR ecosystem and details the actions that the members of the VR/AR Industrial Coalition commit to take to further develop the ecosystem. These actions include **supporting workforce upskilling, encouraging cross-sector collaboration and fostering standards and interoperability.** The role of the European Commission in this alliance is to support these initiatives by funding VR/AR projects through programmes like Horizon, building market capacity with investors, promoting VR/AR adoption for technological sovereignty, and addressing funding system fragmentation across national and regional levels.

The Strategic paper[29] on the Virtual and Augmented Reality Industrial Coalition published in 2022 is another output of the coalition. The paper provides an assessment of the European VR/AR market and comes up with **policy recommendations to foster an ecosystem on immersive media**. The recommendations include 'ensuring sovereignty of the EU industry, creating an attractive investment environment, improving awareness of VR/AR on our ways of living, boosting the EU VR/AR industry's unique features, improving the VR/AR skills of the workforce, promoting standards and interoperable solutions'. The paper also discusses the role of VR/AR in the cultural and creative ecosystem and media, by analysing it as a case study. It explores some applications and challenges typical to the media, creative and cultural ecosystem in the context of VR/AR.

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[20] Regulation (EU) 2022/2065
[21] Regulation (EU) 2022/1925
[22] Regulation (EU) 2022/868
[23] Proposal for a Regulation COM/2022/68 final
[24] Parliamentary Committee on Legal Affairs, Draft Report on the Legal Aspects of the Development of Virtual Worlds, December 2023 (JURI-OJ-2023-12-11-1).
[25] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0784&from=EN

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[26] https://digital-strategy.ec.europa.eu/en/policies/virtual-and-augmented-reality-coalition
[27] https://digital-strategy.ec.europa.eu/en/library/staff-working-document-citizens-panel-report-virtual-worlds
[28] https://digital-strategy.ec.europa.eu/en/news/vrar-industrial-coalition-statement-support-european-vrar-ecosystem
[29] https://op.europa.eu/en/publication-detail/-/publication/9aaef6fd-28db-11ed-8fa0-01aa75ed71a1

Case study: VR/AR in the Media, Creative and cultural ecosystem

The VR/AR ecosystem has a significant impact on various sectors within the media, cultural, and creative industries. This case study highlights how VR and AR technologies are reshaping these subsectors, which include video games, advertising, cultural heritage institutions like museums, and live entertainment. The cultural ecosystem, especially in Europe, plays a crucial economic and social role. Digitalisation, particularly through VR/AR technologies, is enhancing traditional activities and creating entirely new digital possibilities, such as immersive virtual art experiences and the metaverse.

The VR/AR market in the cultural ecosystem is divided into B2B (business-to-business) and B2C (business-to-consumer) categories. The B2B market leverages immersive technologies to improve efficiency and productivity, particularly with AR and MR in enterprise settings. The B2C market, driven by video games, film, and entertainment, focuses on delivering artistic and entertaining content to consumers. Despite their potential, both markets face challenges: the B2B market is more stable due to better technology penetration, while the B2C market struggles with the absence of "killer applications" that could drive mass adoption. A shared aspect in both markets is the power of storytelling, where VR/AR enhances user engagement and emotional experiences. However, issues such as platformisation, with dominance by non-EU tech giants, and fragmentation within the European market—where SMEs dominate—pose challenges. These issues highlight the need for a more unified platform to support creators, manufacturers, and developers, ensuring that European values and cultural diversity are better represented in the digital ecosystem.

The strategy is reflected in **key funding programmes at European level** (*i.e. Horizon Europe, Digital Europe, Creative* Europe) targeting critical issues including developing market ready products adapted to specific application and niche sectors, expending the pool of talent to conceptualise, create & develop immersive experiences and pool resources & investments while supporting the emergence of a European innovation ecosystem.

The strategic agenda of the newly introduced EIT KIC Culture & Creativity also included as part of their first calls **high-impact areas** (CI with the greatest acceleration potential) **on Audiovisual & Gaming** focusing on innovations that have the potential to transform the way media creation and consumption is made, exploring the use of new technologies such as virtual & augmented reality.[30]

The call addresses critical CCI challenges, particularly by closing skills gaps in entrepreneurship and technology, improving access to digital tools and collaborative networks, and enhancing venture creation within a fragmented ecosystem. It also seeks to foster European identity and social cohesion through culture-led innovations while promoting cross-sectoral collaboration and knowledge-sharing to build an integrated, resilient CCI ecosystem across Europe. Morevover, the recent Communication from the Commission, "Long-term competitiveness of the EU looking beyond 2030"[31], identifies **Web 4.0 as a ground-breaking technological transition** towards a world where everything is seamlessly interconnected. At its core, Web 4.0 is powered by advanced technologies such as artificial intelligence (AI), blockchain, edge computing, and, crucially, immersive media technologies. Immersive media is not only a component but the central enabler of Web 4.0, facilitating the creation of persistent, spatial, and deeply interactive environments. In this regard, the European Commission's introduced potential future initiatives[32]. The co-programmed partnership on Virtual Worlds has been identified by the Commission as candidate and will be a collaborative effort between the European Commission and industry partners who share responsibility for **planning, funding, and prioritising R&I activities in the topic of virtual world**s which now includes immersive technologies. From this perspective, the partnership will guide development in the area, addressing fragmentation of the sector, bringing together public and private funding to tackle investment risks and positioning the EU at the forefront of developing virtual world solutions.

> *"Stakeholders, developers, creators, venues, audiences, benefit from unified strategies, standards, and broader access to immersive experiences."*

4.2 EXISTING PROJECTS AND NETWORKS

Under the Horizon 2020 LEIT ICT programme part (WP2018-2020), specific topics have been funded focusing on **next generation media**[33] addresses the transformative challenges and opportunities presented by the digital era in media, focusing on **the integration of advanced technologies** such as 5G, AR/VR, AI, and data analytics **into next-generation media ecosystems**. The call highlights the disruption of traditional media boundaries, where users and producers interchange roles, creating a complex and evolving ecosystem. Key challenges include f**ostering innovation in immersive, user-driven experiences, addressing fragmentation in distribution systems, and promoting cross-sectoral synergies** between media operators, technologists, and cultural actors. The call also emphasises the need for **open and interoperable solutions** that support a unified Digital Single Market and enable crossborder content availability. By leveraging networks like STARTS, it aims to create sustainable collaborations and innovative business ecosystems that empower SMEs, bridge gaps in technology transfer, and enhance media as a cultural and societal catalyst. Ultimately, the call positions media as both a driver of technological progress and a tool for social transformation, aligning with the broader objectives of European digital and cultural innovation.

Topics funded under **Interactive Technologies** under H2020[34] focused on **the transformative potential of interactive technologies** such as Augmented Reality (AR) and Virtual Reality (VR) across a wide range of European industries, including cultural and creative industries, healthcare, manufacturing, education, and media. These technologies are seen as critical enablers of new business opportunities, driving innovation in how people interact, communicate, and share information. The call addresses the challenge of fostering a competitive and sustainable European ecosystem for interactive technology providers, emphasising the need for stronger **coordination and collaboration among stakeholders.**

[30] EIT Culture & Creativity – First calls for proposal 2023
[31] COM(2023) 168 final
[32] https://research-and-innovation.ec.europa.eu/document/download/04162ca0-b5db-4773-bd47-d75ff1af1723_en?filename=ec_rtd_candidate-list-european-partnerships.pdf

[33] ICT-44-2020: Next Generation Media
[34] ICT-25-2018-2020

The scope of the call includes two main areas: first, community building and coordination through the development of a **pan-European platform to share knowledge, algorithms, and tools.** This aims to foster collaboration, provide access to a broad community, and support technology transfer strategies. Second, research and innovation efforts target advancing **multi-user interactions and developing higher-quality interactive systems.**

XR4ALL – eXtended Reality for All

XR4ALL was a Horizon 2020 Coordination and Support Action, which ran from 2018 until 2021, with the goal of strengthening the European XR sector. The project aimed to build a connected XR community, support innovation through funding, and provide strategic guidance for the European XR industry's future growth. XR4ALL also focused on facilitating and fostering collaboration among stakeholders, including researchers, developers, and industry actors, in order to advance XR applications in fields such as education, entertainment and cultural preservation. To promote innovation, XR4ALL supported various projects through targeted funding and developed a comprehensive research agenda to identify opportunities and challenges in the XR landscape. These efforts aimed to ensure Europe's competitiveness and leadership in the global XR industry. After the project ended, its partners established XR4Europe, a non-profit organisation dedicated to continuing some of XR4ALL's activities, by connecting professionals and supporting further development and innovation in the European XR ecosystem.[35]

Under Horizon Europe, most development related to immersive media were funded under Cluster 4, building upon the outcomes of the LEIT ICT programme under H2020. The destination 'A Human-Centred and Ethical Development of Digital and Industrial Technologies' places a strong emphasis on the ethical and inclusive development of emerging technologies such as eXtended Reality (XR)[36].

This focus aims to empower end-users, foster social innovation, and support the digital transformation of critical sectors such as education and media. Europe's current dependency on external providers in the consumer electronics industry raises concerns about digital sovereignty, making the advancement of XR technologies a strategic priority for maintaining competitiveness and values in digital interaction services.

Topic funded under eXtended Reality focuses mainly on positioning Europe as a global leader in XR technologies, focusing on innovation[37], accessibility[38], ethics, and industry leadership. These calls address both technological and societal dimensions of XR through Research & Innovation Actions, emphasising the development of s**calable, inclusive, and interoperable solutions** that uphold European values of privacy, security, and ethics[39].

The topic o**n Innovation for Media including eXtended Reality**[40] specifically addresses innovation for immersive media. The call responds to transformative opportunities presented by XR in industries such as entertainment, news, education, and tourism. It aligns with the **Media Action Plan,** targeting recovery, transformation, and empowerment within the media industry, particularly through fostering advanced tools and immersive solutions.

The topic focus on fostering innovation and interdisciplinary collaboration to advance the creation, distribution, and consumption of immersive media products. Supported projects aim to develop advanced XR solutions that bring together diverse professionals—artists, designers, filmmakers, programmers, and researchers—to push the boundaries of storytelling, entertainment, and news media. A central initiative under this framework is the establishment of a **VR Media Lab**, designed to prototype and accelerate innovation in immersive technologies, exploring their application across sectors such as education, tourism, and intermodal transport.

[35] XR4ALL – eXtended Reality for All https://cordis.europa.eu/project/id/825545/reporting

[36] EC DG RTD, Horizon Europe strategic plan 2021-2024, 2021

[37] Advancing XR Models and Interactions (HORIZON-CL4-2021-HUMAN-01-13)

[38] Improving Accessibility Through Haptics (HORIZON-CL4-2021-HUMAN-01-14)

[39] Ensuring Ethics, Interoperability, and Ecosystem Impact (HORIZON-CL4-2021-HUMAN-01-28)

[40] HORIZON-CL4-2021-HUMAN-01-06: Innovation for Media, including eXtended Reality (IA)

EMIL – European Media & Immersion Lab

The European Media and Immersion Lab (EMIL) is a Horizon Europe Innnovation Action, launched in 2022 and scheduled to run until 2025. EMIL focuses on advaniced VR, AR, and MR technologies, content, services and applications. It seeks to foster collaboration among European XR stakeholders, foster innovation, and support the development of immersive media experiences. EMIL provides funding and support to projects that use XR technologies in fields such as storytelling, healthcare, cultural preservation, alongside providing access to research expertise, technological resources, and professional networks. The participating institutions also lead their own specialized projects, called Lighthouse Projects, to demonstrate developments and explore new applications of XR technologies.[41]

TRANSMIXR - Ignite the Immersive Media Sector by Enabling New narrative Visions

TRANSMIXR is a three-year Innovation Action initiated under the Horizon Europe framework, led by the Technological University of the Shannon (TUS) in Ireland, and running from October 2022 to September 2025. It is a consortium of CCI representatives, industrial actors and academic partners, aiming to advance tools for the production and consumption of immersive media experiences. TRANSMIXR focuses on developing two main solutions: an XR Creation Environment for remote collaboration and an XR Media Experience Environment for delivering engaging virtual experiences. The project evaluates its developments through pilots in four domains: news media, broadcasting, performing arts, and cultural heritage. Moreover, TRANSMIXR contributes to the European Commission's Media and Audiovisual Action. Plan by boosting the adoption of XR technologies and opening new business model opportunities, while being grounded in European values like diversity and universality.[42]

Two key innovation types are prioritised: the development of modular tools and services for media applications, with a strong emphasis on **interoperability and cross-sector** collaboration, and the creation **of new business models and solutions for XR content** that drive creative cooperation and market scalability. These initiatives aim to position Europe as a leader in immersive media while fostering sustainable ecosystems for technological and creative advancement.

5 Current challenges and unmet needs

The ekip Policy Lab addressed several key questions in the field of immersive media that are instrumental in shaping policy recommendations and future policy actions and are linked to the current analysis of production challenges identified in the scoping phase of the challenge. These challenges were addressed following the building blocks that are critical to establish an open innovation ecosystem, reflecting both complex R&I processes and key dimensions of the transition of industrial ecosystems[43].

BUILDING BLOCKS	DESCRIPTION OF DIMENSION AND RELEVANCE FOR IMMERSIVE MEDIA AND THE CCIS
SUSTAINABLE COMPETITIVENESS	• Collaboration, networking and cross-sectorality • Focus on scalability and streamlined distribution practices • Innovation culture and mindset throughout immersive media value chain
REGULATION AND GOVERNANCE	• Integrate immersive media better with EU programmes • Standardisation • Focus on policy experimentation and reflexivity
SOCIAL DIMENSION	• Connection of industry wide networks • Strengthened presence of intermediary organisations • Network of venues for distribution • Involvement of end-users
R&I, TECHNIQUES AND TECHNOLOGICAL SOLUTIONS	• Focus on interdisciplinarity between CCIs and immersive industry • Shared understanding of immersive productions

INFRASTRUCTURES	• **Availability and access to immersive technologies** • **Technical services and support (tools, methods, space, etc.)** • **Availability of technology infrastructure for small-scale players in immersive media**
SKILLS	• **Relevant skill provision and industry needs for the entire value chain** • **Availability of industry-specific resources for training** • **Robust market alignment**
INVESTMENT AND FUNDING	• **Tailored access to funding and financing** • **Addressing structural challenges in funding mechanisms for CCI players**

5.1 ADDRESSING CHALLENGES FOR XR DISTRIBUTION AND SCALABILITY

Guiding Question 1: How can R&I policy foster the development of more accessible and scalable XR technologies for the CCI, driving the development of distribution models for immersive content?

• What support mechanisms or funding can facilitate economies of scale to reduce high development costs in immersive production?

• How can policy support the creation and dissemination of case studies to help potential adopters better understand the adoption journey and Return on Investment for XR technologies in the CCI?

• What initiatives can be introduced to build networks and create a pipeline for the distribution of immersive productions, ensuring broader audience reach and market validation?

The challenges and unmet needs identified during the Policy Lab breakout sessions align with and expand upon the issues previously outlined in the scoping phase. In particular, the distribution and scalability of XR technologies for the Creative and Cultural Industries face several critical challenges, limiting their adoption and market impact. Participants highlighted significant gaps related to funding models, interoperability, accessibility, and strategic approaches to scaling XR technologies in Europe.

Participants underlined that European immersive media and XR communities remain heavily **dependent on tools, platforms and investments** originating outside the continent. Efforts on scaling, including distribution platforms but also level and investment and expertise are often significantly higher from global competitors like US or China. This lack of European-made resources leaves the sector vulnerable to external influence, diminishing Europe's digital sovereignty. Moreover, Moreover, European funding mechanisms are perceived as fragmented and **overly reliant on short-term project-based funding** and **lack of follow-through for post-project phases** while access to **national funding remains inconsistent,** leading to uneven distribution of capacity across Europe. As such, hybrid funding models could combine multiple sources of funding, such as public grants and private investment, to create a more balanced financial ecosystem. For example, public bodies could provide seed funding for experimental or earlystage projects, while private investors step in during scalable phases.

As such, participants identified a need for a **clear European strategy** going beyond XR technology development, including more broadly the different relevant CCI sectors. Participants noted that when a strategy existed, they often **overemphasised on specific sectors** (e.g. audiovisual, gaming, cultural heritage) and lacked clarity or felt short in covering specific objectives such as support to production or distribution. A European strategy on immersive media would critically need to foster the creation of **new distribution models** to overcome the limitations of existing practices. In this regard, the strategy would benefit from:

[41] EMIL – European Media and Immersion Lab https://culture.ec.europa.eu/funding/cultureu-funding-guide/case-studies/emil european-media-and-immersion-labf

[42] TransMIXR – Ignite the Immersive Media Sector by Enabling New Narrative Visions https://cordis.europa.eu/project/id/101070109

[43] DG GROW, Industrial Forum – Blueprint for the development of transition pathways, 2022

- Fostering the development of **streamlined distribution practices** specific to XR and immersive experiences.

- Encouraging the **formation and connection of industry-wide networks and consortia** to promote knowledge-sharing, standardisation, and collaborative ventures.

Moreover, participants highlighted that new distribution models developed must account and be **tailored to the needs of SMEs and small creators**, as current systems often favour large organisations with greater resources, leaving smaller entities unable to compete.

Scaling immersive production is essential to making projects economically feasible. Many immersive experiences currently fail to align with market expectations[44], often requiring developers and artists to absorb the costs of demonstrators. Achieving scalability necessitates both technical innovation and educational support. Artists and creators need resources to understand how to design content in order to develop their audiences and marketing their productions. This involves developing content formats and processes tailored to broader market demands, balancing creativity with market feasibility. A significant barrier to immersive content distribution lies in the logistical challenges of touring and exhibiting XR experiences. To streamline these experiences, there is a need for:

- **Optimisation during early development** through the creation of portable and standardised design kits that enhance the adaptability of XR content.

- **Support for standardised modules** with movable and lightweight components that enableseamless scalability and portability across venues.

Compatibility and interoperability of hardware, software and solutions developed remain a key issue for participants to the focus group, compounded by the lack of existing standards. As underlined, while standardisation could support scalability, some participants raised concerns that it might limitcreativity and innovation in this rapidly evolving field. Here participants pointed out the need for the sector to **strengthen the role of intermediary organisations,** connecting research & development, creators & distribution networks, helping bridge the gaps between innovation and market access. In this light, as elaborated further in the validation workshop, a framework is also necessary to facilitate cross-border and cross-sector knowledge sharing platforms. These guidelines would enable better collaboration, interaction, and partnerships between different sectors and to work together effectively.

> *"Immersive technologies offer new creative, interactive, and economic opportunities across film, gaming, cultural heritage, publishing, and social media."*

One of the foremost barriers is the lack of case studies demonstrating the benefits, risks, and Return on Investment (RoI) of XR technologies[45]. Potential adopters often lack sufficient understanding of the adoption journey, with developers frequently bearing the costs of pilot projects to prove feasibility. Additionally, there is a pronounced lack of showcasing opportunities for immersive creative works, with institutions such as theatres not often investing in immersive tech. Prototyping new distribution models, such as using museums or unconventional venues, was identified as a critical area for experimentation. Participants also noted the need to connect R&D efforts with real-world distribution practices. Small and fragmented audiences, combined with the absence of a standardised pipeline or network of venues for distribution, result in a limited proof of market viability[46], making the adoption of XR products more challenging.

These three aspects were confirmed as important needs by workshop participants. In addition, specific lack of open-source standard libraries and resources is perceived as hindering the potential democratisation of immersive media, while the lack of specific skills to pitch projects and secure funding remains an important issue for developers and creators. Finally, while participants stressed the need for concrete examples and case studies demonstrated the value and RoI for immersive media, and potential benefits across industry sectors, they also pointed out the difficulty of explaining XR innovation potential to policymakers and limited awareness of immersive media technologies' value.

[44] Ibid.

[45] UK Immersive Economy report 2023

[46] Hosted by Venice Immersive 2023: Michel Reilhac, Liz Rosenthal and Doede Holtkamp, Think Tank Immediate Options to Address the Pressing Needs of Immersive Distribution, Venice Production Bridge

To push the boundaries of immersive media, **investment in research and Innovation** must focus on advancing haptic technologies, artificial intelligence, and real-time rendering. The objective should be to create more natural and intuitive user interfaces that can enhance audience engagement and experience.

Participants at the validation workshop further built on these points by emphasising the need to focus more thoroughly on end users benefitting from XR technologies, specifically in terms of how policies serve them and their interests. This focus also ties in with the need to think about market needs and designing a process fit for a wider audience. The obligation of showing end users the value immersive tech provides is also important in order to encourage users to be more familiar with these technologies. This should also be strengthened by further audience research.

5.2 ENHANCING COLLABORATION BETWEEN CREATIVES & TECHNOLOGISTS

Guiding question 2: How can R&I policy improve collaboration between creative professionals and technology developers?

- What initiatives can facilitate cross-border knowledge-sharing, standardisation, and joint ventures

between content creators, technologists, distributors, and venues?

- What policy initiatives can facilitate better collaboration and communication between creative professionals and technology developers to improve project outcomes and efficiency?

The discussions revealed significant challenges and unmet needs that hinder effective collaboration between creative professionals and technologists in the XR ecosystem. These issues stem from structural, cultural, and systemic barriers that limit the quality, efficiency, and scalability of immersive projects.

The weak links between creative professionals and technologists (e.g. cultural institutions, venues and design studios) significantly impact the cost, timelines, and overall quality of XR projects. Disjointed skills and communication barriers often hinder effective collaboration, leading to inefficiencies in development and suboptimal outcomes. Beyond these immediate challenges, there is a marked **lack of understanding of immersive production**s among professionals in other cultural sectors, limiting opportunities to experiment with and adopt XR technologies.

Participants to the workshop underlined the clear **lack of shared spaces or platforms** where creative and technologists can come together to develop a common language and foster meaningful collaborations in the area of XR. They emphasised that there is a need for facilitators or community managers to bridge this gap and ensure alignment but also support access to resources & competence. Pointed out as part of the scoping research, the sector requires curated platforms and structured spaces, such as labs or incubators, to bridge this divide and optimise the transition from festival exposure to market launch[47] . An additional aspect from the validation workshop included the need for identifying who is not part of existing incubators and accelerators, such as libraries and museums, and providing space for them. These can benefit from exploring opportunities for accessing audiences, spaces, venues, and distribution models that can play a role in supporting XR technologies.

Collaboration models and networks[48] are crucial for advancing the market positioning of immersive media. Building industry-wide consortia and fostering cross-border knowledge-sharing can promote standardisation and facilitate joint ventures. In this regard, participants stressed the important **fragmentation and unequal access to resources** creating silos and limiting collaboration opportunities. They emphasised the need of mapping resources, networks, infrastructures available at different level, to make it easier for stakeholders to identify potential collaborators and access necessary tools and venues. Moreover, structured **dialogues between key cultural agencies**, such as arts councils, could provide pathways to spread awareness of XR technologies and secure necessary financial commitments.

In this regard, an important aspect for public funders to acknowledge is the current **structural challenges in funding mechanisms**. Current funding mechanisms, particularly in R&I programmes, are perceived restrictive and foster limited potential for collaboration. The difference between co-funding rates (e.g. between universities & creative professionals), reduce attractiveness of the schemes and feasibility of collaboration. Participants pointed out that co-funding requirements and the lack of entry-level funding schemes for smaller creative organisations discourage active involvement.

[47] Hosted by Venice Immersive 2023: Michel Reilhac, Liz Rosenthal and Doede Holtkamp, Think Tank Immediate Options to Address the Pressing Needs of Immersive Distribution, Venice Production Bridge

[48] Ibid.

An example of this situation can be illustrated in Horizon Europe projects, where developing use cases on performance art represent productions involving many parties (producers, dancers, lighting etc.) and don't allow currently to **align production & distribution processes into innovation processes.**

Further considerations from the validation workshop emphasised the need for funding schemes to open up to new form of collaborations and innovation processes, enhancing collaborations between creatives and immersive tech experts. At the same time, funders should also take more responsibility to ensure the sustainability of outcomes, as public funding may not push beneficiaries to commercialise an activity postfunding period. In other words, enabling creative organisations to focus on joint innovation processes . This would also enhance collaboration between creatives and immersive tech experts and encourage new partnerships to be made to explore new ideas. Funders should also take more responsibility to ensure the sustainability of outcomes, as public funding may not push beneficiaries to commercialise an activity post-funding period.

Finally, interdisciplinary research combining cognitive science, art, and computer science is essential to develop innovative collaboration frameworks and elevate the quality of immersive productions. Tackling educational and training gaps in the immersive sector

Guiding question 3: How can R&I policy address the training and education gaps identified in the immersive sector, particularly for non-immersive players?

• What strategies, including EU grants or collaborative programmes, can be implemented to support stakeholders in understanding distribution practices, audience engagement, and economic opportunities, while improving operational efficiency and ensuring the scalability of immersive productions?

The XR industry faces significant skill gaps, shortages, and mismatches both in the EU and globally, challenges that are even more pronounced in the immersive media market. A recent industry survey highlights this disconnect, with 97% of companies reporting a lack of specialised XR skills among the workforce, despite the sector growing by 1400% over the past two years. This disparity underscores the urgency of addressing the educational and training gaps hindering the sector's scalability and sustainability.[49]

[49] International Training Centre, The many realities of skills development in TVET

Developing robust skills programmes is essential to bridge this gap, particularly for non-immersive players such as exhibitors. These stakeholders require targeted training to improve their understanding of XR distribution practices, audience engagement, and the economic opportunities presented by immersive technologies. Specific education for immersive artists is also crucial, focusing on the creation of market-ready XR formats that consider scalability, distribution pipelines, and business models. Skills development should extend across the value chain, encompassing distributors, end consumers, and those orchestrating the production and deployment of immersive works. During the validation workshop, one participant pointed out that the divide between creatives and technology experts may be narrower due to a more generalised understanding of coding and it being taken up across different fields. Still the absence of a defined career path in immersive tech poses a greater challenge from an industry-scalable perspective.

Participants to the workshop underlined that there is a **mismatch between skills provision and industry needs. For example,** the skills provided by academic institutions do not sufficiently respond to the dynamic demands of the labour market, particularly in immersive media. This mismatch is exacerbated by the rapid pace of technological advancements, leaving educational curricula lagging behind by several years. In addition, vocational training opportunities for XR are limited, and existing programmes do not adequately prepare learners for the technical or business realities of the sector. Hence, there is a pressing need for EU-recognised curricula that integrate technical, creative, and entrepreneurial elements tailored to XR. These frameworks should also include "learning by doing" approaches and interdisciplinary modules to develop a holistic understanding of the XR ecosystem. In addition to training, shadowing opportunities could help fill gaps and build confidence to deepen learning in the XR domain. Furthermore, participants emphasised that a broader understanding of immersive media is needed, decoupling it from its predominant association with gaming. Artistic literacy, storytelling structures, and human-centred design principles should be integrated into education and training.

In addition, participants noted a lack of Entrepreneurial and Business Skills in the CCI sector. Many professionals in the immersive sector, including talented XR creators, lack entrepreneurial skills. This includes the ability to pitch their work, secure funding, develop sustainable business models, and navigate the funding and investment landscape. Thus, the CCI sector struggles to combine creative and business mindsets effectively, leading to siloed approaches and missed opportunities for collaboration and scalability. In sum, a significant need exists to build entrepreneurial skills within the sector, including the ability to pitch ideas, secure funding, and develop sustainable business models. This should extend to educating professionals on the investment and funding journey.

Additionally, stakeholders identified critical gaps in **skills in recognizing networking opportunities,** as well as skills in pitching and brokering partnerships. Without these skills, XR professionals struggle to navigate the ecosystem, identify collaborators, and align with market needs. There is also a lack of structured mentorship programmes and opportunities for peer-to-peer learning, particularly among startups and early-stage talent, which hinders the development of a robust startup ecosystem. Therefore, XR professionals require better training in soft skills, such as collaboration, networking, and pitching ideas effectively. Brokering and matchmaking opportunities should also be enhanced to help connect creatives, technologists, and investors. These could be further supported by mentorship programmes which connect professionals with peers and experts in their field, fostering collaboration, knowledge-sharing, and the exchange of best practices. In addition, Resources and training programmes need to be more accessible to underrepresented groups, addressing the digital divide and ensuring inclusivity in the XR workforce.

6 Policy recommendations

Based on the discussions from the policy lab, as well as further refinement from the validation workshop afterwards, the following recommendations were co-created for each challenge:

6.1 ADDRESSING CHALLENGES FOR XR DISTRIBUTION AND SCALABILITY

1. Develop a European cohesive vision and strategy for immersive media addressing sectoral fragmentation, cutting across cultural, innovation, entrepreneurial and educational domains.

a) Foster the development of streamlined distribution practices specific to XR and immersive experiences

b) Encourage formation of industry-wide networks and consortia

c) Include end users and target audience of XR in its design and showcase the value of immersive media to create familiarity. This aspect should be complemented by further market research into current and potential audiences.

2. Coordinate funding strategies, such as investment pooling mechanisms for more effective multi-level funding partnerships between national authorities, EU institutions and private investors

a) Align funding priorities, and ensure transparency in resource allocation across different take holders, giving space not just to outcome-driven priorities, but also experiment and innovation-based activities

b) Create greater incentives for combined sources of funding such as public grants and

private investment to create a more balanced financial ecosystem

3. Invest in collaborative infrastructure and support intermediary organisations to act as connection between R&D centres, creators, distribution networks

a) Foster the role of intermediary organisations to act as connectors, with a focus on infrastructures for collaboration and knowledge production and sharing. These services should be geared toward the needs of small-scale immersive media actors

b) Create framework guidelines that enable better collaboration in cross-border and crosssector knowledge sharing platforms

4. Prototype new distribution models to identify scalable approaches for immersive technologies

a) Encourage use of museums or unconventional venues (e.g. theatre backstage) as a critical area for experimentation

b) Connect R&D efforts with real-world distribution practices

c) Support of funding pilots and prototypes for immersive media distribution for the development of innovative venues and distribution strategies, ensuring alignment between R&D and market needs

d) Exploration and transfer of knowledge from other sectors, such as film or digital media, to support distribution and sustainability of immersive media.

6.2 ENHANCING COLLABORATION BETWEEN CREATIVES AND TECHNOLOGISTS

1. Support and establish shared spaces such as technology infrastructures, incubators and accelerators where creative professionals and technologists can collaborate & find resources

a) Identify stakeholders who are not part of existing incubators and make space and access available for them

b) Provide shared tools, resources, and mentoring to facilitate collaboration and bridge knowledge gaps

c) Foster the development of a common language and shared understanding between stakeholders through the role of facilitators and community managers, enhancing mutual recognition of value.

2. Invest in intermediary organisations to act as connectors across the XR value chain, mapping available resources, networks and infrastructures, and support the creation of cross-border consortia

a) These intermediary organisations, for example umbrella networks at sectoral level, should also provide networking opportunities and facilitate cross-sector partnerships

b) Map available resources, networks, and infrastructures to identify collaborators

3. Facilitate structured dialogues and develop funding mechanisms with key cultural agencies, such as arts councils, as well as final users of XR to raise awareness of XR technologies, secure financial commitments addressing specific barrier entries

a) Introduce entry-level funding schemes tailored for smaller creative organisations to encourage active participation

b) As part of the funding mechanisms, mandate interdisciplinary collaboration between creatives and XR specialists and allocate resources for sustaining project results beyond lifecycle

c) Implement both experiment-based results funding as well as outcome-driven funding to incentivise the innovation process and encourage collaboration

6.3 TACKLING EDUCATIONAL AND TRAINING GAPS IN THE IMMERSIVE SECTOR

1. Targeted education and training for creators and developers to address gap in education system regarding XR technologies

a) Life-long learning and knowledge transfer to support skills development for immersive media actors

b) Micro-credential programmes supporting technical and transversal skills needed for a career in immersive tech

c) Support non-formal learning opportunities, mentoring, job shadowing, and matchmaking to facilitate knowledge transfer and stimulate better market access

2. Foster local talent retention by creating policies aimed at retaining XR talent through localised career development programmes

a) Launch grassroots advocacy campaigns to raise awareness about XR potential and embed XR education and advocacy efforts into cultural programmes, festivals, and EU exchange initiatives

b) Promote a pipeline of technology professionals for the immersive sector by supporting existing educational programmes which address skills, such as STEAM courses

c) Promote internships and early onboarding job positions in the domain of XR

3. Foster access to educational resources and avoid fragmentation by developing a shared repository of resources, such as knowledge, best practices etc.

a) Open access to digital literacy and XR training, ensuring accessible education for all, leveraging partnerships with global technology providers

Methodological note

The policy recommendations were co-created using the ekip Policy Lab methodology.[50] The methodology designed for the development of policy recommendations as part of a Policy Lab is divided in three consecutive steps:

1) Scoping and identification of the problem: the first step is the identification of the problem and its scoping. The topic is identified and scoped via desk research, interviews with stakeholders and the input from the different consortium partners. As part of the Policy Lab preparatory work, a scoping document is shared with the participants to prepare them ahead of the day and to ensure a common understanding among participants. The scoping documents for this policy are available at

https://ekipengine.eu/knowledge-category/policy-labs-immersive-media-in-the-ccis-scopingdocuments/

2) Policy formulation as part of the Policy Lab: The Policy Lab is a moment of co-creation with the participating stakeholders. The goal of the policy formulation session is to develop, refine and propose together with the participants different policies for the challenges at hand. More information on this Policy Lab is available at https://ekipengine.eu/knowledge-category/policy-labs-immersivemedia-in-the-ccis/

3) Workshop for validation of the recommendations: After concretising the set of recommendations, they were validated in an online workshop which involved participants from the policy lab as well as other stakeholders from the immersive media sector and the CCIs. This workshop presented the recommendations to the stakeholders and invited them to fill the gaps with information that may have been missing and from which their perspective should have been included. The recommendations were discussed in plenary and the inputs were collected on a digital canvas, and then later incorporated in the final recommendations.

[50] Deliverable D10.1 Methodology of Policy Labs

7 Appendix: Agenda of the Policy Lab, Participant List, and Validation Workshop Agenda

AGENDA OF THE POLICY LAB

Time	Session
09:30 – 10:00	Registration and welcome coffee
10:00 – 10:10	Welcome and introduction, scope of the policy lab: Immersive media reimagining distribution models of immersive experience – **Laura Galante**, Technopolis Group
10:10 – 10:30	Presentation of the Hybrid Catwalk - **Markku Lorentz**, Pengu Studios and **Stefan Lindgren**, Humlab Lund University
10:30-10:50	Project TransMIXR - **Rasa Boocyte**, Netherlands Institute for Sound and Vision
10:50-11:10	The Co-STAR Programme - **Caitlin McDonald**, University of Edinburgh
11:10-11:20	Introduction to the programme & objectives of the breakout sessions – **Laura Galante**, Technopolis Group
11:20-11:45	**Session 1: Current Landscape of Immersive Media in the CCI** **Key questions:** What are the current opportunities and strengths in the immersive sector across CCI sub-industries like film, museums, videogames? What are the challenges and gaps in the EU-context? Presentation and discussion on sector fragmentation and distribution challenges Breakout brainstorming: mapping of challenges along the production chain including good practices
11:45-12:00	Coffee break
12:00-13:00	**Session 2: R&I Policy Challenges for XR Distribution and Scalability** **Key problem statements:** How can R&I policy promote accessible and scalable XR technologies for broader adoption? What mechanisms can reduce development costs and facilitate economies of scale? **Policy sprint:** Proposing policy actions to address scalability and distribution challenges
13:00-14:00	Lunch break
14:00-15:00	**Session 3: Enhancing Collaboration Between Creatives and Technologists** **Key questions:** How can R&I policy foster cross-border collaborations between creators, technologists, and distributors? What frameworks can improve communication and outcomes between these groups? **Policy sprint:** Identifying stteps to build collaborative ecosystems and joint ventures across the EU
15:00-15:15	Coffee break
15:15-16:15	**Session 4: Tackling Educational and Training Gaps in the Immersive Sector** **Key questions:** How can R&I policy address education gaps for non-immersive venue managers, exhibitors, and cultural institutions? What strategies, such as EU grants, can help stakeholders improve distribution practices, economic data collection, and audience engagement? **Policy sprint:** Collaborative programmes and curricula to bridge the skills gap
16:15-17:00	**Final session - action planning & policy recommendations** Wrap-up & Summary of outcomes and next steps for policy development **Key question:** Who should act, and what specific actions are needed to drive the EU's immersive media sector forward? **Plenary discussion** to improve distribution, scalability, collaboration, and training.

Participants to the Policy Lab

Vullnet Sanaja
Anibar

Barbora Andor Tothova
CINEFIL, Caring Culture

Marcel Giboda
City of Kosice

Camila Celar
Creative Business Network

Josephine Hage
CREATIVE SAXONY / Chemnitz 2025

Davide M. Parrilli
Delft University of Technology

Lulzim Hoti
Future by Lund

Katarina Scott
Future By Lund Innovation Platform

Marcin Poprawski
Humak University of Applied Sciences

Carlo Vuijlsteke
IDEA Consult

Maya Magnat
Independent artist

Cristina Farinha
Independent expert on cultural and creative sectors

Ondrej Iván
Innovation Center of the Košice Region

Bodil Malmström
Lund University

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Technopolis Group

Siepke van Keulen
The Netherlands Institute for Sound and Vision

Uri Aviv
The Utopia Association & Festival

Caitlin McDonald
University of Edinburgh

Miso Hudak
IVýchodné pobrežie

AGENDA OF THE FEEDBACK WORKSHOP

Time	Session
14:00 – 14:10	Introduction to the workshop and recap of the policy lab approach
14:10 – 14:30	Policy recommendations report – key points: • The area of immersive media for the CCIs • The challenges identified • The solutions • The recommendations
14:30 – 15:20	Open feedback: suggestions for bridging missing gaps, and recommendation priority ranking
15:20 – 15:30	Recaps and conclusions and next steps