Freedom of Expression in Next-Generation Computing

BRITTAN HELLER[†]

Extended reality (XR)—the integration of virtual, augmented, and mixed reality technologies—creates immersive, embodied, and behaviorally integrated forms of communication that challenge traditional understandings of freedom of expression. While XR offers new opportunities for creativity, civic engagement, and cross-cultural participation, its immersive nature introduces risks of censorship, surveillance, biometric profiling, algorithmic manipulation, and inequitable access.

This Article situates XR within the framework of European human rights law. It begins by identifying the technical and psychological features that distinguish XR from conventional platforms, particularly presence, immersion, and embodiment, which transform speech into multisensory and interactive experiences. It then evaluates how existing legal protections—chiefly Article 10 of the European Convention on Human Rights, the EU Charter of Fundamental Rights, and Council of Europe recommendations—apply to XR contexts. Although these frameworks emphasize legality, necessity, and proportionality, their application remains underdeveloped where expression occurs through avatars, immersive environments, and biometric data. Key cases such as Handyside v. United Kingdom*,* Delfi AS v. Estonia*, and* Bărbulescu v. Romania *illustrate both the adaptability and limits of current doctrine when extended into immersive settings.*

The Article concludes by proposing reforms to adapt human rights protections to XR. These include clarifying platform liability for real-time immersive interactions, enhancing transparency in algorithmic governance, strengthening privacy safeguards for biometric and behavioral data, addressing immersive misinformation or "mis-experience," and promoting equitable access to XR technologies. Taken together, these measures would help ensure that XR develops as an inclusive and rights-respecting medium rather than a frontier for unchecked corporate or state control. By grounding its analysis in European legal traditions,

---

[†] Stanford Law School, Lecturer. Teaching Fellow in the LLM Program for Law, Science, and Technology, Stanford Law School.

Thank you to Rodica Ciochina, Tudor Rosu, Artemiza-Tatiana Chisca, and the members of the CDMSI for their guidance and support. Additionally, thank you to Mark Lemley, Hank Greely, Julia Aleksandra Naruszewicz Stroinska and Ruchira Ravindra Naik and the Program on Law, Science, and Technology at Stanford Law School, along with organizers of U.C. Law Journal Symposium, Chronically Online. Additional thanks to Nathaniel Gleicher, Ambrose Gleicher, and everyone who has helped me imagine new forms of computing and the future of human rights.

this Article demonstrates both the urgency and feasibility of adapting existing frameworks to safeguard expressive freedoms in the age of immersive computing.

TABLE OF CONTENTS

INTRODUCTION

Emerging digital interfaces, particularly extended reality ("XR") technologies, facilitate dynamic, real-time interactions that shape fundamental rights in novel ways. Unlike conventional digital platforms, XR's immersive and behaviorally integrated nature introduces unprecedented challenges for safeguarding freedom of expression as it becomes increasingly woven into daily life. Article Ten of the European Convention on Human Rights ("ECHR")[1] establishes the right to freedom of expression, but its current interpretations are primarily based on traditional and digital media contexts. As a result, its applicability to speech and expression within immersive environments remains underexplored, leaving regulatory gaps in addressing XR-specific challenges.

Legal frameworks under the European human rights system, particularly ECHR and European Court of Human Rights ("ECtHR") jurisprudence, are insufficient to fully address XR's emerging risks.[2] While Article Ten of the ECHR provides a foundational right to freedom of expression,[3] traditional and digital medium cases have largely confined its interpretation, leaving open questions about how it applies to the embodied, interactive, and data-intensive nature of XR. Existing legal frameworks grounded in traditional digital environments—focusing on principles like legality, necessity, and proportionality—provide an initial basis for regulation. However, they do not fully account for the complexities introduced by XR, such as the collection of biometric data for behavioral profiling, the spread of misinformation through immersive experiences, and the challenges of moderating expression in three-dimensional, interactive spaces.[4] Overall, without a recalibration of legal standards and enforcement mechanisms, XR risks amplifying both state and private control over speech in ways that existing laws fail to anticipate.

This Article examines the foregoing issues in three parts. The First Part explores the technical and psychological features of XR that distinguish it from traditional online platforms. The Second Part evaluates how existing legal frameworks, including Article Ten of the ECHR and EU regulatory mechanisms, apply to XR—and where they fall short. Finally, the Third Part presents policy recommendations for adapting human rights protections to ensure that XR enhances, rather than undermines, freedom of expression. By

1. Convention for the Protection of Human Rights and Fundamental Freedoms, art. 10, Nov. 4, 1950, 213 U.N.T.S. 221, 230 [hereinafter ECHR]. This Convention is commonly known as the European Convention on Human Rights or the ECHR.

2. The research for this paper originally came from a project commissioned by the Council of Europe, specifically under the direction of the Steering Committee on Media and Information Society (CDMSI). Under the authority of the Committee of Ministers, the CDMSI steers the Council of Europe's work in the fields of freedom of expression, media, internet governance and other information society-related issues and oversees the work on personal data protection. However, the views and conclusions contained in the text are that of the author at the time of publishing.

3. ECHR, *supra* note 1.

4. *See* Brittan Heller, *Watching Androids Dream of Electric Sheep: Immersive Technology, Biometric Psychography, and the Law*, 23 VAND. J. ENT. & TECH. L. 1, 6 (2020).

addressing these concerns, this Article aims to contribute to the growing discourse on how law and policy must evolve to meet the challenges of emerging technologies.

II. UNDERSTANDING XR TECHNOLOGIES

A. KEY TECHNICAL FEATURES OF XR

This Part explores the foundational components of XR systems. Unlike traditional media, XR integrates hardware, software, and design elements that blur the boundaries between physical and virtual environments.[5] Often referred to as spatial computing, the metaverse, or the combination of virtual reality ("VR"), augmented reality ("AR"), and mixed reality ("MR"),[6] XR creates three-dimensional digital spaces that incorporate sensory input, emotional engagement, and spatial representation to an unprecedented degree.[7] These features distinguish XR from traditional internet-based communication and offer transformative opportunities for creativity and expression.[8]

1. *Hardware Infrastructure*

XR hardware consists of specialized devices designed to enhance immersion and user engagement.[9] Head-mounted displays ("HMDs"), including VR and MR headsets, use high-resolution stereoscopic displays and wide fields of view to generate realistic virtual environments.[10] These devices typically feature motion-tracking sensors, including inward-facing cameras for eye tracking and facial expression detection, as well as external cameras and inertial measurement units that capture user movements and translate them into virtual space.[11]

AR interfaces, such as smartphones and smart glasses, play a critical role in integrating digital content with the physical world. Unlike fully immersive VR systems, these devices overlay virtual elements onto real-world environments, allowing users to interact with digital information while maintaining awareness of their surroundings.[12] Smartphones and tablets serve as accessible AR entry points, while smart glasses offer hands-free interaction and advanced features, such as embedded AI assistants, spatial mapping, and real-time object recognition. These devices rely on embedded sensors and transparent

5. *See* JEREMY BAILENSON, EXPERIENCE ON DEMAND: WHAT VIRTUAL REALITY IS, HOW IT WORKS, AND WHAT IT CAN DO 5–6 (2018).

6. Rory Greener, *What Is the Metaverse?*, XR TODAY (Apr. 19, 2023), https://www.xrtoday.com/mixed-reality/what-is-the-metaverse/.

7. Heller, *supra* note 4, at 23–24.

8. *Id.* at 12.

9. *Id.* at 13–17; Zaynah Bhanji, *A New Reality: How VR Actually Works*, MEDIUM (Oct. 1, 2018), https://medium.com/predict/a-new-reality-how-vr-actually-works-663210bdff72.

10. Heller, *supra* note 4, at 13; Bhanji, *supra* note 9.

11. Heller, *supra* note 4, at 16–17; *see* Bhanji, *supra* note 9.

12. Heller, *supra* note 4, at 16.

displays to seamlessly project contextual digital overlays into the user's field of vision.[13]

MR combines elements of VR and AR, allowing users to interact with digital objects while remaining aware of their physical surroundings.[14] For example, devices such as the Apple Vision Pro exemplify MR technology by enabling users to control the degree of digital overlays within their environment.[15] WebXR technologies further enhance accessibility by delivering immersive content via standard web browsers, eliminating the need for specialized applications.[16]

Haptic devices add another layer of realism by providing tactile feedback, allowing users to "feel" interactions within XR environments.[17] Other emerging XR technologies, such as olfactory simulators, are being developed to further enhance sensory immersion.[18]

2. *Software and Rendering Technologies*

The effectiveness of XR systems depends heavily on software capable of real-time rendering and interaction. An XR engine typically includes graphics creation, physics simulation, audio rendering, and artificial intelligence.[19]

AI integration is increasingly enhancing XR interactivity and personalization.[20] Generative AI, in particular, is being used to create dynamic virtual environments and content, expanding creative possibilities for users without specialized coding expertise.[21]

---

13. *Id.*

14. *Id.* at 5.

15. *Introducing Apple Vision Pro: Apple's First Spatial Computer*, APPLE NEWSROOM (June 5, 2023), https://www.apple.com/newsroom/2023/06/introducing-apple-vision-pro/.

16. Heller*, supra* note 4, at 5.

17. *Internet of Senses,* ERICSSON, https://www.ericsson.com/en/6g/internet-of-senses (last visited June 21, 2025).

18. Matthew S. Smith, *Smellovision Gets a Refresh*, IEEE SPECTRUM (May 19, 2023), https://spectrum.ieee.org/virtual-reality-smell.

19. *See* Heller*, supra* note 4, at 24.

20. Sarah Maenner, *Combining (a Little) AI and Extended Reality*, CARNEGIE MELLON UNIV. ELEC. & COMPUT. ENG'G (Dec. 16, 2024), https://www.ece.cmu.edu/news-and-events/story/2024/12/combining-ai-and-extended-reality.html; *see also* Brian Beams & Lissa Crofton-Sleigh, *Conclusion: Preparing for the Future of XR*, *in* PAST AND FUTURE PRESENCE: APPROACHES FOR IMPLEMENTING XR TECHNOLOGY IN HUMANITIES AND ART EDUCATION 233, 238–39 (Brian Beams & Lissa Crofton-Sleigh eds., 2024) (discussing how generative AI can enhance XR experience).

21. Beams & Crofton-Sleigh, *supra* note 20.

3. *Connectivity and Infrastructure*

XR platforms require robust network infrastructure to support real-time, high-fidelity experiences.[22] Low-latency networks, such as those enabled by 5G, are essential for handling the substantial data demands of XR interactions.[23]

B. KEY PSYCHOLOGICAL FEATURES OF XR

Spatial computers do not work in the same way as traditional flat screen personal computers or smartphones.[24] In particular, three psychological characteristics—presence, immersion, and embodiment—explain why XR feels so very real.[25]

1. *Presence*

Presence refers to the psychological state in which users perceive a virtual environment as their immediate reality.[26] Users experience a disconnect from the physical world and engage with the virtual one due to factors like high-quality graphics, high frame rate in XR headsets, real-time responsiveness, and synchronized sensory stimuli.[27]

2. *Immersion*

Immersion describes the extent to which a virtual environment engages the user's senses, creating the experience of being "inside" a digital world.[28] This heightened realism amplifies both the positive and negative impacts of virtual interactions.[29]

3. *Embodiment*

Embodiment occurs when users adopt digital avatars or virtual representations of their physical or chosen identities.[30] Research indicates embodiment can foster a sense of ownership over avatars, further blurring the

22. *See* Fredrik Alriksson, Oskar Drugge, Anders Furuskär, Du Ho Kang, Jonas Kronander, Jose Luis Pradas & Ying Sun, *Future Network Requirements for Extended Reality Applications*, ERICSSON TECH. REV., Apr. 4, 2023, at 1, 2–4.

23. *Id.* at 2.

24. BRITTAN HELLER, HARV. KENNEDY SCH. CARR CTR. HUM. RTS. POL'Y, REIMAGINING REALITY: HUMAN RIGHTS AND IMMERSIVE TECHNOLOGY 6 (June 12, 2020).

25. *Id.* at 8.

26. *See* Eric Johnson, *Full Transcript: Stanford Virtual Reality Expert Jeremy Bailenson on Too Embarrassed to Ask*, VOX (Aug. 4, 2016, 8:00 AM PDT), https://www.vox.com/2016/8/4/12371450/jeremy-bailenson-stanford-university-virtual-reality-tooembarrassed-to-ask-podcast-transcript.

27. *See id.*

28. *See id.*

29. *Id.*

30. Nick Yee, Jeremy N. Bailenson & Nicolas Ducheneaut, *The Proteus Effect: Implications of Transformed Digital Self-Representation on Online and Offline Behavior*, 36 COMMC'N RSCH. 285, 286–87 (2009).

distinction between physical and digital realities.[31] While this phenomenon can encourage creativity and inclusivity, it also raises privacy concerns, as movement data—including telemetry signals such as head tilts and pointing gestures—can serve as unique biometric identifiers.[32] Studies have shown that motion data alone can uniquely identify an individual among thousands.[33] Additionally, XR devices collect vast amounts of behavioral data, enabling sophisticated profiling that raises ethical and regulatory concerns, particularly regarding the erosion of anonymity in immersive environments.[34]

These psychological features not only enable novel forms of expression but also introduce unprecedented risks. Addressing these risks requires both technological safeguards and policy measures that prioritize user safety without stifling creativity.

C. EMERGING TRENDS IN XR

Targeted advertising in XR is a growing area of concern.[35] By analyzing biometric and behavioral data—such as eye movements, heart rate, and physiological responses—XR systems can infer emotional states [36] to personalize experiences or deliver targeted advertising.[37] This practice, referred to as biometric psychography, raises ethical questions about user manipulation and the potential delivery of emotionally charged political or incendiary messages when individuals are most susceptible.[38]

The ability of XR to manipulate real-time sensory experiences heightens the risk of covert influence and behavioral control.[39] Unlike traditional media, XR environments can dynamically alter user perceptions, creating highly personalized realities that influence decision-making.[40] These capabilities necessitate a reevaluation of existing legal frameworks to address the risks of perceptual manipulation.

---

31. *See id.* at 293–94 (explaining that people infer and conform to their expected behaviors and attitudes after observing their avatar's appearance).

32. *See id.* at 301–02 (discussing head tilts, an example of movement data); Vivek Nair, Louis Rosenberg, James F. O'Brien & Dawn Song, *Truth in Motion: The Unprecedented Risks and Opportunities of Extended Reality Motion Data*, 22 IEEE SEC. & PRIV. 24, 25 (2024).

33. Nair et al., *supra* note 32, at 26, 29.

34. *Id.* at 26.

35. Brittan Heller & Avi Bar-Zeev, *The Problems with Immersive Advertising: In AR/VR, Nobody Knows You Are an Ad*, J. ONLINE TR. & SAFETY, Oct. 2021, at 1, 2.

36. HELLER, *supra* note 24, at 9.

37. *Id.* at 19.

38. Louis B. Rosenberg, *The Metaverse: The Ultimate Tool of Persuasion*, *in* METAVERSE APPLICATIONS FOR NEW BUSINESS MODELS AND DISRUPTIVE INNOVATION 1, 9 (Muhammad Anshari, Muhammad Syafrudin & Ganjar Alfian eds., 2023); *see also* Heller & Bar-Zeev, *supra* note 35, at 10.

39. *Cf.* Andreas T. Schmidt & Bart Engelen, *The Ethics of Nudging: An Overview*, PHIL. COMPASS, Feb. 2020, at 1, 4 (discussing the ethics behind steering people toward behavioral modification).

40. *Cf. id*. at 2 (explaining how people can be influenced to make predictable decisions).

Generative AI is further transforming XR by enabling the dynamic creation of tailored content, from virtual environments to lifelike avatars.[41] While these technologies enhance user experience, they also blur the line between authentic and synthetic interactions.[42] Experts warn that AI-driven avatars could be used for disinformation campaigns or real-time user manipulation, raising questions of trust and accountability.[43] Given the potential for real-time influence operations, clear regulations on developer and user responsibilities are necessary.[44]

Neurotechnology integration represents the cutting edge of XR development.[45] Current XR systems already incorporate gesture tracking, eye movement analysis, and even voice modulation for user interactions.[46] However, even this minimal level of human-computer interaction is advancing toward a more embodied style of computing. As human-computer interaction evolves toward more embodied computing, ethical concerns surrounding neurotechnology become increasingly urgent.[47] The combination of XR and neurotechnology highlights the need for proactive regulation, including the establishment of neuro-rights frameworks.[48]

D. GOVERNANCE CHALLENGES IN XR

The fragmented and rapidly evolving nature of XR ecosystems presents significant governance challenges, with direct implications for freedom of expression.

One major issue is the lack of clear technical standards for cross-platform interoperability. Without standardized protocols, XR ecosystems risk reinforcing inequities and exclusionary practices, restricting users' ability to navigate virtual environments freely.[49]

XR technologies also collect vast amounts of sensitive data, including biometric and geolocation information, which is often controlled by a small number of corporations.[50] Recent findings confirm that motion and telemetry data—previously considered non-identifying—can serve as unique personal

41. Beams & Crofton-Sleigh, *supra* note 20.

42. Louis B. Rosenberg, *Regulating the Metaverse, a Blueprint for the Future*, *in* EXTENDED REALITY: FIRST INTERNATIONAL CONFERENCE, XR SALENTO 2022, at 263, 267 (Lucio Tommaso De Paolis, Pasquale Arpaia, & Marco Sacco eds., 2022).

43. *Id.* at 270.

44. *Id.* at 269.

45. Brittan Heller, *Balancing Realities: Navigating the Benefits, Risks, and Policy Landscape of Extended Reality*, 17 DREXEL L. REV. 91, 94–99 (2024).

46. *Id.* at 126.

47. *Id.* at 105.

48. *Id.*

49. WORLD ECON. F., METAVERSE PRIVACY AND SAFETY 3 (2023), https://www3.weforum.org/docs/WEF_Metaverse_Privacy_and_Safety_2023.pdf.

50. Mark Roman Miller, Fernanda Herrera, Hanseul Jun, James A. Landay & Jeremy N. Bailenson, *Personal Identifiability of User Tracking Data During Observation of 360-Degree VR Video*, SCI. REPS., Oct. 2020, at 1, 1.

identifiers, presenting serious privacy risks.[51] Although the General Data Protection Regulation ("GDPR") provides some safeguards, regulatory uncertainties remain, particularly regarding jurisdictional challenges and cross-border data flows.[52] Addressing these complexities requires enhanced international collaboration to ensure robust privacy protections and prevent the misuse of biometric data.[53]

XR technologies introduce new dimensions of interactivity and immersion, reshaping how individuals engage with digital content. While these advancements create opportunities for enhanced expression, they also introduce significant legal, ethical, and regulatory challenges. Addressing these issues requires a nuanced governance approach that balances innovation with user protection, ensuring that XR remains a space that fosters—rather than undermines—fundamental rights such as freedom of expression.

III. IMPACTS OF XR ON FREEDOM OF EXPRESSION

XR technologies have the potential to reshape freedom of expression by enabling new forms of creativity, advocacy, and communication. However, their immersive and data-driven nature also presents significant risks, including heightened surveillance, censorship, algorithmic bias, and psychological harm from immersive misinformation and harassment. This Part examines both the opportunities and challenges of XR through the lens of European human rights law.

A. THE IMPORTANCE OF FREEDOM OF EXPRESSION

Article Ten of the ECHR, adopted in 1950, establishes freedom of expression as a fundamental right.[54] It states:

> 1. Everyone has the right to freedom of expression. This right shall include freedom to hold opinions and to receive and impart information and ideas without interference by public authority and regardless of frontiers. This Article shall not prevent States from requiring the licensing of broadcasting, television or cinema enterprises.
>
> 2. The exercise of these freedoms, since it carries with it duties and responsibilities, may be subject to such formalities, conditions, restrictions or penalties as are prescribed by law and are necessary in a democratic society, in the interests of national security, territorial integrity or public safety, for the prevention of disorder or crime, for the protection of health or morals, for the protection of the reputation or rights of others, for preventing the disclosure

51. *Id.* at 2.
52. Heller, *supra* note 45, at 167–68.
53. WORLD ECON. F., *supra* note 49, at 20–21.
54. ECHR, *supra* note 1.

> of information received in confidence, or for maintaining the authority and impartiality of the judiciary.[55]

As technology evolved, so did the ECtHR interpretation of Article Ten, expanding protections beyond traditional media to include digital communication.[56] During this period, landmark cases shaped the court's approach to balancing public interest and individual rights online.[57] Landmark cases—such as *Delfi AS v. Estonia*—addressed intermediary liability for user-generated content and illustrated the complexities of applying Article Ten in the online sphere, where information spreads instantaneously and globally.[58]

The rise of social media further shaped European jurisprudence, introducing challenges such as misinformation, hate speech, and algorithmic amplification.[59] While freedom of expression is not absolute, restrictions under Article Ten, Paragraph Two must meet strict legal criteria: they must be "necessary in a democratic society" and serve legitimate aims, such as the protection of national security, public safety, the prevention of crime, and the safeguarding of the rights of others.[60] Restrictions on expression must be proportionate, and any interference with the right to freedom of expression must pursue a legitimate aim while maintaining a balance between individual rights and public interests.[61] The ECtHR has consistently reinforced the principle that any limitation on expression must be justified under these standards, particularly regarding traditional media outlets and, more recently, online platforms and social media.[62]

Case law from the ECtHR has consistently affirmed that any restrictions on expression must meet the criteria of legality, necessity, and proportionality.[63] In the context of traditional media, these principles have been well developed through jurisprudence.[64] However, with the advent of XR technologies, the legal landscape presents new challenges.

Unlike traditional digital platforms, XR enables deeply immersive, interactive experiences where expression extends beyond text and images to

---

55. *Id.*

56. *Id.*

57. *See, e.g.*, Delfi AS v. Estonia, App. No. 64569/09, ¶ 3 (June 16, 2015), https://hudoc.echr.coe.int/fre?i=001-155105.

58. *See id.* ¶ 113.

59. *See, e.g.*, James G. Brown, Jeremy N. Bailenson & Jeffrey Hancock, *Misinformation in Virtual Reality,* J. ONLINE TR. & SAFETY, Apr. 2023, at 1, 1.

60. ECHR, *supra* note 1, art. 10, ¶ 2.

61. Handyside v. United Kingdom, App. No. 5493/72, ¶ 49 (Dec. 7, 1976), https://hudoc.echr.coe.int/eng?i=001-57499.

62. *See, e.g.*, David Kaye (Special Rapporteur), *Rep. of the Special Rapporteur on the Promotion and Protection of the Right to Freedom of Opinion and Expression*, UN GAOR, 38th Sess., Agenda Item 3, UN Doc. A/HRC/38/35, ¶ 7 (Apr. 6, 2018), https://docs.un.org/en/A/HRC/38/2.

63. *See, e.g.*, Delfi AS v. Estonia, App No. 64569/09, ¶¶ 61–65 (June 16, 2015), https://hudoc.echr.coe.int/fre?i=001-155105.

64. *Id.* ¶ 48.

include avatar-based interactions, spatial environments, and behavioral cues.[65] In these settings, distinguishing between speech and conduct becomes more complex.[66] In these environments, expression is not limited to written or spoken words but can take the form of interactive and immersive experiences, including avatar representations, simulated environments and experiences, and augmented interactions.[67] In immersive environments, both actions and spatial design function as forms of expression, extending beyond traditional speech.[68] As XR technologies become deeply embedded in daily interactions, ensuring the protection of expressive rights in political, cultural, and social settings is crucial.[69] Protecting freedom of expression in XR requires adapting legal frameworks to account for the medium's embodied and participatory nature.[70]

B. OPPORTUNITIES FOR FREEDOM OF EXPRESSION

1. *Transforming Creative and Social Expression*

XR expands the possibilities for artistic and cultural expression by merging digital and physical environments.[71] Artists can create multisensory installations and interactive virtual exhibits, democratizing access to creative platforms and broadening participation in artistic discourse.[72]

XR also fosters cross-cultural dialogue by connecting users in shared virtual spaces, promoting understanding and empathy.[73] Virtual protests and global assemblies in XR platforms illustrate the technology's potential to amplify marginalized voices and overcome traditional barriers to civic engagement.[74]

2. *Enhancing Civic Engagement*

Governments are increasingly adopting XR for political expression, using virtual town halls, policy simulations, and immersive awareness campaigns to

65. Mark A. Lemley & Eugene Volokh, *Law, Virtual Reality, and Augmented Reality*, 166 U. PA. L. REV. 1051, 1054–55 (2018).

66. *Id.* at 1136.

67. *See* ELIZABETH M. RENIERIS, BEYOND DATA: RECLAIMING HUMAN RIGHTS AT THE DAWN OF THE METAVERSE 104 (2023).

68. *Id.* at 105–07.

69. *Id.* at 112–14.

70. Brittan Heller, *Revisiting Code-as-Law: Regulation and Extended Reality*, 26 VAND. J. ENT. & TECH. L. 655, 666 (2024).

71. *Id.* at 678–79.

72. Petra Palusova, *XR and Immersive Art: Bringing New Ways of Expression*, VRX (Jan. 15, 2024), https://vrx.vr-expert.com/xr-and-immersive-art-bringing-new-ways-of-expression.

73. *See generally* Courtney D. Cogburn, Jeremy Bailenson, Elise Ogle, Tobin Asher & Teff Nichols, *1000 Cut Journey*, *in* SIGGRAPH: VIRTUAL, AUGMENTED, & MIXED REALITY (2018), https://doi.org/10.1145/3226552.3226575 (creating a virtual reality in which the user becomes a Black man who encounters racism throughout his life).

74. *See, e.g.*, Emmie Hine, Josh Cowls & Luciano Floridi, *Assembly and Expression in Extended Reality: Transposing Fundamental Rights Across Realities*, PROCS. INT'L CONG. TOWARDS RESPONSIBLE DEV. METAVERSE 1, 2–3, 10–11 (2024).

expand civic participation.[75] These tools can offer innovative avenues for advocacy and public discourse that are valuable in geographically remote or politically repressive regions.[76] Notably, legal institutions have begun experimenting with XR.[77] Courts in China and Colombia have conducted hearings in virtual courtrooms, and South Barbados has established a diplomatic embassy in the metaverse, highlighting XR's potential to support governance and diplomacy.[78]

C. THE COLLABORATIVE CREATIVE POTENTIAL OF XR

XR transforms human interaction and expression by merging physical and digital spaces, offering deeply immersive experiences that extend beyond traditional modes of communication.[79] Unlike conventional digital platforms, XR allows users to engage through embodied interactions, spatial storytelling, and multi-sensory environments.[80] These capabilities redefine freedom of expression by enabling creative and social engagement in ways previously unattainable.[81]

However, the immersive nature of XR also introduces complexities.[82] Questions about access, inclusivity, and governance require careful legal analysis, particularly within the framework of European human rights law.[83] This Part examines how XR fosters artistic innovation, democratizes creative tools, amplifies marginalized voices, and enables collaborative creation while raising novel regulatory challenges.

1. *Redefining Artistic Mediums*

XR fundamentally reshapes artistic expression by enabling dynamic, interactive, and immersive creations.[84] Unlike traditional artworks confined to physical two-dimensional media, XR pieces require active audience

75. *Id.* at 4 (discussing *Behind the Scenes of "IN PROTEST" with Alton Glass and Adam Davis-McGee*, META BLOG (Oct. 5, 2020), https://www.meta.com/blog/behind-the-scenes-of-in-protest-with-alton-glass-and-adam-davis-mcgee/?utm_source=catedrametaverso.ua.es&utm_medium=oculusredirect).

76. *See, e.g.*, Press Release, Seoul Metro. Gov't, Official Release of Metaverse Seoul (Jan. 25, 2023), https://english.seoul.go.kr/official-release-of-metaverse-seoul/.

77. Brittan Heller & Daniel Castaño, *Artificial Intelligence, Virtual Courts, and Real Harms*, LAWFARE (Mar. 13, 2023, 3:14 PM), https://www.lawfaremedia.org/article/artificial-intelligence-virtual-courts-and-real-harms.

78. *Id.*

79. Heller, *supra* note 70, at 679.

80. *Id.*

81. *Id.*

82. MEGAN BRADLEY ET AL., UCLA INST. FOR TECH., L. & POL'Y, GOVERNING XR: EXECUTIVE SUMMARY 3 (2024).

83. *See* COUNCIL OF EUROPE & IEEE, THE METAVERSE AND ITS IMPACT ON HUMAN RIGHTS, THE RULE OF LAW, AND DEMOCRACY 26–31 (2024).

84. *See, e.g.*, Google, *Tilt Brush: Painting from a New Perspective*, YOUTUBE (May 3, 2016), https://www.youtube.com/watch?v=TckqNdrdbgk. Tilt Brush is now open-source and many alternatives are available for sketching, drawing, and painting in XR.

participation, allowing users to navigate and manipulate digital environments.[85] This interactivity fosters deeper engagement with creative works and challenges conventional distinctions between artist and observer.

Immersive storytelling exemplifies XR's transformative potential. *Carne y Arena*, an award-winning VR installation by Alejandro González Iñárritu, places participants in the perspective of migrants crossing the U.S.-Mexico border.[86] The installation fosters an emotional connection beyond traditional storytelling methods by integrating haptic feedback and environmental cues.[87] The inclusion of XR experiences in major film festivals further highlights the medium's growing cultural significance.[88]

As XR continues to evolve, these new artistic forms require updated legal frameworks to help protect freedom of expression.[89] The embodied and participatory nature of XR raises questions about copyright, authorship, and intellectual property rights, particularly in collaborative and interactive works.[90]

2. *Democratization of Creativity*

XR's increased accessibility to digital tools and platforms drives the democratization of creativity. While traditional artistic media often require significant financial investment and institutional support, XR—particularly when combined with generative AI—lowers these barriers by enabling creators to develop immersive experiences without extensive technical expertise.[91]

XR allows individuals to create and distribute content without reliance on traditional gatekeepers such as galleries, production studios, or publishing houses.[92] Platforms incorporating generative AI and no-code development tools empower a broader range of creators to produce high-quality XR content with minimal programming knowledge.[93]

However, this shift also raises concerns about the ethical use of generative AI in creative processes, as well as the potential for the unauthorized appropriation of artistic works.[94] Legal frameworks governing creative rights in

85. *See, e.g.*, *id.*

86. CARNE Y ARENA, https://phi.ca/en/carne-y-arena/ (last visited June 23, 2025).

87. *Id.*

88. *The Biggest VR Film Festivals*, OTHERWORLD, https://www.other.world/blog/biggest-vr-film-festivals (last visited June 23, 2025).

89. Justin Hendrix, *Evaluating Novel Legal and Policy Challenges Presented by Extended Reality, in* EXISTING LAW AND EXTENDED REALITY: AN EDITED VOLUME OF THE 2023 SYMPOSIUM PROCEEDINGS 8, 10–11 (Brittan Heller ed., 2024).

90. *Id.*

91. Trevor Sudano, *Shifts: Creativity Democratized, Globalized and Immersive*, IPSOS (June 13, 2024), https://www.ipsos.com/en-us/future/shifts-creativity-democratized-globalized-and-immersive.

92. *See, e.g.*, Rebekah S. Davis, *Leveraging the Power of Presence for Learning Design*, *in* BRIDGING THE XR TECHNOLOGY-TO-PRACTICE GAP: METHODS AND STRATEGIES FOR BLENDING EXTENDED REALITIES INTO CLASSROOM INSTRUCTION 13, 13–15 (Todd Cherner & Alex Fegely eds., 2023).

93. *See id.* at 15.

94. *See* WORLD ECON. F., CREATIVE DISRUPTION: THE IMPACT OF EMERGING TECHNOLOGIES ON THE CREATIVE ECONOMY 12, 18 (2018), https://www3.weforum.org/docs/39655_CREATIVE-DISRUPTION.pdf.

XR will need to balance accessibility with protections for original content creators.[95]

3. *Uplifting Marginalized Voices*

XR can provide historically marginalized communities with new avenues for cultural expression and social participation.[96] For example, Indigenous groups and displaced populations have used VR to create digital archives, document lived experiences, and showcase artistic works.[97] Through virtual museums and social XR platforms, underrepresented voices can engage with global audiences, bypassing traditional gatekeepers in the art and media industries.

Additionally, XR offers the potential to preserve and revitalize endangered languages and cultural practices. Virtual spaces can be used for immersive education, historical reconstructions, and participatory storytelling that reflect diverse narratives often overlooked in mainstream media.[98]

4. *Collaborative Creation*

Unlike traditional artistic practices that often emphasize individual authorship, XR fosters collaborative, community-driven creativity.[99] XR platforms enable real-time co-creation by allowing geographically dispersed artists and designers to work together in shared virtual spaces.[100]

Within immersive digital spaces, the distinction between content creators and audiences often dissolves.[101] This interchangeability of roles encourages a decentralized creative ecosystem, where expression is shaped collectively rather than dictated by a select few.[102]

D. RISKS TO FREEDOM OF EXPRESSION IN XR

While XR technologies hold great promise for enhancing freedom of expression, they also present significant risks that, if left unaddressed, could undermine this fundamental right. The deeply engaging nature of XR, combined

95. *Id.* at 11, 19.

96. ELYSSE DICK, CURRENT AND POTENTIAL USES OF AR/VR FOR EQUITY AND INCLUSION 1 (2021), https://itif.org/publications/2021/06/01/current-and-potential-uses-arvr-equity-and-inclusion/.

97. CHRIS MILK, *How Virtual Reality Can Create the Ultimate Empathy Machine*, TED (Mar. 2015), https://www.ted.com/talks/chris_milk_how_virtual_reality_can_create_the_ultimate_empathy_machine.

98. *See* DICK, *supra* note 96, at 1–2; WORLD ECON. F., *supra* note 49, at 6.

99. *See, e.g.*, *Horizon Worlds*, META, https://www.meta.com/horizon-worlds/ (last visited June 24, 2025); *see also* Julie R. Williamson, *Being Social in XR*, *in* EICS '24 COMPANION: COMPANION OF THE 16TH ACM SIGCHI SYMP. ON ENG'G INTERACTIVE COMPUTING SYS'S. 1 (2024), https://dl.acm.org/doi/pdf/10.1145/3660515.3661322.

100. *See, e.g.*, Williamson, *supra* note 99.

101. *See* RALPH SCHROEDER, SOCIAL THEORY AFTER THE INTERNET: MEDIA, TECHNOLOGY, AND GLOBALIZATION 1 (2018).

102. *Id.* at 137.

with data-driven personalization and automated content curation, introduces unprecedented regulatory challenges.[103]

1. *Censorship and Content Moderation Challenges*

Moderating XR environments is far more complex than moderating traditional digital platforms.[104] XR interactions involve spatial architecture, user-generated environments, and behavioral expressions that blur the line between speech and conduct.[105] These elements make it difficult to apply conventional moderation strategies.[106]

Volunteer-based moderation, while offering community-driven oversight, introduces accuracy and accountability concerns.[107] Unlike text-based moderation, immersive environments require real-time decision-making, with limited avenues for appealing moderation decisions.[108] The alternative—recording all XR interactions for later review—is neither practical nor desirable due to data storage limitations and severe privacy risks.[109]

Automated moderation remains immature.[110] Existing AI models, designed for text and video, are inadequate for understanding XR-specific behaviors, such as nonverbal cues and spatial interactions.[111] Current systems lose the behavioral context needed to understand immersive scenarios as they often convert audio to text and process it using frameworks intended for flat-screen environments.[112] Without significant advances in AI moderation and computer vision, XR platforms may struggle to balance content governance with user rights.

2. *Surveillance and Privacy Risks*

As previously noted, XR devices collect extensive biometric and behavioral data—including eye tracking, facial expressions, and motion telemetry—to create personalized immersive experiences.[113]

However, these data streams pose serious privacy risks, as studies confirm that motion patterns alone can serve as unique biometric identifiers.[114] Unlike traditional digital platforms, where users may opt out of certain data collection

---

103. *See* HELLER, *supra* note 24, at 7.

104. *See* Michelle Cortese & Andrea Zeller, *How to Protect Users from Harassment in Social VR Spaces*, THE NEXT WEB (Jan. 2, 2020, 12:00 AM), https://thenextweb.com/news/how-to-protect-users-from-harassment-in-social-vr-spaces.

105. *Id.*

106. *Id.*

107. Bradley et al., *supra* note 82, at 2.

108. *Id.* at 3.

109. *Id.* at 4.

110. STANFORD CYBER POLICY CENTER, *The Embodied Web: How Will Physical and Digital Data Meet in the Next Iteration of the Internet?*, at 17:41–18:01 (YouTube, Jan. 30, 2024), https://www.youtube.com/watch?v=F0zhkvM_iGY&list=PLSggFhQ5E_3AOs1Yo8KCKSWAS1PLQTyB7.

111. *Id.* at 38:26–38:52.

112. *Id.* at 38:53–39:15.

113. *Id.* at 7:27–7:38.

114. *See* Nair et al., *supra* note 32, at 25; Miller et al., *supra* note 50, at 2.

practices, XR interactions inherently depend on this data, complicating traditional consent mechanisms.[115]

Beyond direct users, XR systems may also inadvertently capture data from bystanders, raising ethical and legal concerns about consent and the rights of non-users in immersive environments.[116] Without strict regulatory safeguards, these surveillance risks could create a chilling effect on freedom of expression, discouraging individuals from fully engaging in XR spaces.[117]

3. *Amplification of Immersive Harms*

The psychological impact of XR-based misinformation and harassment is significantly greater than in traditional digital environments.[118] Because XR environments simulate reality more convincingly than text or video, false or mis-contextualized information—termed "mis-experience"—can persuasively shape user perception and behavior in more profound ways.[119]

Similarly, harassment in XR extends beyond verbal abuse to include nonverbal and spatial interactions.[120] Avatar-based harassment, including unwanted proximity or simulated assaults, can feel as invasive as physical-world violations due to the psychological characteristics that make immersive worlds seem real.[121]

Reports of sexual harassment in XR environments date back to 2016, and cases involving women and girls have highlighted the severe psychological impact of such incidents.[122] Studies indicate that women and marginalized communities are disproportionately affected,[123] with immersive harassment leading many to disengage from XR platforms altogether.[124]

4. *Intellectual Property Complexities in XR*

The emergence of XR technologies introduces novel challenges to intellectual property ("IP") frameworks, which directly influence freedom of expression. In immersive digital spaces, content creation is often collaborative, with developers, designers, and users contributing dynamically, challenging

115. MARIANA OLAIZOLA ROSENBLAT, NYU STERN CTR. FOR BUS. & HUM. RTS., REALITY CHECK: HOW TO PROTECT HUMAN RIGHTS IN THE 3D IMMERSIVE WEB 11 (2023).

116. Bradley et al., *supra* note 82, at 4.

117. *Id.* at 3.

118. Brown et al., *supra* note 59, at 17.

119. *Id.* at 2.

120. Jessica Oultaw, *Virtual Harassment: The Social Experience of 600+ Regular Virtual Reality (VR) Users*, THE EXTENDED MIND (Apr. 4, 2018), https://www.extendedmind.io/the-extended-mind-blog/2018/04/04/2018-4-4-virtual-harassment-the-social-experience-of-600-regular-virtual-reality-vrusers.

121. Lemley & Volokh, *supra* note 65, at 1083–84.

122. Jordan Belamire, *My First Virtual Reality Groping*, MEDIUM (Oct. 20, 2016), https://medium.com/athena-talks/my-first-virtual-reality-sexual-assault-2330410b62ee#.swe1c0pgr; Adriana Diaz, *Disturbing Reports of Sexual Assaults in the Metaverse: 'It's a Free Show'*, N.Y. POST (May 27, 2022, 2:24 PM ET), https://nypost.com/2022/05/27/women-are-being-sexually-assaulted-in-the-metaverse.

123. Oultaw, *supra* note 120.

124. *Id.*

existing copyright norms.[125] For example, dynamic interactions raise questions about whether creators retain full copyright over their work or if participants acquire derivative rights.[126] Similarly, modifications in virtual worlds can blur the line between permissible alterations and derivative works, leaving creators uncertain about their ability to control the use of their creations.[127] While the Berne Convention—a 1886 international treaty established to protect authors' artistic rights—provides baseline protections, its principles fail to account for the evolving and intangible nature of XR creations.[128]

Enforcement of IP rights in XR is further complicated by jurisdictional issues, similar to what Eugene Volokh termed the "Bangladesh problem"[129] with international cybercrime.[130] The "Bangladesh problem" refers to the challenge of regulating disruptive behavior in virtual spaces when real-world legal enforcement is impractical or ineffective.[131] The term originates from discussions on cyberspace governance, using an analogy: just as law enforcement in one country cannot police a disruptive individual shouting on the streets of Bangladesh, authorities struggle to regulate virtual environments that transcend national jurisdictions. In virtual reality, this issue arises when disruptive behavior, like harassment or property damage, is beyond the reach of real-world law enforcement, leaving governance to platform operators who regulate conduct through code rather than traditional legal mechanisms.[132]

Similarly, virtual artworks that exist on global platforms may be subject to conflicting legal standards, as seen in scenarios involving creators in one jurisdiction, platforms in another, and users in yet another.[133]

125. JANNA ANDERSON & LEE RAINIE, PEW RSCH. CTR., THE METAVERSE IN 2040, at 11 (2022); Ryan N. Phelan, Barrett Spraggins, David Pointer & George Raynal, *IP Aspects of Augmented Reality and Virtual Reality Technologies*, AIPLA (2022), https://www.aipla.org/list/innovate-articles/2022-paper-for-aipla-augmented-reality(ar)-virtual-reality(vr)-committee.

126. Phelan et al., *supra* note 125.

127. Lemley & Volokh, *supra* note 65, at 1111–13; *see* STANFORD CYBER POLICY CENTER, *Panel 2 New Technology, Old Property Laws*, at 22:24 (YouTube, Jan. 28, 2023), https://www.youtube.com/watch?v=LJr8J8FfGZ0&list=PLMMzlTW0h1frDneDV1IczpsxSqlddUDg5&index=4.

128. Berne Convention for the Protection of Literary and Artistic Works art. 1, July 24, 1971, WIPO Lex No. TRT/BERNE/001 (amended on Sept. 28, 1979).

129. Lemley & Volokh, *supra* note 65, at 1072.

130. STANFORD CYBER POLICY CENTER, *Panel 1 Constitutional Law, and Criminal Law*, at 05:27 (YouTube, Jan. 28, 2023), https://www.youtube.com/watch?v=40J-AcyJpio&list=PLMMzlTW0h1frDneDV1IczpsxSqlddUDg5&index=2.

131. *See generally* David R. Johnson & David Post, *Law and Borders—The Rise of Law in Cyberspace*, 48 STAN. L. REV. 1367 (1996) (analyzing the limits of territorial legal enforcement in digital spaces).

132. STANFORD CYBER POLICY CENTER, *supra* note 130, at 06:36.

133. *See id.* at 05:34–07:08.

5. *Equity and Accessibility Barriers*

Access to XR technologies often requires expensive hardware and high-speed internet, creating barriers for marginalized communities.[134] The initial wave of XR devices lacked inclusive design, making access difficult for marginalized groups, including women, religious minorities, and disabled individuals.[135] Closing accessibility disparities in XR necessitates user-centric design strategies and policy-driven investment in equitable digital infrastructure.[136]

6. *Implications for Identity and Self-Expression*

XR environments enable users to explore and express their identities through avatars and virtual personas. However, risks such as identity theft, misrepresentation, and harassment temper this freedom because such uses can undermine users' ability to safely engage in XR spaces.[137]

IV. POLICY AND LEGAL FRAMEWORKS GOVERNING XR AND FREEDOM OF EXPRESSION

XR technologies introduce both new opportunities and significant challenges for legal and policy frameworks governing freedom of expression, especially within European legal structures. While existing international human rights frameworks provide a foundation for protecting speech, they were developed in response to traditional and digital media and do not fully account for the embodied, interactive, and immersive nature of XR.[138]

This Part examines the legal frameworks relevant to freedom of expression in XR, focusing on the ECHR, the EU Charter of Fundamental Rights, and key Council of Europe recommendations. These instruments provide a basis for assessing how legal protections apply, or require adaptation, to address speech regulation, platform governance and content moderation in immersive environments.[139]

A. THE EUROPEAN CONVENTION ON HUMAN RIGHTS

The ECHR, which came into force in 1953, is a cornerstone of human rights protection in Europe.[140] The ECHR and its supervisory body, the ECtHR, have

134. Brittan Heller, *VR Is Failing the Very People It Could Benefit Most*, THE INFO. (May 19, 2022, 9:00 AM PDT), https://www.theinformation.com/articles/vr-is-failing-the-very-people-it-could-benefit-most?page=1.

135. *Id.*

136. *Id.*

137. *See* Larry Magid, *Metaverse: What's the Risk?*, CONNECTSAFELY (Jan. 20, 2022), https://connectsafely.org/metaverse-what-it-is-and-what-are-its-risks/.

138. COUNCIL OF EUROPE & IEEE, *supra* note 83, at 12.

139. *Id.* at 55.

140. ECHR, *supra* note 1.

developed a rigorous standard for freedom of expression under Article Ten.[141] This Article grants everyone the "right to freedom of expression," including the "freedom to hold opinions and to receive and impart information and ideas without interference by public authority."[142]

However, as previously noted, the ECHR anticipates that freedom of expression can be limited under certain conditions, as specified in Article Ten, Paragraph Two.[143] This allows for limitations that are "necessary in a democratic society," contingent upon legitimacy, proportionality, and adherence to legal standards.[144] Legitimate aims for such limitations on expression include protection of national security, public safety, prevention of disorder or crime, and protection of others' rights.[145] The ECtHR has developed substantial jurisprudence that operationalizes these standards by examining restrictions imposed by member states.[146]

The ECtHR has established key principles through its case law, particularly in landmark cases that interpret Article Ten in traditional and digital contexts. A pivotal case in free expression jurisprudence, *Handyside v. United Kingdom*, affirmed that protection extends even to information or ideas "that offend, shock or disturb."[147] This broad definition has underpinned the court's stance on speech, reinforcing the need for tolerance in democratic societies. The court's interpretation has gradually evolved, accounting for new forms of media, such as the internet, social media, and, more recently, emerging digital platforms.[148]

In the digital context, cases like *Delfi AS v. Estonia* and *Bărbulescu v. Romania* demonstrate the ECtHR's willingness to adapt Article Ten protections to digital expressions.[149] *Delfi AS*, for instance, tackled the responsibility of online platforms for user-generated content, ruling that hate speech justified certain restrictions on online comments.[150] The *Bărbulescu* case also highlighted the delicate balance between workplace surveillance and individual privacy, shaping digital rights discourse.[151] As XR technologies expand digital interaction into immersive environments, the ECtHR's established frameworks may require further adaptation to account for expression that involves both physical presence and digital embodiment.

---

141. *Id.* art. 10, ¶ 1.

142. *Id.*

143. *Id.* art. 10, ¶ 2.

144. *Id.*

145. *Id.*

146. *See generally id.* art. 19 (establishing the ECtHR).

147. Handyside v. United Kingdom, App. No. 5493/72, ¶ 49 (Dec. 7, 1976), https://hudoc.echr.coe.int/eng?i=001-57499.

148. *See, e.g.*, Delfi AS v. Estonia, App. No. 64569/09, ¶ 94 (June 16, 2015), https://hudoc.echr.coe.int/fre#{%22itemid%22:[%22001-155105%22]}; Bărbulescu v. Romania, App. No. 61496/08, ¶¶ 140–141 (Sept. 5, 2017), https://hudoc.echr.coe.int/fre#{%22itemid%22:[%22001-177082%22]}.

149. *See, e.g.*, *Delfi AS*, App. No. 64569/09, ¶ 83; *Bărbulescu*, App. No. 61496/08, ¶ 121.

150. *Delfi AS*, App. No. 64569/09, ¶¶ 69–70, 84–87.

151. Bărbulescu v. Romania, App No. 61496/08, ¶¶ 5–12 (Jan. 12, 2016), https://hudoc.echr.coe.int/eng?i=001-159906. This was the original case, before appeal to the Grand Chamber.

In *Delfi AS*, the ECtHR also addressed the issue of intermediary liability for user-generated content.[152] In this case, Delfi, a digital news outlet, faced liability for anonymous user-generated hate speech.[153] Delfi argued that holding it liable for these comments infringed on its Article Ten rights.[154] The court, however, upheld Estonia's decision to impose liability, emphasizing that the hateful and threatening nature of the comments outweighed Delfi's freedom of expression.[155]

The court's judgment was grounded in two key principles. First, the court examined the nature of the speech. The ECtHR categorized the comments as hate speech falling outside the protected scope of Article Ten.[156] The court has consistently held that hate speech, particularly when it incites violence or discrimination, does not merit protection under the Convention.[157]

The second principle was platform responsibility. Delfi, as a professionally managed news outlet, owed a duty to exercise a higher standard of oversight over user-generated content than purely passive platforms.[158] The court considered the platform's failure to promptly remove hate speech after notification as a failure to meet this standard.[159]

The implications of *Delfi AS* extend into the XR domain, where platforms hosting immersive user interactions may face similar challenges. In XR environments, hate speech may manifest not just in text but also in real-time interactions, avatars, or virtual graffiti, potentially increasing a platform's duty to moderate content effectively and proactively. These developments necessitate a recalibration of existing legal principles to address the unique dynamics and challenges of XR technologies.[160]

In *Bărbulescu*, the ECtHR examined the intersection of freedom of expression and privacy in the context of workplace surveillance.[161] Here, an employee challenged employer-imposed monitoring of private communications, asserting that the surveillance exceeded necessary workplace oversight.[162]

152. *Delfi AS*, App. No. 64569/09, ¶ 26.

153. *Id.*

154. *Id.* ¶ 59.

155. *Id.* ¶ 162.

156. *Id.* ¶¶ 115–117.

157. *See, e.g.*, Vejdeland v. Sweden, App. No. 1813/07 (Feb. 9, 2012), https://hudoc.echr.coe.int/fre#{%22itemid%22:[%22001-109046%22]}; Féret v. Belgium, App. No. 15615/07 (July 16, 2009), https://hudoc.echr.coe.int/eng?i=001-93627; Perinçek v. Switzerland, App. No. 27510/08 (Oct. 15, 2015), https://hudoc.echr.coe.int/eng?i=001-158235; Norwood v. United Kingdom, App. No. 23131/03 (Nov. 16, 2004), https://hudoc.echr.coe.int/eng?i=001-67632; Pavel Ivanov v. Russia, App. No. 35222/04 (Feb. 20, 2007), https://hudoc.echr.coe.int/eng?i=001-79619; Garaudy v. France, App. No. 65831/01 (June 24, 2003), https://hudoc.echr.coe.int/eng?i=001-23829; Le Pen v. France, App. No. 18788/09 (Apr. 20, 2010), https://hudoc.echr.coe.int/eng#{%22itemid%22:[%22001-98489%22]}.

158. *Delfi AS*, App. No. 64569/09, ¶¶ 115–117.

159. *Id.* ¶¶ 141–143.

160. Bradley et al., *supra* note 82, at 4.

161. Bărbulescu v. Romania, App. No. 61496/08, ¶¶ 5–12 (Jan. 12, 2016), https://hudoc.echr.coe.int/eng?i=001-159906.

162. *Id.* ¶ 33.

While the initial Chamber judgment sided with the employer, the Grand Chamber reversed this decision,[163] emphasizing the importance of safeguarding the employee's right to private communication under Article Eight.[164] The case underscores key legal principles that guide the evaluation of surveillance measures: legitimacy, necessity, proportionality, and the balancing of competing rights.[165]

According to the ECtHR in *Bărbulescu*, legitimacy evaluates whether digital surveillance serves a lawful and justified aim, such as enforcing workplace policies or protecting business assets.[166] Necessity evaluates whether the action is essential to achieving this aim, avoiding unnecessary infringements.[167] Proportionality evaluates whether the method of surveillance employed is the least intrusive option available to accomplish the purported objective.[168] The balancing of competing rights involves reconciling the employer's interests with the employee's fundamental rights of privacy and freedom of expression.[169]

The judgment articulated several important principles. First, regarding legitimacy and transparency: employers must clearly communicate surveillance policies to employees to ensure that individuals are aware of and consent to monitoring practices.[170] Next, considering necessity and proportionality, surveillance must serve a legitimate aim, and the means employed must be the least intrusive necessary to achieve that aim.[171]

The *Bărbulescu* case is particularly relevant for XR environments, where surveillance can be more pervasive and subtle.[172] As previously noted, XR technologies increasingly rely on extensive data collection, including biometric information, to create personalized experiences.[173] This may raise the risk of overreach, where user activities, expressions, and interactions within virtual spaces may be monitored or censored without adequate safeguards.[174] Consequently, this highlights the urgent need for evaluating regulatory frameworks to ensure that they mitigate risks and uphold fundamental rights in these immersive settings.

---

163. *See* Bărbulescu v. Romania, App. No. 61496/08, ¶¶ 140–141 (Sept. 5, 2017), https://hudoc.echr.coe.int/fre#{%22itemid%22:[%22001-177082%22]}.

164. *Id.* ¶ 141; *cf.* Bărbulescu v. Romania, App. No. 61496/08, ¶¶ 59–63 (Jan. 12, 2016), https://hudoc.echr.coe.int/eng?i=001-159906 (holding that the employer's monitoring of the employee's communications was reasonable and that there was no violation of Article Eight).

165. Bărbulescu v. Romania, App. No. 61496/08, ¶¶ 121–123 (Sept. 5, 2017), https://hudoc.echr.coe.int/fre#{%22itemid%22:[%22001-177082%22]}.

166. *Id.* ¶ 36.

167. *Id.* ¶ 43.

168. *Id.* ¶ 121.

169. *Id.* ¶ 145.

170. *Id.* ¶¶ 133–134.

171. *Id.* ¶¶ 135–136.

172. Heller, *supra* note 4, at 10.

173. *Id.*

174. *Id.* at 9.

Both *Delfi AS* and *Barbulescu* illustrate the ECtHR's approach to balancing freedom of expression against other rights and interests, offering an adaptable framework to address challenges in XR contexts. Despite existing legal precedents, immersive digital spaces present novel challenges that necessitate reinterpreting fundamental legal standards. The ECtHR's jurisprudence provides a foundation, but XR technologies require a nuanced approach to balancing freedom of expression and new legal challenges.

B. THE EU CHARTER OF FUNDAMENTAL RIGHTS

The EU's Charter of Fundamental Rights serves as a complementary, binding instrument within the EU's jurisdiction and consolidates various human rights standards, including freedom of expression, into a single instrument.[175] Article Eleven of the Charter mirrors the protections enshrined in Article Ten of the ECHR, while explicitly guaranteeing the right to "hold opinions and to receive and impart information and ideas" and additionally safeguarding media pluralism.[176] By emphasizing media pluralism, EU regulations acknowledge the need for diverse and autonomous media ecosystems within democratic governance. This principle has become increasingly pertinent in the context of digital platforms and could take on new dimensions in XR environments, where virtual spaces may become arenas for expression and information dissemination.

Given the Charter's binding status, it has been integral in shaping the EU's legislative approach to digital rights. The Charter's influence is evident in frameworks like the Digital Services Act ("DSA")[177] and the GDPR,[178] which both prioritize fundamental rights, including freedom of expression. [179] Regulatory models governing online platforms and user privacy are foundational but require significant adaptation for immersive digital environments. For example, the DSA's focus on platform accountability could inform regulatory approaches to content moderation in XR spaces, where, as previously noted, harmful interactions or misinformation might manifest in more immersive and impactful forms.

Article Fifty-Two of the Charter provides a legal basis for restricting freedoms: any restriction must respect the "essence of those rights and freedoms" and meet the criteria of legality, necessity, and proportionality.[180] As previously noted, the application of proportionality in immersive spaces demands reconsideration, as physical and digital interactions merge in ways that

175. Charter of Fundamental Rights of the European Union, art. 11, 2012 O.J. (C 326) 391, 398.

176. *Id.*

177. *See The Digital Services Act*, EUR. COMM'N, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/digital-services-act_en (last visited June 29, 2025).

178. Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC (General Data Protection Regulation), 2016 O.J. (L 119) 1, 1.

179. *Id.*; *see also* Charter of Fundamental Rights of the European Union, *supra* note 175, art. 52, at 406–07.

180. Charter of Fundamental Rights of the European Union, *supra* note 175, art. 52, at 406–07.

defy conventional legal categorization. In immersive realities, the boundaries of individual expression could directly intersect with the rights of others in shared virtual spaces, necessitating a recalibrated application of proportionality to account for the heightened immediacy and interactivity of XR interactions.

The European Court of Justice ("ECJ") has further interpreted Article Eleven in key cases like *Glawischnig-Piesczek v. Facebook Ireland Ltd.*, which dealt with intermediary liability and content removal on social media platforms.[181] The ECJ allowed national courts to compel social media platforms to remove harmful content, establishing a precedent for balancing individual expression with the prevention of harm.[182] While this case focused on traditional social media platforms, its principles are increasingly relevant to XR environments, where platforms exert even greater control over immersive user interactions and moderation. Intermediary responsibility, as outlined in *Glawischnig-Piesczek*, could guide how XR platforms address virtual hate speech, misinformation, or harmful behaviors, ensuring that these spaces respect a user's freedom of expression while maintaining safety.[183]

The principles held in the Charter and interpreted by the ECJ underscore the critical balance between safeguarding freedom of expression and addressing legitimate concerns such as harm prevention and platform accountability. As the digital-physical convergence deepens in XR, existing legal principles, such as proportionality and intermediary accountability, must adapt to safeguard rights in immersive spaces.

C. RELEVANT COUNCIL OF EUROPE GUIDELINES AND RECOMMENDATIONS

The Council of Europe supplements its binding legal instruments with nonbinding yet influential guidelines addressing emerging legal issues.[184] One key document is the Recommendation of the Committee of Ministers on the Roles and Responsibilities of Internet Intermediaries, which was adopted on March 7, 2018 and emphasizes the need for transparency, accountability, and a balanced approach to content regulation.[185] While designed for traditional online platforms, these principles are just as relevant to XR governance, where platform operators may exert even greater control over immersive digital environments.

Another relevant document is the Declaration by the Committee of Ministers' on the Manipulative Capabilities of Algorithmic Processes, which

181. Gabriel M. Lentner, Jonathan Cardenas, Kletia Noti & Marie-Andrée Weiss, *Injunctions and Article 15(I) of the E-Commerce Directive: The Pending* Glawischnig-Piesczek v. Facebook Ireland Limited *Preliminary Ruling*, TRANSATLANTIC ANTITRUST & IPR DEVS. (Stanford-Vienna Transatlantic Tech. L. F.), Nov. 2, 2018, at 25.

182. *Id.* at 25–37.

183. *Id.* at 43.

184. *Recommendation CM/Rec(2018)2 of the Committee of Ministers to Member States on the Roles and Responsibilities of Internet Intermediaries*, COUNCIL OF EUR. (Mar. 7, 2018), https://search.coe.int/cm?i=0900001680790e14.

185. *Id.*

was adopted on February 13, 2019 and highlights the role of algorithmic systems in shaping user experiences and public discourse.[186] In XR environments, algorithmic processes are even more deeply embedded in speech regulation, as they can dynamically adjust virtual spaces, curate interactions, and influence perception through real-time modifications of immersive content.[187]

This potential for algorithmic ranking poses a dual risk: curtailing users' exposure to diverse viewpoints and fostering echo chambers within immersive environments. The Declaration's call for transparency and accountability is particularly pertinent[188] to XR platforms, as these capabilities raise concerns about the potential for algorithmic manipulation to impact autonomy, cognitive bias, and user agency in XR-based expression.

The Council of Europe's guidelines reflect broader concerns about content governance in digital spaces, particularly regarding the transparency of algorithmic decision-making.[189] As XR technologies advance, legal and policy frameworks must ensure that regulatory principles developed for flat-screen digital platforms remain applicable to immersive and behavioral computing environments.

CONCLUSION AND RECOMMENDATIONS

Ensuring that XR technologies enhance rather than restrict freedom of expression requires a governance approach that accounts for their unique characteristics. While existing legal frameworks provide a foundation, they do not fully address the embodied, behavioral, and immersive nature of XR speech. To bridge this gap, regulatory measures—regardless of jurisdiction—should learn from European human rights law and strengthen legal protections, increase transparency, and mitigate emerging risks.

One key area requiring reform is platform liability. Existing content moderation models, designed for text-based and audiovisual content, are ill-equipped to govern XR, where speech extends to gestures, avatar interactions, and spatial environments. Liability frameworks must reflect the complexity of immersive expression by distinguishing between static speech, such as virtual objects and persistent digital spaces, and real-time interactions, such as avatar-based harassment or environmental manipulation. As platforms assume greater control over immersive environments, they owe a duty of transparency, ensuring that content moderation decisions in XR spaces follow clear and accountable processes.

Algorithmic governance in XR presents additional risks. Immersive platforms rely on opaque recommendation systems that curate experiences based

186. *Declaration by the Committee of Ministers on the Manipulative Capabilities of Algorithmic Processes,* COUNCIL OF EUR. (Feb. 13, 2019), https://rm.coe.int/090000168092dd4b.

187. *See, e.g.*, Heller, *supra* note 4, at 30.

188. *Id.* at 43.

189. COUNCIL OF EUR., *supra* note 184.

on behavioral data, often without user awareness. Requiring transparency in algorithmic ranking, as well as independent bias audits, would provide accountability for how speech is surfaced or suppressed in immersive spaces. As XR speech governance relies heavily on real-time data processing, regulators should introduce disclosure obligations that inform users when algorithmic interventions shape their experiences. These measures would prevent the emergence of closed, highly curated virtual ecosystems that limit access to diverse perspectives.

Privacy protections must also be strengthened to account for the vast amounts of biometric and behavioral data collected by XR platforms. Eye tracking, motion telemetry, and gaze analysis enable highly personalized interactions, but they also introduce risks of biometric psychography, where inferred emotional and cognitive states shape what content users see. This data should be classified as personally identifiable information and subjected to strict consent, retention, and processing limits. Additionally, because XR devices collect environmental data that may include bystanders, privacy laws must address the involuntary capture of non-users in public spaces. Without clear legal safeguards, these technologies risk chilling expression, as individuals may self-censor in immersive spaces due to fears of surveillance.

The emergence of "mis-experience," where manipulated environments shape users' perceptions in ways that feel real, requires proactive mitigation strategies. Unlike traditional disinformation, users immersively experience XR falsehoods rather than read or watch them, increasing their persuasive impact. Regulations should, to the extent possible, mandate provenance labeling and authentication mechanisms for AI-generated immersive content to prevent perceptual manipulation. Additionally, predictive testing for disinformation risks in XR environments would help preempt large-scale misinformation campaigns before they take effect.

Access and inclusion remain critical concerns in XR governance. High hardware costs and infrastructure demands create barriers to participation, limiting the diversity of voices in immersive spaces. Public investment in XR access—including funding for public immersive spaces and accessibility mandates—would help ensure that freedom of expression in XR is not limited to those with financial or technological privilege.

Finally, as XR increasingly hosts cultural and political discourse, its regulation must align with international human rights principles. Legal protections should safeguard virtual cultural heritage, prevent political censorship in immersive spaces, and ensure that XR remains a medium for democratic engagement rather than a tool for state or corporate control. Proactive legal and policy measures will determine whether XR develops as an open, rights-respecting ecosystem or becomes another frontier for unchecked algorithmic governance and speech regulation.

By implementing precise and forward-looking recommendations, policymakers and judicial bodies can ensure that XR technologies enhance freedom of expression while addressing their inherent risks and complexities.

***