XRA XR ASSOCIATION

Federal Trade Commission
Office of the Secretary
600 Pennsylvania Avenue NW
Suite CC-5610 (Annex B)
Washington, D.C. 20580

November 21st, 2022

Dear Commissioners:

The XR Association (XRA) is pleased to submit comments in response to the Federal Trade Commission's ("FTC" or "Commission") advance notice of proposed rulemaking ("ANPR") regarding its potential "Trade Regulation Rule on Commercial Surveillance and Data Security," (R111004, Docket Number: FTC-2022-0053).

XRA represents the broad ecosystem of XR industry stakeholders including hardware manufacturers, technology platforms, software developers, component and peripheral companies, internet infrastructure companies, enterprise solution providers, and corporate end-users. Our members run the gamut from the world's biggest technology corporations to start-up companies with just a handful of employees. Our mission is to champion the thoughtful advancement of XR solutions to foster positive societal outcomes. We are leading the way for the responsible development and adoption of virtual reality (VR), augmented reality (AR), and mixed reality (MR) – collectively "XR" technology – by convening stakeholders, developing research and best practices, and advocating on behalf of our members and the broader XR industry.

Introduction

XR technology is poised to change the way we work, play, learn, and communicate and will improve people's lives. Although XR is still relatively nascent, it is already having a positive impact in sectors including healthcare, education, manufacturing, public safety, and urban planning to name just a few. XR is unique in that it allows the user to interact with digital content and engage with other users while enjoying a sense of physical presence, thus enriching the experience. This concept of "immersion" distinguishes XR from traditional two-dimensional (2-D) platforms, which simply display information on a flat screen. In order to create a safe and accurate immersive environment, XR technology captures and utilizes certain data including - in some, but not all cases - location and spatial information; data about the body; and eye-tracking data.

Members of the XR community keenly appreciate that the collection and use of this type of data raises questions about user privacy and are actively working to earn user trust by increasing transparency; implementing privacy by design; giving users power over how their data is used; and educating users about how XR technology works. The XR industry is committed to cultivating a positive relationship with the XR consumer – whether in the context of personal use or on an enterprise scale – and, as discussed above, XRA's objective is to foster positive societal outcomes. However, XR is still emerging as a suite of technologies, and

perfecting solutions like "privacy by design" will be incremental, and will take time. Although some issues can be addressed through policy decisions alone, others must be tackled through engineering advancements and other technology breakthroughs.

With that in mind, XRA encourages the FTC to narrowly tailor any potential rulemaking so as to avoid unduly restricting XR innovation at this pivotal point in its development. For the XR industry to reach its full potential and benefit all of society, the industry needs some degree of latitude to grow and innovate. Developers and manufacturers must be permitted to take some risks, and to try and sometimes fail, in their pursuit of continual improvement. As Public Knowledge CEO Christopher Lewis recently said, "As policymakers, advocates, [and] users of technology around the country, we have to do the hard work of finding solutions that are not overreactions, but actually deal with the specific challenges that we're seeing."[1] We hope the FTC will think of the XR Association and its member companies as partners with the common aim of bringing this remarkable technology to users across the country in a safe, secure, and beneficial way.

With that in mind, this paper will discuss the role of certain types of data in XR technology; how that data contributes to safe and enjoyable experiences; how data supports the critical advancements in technology that improve outcomes for people and enterprises; and how this information should inform the FTC's thinking with respect to the ANPR.

Discussion

Although XR technology is often associated with entertainment and social activities like social media and gaming, those are just part of its applicability. XR technology is currently experiencing broad adoption as an enterprise solution across a wide variety of sectors, as will be discussed below. To be sure, XR technologies are still in their infancy. But they have already demonstrated significant benefits which will only increase as the technology matures.

I. Current Uses of XR Technology and its Benefits to American Communities

XR technology has been playing an important role in improving efficiency, enhancing creativity, and supporting superior outcomes at enterprise scale for several years. Businesses of all kinds and individual adopters have realized its value. Below are just some examples of the ways in which XR technology is currently benefiting American communities.

Urban Planning, Infrastructure, Transportation, and Workforce Preparedness

As America seeks to develop modern, sustainable infrastructure for the 21st century, the United States is investing in traditional projects like improving roads, tunnels, and bridges, as well as clean energy and efficient transportation networks. As part of this effort, it is important to also assess how best to prepare America's workforce to build and maintain these systems. XR is providing solutions to all of these challenges, and helping industries across the board become more innovative, more productive, and safer while delivering cost savings.

---

[1] Culhane, Mallory, "POLITICOPro Morning Technology," *POLITICO,* 16, Sept. 2022

Urban Planning and Infrastructure: Immersive technology allows architects, engineers, and construction workers to create digital twins to identify and plan around existing electricity, gas, and sewage networks, and assess potential changes to traffic flows, providing an unmatched opportunity to resolve design flaws before and during the construction phase, saving time and money and mitigating risk.[2] Immersive technology models can also help identify engineers understand what led to an asset failure and how to improve future maintenance or even guide workers in the field directly to an asset that needs attention.[3]

Transportation: The railway industry is leveraging VR to evaluate tracks and carryout maintenance remotely, predicting problems before they happen and reducing the hazards of in-person labor. AR is helping the industry to ease overcrowding on subways, eliminate bottlenecks, improve wayfinding and security checks, and enhance scheduling.[4]

Workforce Training and Preparedness: Immersive technology is helping workers adapt to new environments and develop new competencies. In the height of the Fourth Industrial Revolution[5] which has seen greater integration of technology with the physical and biological spheres, workers are increasingly expected to upgrade their skills quickly and efficiently throughout their careers. In an XR Association survey conducted by the Martec Group, almost half of HR professionals believe that XR technology leads to better training and development outcomes, 46% see XR as a way to increase work efficiency and time savings, and 45% see XR as a way to expand distance learning.[6] In the transportation and construction industries, XR uptake is extremely high with over 90% of HR professionals in those fields having used XR.[7] What's more, AR is facilitating remote collaboration, allowing off-site experts to connect with workers in the field in real time via a live-shared view of the environment. With AR technology, supervisory personnel can see exactly what local engineers and technicians see and work with them from a distance, streamlining collaboration. The result: improved knowledge transfer and cost savings.[8]

Healthcare

---

[2] Global Infrastructure Hub. "Virtual and Augmented Reality for Planning and Design." *Global Infrastructure Hub - A G20 INITIATIVE*, Global Infrastructure Hub, 3 Nov. 2020, www.gihub.org/infrastructure-technology-use-cases/case-studies/virtual-and-augmented-reality-for-planning-and-design/

[3] XR Association. "Immersive Technology and Infrastructure: Building America's Future." *XR Association*, 2021, https://xra.org/wp-content/uploads/2021/06/XRA_Immersive-Technology-and-Infrastructure_Whitepaper-1.pdf.

[4] Future Rail, "How is Augmented Reality Changing Rail Operations?," *Future Rail,* Feb. 2022, https://rail.nridigital.com/future_rail_feb20/how_is_augmented_reality_changing_rail_operations

[5] Schwab, Klaus. "The Fourth Industrial Revolution: What It Means and How to Respond." *World Economic Forum*, 14 Jan. 2016, www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/.

[6] XR Association. "XR-Based Workforce Training Identified as Key Tool in Addressing America's Employment Crisis." *XR Association*, 20 June 2022, https://xra.org/xr-workforce-training-addressing-americas-employment-crisis

[7] *Ibid*

[8] "Executive Summary: The Future of Jobs - Employment, Skills, and Workforce Strategy for the Fourth Industrial Revolution." *World Economic Forum*, Jan. 2016, www.weforum.org/docs/WEF_FOJ_Executive_Summary_Jobs.pdf.

Over the past decade, XR technology has shown great potential to enhance medical training, advance healthcare interventions, and improve people's lives. Indeed, XR's use in healthcare is on the rise, from the operating room to the medical classroom, from pain management and rehabilitation to mental health. Experts estimate the market for XR in healthcare to reach over $10B by 2026.[9] This is linked to increasing disease awareness, improved information technology systems, and a demand for innovative diagnostic tools.

Medical Training: XR allows medical students to repeatedly practice techniques in virtual environments at no risk to patients. Virtual environments simulate the movements and reactions of living patients, ultimately mitigating error, and promoting superior health outcomes. VR also offers experiential surgical education, helping surgeons increase their skill level. Surgeons at the Cleveland Clinic are using Microsoft's HoloLens to layer virtual, three-dimensional projections of their patients' anatomies atop their bodies, improving efficiency and reducing procedure time.[10]

Pain Management, Chronic Pain, and the Opioid Crisis: Physicians are actively exploring virtual reality technologies as an alternative to pain relieving prescriptions, including opioids. VR is a mind-body treatment that does more than just distract the mind from pain - it also helps to block pain signals from reaching the brain, offering a drug-free supplement to traditional pain management.[11]

PTSD: Researchers, companies, universities, and the U.S. Government are utilizing XR technology to improve the effectiveness of treatment for post-traumatic stress disorder (PSTD). In collaboration, virtual reality, exposure therapy, and biofeedback sensors can diagnose and treat PTSD. The Department of Veterans Affairs uses VR exposure therapy to treat soldiers with PTSD and has found that there are several advantages of using VR to help treat PTSD, such as the patient being exposed to stimuli and environments that are otherwise difficult to access, and the therapist having a high degree of control over the situation.[12] Furthermore, veterans have reported positive engagement and that the VR experience makes them stick with their treatment.[13]

Stroke Rehabilitation: Virtual reality-based rehabilitation programs are becoming an important complement to conventional motor therapy for stroke patients and individuals with neurodegenerative diseases. Immersion in virtual environments stimulates several sensory systems, especially sight and hearing, and intensifies central nervous system information input

[9] Carter, Rebekah. "Building A Business Case For XR In Healthcare," *XR Today*, 22 January 2022, https://www.xrtoday.com/mixed-reality/building-a-business-case-for-xr-in-healthcare/

[10] Furnari, Frank. "AR/VR Technology Set to Transform Medical Training." *Training Industry*, 22 June 2022, www.trainingindustry.com/articles/learning-technologies/ar-vr-technology-set-to-transform-medical-training

[11] Hoffman, Hunter G. "Interacting with Virtual Objects via Embodied Avatar Hands Reduces Pain Intensity and Diverts Attention." *Nature News*, Nature Publishing Group, 21 May 2021, www.nature.com/articles/s41598-021-89526-4.

[12] Huckfeldt, James W. "Virtual Reality Therapy Helps Treat PTSD and Cognitive Impairment." *VA News*, 2 Aug. 2022, www.news.va.gov/104081/virtual-reality-therapy-helps-treat-ptsd-and-cognitive-impairment

[13] Wood, Dennis P., et al. "Combat-Related Post-Traumatic Stress Disorder: A Case Report of Virtual Reality Graded Exposure Therapy with Physiological Monitoring in a U.S. Navy Officer and a U.S. Army Officer." *Cureus*, 15 Nov. 2021, www.cureus.com/articles/56511-combat-related-post-traumatic-stress-disorder-a-case-report-of-virtual-reality-graded-exposure-therapy-with-physiological-monitoring-in-a-us-navy-officer-and-a-us-army-officer.

and output. Recent studies indicate that VR rehabilitation improves walking and increases activation in cortical regions of stroke survivors.[14]

Public Safety

Nothing is more fundamental to a thriving community than public safety. Officials recognized early on the advantages XR technology provides in ensuring personnel are well-trained and properly equipped for their missions. What's more, XR allows individuals in high-risk, high-stakes professions like law enforcement and firefighting to experiment with various techniques and perfect skills in realistic, but perfectly safe, environments.

Firefighting: Augmented reality technology allows firefighters to see through smoke to identify the people and objects in a smoke-filled space, potentially saving lives—including the firefighter's own. Additionally, virtual reality is helping firefighters train for life-threatening, real-world situations safely and effectively by simulating unusual incidents that otherwise cannot be easily replicated. [15]

Disaster Management: Disaster Management is a complex process requiring swift action based on incomplete information. Several government agencies are exploring the unique advantages of VR-based training for disaster preparedness and response. Among them, the Centers for Disease Control and Prevention (CDC) is leveraging VR to offer laboratory professionals the opportunity to experiment in a safe and controlled learning environment— allowing them to make mistakes without suffering real-world consequences.[16]

Law Enforcement: Virtual reality is helping police officers hone the skills needed to de-escalate tense situations. By virtually putting officers in the shoes of their subjects, VR facilitates a perspective shift, imparting an understanding of how officers' body language and chosen commands influence outcomes. These skills can be particularly impactful in situations involving subjects living with psychiatric or cognitive disorders.[17]

Education and Accessibility

XR is bringing people closer together by facilitating shared experiences and allowing individuals to walk in one another's shoes. Sometimes referred to as "the ultimate empathy machine," virtual reality in particular allows users to see the world through the eyes of another. For example, film producer Chris Milk worked with the United Nations to create a virtual reality film, *Clouds Over Sidra*, that puts the viewer inside a Syrian refugee camp and follows a day in the life of 12-year-old Sidra, a girl who has lived there for 18 months with thousands of other

[14] Xiao, Xiang, et al. "Cerebral Reorganization in Subacute Stroke Survivors after Virtual Reality-Based Training: A Preliminary Study." *National Library of Medicine - National Center for Biotechnology Information*, 28 June 2017, www.ncbi.nlm.nih.gov/pmc/articles/PMC5506482/

[15] Huergo, Jennifer. "In the Eye of the Fire." *NIST*, 28 May 2019, www.nist.gov/feature-stories/eye-fire.

[16] "Virtual Reality Laboratory Training," *Centers for Disease Control and Prevention*, https://www.cdc.gov/labtraining/vr.html

[17] XR Association. "XR Technology and Public Safety." *XR Association*, Jan. 2021, https://xra.org/wp-content/uploads/2021/02/XRA_Slicks_PublicSafety_VF-Jan-21.pdf

refugees. Psychologists, neuroscientists, and researchers around the world are using XR to learn more about issues like mutual respect, gender identity, physical limitations, and immigration.[18]

XR is also expanding experiences for users with disabilities, making once-inconceivable experiences available to users with limited mobility, sensory impairments, and cognitive disabilities. Beyond democratizing experiences, the XR industry is also focused on ensuring XR technology is itself accessible. To that end, XRA published its Developers Guide — "Accessibility & Inclusive Design in Immersive Experiences"— a set of best practices for platform and application developers on creating programs that can be enjoyed by all.[19]

In terms of classroom use, educators can "bring" students to the Great Wall of China, the Greek Acropolis, or Rembrandt's painting studio to enhance their lessons. Studies have shown that learning retention is increased significantly through VR versus traditional media and methods: the National Training Laboratory found that learners using VR had a retention rate of 75%, compared to 10% for reading and 5% for lectures.[20]

<u>Supporting Individuals with Limited Mobility, Sensory Impairments, and Cognitive Disabilities</u>

For users with limited mobility, VR's ever-expanding range of sights and sounds can mean the ability to explore caves, play sports, and summit mountains. In VR, a once-avid skier living with mobility impairments can virtually reconnect with the thrill of the sport. For the hearing impaired, developers are creating AR glasses can provide a holographic interpreter to translate verbal speech into sign language in real time, helping people to achieve new levels of independence. For the blind, AR devices using artificial intelligence (AI) to extract different kinds of information from images and then speak the images out loud so the user has a greater understanding of the environment around her. These devices can describe scenes, detect colors, find objects, read complex documents and letters, and more. [21] VR is also helping individuals with autism to navigate virtual social situations and develop life skills that can lead to secure employment and independent living.[22]

<u>Classroom Education</u>

Almost every student enjoys a school trip, whether that be to a museum, monument, or even another country. Unfortunately, many students are unable to experience them, for a variety of reasons. This could be due to a disability, the expense, or transportation issues, among other reasons. Field trips in VR overcome all of these limiting factors. What's more, when it comes to

[18] Alsever, Jennifer. "Is Virtual Reality The Ultimate Empathy Machine?."
https://www.wired.com/brandlab/2015/11/is-virtual-reality-the-ultimate-empathy-machine/
[19] XR Association. "XRA's Developers Guide, Chapter Three: Accessibility & Inclusive Design in Immersive Experiences." *XR Association*, XR Association, 7 July 2021, https://xra.org/research/xra-developers-guide-accessibility-and-inclusive-design
[20] Masie, Elliot. "Virtual Reality: Opportunities for Learning?" https://vrmaster.co/virtual-reality-learning-report-masie-com/
[21] Carlton, Bobby. "Caltech Scientists Use AR to Help the Blind Navigate." *VRScout*, 11 Dec. 2018, www.vrscout.com/news/caltech-ar-helps-blind-navigate
[22] PEAT, and XR Association. "Inclusive XR in the Workplace." *Peatworks*, XRA + PEAT, 21 Apr. 2022, www.peatworks.org/futureofwork/xr/inclusiveworkplacexr/

learning about an environment, there is no substitute for being there – and this is where VR really shines. With a virtual field trip, students actually feel as though they are at the location and can get a better sense of the scale and the surroundings.

VR is also making a difference in STEM education. Visualizing inherently abstract concepts in physics, engineering, mathematics, chemistry, and biology is often very difficult for students and discourages them from pursuing these fields from an early age. Using VR, students are able to take a different approach like exploring geometric shapes in 3-D, following signals through the nervous system, and seeing the behavior of physical structures under different loads and environmental conditions. Educators have found information retention improves when the individual is engaged in such diverse multi-level experiences - and so does student confidence.

II.   How XR Technology Works

Hardware*:* Although some XR experiences can be accessed via mainstream devices like smartphones, laptops, or gaming consoles, more sophisticated applications require the use of AR glasses or a VR headset, handheld controllers, and other sensors and input mechanisms that enable a more immersive experience.

Software: AR/VR experiences require programs and code to run on the physical hardware. Software must translate a user's sensory and tactile inputs into the physical layout of a virtual space (when the user kicks a virtual ball, the ball rolls) or to create augmented reality experiences such as 3-D object modeling (e.g., extrapolating a 3-D model of a fingernail to enable the user to try a virtually superimposed nail polish color).

Data Collection and Use: XR technologies are powered by the interplay of multiple sensors that use data, and various algorithms and automated systems, such as machine learning (ML). Sensor and location data are used to accurately place the user within an experience, position them in relation to virtual content, and create spatial awareness of the real-life physical space. In immersive experiences, the user can then utilize physical controllers, hand gestures, and eye movement to interact with both content and other users.[23]

XR technology is unique in that it must utilize certain bodily data and other sensing information to create the immersive experience. A 2021 report issued by the Institute of Electrical and Electronics Engineers (IEEE) aptly describes the intrinsic role that data has in the functioning of XR technology and the benefits it can provide:

"Such sensing underpins much of the core functionality that makes this technology, and the software that runs on it, so compelling to futurists. It drives the capability to create more usable spatial interactions, enables new applications that better address accessibility needs, and enhances understanding of the user's context, behavior, and needs that drive better AI assistants. For example, an XR headset without *sophisticated optical sensing would feature greatly degraded performance in all use cases. Many current consumer devices would lose the ability to accurately track its position and orientation in the world,*

---

[23] XR Association. "Into the Digital World: XRA's Guide to Immersive Technology." *XR Association*, 3 Oct. 2022, https://xra.org/howxrworks/

meaning it would be unable to render exocentric (world-fixed) spatial virtual content that underpins virtual and augmented reality experiences."[24]

In other words, XR technology requires the collection and use of specific data in order to operate.

III.   A Word About the Future of XR and "the Metaverse"

There has been a great deal of talk about "the metaverse" this past year. Although opinions vary as to what exactly the metaverse will look like, there is general agreement that it will be the successor to the 2-D internet. As National Public Radio (NPR) wrote, "think of [the metaverse] as the internet brought to life, or at least rendered in 3D."[25] To be clear, *XR technology is not the metaverse*. Rather, XR will serve as a tool through which we can interact in the metaverse, much the way the smartphone serves as a tool to access the internet today. What's more, while AR and VR can be used to engage socially, XR technology should not be conflated with social media platforms.

All that said, given XR's utility at enterprise scale and its future use as a tool to access the next iteration of the internet (i.e., the metaverse), it is likely that XR technology will become a part of everyday life for millions of people around the world within the next 5-10 years. Thus, now is the time to identify possible challenges for user privacy and to develop sensible, future-proofed policy solutions that protect individuals while allowing the technology to achieve its full potential. The XRA and our member companies take that mandate very seriously.

IV.   The XR Industry's Approach

XRA member companies keenly understand that when users provide their data, they do so trusting companies to keep that information confidential and secure. XRA has made formal commitments with respect to that responsibility through our "Privacy Basics."

Privacy by design is the goal: *Privacy by design is a mantra of the XR industry, and manufacturers should work toward privacy-protective defaults for their devices. Because of significant engineering challenges, there will sometimes have to be trade-offs. For example, data storage and processing require a lot of computing power – which means bigger, heavier hardware. So, storing your data on your VR headset would require the headset to be larger and clunkier. To keep the device compact, light, and untethered, information might be stored in the cloud. Industry scientists are continually working on solutions to engineering challenges like this one. XRA members share a deep commitment to consult with various stakeholders, and through consultation and innovation, further the development of "privacy by design" to the greatest extent possible.*

---

[24]McGill, Mark, "Extended Reality (XR) and the Erosion of Anonymity and Privacy," *Institute of Electrical and Electronics Engineers*. 29 Nov. 2021, https://standards.ieee.org/wp-content/uploads/import/governance/iccom/extended-reality-anonymity-privacy.pdf

[25] The Associated Press. "Facebook Wants to Lean into the Metaverse. Here's What It Is and How It Will Work." *NPR*, NPR, 29 Oct. 2021, www.npr.org/2021/10/28/1050280500/what-metaverse-is-and-how-it-will-work

You should understand the technology you are using: *Although XR technology is complex, and most users don't have the technical background needed to fully grasp its nuances, fundamental concepts can be explained in a way that every user can understand. The XR industry should provide opportunities for you to learn more about how XR technologies work and why certain user data is needed to create an immersive experience. XRA recently published an infographic to explain the basics as we follow XR user "Kayla" through her day as she uses VR, AR, and MR for a variety of experiences.*

You are in control of your data*: The collection and use of sensor data has an important role in creating the XR experience. For example, some virtual reality headsets use eye tracking to provide a more realistic sense of what appears in the user's view and to reduce motion sickness. But that doesn't mean the eye tracking data collected should be used for any purpose other than delivering the XR experience without your knowledge. Ultimately, giving users control over XR sensors will be important.*

Privacy policies should be clear*: Transparency matters. Manufacturers should present their privacy practices in a clear, specific way and provide the opportunity for the user to decide what level of data collection they are comfortable with. Some immersive experiences are not possible without the collection and use of certain information. In those situations, the XR user and the XR technology provider should be partners in the XR experience - which means trust is essential. Nothing should be hidden or obfuscated.*

Bystanders have a right to privacy, too*: Just as the XR user has a right to privacy, so does the person who inadvertently comes into the XR user's space. While it is not possible to have complete privacy as a bystander in today's world of ubiquitous sensors in both public and private environments, the bystander should – at the very least – have opportunities to learn XR technologies are operating around them.*

Children are our collective responsibility: *Protecting young people is a top priority for all of us, and the XR industry has an important role to play by developing products that promote young people's wellbeing from the outset. The industry should also do everything it can to provide parents and guardians the knowledge and the tools they need to support their kids' use of XR technology for safe, positive, and age-appropriate experiences.*

 XRA and its member companies strive to advance these principles each and every day. Many of our member companies have developed tools to enhance data protection and online safety as well as give users greater control over the collection and use of their data. For example, some XRA member companies have made certain features that collect bodily data be off by default, requiring users to opt-in if they want those functions. Many XRA members have also instituted parental control features to ensure that young people's data is kept safe and that kids are only accessing age-appropriate content.[26] And although, there are computing and form factor limitations to current XR devices, XR companies also seek to process certain types of data on

---

[26] HTC VIVE. "VIVE Guardian: VR Parental Control Solution." *Vive Guardian: VR Parental Control Solution*, HTC VIVE, 11 Apr. 2022, www.htc.com/blog/vive-guardian-vr-parental-control-solution/

device and delete data once it is no longer needed for functionality.[27] Further, user data is often encrypted, and many companies require multi-factor authentication to ensure data is securely maintained.[28]

Not only is protecting user data and respecting user privacy the right thing to do, but it also makes business sense. If consumers fear companies are exploiting or mishandling their data, or operating in a deceptive manner, they will certainly not be inclined to use those companies' products, devices, and services. Thus, there are multiple incentives for industry players to prioritize the user's best interest.

V.   The Importance of Context-Conscious Regulation

As a 2019 Harvard study on the impact of regulation on innovation recognized, "there is considerable literature on the economic impacts of regulations, but relatively few studies on the impact of regulation on technological innovation. Most analyses focus on the static costs (and benefits) of regulation rather than on its dynamic effects. Yet these potential effects on innovation and growth are likely to be much more important in the long run. Herberger triangles may be small, but rectangles can be very large."[29] Consequently, the costs versus benefits of an expansive rulemaking must be carefully considered.

The FTC's existing regulatory and enforcement authority has been effective in securing improved outcomes for consumers and provides a strong foundation from which the Commission may chart a narrowly tailored regulatory course that targets specific privacy and security harms without restricting or limiting technological innovations. This is largely attributable to Congress's decision to take a sector-specific approach to privacy regulation, reflecting how the tradeoffs between privacy and other important values may differ depending on the context.

If the FTC were to implement rules that did not take into account context, it would risk eliminating the benefits of XR to society by restricting the industry's ability to obtain critical data. For example, this paper has already addressed how eye tracking and foveated rendering can deliver a safer, more enjoyable experience for the user. But XR technology using this same type of data can also "create an option for users with significant mobility disabilities, such as paralysis or severe tremors, to select eye-tracking as their primary way of manipulating the interface," thus making more platforms and services accessible.[30] If the FTC were to implement rules with overly rigid data minimization or purpose limitations that did not consider the follow-on benefits of using certain kinds of data, it would risk eliminating these benefits.

---

[27] Meta. "Responsible Innovation." *Meta*, Meta, www.about.meta.com/metaverse/responsible-innovation/?utm_source=about.facebook.com&utm_medium=redirect.

[28] Evmill, et al. "Hololens Security Overview." *Microsoft*, Microsoft, 13 Oct. 2022, www.learn.microsoft.com/en-us/hololens/security-overview

[29] Aghion, Philippe, et al. "The Impact of Regulation on Innovation." *Harvard Scholar*, Harvard University, Mar. 2019, www.scholar.harvard.edu/files/aghion/files/impact_of_regulation_on_innovation.pdf.

[30] Fox, Dylan, and Isabel Guenette Thornton. "Extended Reality (XR) Ethics and Diversity, Inclusion, and Accessibility." *IEEE Standards Association*, Institute of Electrical and Electronics Engineers, 21 Apr. 2022, www.standards.ieee.org/wp-content/uploads/2022/04/Ethics_Diversity_Inclusion_Accessibility.pdf.

As Helen Nissenbaum, professor of information science at Cornell Tech, has described in her work on the concept of "contextual integrity," information flows should be considered relative to the stakeholders within a specific context who are trying to achieve a common purpose or goal. Nissenbaum's theory of privacy reflects the context dependent nature of privacy where "context" is defined as differentiated social spheres defined by important purposes, goals, and values, characterized by distinctive ontologies, roles, and practices (e.g., healthcare, education, family); and norms, including informational norms.[31] Because XR technology is not monolithic, and because it can be leveraged for such a wide variety of purposes from healthcare to gaming and from urban planning to job training, the FTC should consider the data captured by XR and privacy rights attached to that data in the context of the particular application at issue. In other words, context matters. Thus, an overly broad rule could have the unintended effect of undermining the user's access to a valuable benefit. In order to protect user privacy while allowing American ingenuity to flourish, any regulation pertaining to XR technology should be tailored as narrowly as possible.

Furthermore, Congress has not authorized the FTC to adopt a comprehensive data protection rule, although legislative debates on the issue have made remarkable progress in the past year. To the extent new legislation is needed, XRA has been supportive of Congressional efforts to establish a federal data protection law. Such a law would create an unequivocal bar of conduct and instill both consumer confidence that their data is protected, and also provide regulatory certainty to ensure that all technologies are developed to the same high privacy-protecting standards from day one. If not properly scaled and targeted, the proposed rulemaking could risk short-circuiting that effort.

VI.   Best Practices and the Value of Self-Regulation

As stated above, XRA and its member companies continually strive to protect their users' privacy and earn their trust. What's more, because of their intimate knowledge of how their technology works, it is industry experts that are best positioned to develop the standards, best practices, and tools that will protect users while also allowing for continued innovation. As previously noted, while some privacy issues can be addressed through policy decisions alone, others must be solved through engineering advancements and technology breakthroughs. Members of the XR industry understand the intersection of policy measures and engineering solutions and can recommend and implement strategies that optimally leverage both.

And this is not unique. Many industries successfully self-regulate. Self-regulation allows for better alignment with sector-specific or situation-specific needs. For instance, the Better Business Bureau operates numerous tailored self-regulatory programs such as the National Advertising Review Board, the Children's Food and Beverage Advertising Initiative, the Direct Selling Self-Regulatory Council, and the Digital Advertising Accountability Program.[32] Each of these programs meets a specific need, allowing for regulation to be more impactful because it

[31] Bye, Kent. "#998: Primer on the Contextual Integrity Theory of Privacy with Philosopher Helen Nissenbaum." *Voices of VR*, Voices of VR, 24 June 2021, www.voicesofvr.com/998-primer-on-the-contextual-integrity-theory-of-privacy-with-philosopher-helen-nissenbaum

[32] Better Business Bureau. "BBB National Programs: All Programs." *BBBPrograms*, Better Business Bureau, www.bbbprograms.org/programs/all-programs

can be narrowly targeted. What's more, self-regulation can even prove effective in concert with government oversight. For example, self-regulatory organizations (SROs) such as the North American Electric Reliability Corporation (NERC), which oversees standards to the electrical grid, and the Financial Industry Regulatory Authority (FINRA), which regulates the securities industry, successfully operate with oversight by the government, but not direct involvement.

Self-regulation involves collaboration to solve difficult problems – while focusing on practical measures to address specific challenges. Self-regulatory systems are probably the most flexible and adaptable way to manage rapidly changing industries such as those where cutting-edge innovation is involved because self-regulation involves collaboration to solve difficult problems – while also focusing on practical measures to address specific challenges.[33] Industry best practices can also help avoid conflicting, and at times backward-looking, regulations that risk stifling innovation in the name of protecting consumers without actually helping either cause. [34] In fact, the FTC itself concluded that, "A well-constructed self-regulatory regime has advantages over government regulation. It conserves limited government resources and is prompter and more flexible than government regulation."[35]

VII.   Way Forward: Narrow Tailoring and Partnership with Industry

There is broad consensus, even among some of the toughest critics, that XR is poised to change the world – and that, if we get it right, it will bring people together for the betterment of society. But no single group will ensure XR technology is responsibly developed, adopted, and utilized. Lawmakers and policymakers; manufacturers and developers; scientists and academics; activists and advocates all have important roles to play.

As discussed above, the XR industry itself is well-positioned to develop its own best-practices because it understands the intricacies of the technology and the engineering tradeoffs involved in privacy by design. But the U.S. Government can play a meaningful role here as well. In 2022, the U.S. Congress recognized the critical importance of XR technology in the CHIPS and Science Act, where it included "immersive technology" among its list of ten key technology focus areas designated for critical R&D funding from the National Science Foundation and the National Institute of Standards and Technology.[36] It is essential that in implementing this research and development, industry and the government work together. Indeed, many groups of stakeholders should be involved. As Dr. Arun Ross, Site Director at the NSF Center for Identification Technology Research, said:

---

[33]Ostrom, Elinor. "Polycentric Systems as One Approach for Solving Collective-Action Problems." *Social Science Research Network*, Indiana University, Bloomington: School of Public and Environmental Affairs, 2 Sept. 2008, www.papers.ssrn.com/sol3/papers.cfm?abstract_id=1936061.

[34]Shackelford, Scott. "Companies' Self-Regulation Doesn't Have to Be Bad for the Public." *The Conversation*, The Conversation US, 12 June 2019, www.theconversation.com/companies-self-regulation-doesnt-have-to-be-bad-for-the-public-117565.

[35] "Self-Regulation in the Alcohol Industry: Report of the Federal Trade Commission." *Federal Trade Commission*, Federal Trade Commission, June 2008, www.ftc.gov/reports/self-regulation-alcohol-industry-report-federal-trade-commission.

[36] The CHIPS and Science Act of 2022 (P.L. 117-167)

"A consortium consisting of researchers, practitioners, legal scholars, ethicists, policymakers, and end- users must be established in order to address privacy aspects of the technology in a systematic and comprehensive manner. Privacy should never be an afterthought; rather, it should be a factor that is prominently considered during the design and development."[37]

In this spirit, industry will continue working with scientists and developers to create tools that empower consumers to protect themselves. And organizations like the XR Association will continue to bring a wide variety of stakeholders together to both identify issues and develop the policy and technical approaches to address them.

Conclusion

The XR Association hopes this discussion has effectively educated the Commission as to how XR technology works, the distinctions between XR technology and 2-D web platforms, the important role data plays in ensuring safe XR experiences, the benefits XR can confer on society with continued room for innovation, and the importance of privacy protection the XR industry. XR is at a pivotal point in its development as an emerging technology. Broad rules not tailored to concrete harms would not only limit its current value to users, but may also foreclose future innovations and consumer benefits.

We urge the FTC to take a well-considered, measured approach to regulating the use of data with respect to XR. To ensure that the XR industry can continue to deliver the benefits discussed in this comment (as well as many others) and secure America's role as the leader in XR innovation, the FTC should partner with industry and other interested stakeholders to chart a path forward. That path should build on the Commission's existing privacy and security regulatory framework; encourage industry's implementation of robust, good faith best practices; and support the research and development (R&D) that will allow this remarkable technology to reach its full potential and benefit industries and individuals around the globe.

The XR Association looks forward to continuing its work with the FTC and policymakers on these and other issues.

---

[37]Ross, Arun Abraham. "Privacy in the Age of Biometrics." *U.S. House of Representatives Committee on Science, Space, & Technology*, 29 June 2022, www.science.house.gov/imo/media/doc/Testimony_ArunRoss_June2022.pdf.