# REALITY CHECK:

## Why the U.S. Government Should Nurture XR Development

### *Executive Summary*

XRA XR ASSOCIATION

DIGITAL TRADE & DATA GOVERNANCE HUB

In a world where geopolitical power is increasingly linked to technological advancement, the United States government should nurture XR development in a strategic and systemic way. If it fails to do so, other nations may step in to lead the world in the development, adoption, and governance of a technology that is poised to transform the way we live, work, communicate, and deliver essential human services.

Immersive technology – also called "XR" – includes virtual reality (VR), augmented reality (AR), and mixed reality (MR). This technology enables the integration of the physical world and various virtual elements and can be accessed through a variety of devices like head-mounted displays (HMDs), smartphones, tablets, and smart glasses. What is commonly referred to as "the metaverse" describes an emerging immersive, interconnected, and interoperable digital space that will leverage XR technology. While many in the United States still think of XR primarily in the context of gaming or entertainment, U.S. allies and competitors alike recognized years ago the power of this technology to impact critical sectors from manufacturing and infrastructure to healthcare and education, and they have developed a vision for its future. The United States is behind the curve.

XR technology matters because it is already driving economic growth, upskilling the workforce and creating new jobs, and it promises to become a multi-trillion-dollar industry by the end of the decade. It has also been designated a critical technology by both the National Science and Technology Council and the Department of Defense (DoD) because of its importance to national security and the economy.

In 2022, Congress listed immersive technology in the CHIPS and Science Act (P.L. 117-167) as one of the 10 "key technology focus areas" designated for U.S. government investment. XR will help the United States address some of its most important strategic challenges such as industrial productivity, workforce development, education and opportunity, and environmental sustainability. What's more, XR is widely expected to become the next major computing platform, succeeding the smartphone (as the smartphone succeeded the personal computer).

Yet, despite the government's acknowledgment of XR's importance and America's current standing as the world's largest market by revenue for immersive technologies and one of the world's largest producers of XR content and hardware, the United States has thus far not developed a strategy or institutional structure to nurture the XR sector. This lack of action puts the U.S. at a significant disadvantage and stands in contrast to other nations. If the United States does not correct course, it risks missing its opportunity to lead.

## Case Studies: The Enabling Environment and Fostering a Systemic Approach

For a new technology to flourish, policymakers must create an enabling environment that rests on three core pillars: capacity and support for innovation; regulatory certainty; and trust. However, because technologies constantly evolve, policymakers must also adopt a systemic approach. The Organisation for Economic Co-operation and Development (OECD) notes that a systemic approach allows a government to encourage innovation, provide a predictable regulatory environment, protect users from harm, and build trust as technologies change over time. South Korea, the United Kingdom (UK), the European Union (EU), and China have made significant progress toward creating an effective XR enabling environment. Although none has maximized every aspect of a systemic approach to nurturing XR, each government has a vision for XR's role in society and the economy, and is actively working to achieve that vision on multiple fronts.

### 🇰🇷 The Republic of Korea (South Korea)

South Korea is already a global leader in leveraging immersive technology to improve public services and the government is focused on creating the environment needed for the XR industry to grow. The Korean government implemented its Digital New Deal initiative to nurture the "hyper-connected and immersive emerging industries which will lead the digital future" and support Korean businesses to "go global" with innovative digital products and services. Korea has also established the Immersive Economy Policy Council to facilitate collaboration between the government and the private sector to nurture XR. It has published strategic roadmaps to proactively address regulatory challenges and opportunities associated with XR, and has implemented public service platforms using XR, like Metaverse Seoul.

### 🇬🇧 The United Kingdom

The UK is emerging as a global leader in the realm of digital twins (digital representations of physical objects, people, or processes, contextualized in a digital version of their environment) and has prioritized immersive technology as an essential component of its vision for a 21st century Cyber-Physical Infrastructure. The UK has also developed strategies and policies to nurture XR content creation and is starting to put in place the building blocks for a strategy to govern the metaverse.

### 🇪🇺 The European Union

The EU aims to be the world leader in the industrial use of XR and a dominant force behind the metaverse. The European Commission recently announced an investment of more than $10 billion in funding for critical technologies, including virtual reality, as part of its Strategic Technologies for Europe Platform (STEP). And in July 2023, the EU released an official recommended strategy, "An EU initiative on Web 4.0 and virtual worlds: a head start in the next technological transition," to set out proposed actions to ensure XR technologies develop in line with European values.

### 🇨🇳 The People's Republic of China (China)

China has integrated XR into its national industrial and technology strategies to position itself as a leading producer of immersive technology and to secure a commanding role in the XR sector. China has carefully engineered numerous strategies, such as the Action Plan for the Integration and Development of Virtual Reality and Industrial Applications (2022-2026), and has demonstrated a willingness and ability to subsidize, nurture, and govern data-driven technologies at both the national and regional levels. Moreover, certain cities have already taken significant steps to streamline and consolidate supply chains, hoping to facilitate the emergence of Chinese companies that can dominate the future of XR production.

## 🇺🇸 The United States

The United States is home to some of the world's largest producers of XR content and hardware, and the U.S. government has supported research in immersive technologies and invested in underlying infrastructure, like 5G. These lines of effort are further strengthened by the passage of the CHIPS and Science Act. However, the U.S. has not articulated a vision for XR. The U.S. is the world's epicenter for disruptive innovation, thanks to its exceptional research infrastructure and low barriers to entrepreneurs and start-ups. America should be the world leader in XR.

### Summary Chart of XR-Specific and Supporting Initiatives

| | Research and Innovation | Supporting Infrastructure | Vision for XR | Regulatory Approach to Build Trust |
|---|---|---|---|---|
| **SK** 🇰🇷 | • XR Device Centers and Hologram Centers<br>• XR Funds<br>• Metaverse Alliance | • Digital New Deal<br>• Metaverse Graduate School<br>• Metaverse Academy<br>• 5G+ Strategy Committee<br>• 5G+ Implementation Plan<br>• Data Dam | • Immersive Economy Policy Council<br>• Immersive Economy Development Strategy<br>• Digital Twin Activation Strategy<br>• Emerging Metaverse Industry Promotion Strategy<br>• Metaverse Seoul | • Metaverse Ethical Principles<br>• Metaverse Policy Council<br>• Preemptive Regulatory Innovation Plan for the Metaverse<br>• Metaverse Special Act*<br>• Personal Information Protection Act<br>• Biometric Information Protection Guidelines |
| **UK** 🇬🇧 | • Innovate UK<br>• Digital Catapult<br>• Audience of the Future Challenge Fund<br>• Creative Industries Clusters Programme<br>• UK Innovation Strategy- Prosperity Partnerships<br>• National Digital Twin Programme<br>• Digital Twin Hub | • UK Industrial Strategy<br>• UK Wireless Infrastructure Strategy | • Cyber-Physical Infrastructure<br>• Transport Digital Twin Vision and Roadmap 2035<br>• 2022 Metaverse Symposium | • Regulators' Pioneer Fund<br>• Regulatory Horizons Council Digital Regulation Cooperation Forum<br>• Regulatory Sandbox at ICO<br>• Digital Markets Unit at CMA*<br>• General Data Protection Regime<br>• Online Safety Regime |

| | Research and Innovation | Supporting Infrastructure | Vision for XR | Regulatory Approach to Build Trust |
|---|---|---|---|---|
| **EU** | • **Framework Programmes (Horizon 2020 and Horizon Europe)**<br>• **XR4Europe**<br>• **Destination Earth**<br>• **European Media and Immersion Lab**<br>• **European Virtual Human Twin*** | • **Digital Europe**<br>• **5G Action Plan**<br>• **European Chips Act** | • **EU initiative on Web 4.0 and virtual worlds**<br>• **VR/AR Industrial Coalition**<br>• **European CitiVerse*** | • **Virtual Worlds Toolbox ***<br>• **Virtual Worlds Citizens' Panels and Public Consultation**<br>• **General Data Protection Regime**<br>• **Digital Services Act**<br>• **Digital Markets Act**<br>• **AI Act*** |
| **CCP** | • **Made in China 2025**<br>• **Guiding Opinions for Accelerating the Development of the Virtual Reality Industry**<br>• **VR/AR Mass Fitness**<br>• **VR Towns**<br>• **Provincial XR Strategies (see Table 1)** | • **Internet+ Artificial Intelligence Three-Year Action and Implementation Plan**<br>• **Special Action Notice for the Innovation and Development of the Intelligent Hardware Industry**<br>• **New Generation Artificial Intelligence Development Plan**<br>• **Guiding Opinions on Expanding Information Consumption** | • **13th Five-Year Plan for Informatization**<br>• **Outline of the National Innovation-Driven Development Strategy**<br>• **13th Five-Year Plan for the Development of Strategic Emerging Industries**<br>• **White Paper on the Development of Virtual Reality Industry 5.0**<br>• **Action Plan for the Integration and Development of Virtual Reality and Industrial Applications (2022-2026)**<br>• **Industrial Clusters for the Metaverse**<br>• **Metaverse Industry Committee** | • **Metaverse Industry Professional Committee**<br>• **Personal Information Security Specification**<br>• **Regulations on the Administration of Deep Synthesis of Internet Information Services**<br>• **Provisions on the Administration of Internet Information Service Algorithm Recommendations**<br>• **Administrative Measures for Generative Artificial Intelligence Services** |

| | Research and Innovation | Supporting Infrastructure | Vision for XR | Regulatory Approach to Build Trust |
|---|---|---|---|---|
| US | • Human Centered Systems – NITRD<br>• Chuman – NITRD<br>• Synthetic Training Environment and Augmented Reality Sandtable at DOD<br>• Enhanced Dynamic GeoSocial Environment at DHS<br>• Immersed VR at FEMA<br>• EdSim at Ed<br>• VA Immersive<br>• Regional Technology and Innovation Hubs at Commerce<br>• Regional Innovation Engines at NSF | • National Strategy to Secure 5G<br>• Infrastructure Investment and Jobs Act<br>• CHIPS and Science Act | N/A | N/A |

*Not yet completed.*

# Opportunity For Both International Cooperation and U.S. Leadership

At the conclusion of their 2023 Annual Summit in Kyoto, Japan, the leaders of the world's largest economies, the G7, issued a Leaders' Communiqué that addressed the coming impact of XR technology and the metaverse, stating: **"We recognize the potential of immersive technologies, and virtual worlds such as metaverses, to provide innovative opportunities in all industrial and societal sectors, as well as to promote sustainability.** For this purpose, governance, public safety, and human rights challenges should be addressed at the global level. We task our relevant Ministers to consider collective approaches in this area, including in terms of interoperability, portability, and standards with the support of the OECD. We express our interest in possible joint cooperation in research and development on computing technologies. We also task our relevant Ministers to consider ways to further promote digital trade."

Thus, the United States has an invitation to partner with like-minded countries to shape the future of XR. In addition to the G7, there are a number of other multilateral fora where the U.S. is already helping bring together allies to shape the future technology landscape: the EU-U.S. Trade and Technology Council (TTC), the International Telecommunication Union (ITU), the Organisation for Economic Co-operation and Development (OECD), and the United Nations (UN) all provide opportunities for the U.S. to foster international cooperation


Source: U.S. Department of State

on XR technologies. **America's technological prowess, economic influence, and commitment to democratic values, however, make the U.S. well-positioned not just to participate, but to lead initiatives to develop, deploy, and govern XR.** As a pioneer in the creation of the technology, the U.S. possesses significant expertise and resources to guide international standards, regulations, and best practices in the field. In so doing, the U.S. can foster cross-border collaborations, facilitate knowledge exchange, and help ensure the responsible and ethical advancement of immersive technology worldwide. But first, the United States must develop its own strategic vision for XR.

# Recommendations

The U.S. government should develop a strategy, a structure, and policies to nurture XR in the way that it has for other critical technologies. Specifically,

## 1. Congress should introduce legislation authorizing an advisory council to develop a strategy to nurture XR in the United States.

Congress should authorize an advisory council to be established by the Department of Commerce in consultation with other government agencies. Diverse stakeholders with interdisciplinary expertise from academic institutions, the private sector, nonprofit and civil society entities should be appointed to the council.

The advisory council should be tasked with developing a comprehensive national strategy on immersive technology aimed at guiding and promoting its development and deployment across the U.S. economy.

## This strategy should include:

- An assessment of the specific measures — such as standards, regulations, investments, and improved trust and safety practices — that are needed to ensure that immersive technology is designed, developed, and deployed in a manner that protects people's rights and safety;
- An assessment of the national security benefits and risks associated with immersive technology and the ways in which benefits can be maximized and risks mitigated;
- An assessment of the role of immersive technology in the broader emerging technology ecosystem and how the U.S. can support the synergistic effects of such an ecosystem;
- Economic objectives around the development and use of immersive technology;
- A projection of the research and development investment needed to ensure the United States is the global leader in immersive technology development, production, and implementation;
- A plan for developing and retaining the talent and workforce needed to ensure America's position as the global immersive technology leader; and
- Recommendations for how the U.S. government can leverage immersive technology to service the public good.

## 2. Congress should empower U.S. government agencies to model how digital twins can be leveraged by the government to serve the public interest.

Governments around the world are increasingly using digital twins to solve complex problems, streamline government operations, and find efficiencies. The U.S. also funds digital twins for a wide range of uses including to predict floods, to model earth systems, and for defense purposes, but the U.S. can do more. Congress should authorize agencies including the Department of Transportation, the Department of Health and Human Services, and the Federal Emergency Management Agency to develop test beds for using digital twins to advance urban planning and sustainability goals, enhance healthcare delivery and education, and improve disaster response and mitigation, among other core societal challenges. Moreover, tasking U.S. agencies to model and develop digital twins would help the government establish best practices and common standards for deploying XR technology across the federal government.

## 3. Congress should pass a comprehensive federal data protection law.

In contrast with other countries examined in this report, the U.S. does not have an overarching law governing the use of data. Hence, Congress should pass legislation that clearly delineates the rights and responsibilities of both the individuals that provide data and the entities that collect, analyze, and control data. The law should be technology neutral. Businesses and individuals will benefit from the certainty of an overriding federal data protection law, as opposed to the current patchwork of municipal and state legislation.

## 4. The White House should establish structures to coordinate, enhance, and fund federal XR research and development.

Several agencies are involved in XR research and development efforts in the federal government, but they do not consistently coordinate and cooperate. Moreover, almost every key agency, from the Office of Science and Technology Policy (OSTP) in the White House to National Institute for Standards and Technology (NIST) in the Department of Commerce, has limited staff working specifically on XR. The same is true for Presidential and interagency advisory committees, including the National Science and Technology Council and the Networking and Information Technology Research and Development (NITRD) program which is responsible for coordinating and tracking R&D across federal agencies. The White House should designate an interagency working group within NITRD for CHuman, the project component area in which XR research is coordinated, to enable agencies to effectively align their research with the government's priorities, pool resources for foundational research, and facilitate the implementation of XR innovations. The White House should also appoint an individual in OSTP and on the National Science and Technology Council to be responsible for coordination of XR policy.

## 5. The Department of State should host a global summit to foster debate and cooperation around complementary regulatory and governance frameworks and ensure that XR technology reflects democratic values.

Because XR technology transcends national borders, and because there is currently no set of universal rules governing the technology, it is especially difficult to regulate. The Department of State, in consultation with other U.S. government agencies such as the Department of Commerce and Office of the U.S. Trade Representative, should host a conference with international leaders to foster consensus on principles, standards, and frameworks that could govern XR.

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## About The Digital Trade and Data Governance Hub

Since 2019, the Digital Trade and Data Governance Hub at The George Washington University has educated policymakers about digital trade, data governance and data driven change. The Hub is the only organization in the world that maps various types of data governance to show commonalities and differences. The Hub is now also part of the NIST–NSF Trustworthy AI Institute.

## About The XR Association

Founded in 2018, the XR Association (XRA) is the voice of the immersive technology industry. Representing the businesses large and small that are shaping the immersive future, XRA provides insight to XR stakeholders on the issues that matter most. The XR Association is leading the way for the responsible development and adoption of XR.

*Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the George Washington University.