
Public Policy for the Metaverse: Key Takeaways from the 2021 AR/VR Policy Conference



ELLYSSE DICK
NOVEMBER 2021

ITIF | **INFORMATION TECHNOLOGY
& INNOVATION FOUNDATION**

itif.org



Augmented and virtual reality technologies (AR/VR), also known as extended reality (XR)—immersive technologies that enable users to experience digitally rendered content in both physical and virtual spaces—have the potential to transform the ways in which people communicate, work, and learn. No longer just for niche enthusiasts or high-tech industries, these technologies are already being used across sectors to overcome physical space barriers and enhance how individuals can interact with the world around them.

As AR/VR technologies proliferate across homes, workplaces, classrooms, and other aspects of everyday life, they raise unique considerations for policymakers. To bring these considerations to the forefront of policy debates, the Information Technology and Innovation Foundation partnered with the XR Association to host a half-day Augmented and Virtual Reality Policy Conference on October

21, 2021. The conference brought together 21 speakers from across sectors and industries to discuss key considerations and potential recommendations for policymakers as we move toward a more immersive future.

Awareness and interest in the power and potential of AR/VR are certainly growing among policymakers. For example, the 2021 U.S. Innovation and Competition Act identifies “immersive technology” as one of 10 key technology focus areas. The VR TECHS Act, introduced in 2019, proposed creating a “Federal Advisory Committee on the Usability of Reality Technologies Within the Federal Government.” And the Congressional Caucus on Virtual, Augmented, and Mixed Realities was formed in 2017 to enable members “to educate [their] colleagues and others to ensure Congress is doing all it can to encourage—rather than hinder—these enterprising fields.” However, AR/VR technologies and their applications are rarely considered in broader

discussions of key policy issues, including privacy, security, online safety, and the future of education and work.

Through a series of expert talks and panels, speakers at the AR/VR Policy Conference provided a glimpse at what a policy agenda for an immersive future might look like. This post reviews some of the key takeaways from these discussions.

A full recording of the event is available on the conference website at www.arvrpolicy.org.

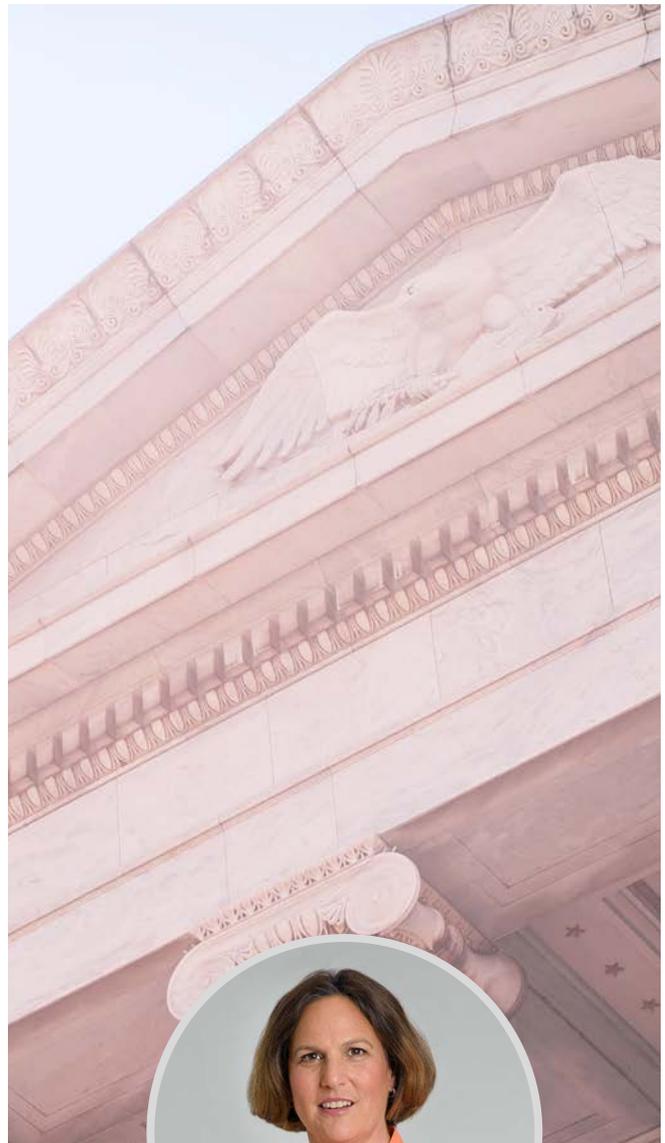
AR/VR SOLUTIONS HAVE WIDE-RANGING POTENTIAL

Across industries and areas of expertise, speakers agreed the potential of immersive technologies extends well beyond gaming and entertainment. AR/VR has the potential to enhance businesses as well as public services and expand economic and social opportunities for individuals.

One of the most promising areas for AR/VR solutions is training and education. For example, **David Vasko**, Director of Advanced Technology at Rockwell Automation, illustrated how immersive technologies can allow existing employees as well as college students to gain experience in digital replicas of factories and reduce the need for travel or relocation. **Jeremy Bailenson**, Founding Director of the Stanford Virtual Human Interaction Lab (VHIL), similarly named training as the “home run” use case that could accelerate adoption of AR/VR.

As an example, his company Strivr provided Walmart with immersive training solutions that resulted in 30 percent higher employee satisfaction and up to 15 percent higher knowledge retention rate.

These benefits extend to younger learners as well: both **Raul Carvajal**, Director of Production and XR for Change at Games for Change, and **Michael Preston**, CEO of the Joan Ganz Cooney



“We’re at an exciting point in time where we can now more fully understand the exceptional uses and applications of augmented, mixed, and virtual reality.”

– Elizabeth Hyman, President and CEO, XR Association

Center at Sesame Workshop, noted that AR/VR experiences can offer enriching and engaging experiences for kids both individually and in classroom settings.

Another key application for AR/VR is communication and collaboration. Jeremy Bailenson noted that the Stanford VHIL has done research on this subject, including the unique ability of VR to translate non-verbal communications more realistically than two-dimensional videoconferencing. And **Scott Evans**, Vice President for Mixed Reality at Microsoft, agreed that video-based platforms “will evolve into much more immersive and 3D collaborative environments that allow us to connect across physical barriers and spatial barriers in ways that we haven’t had in the past.”

Immersive solutions can also expand opportunities and create new avenues for inclusion. For example, “tools powered by [AR/VR] can help people with disabilities succeed by experiencing environments, learning new skills, and participating in new ways in the workplace,” explained **Bill Curtis-Davidson**, co-director of the Partnership on Employment and Accessible Technology. And while “VR is not a magic tool where you put on the medium and suddenly racism, sexism, [and] ageism goes away,” noted Jeremy Bailenson of Stanford VHIL, the technology can “[give] you a very intense experience where you can be in a situation you wouldn’t be in otherwise.”

PRIVACY AND DATA GOVERNANCE SHOULD BE A PRIORITY

To reach the full potential of these technologies, many speakers argued, there are unique questions about privacy that

policymakers and the companies building AR/VR technologies will have to address. AR/VR devices require a large amount of information about individuals and their surroundings in order to deliver immersive, engaging experiences. As **Joan O’Hara**, Vice President for Public Policy at the XR Association noted, “we’re already dealing with these challenges in two dimensions, but this ups the ante a bit.”

Data stewardship was the foremost concern for many speakers. As experts deeply familiar with these technologies, they recognized that the amount of information they gather—and what can be inferred from that data—requires strong data protection and privacy measures. For example, users should clearly understand how biometric data, such as motion tracking or eye tracking, is used, and companies gathering that data should ensure they have measures in place to protect that information from unauthorized third parties.





“Work is far more remote, far more hybrid than it has ever been. AR and [VR] create an immersive experience where most people still feel like they are with their colleagues.”

– Chike Aguh, Chief Innovation Officer,
U.S. Department of Labor

Many speakers argued that the unique privacy considerations that these technologies present make a case for a comprehensive national privacy law that puts necessary guardrails in place and provides a foundation for companies developing these and other new technologies to build from. “It would make sense for a privacy law to be tech-agnostic so that it can be impactful in the future,” noted **Jeremy Greenberg**, Policy Counsel at the Future of Privacy Forum. In her remarks, Reality Caucus Co-Chair **Representative Suzan DelBene** also raised concerns that others will fill in regulatory gaps if the U.S. does not move quickly on privacy legislation. “We won’t be able to shape standards abroad,” she warned, “and we risk others driving global policy.”

AN IMMERSIVE FUTURE RAISES UNIQUE SAFETY AND SECURITY CONSIDERATIONS

In addition to mitigating potential privacy harms, speakers highlighted the need to consider other safety and security implications

of AR/VR devices and applications. Several raised concerns about the potential for both physical and emotional harms when the physical world can be altered or replaced entirely by digitally rendered content. “There becomes this possibility that your reality can be manipulated,” said **Jessica Outlaw**, Research Director at the Extended Mind. On the one hand, this creates physical safety concerns: imagine, for example, that an AR application shows it is safe to cross the street by obscuring the user’s view of oncoming traffic. On the other hand, it also presents less tangible safety concerns by creating new channels for harassment or defamation. And, as Jeremy Greenberg of the Future of Privacy Forum noted, there are also valid concerns around mental health and addiction as physical and virtual reality overlap but never fully converge.



All of these concerns are particularly relevant when it comes to child safety. Many speakers cautioned that, as AR/VR technologies become more present in homes, classrooms, and other aspects of everyday life for all ages, it will be important to establish guardrails that protect children’s physical and emotional wellbeing across these experiences. Jeremy Bailenson of Stanford VHIL also raised this concern, noting that child safety remains a notable knowledge gap in our understanding of the impacts of immersive technologies.

In addition to personal security, **Ash M. Richter**, Senior Technology Architect at In-Q-Tel, argued that AR/VR technologies could also have implications for national security. “What we’re talking about is a new mechanism for recording our history as a species,” she argued, and “if we’re not there at the conversations for how to even ensure the record stays intact ... then we’re ceding a very big security component on top of all of the economic pieces attached to this.” It is not difficult to imagine how adversarial actors could take advantage of the reality-altering capabilities of these technologies if necessary security protections are not in place. Similar concerns arise from capabilities such as deepfakes, which can fabricate recorded images or video—but AR/VR can present falsified realities in real-time. For example, digital overlays could be altered to make a person appear somewhere they are not or even to distort the information that military personnel or officials receive on the ground during a crisis.

ACCESSIBILITY AND INCLUSION ARE FOUNDATIONAL TO SUCCESSFUL INNOVATION

As conversations unfolded around the power and potential of these technologies, ensuring equitable access and inclusive design from the start was a central theme. Many speakers saw this as an opportunity to build technologies

that benefit as many people as possible from the outset—rather than scrambling to expand access or build in accessibility features after the fact.



“There’s a massive responsibility to keep these technologies safe and ensure that the public has visibility over how their data is used and managed.”

– Raul Carvajal, Director of Production and XR for Change, Games for Change

“These technologies are going to be everywhere ... but we cannot leave people behind in terms of being educated and participating in society,” argued Bill Curtis-Davidson of the Partnership on Employment and Accessible Technology.

Speakers from the public sector, industry, and civil society largely agreed that if accessibility and inclusive design are seen as an imperative at this early stage, this will ultimately lead to more widespread adoption and opportunities to drive innovation. For example, Chike Aguh of the U.S. Department of Labor highlighted the importance of equity, accessibility, and inclusion in designing AR/VR solutions that can expand economic opportunity by making workplaces more accessible to those who might face mobility constraints.



“Often the necessary protections for kids are applied only to products designed for kids, rather than products designed for adults that kids happen to adopt.”

— Michael Preston, Executive Director, Joan Ganz Cooney Center at Sesame Workshop

This means designing both for and with people with diverse needs, including people with disabilities, different demographic groups (such as age, race, and gender), and people from different cultural or socioeconomic backgrounds. “It’s important to think about who is in the room when the content and the tools are being designed,” said Chike Aguh, arguing that “it is important to look at what—and who—do your design teams look like?” Indeed, as Bill Curtis-Davidson noted, people using technologies that were not designed for them—such as people with disabilities—have developed innovative “life-hacking” skills that could inform inclusive product design.

In addition to devices that are physically useable for a diverse set of individuals, many speakers highlighted the importance of ensuring equitable access, particularly for key use cases such as work and education. “Many organizations that would be able to take advantage of [AR/VR] simply don’t know how they would viably fund some of the hardware implementation, let alone the development of

any custom software,” noted Raul Carvajal of Games for Change. Many speakers highlighted the importance of engaging with stakeholder communities to achieve more equitable access—for example, as Michael Preston of the Joan Ganz Cooney Center proposed, partnering with schools to directly reach diverse students.

Noble Ackerson, President of the CyberXR Initiative, acknowledged that there will be some disparities in access even with the best efforts to avoid them. But just as cell phones went from costly (and somewhat cumbersome) luxury items to a utility that billions around the world rely on, he believes that AR/VR devices will reach a point where they could benefit a significant portion of the population if policies and initiatives are in place to drive equitable adoption.

LOOKING AHEAD: RECOMMENDATIONS FOR BUILDING AN IMMERSIVE FUTURE

AR/VR technologies clearly present enormous potential; and they raise unique considerations. How, then, should policymakers proceed to build an immersive future that positively impacts people’s lives? As **Stephen Yadzinski**, Senior Innovation Officer at Jobs for the Future argued, “we have to hurry up on these issues a little bit to make sure we don’t fall behind in terms of what the right solution might be.” Over the course of the event, speakers identified several actions that policymakers and other stakeholders can take to address this urgency.

First, it is clear that this conversation should be a collaborative effort among policymakers, industry leaders, civil society, and current and potential users across diverse communities. “At times with emerging technologies, companies feel like they have to make it up on their own,” observed Chike Aguh of the Department of Labor. He added, “I think

that to the extent that we can bring all parties together and create some rules of the road ... you'll increase adoption and remove some of the pitfalls that we've seen with prior emerging technologies.” As the technology continues to evolve, established guidelines and best practices will allow companies to continue to innovate with these considerations in mind. For example, **Susan Persky**, Director of the Immersive Simulation Program at the National Institutes of Health’s Human Genome Research Institute, emphasized the importance of clear systems for evaluating a wide range of AR/VR applications, particularly health and medical solutions. In addition, as Erika Peace of Unity Technologies noted, policymakers and implementing organizations should work with developers to determine how best to integrate these technologies into existing IT systems. This will accelerate adoption in key areas, including government operations and public services, workplace training and collaboration, and education.

As AR/VR innovation expands to new use cases and user bases, developers and implementers—whether they be private companies, public sector organizations, or individuals—will need a strong knowledge base to build and utilize these tools safely and effectively. There is still a notable lack of research or evidence base in many of the areas discussed above. For example, there is insufficient research to understand how children might experience AR/VR differently from adults, how these technologies might impact their mental health or cognitive development, and how to best integrate these solutions into established pedagogical approaches to optimize learning outcomes. In addition, many speakers noted that the evidence base for return on investment (ROI) from AR/VR solutions is lacking, particularly outside of well-established uses such as in advanced manufacturing or training. “[If] you show there is an ROI, monetarily, for some of these technologies, that will help push this forward,” noted **Diane Hickey**, SBIR/STTR

Program Director at the National Science Foundation.

Because these technologies are still relatively unknown to many and new to most, technological innovation should be accompanied by efforts to educate consumers and policymakers, upskill workers who could benefit from these technologies, and prepare rising generations for success in a world where virtual and physical reality play equally important roles in their daily lives. Scott Evans of Microsoft also observed that the new technology itself is not necessary the challenge—it’s “how to re-train people how to change operations, how to change procedures and a way of working that sometimes has been ingrained for many decades.” Thus, guidance for change management within companies and institutions will be just as important as building out a skilled workforce that can utilize AR/VR solutions.



“This is such a new technology, we’ve got to make sure that we’re making this available to everyone, we’re considering people who have different abilities, different price points, all of these things.”

– Erika Peace, Senior Industry Product Manager for Government, Unity Technologies



“As new technologies enter the marketplace, one challenge is informing and educating members of Congress about these cutting-edge technology developments, as well as the benefits—and concerns—that come with them.”

– Representative Suzan DelBene, Co-Chair, Congressional Caucus on Virtual, Augmented, and Mixed Realities

Richter of In-Q-Tel. She pointed to mass digitization in the Asia-Pacific region and policy developments in Europe as two areas where the U.S. is falling behind. Policymakers should work with industry to establish policies and invest in initiatives that encourage innovation and promote widespread adoption of AR/VR to solidify U.S. leadership in a more immersive future.

CONCLUSION

AR/VR technologies are proliferating in every aspect of everyday life, from entertainment and communication to workforce development and education. These technologies have transformative potential—but they also raise unique considerations in key areas such as privacy, safety, security, and equity that policymakers are already grappling with in relation to existing technologies. The conversations at the AR/VR Policy Conference brought many of these considerations to light and demonstrated the importance of including these technologies in ongoing policy debates about how to regulate the technologies that shape our lives.

All of this should be part of a larger effort to ensure U.S. competitiveness in this immersive future. AR/VR “has a growing and important place in the minds of legislators when it comes to innovation and global competitiveness,” observed Elizabeth Hyman of the XR Association. Although the United States is home to many leading innovators in this space, ongoing leadership in the global AR/VR ecosystem is not guaranteed. Indeed, “the U.S. has, to a certain extent, ceded a lot of the power, both in terms of the development of these industries as well as the content creation therein,” argued Ash



FURTHER RESOURCES FROM CONFERENCE SPEAKERS:

Noble Ackerson on Medium: <https://medium.com/@nobleackerson>

Joseph Jerome and Jeremy Greenberg, “Augmented Reality and Virtual Reality: Privacy and Autonomy Considerations in Emerging, Immersive Digital Worlds,” <https://fpf.org/wp-content/uploads/2021/04/FPF-ARVR-Report-4.16.21-Digital.pdf>

Archit Kaushik, “XR for Social Impact: A Landscape Review,” https://www.gamesforchange.org/refresh2018/wp-content/uploads/2020/10/G4C_XR4C_2020_white_paper_Final.pdf

Partnership on Employment and Accessible Technology and XR Association, “What Leaders Need to Know: Inclusive, Immersive Workplace Technologies,” <https://www.peatworks.org/futureofwork/xr/inclusivexrbrief/>

Partnership on Employment and Accessible Technology, “Inclusive XR in the Workplace: How Accessible Immersive Technologies Can Help Employers Upskill and Enable an Increasingly Diverse Workforce,” <https://www.peatworks.org/futureofwork/xr/inclusiveworkplacexr>

Research from The Extended Mind: <https://www.extendedmind.io/>

ABOUT THE ORGANIZERS



The Information Technology and Innovation Foundation (ITIF) is an independent, nonprofit, nonpartisan research and educational institute focusing on the intersection of technological innovation and public policy. Recognized by its peers in the think tank community as the global center of excellence for science and technology policy, ITIF’s mission is to formulate and promote policy solutions that accelerate innovation and boost productivity to spur growth, opportunity, and progress. For more information, visit www.itif.org.



The XR Association promotes the dynamic global growth of the XR industry, which includes virtual reality, augmented reality, mixed-reality, and future immersive technology. XRA is leading the way for the responsible development and adoption of XR by convening stakeholders, developing best practices and research, and advocating on behalf of our members and the greater XR industry. The XR Association represents the broad ecosystem of the XR industry including headset manufacturers, technology platforms, component and peripheral companies, internet infrastructure companies, enterprise solution providers, and corporate end-users. The founders of XRA are Google, HTC Vive, Microsoft, Oculus from Facebook, and Sony Interactive Entertainment. To learn more about XRA membership, visit xra.org/joinus.

CONFERENCE SPEAKERS



NOBLE ACKERSON

Noble's professional career is centered at the intersection of data ethics and emergent tech. From evangelizing practical data privacy principles, empowering enterprises with the tools to eliminate bias and promote fairness in machine learning, Noble has pushed the limits of mobile, web, and wearable spatial computing applications the human-centered way. For over a decade, he has delivered award-winning solutions from abstract concepts to impactful digital product solutions. Mr. Ackerson is a Certified AI Product Manager, a Google Certified Design Sprint Master, and formally a Google Developers Expert for Product Strategy. When Noble is not focused on product, he is farming, making art, mentoring underrepresented and aspiring technology founders or speaking at technology events.



CHIKE AGUH

On January 20, 2021, Chike Aguh (Chee-kay Ah-Goo) was sworn in as Chief Innovation Officer (CInO) at the United States Department of Labor, appointed by President Joe Biden. Reporting to the Deputy Secretary and also serving as the Senior Advisor for Delivery, he leads efforts to use innovative technologies, partnerships and practices to protect and invest in the American worker. Previously, Chike was the inaugural Head of Economic Mobility Pathways at the Education Design Lab where he launched the Community College Growth Engine Fund. He has been a Technology and Human Rights Fellow at the Harvard Carr Center for Human Rights Policy, Venture Partner at Maryland-based New Markets Venture Partners, member of the Council on Foreign Relations' Future of Work Taskforce, Lecturer at Columbia University and guest speaker at the University of Maryland School of Public Policy. Chike holds degrees from Tufts University (B.A.), Harvard Graduate School of Education (Ed.M), Harvard Kennedy School of Government (MPA), and University of Pennsylvania's Wharton School (MBA).



JEREMY BAIENSON

Jeremy Bailenson is founding director of Stanford University's Virtual Human Interaction Lab, Thomas More Storke Professor in the Department of Communication, Professor (by courtesy) of Education, Professor (by courtesy) Program in Symbolic Systems, a Senior Fellow at the Woods Institute for the Environment, and a Faculty Leader at Stanford's Center for Longevity. Bailenson studies the psychology of Virtual and Augmented Reality, in particular how virtual experiences lead to changes in perceptions of self and others. His lab builds and studies systems that allow people to meet in virtual space, and explores the changes in the nature of social interaction. His most recent research focuses on how virtual experiences can transform education, environmental conservation, empathy, and health. He is the author of *Infinite Reality* (co-authored with Jim Blascovich) and

Experience on Demand. He earned a B.A. cum laude from the University of Michigan in 1994 and a Ph.D. in cognitive psychology from Northwestern University in 1999. He spent four years at the University of California, Santa Barbara as a Post-Doctoral Fellow and then an Assistant Research Professor.



RAUL CARVAJAL

After working closely with the Festival team to produce the 2018 Games for Change Festival, Raul now serves as the Production Manager at Games for Change. Raul fuses his background in film production and virtual reality development to bring together talented teams that create memorable experiences. Raul coordinates the G4C team's production efforts across all initiatives and manages the development and strategy for the XR for Change program. Raul received his BFA in Film & Television Production from NYU's Tisch School of the Arts, with a concentration in Directing and Producing. He is an avid gamer, enjoying tabletop RPGs just as much as indie platformers. Raul also formerly served as the National President of DKA, a national professional cinema society that prepares university students for a career in the film industry.



BILL CURTIS-DAVIDSON

Bill Curtis-Davidson is a Co-Director and Sr. Consultant on Emerging Tech Accessibility at the Partnership on Employment and Accessible Technology (PEAT). In this role, he works to advance the accessibility of emerging workplace technologies, including XR and AI, to increase employment opportunities for people with disabilities. He partners with the disability community, tech companies, and the public to advance adoption of inclusive design and promising practices for tech accessibility. He serves on the External Advisory Board of the GA Tech Human-Computer Interaction Degree Program.



REP. SUZAN DELBENE (D-WA)

Congresswoman Suzan DelBene represents Washington's 1st Congressional District. First sworn into the House of Representatives in November 2012, Suzan brings a unique voice to the nation's capital with more than two decades of experience as a successful technology entrepreneur and business leader. Suzan currently serves as the Vice Chair on the House Ways and Means Committee, which is at the forefront of debate on a fairer tax code, health care reform, trade deals, and lasting retirement security. She serves on the Select Revenue Measures and Trade Subcommittees. Suzan also serves as Chair of the forward-thinking New Democrat Coalition, which is one of the largest ideological coalitions in the House, and is co-chair of the Women's High Tech Caucus; Congressional Caucus on Virtual, Augmented and Mixed Reality Technologies; Internet of Things Caucus; and the Medical Technology Caucus. She is also a member of the Pro-Choice Caucus. Before being elected to Congress, Suzan served as Director of the Washington State Department of Revenue after more than two decades as an executive and entrepreneur. Her mix of real-world experience

in the private and public sector gives her a deep understanding of how to build successful businesses, create jobs, implement real fiscal accountability, and adopt policies that provide individuals with access to opportunity.



ELLYSSE DICK

Ellysse Dick is a policy analyst in tech and cyber policy at ITIF. Her research focuses on AR/VR innovation and policy including privacy, safety, and accountability. Prior to ITIF, she led communications and outreach for the Women in Public Service Project at the Wilson Center. Ellysse holds a Master of Arts in Law and Diplomacy from the Fletcher School at Tufts University and a BA in International Affairs and German Studies from the University of Colorado.



SCOTT EVANS

Scott Evans is Vice President of the Mixed Reality (MR) product and business at Microsoft. He leads the team responsible for the overall MR commercial and consumer business strategy, new growth categories of devices and services, ever-expanding partner and developer ecosystems, and delivering MR solutions that continuously delight customers and actualize their full potential in-market. Previously, Scott led the team that pioneered innovative partnerships with the DoD and US Army to design HoloLens-type mixed reality headsets for soldiers—building an innovative defense project from the ground up with new approaches to soldier-centered-design, technology development and integrated manufacturing—delivering breakthrough innovation on an unprecedented timeline. During his 14 years at Microsoft, Scott has worked on a range of consumer and commercial products, including bringing the first streaming video store to Xbox and driving the Xbox operating system and platform for game developers. His mission is making computing power profoundly personal—transformative technologies like MR that empower us to achieve more, redefine physical and digital boundaries, and work together more effectively.



JEREMY GREENBERG

Jeremy Greenberg is a Policy Counsel with Future of Privacy Forum (FPF) where he works to promote responsible data use in emerging technology. Prior to that, Jeremy served as a Policy Fellow with FPF where he worked on issues around privacy legislation, artificial intelligence, and advertising technology. Before joining FPF, Jeremy was a Law Clerk in the Office of U.S. Senator Ed Markey where he focused on a number of telecom and privacy items. Jeremy holds a J.D. from Georgetown University School of Law and a B.S. in Cinema, Photography and Media Arts from Ithaca College.



DUSTIN HAISLER

Dustin Haisler is the Chief Innovation Officer for e.Republic. As the former Chief Information Officer (CIO) and Assistant City Manager for the City of Manor, Texas, a city outside Austin, Dustin quickly built a track record and reputation as an early innovator in civic tech. Dustin pioneered government use of commercial technologies not before used in the public sector – including Quick-Response (QR) barcodes, crowdsourcing, and gamification. Dustin was named as one of the nation’s Top 25 Doers, Dreamers and Drivers for government technology, was selected as an Eisenhower Fellow in 2019, and most recently, a 2021 Business Transformation 150 Leader by Constellation Research. Dustin’s work over the years has been featured numerous publications and books including Wired, Fast Company, the Wall Street Journal, Inc. Magazine, the Today Show on NBC, and Citizenville by California Governor, Gavin Newsom. Dustin graduated Magna Cum Laude from LeTourneau University with a Bachelor of Business Administration and has worked with universities around the globe on incubating next-generation technologies in government including the Persuasive Technology Lab at Stanford University and the University of Trento, Italy. Dustin continues to work with Fortune 500 companies, government agencies, academia, gov tech startups, and non-profits across the globe on innovation, go-to-market, and citizen engagement strategies.



DIANE HICKEY

Diane Hickey joined NSF as an SBIR/STTR program director in August 2020. She has extensive experience in multiple technical fields and early-stage deep technology ventures. Diane founded the Diamond Chameleon Group and grew a broad team providing commercialization services to more than 40 SBIR awardees and deep technology startups with funding across government agencies. Diane began her career at Accenture, implementing enterprise-wide systems in utility and chemical corporations. She then joined C-Bridge Internet Solutions, an MIT-based startup that provided technologies to connect corporate back-end systems to users. After completing her Ph.D., Diane joined Advanced Diamond Technologies (ADT), a startup spun out of Argonne National Laboratory. Diane has held life-long roles in STEM education, including the NSF Young Scholars program, participation in the NSF Nanotechnology Informal Science Education network, and as a Sisters4Science mentor. She has also supported science education startups, served as the school and homeschool liaison for the Tampa’s Children’s Museum and has taught for Kaplan, Inc. Diane consulted on science education and pursued graduate coursework at the University of Florida’s College of Journalism and Communications. Diane holds a B.S. in Chemical Engineering from Auburn University, and an M.S. and Ph.D. in Materials Science and Engineering from the University of Florida.



ELIZABETH HYMAN

Elizabeth Hyman is the Chief Executive Officer of the XR Association (XRA), the trade association representing the technology manufacturers that power the virtual, augmented, and mixed reality industries. XRA is dedicated to the responsible development and thoughtful advancement of XR technologies across the globe. Prior to joining XRA, Hyman served as Executive Vice President of Public Advocacy at the Computing Technology Industry Association (CompTIA), where she led the association's outreach to members of Congress, the Executive Branch, and other international, federal, state, and local government institutions that shape and influence public policies affecting the IT industry. Hyman brings more than two decades of experience in the worlds of government, policy, and technology. She began her career in government, including positions at the U.S. Department of Justice, Executive Office of the President, and Office of the U.S. Trade Representative, and has experience in the private sector both in the practice of law and in business. Hyman is a graduate of Tufts University, completed the General Course program at the London School of Economics, and holds a law degree from the Washington College of Law at American University.



JONATHAN D. MARTIN

Jonathan is a director, producer, educator, and performer working at the intersection of immersive technology and live performance. At the University of Maryland, he is a faculty member in the Immersive Media Design program. There, he is leading research into the narrative and user experience design possibilities of AR/VR and training students from across campus for future careers that will utilize spatial technologies. He has been a featured speaker at SXSW, (Re)Connect Festival, and universities around the country. He is the Producing Co-Artistic Director of Smoke & Mirrors Collaborative, a non-profit production company that creates original works for theater, augmented and virtual reality (AR/VR), and the web that combine socially relevant themes with an ambitious, multi-disciplinary approach to storytelling. Jonathan is a 2021 Oculus Launch Pad member where he is serving as the Creative Producer and Narrative Designer for a forthcoming VR experience. He is also the Creative Director and Producer of a mobile augmented reality experience exploring hidden stories in America history. As a performer, he is a pioneer in performance technique for VR, drawing on a 15 year career as an actor and puppeteer on Broadway, TV, film, and regional theaters around the country.



JOAN V. O'HARA

Joan O'Hara is the Senior Vice President of Public Policy of the XR Association (XRA). O'Hara joins XRA from Booz Allen Hamilton where she served as a Principal and Director of Government Relations Policy, creating strategies for engagement with the federal government and major trade associations. Prior to joining Booz Allen, O'Hara served at the White House as Deputy Assistant to the President and Executive Secretary of the National Security Council, and as Deputy National Security Advisor to the Vice President. Earlier in her career, O'Hara was General Counsel of the House Committee on Homeland Security, where she developed legislation around issues such as cybersecurity and data encryption. With experience in all levels of federal government, from the halls of Congress to the West Wing, O'Hara is well-positioned to further the Association's efforts to promote the responsible development of XR technology. O'Hara holds a bachelor's degree from Loyola College in Maryland, a master's degree from San Diego State University, and a JD, cum laude, from New York Law School.



JESSICA OUTLAW

Jessica Outlaw is a behavioral scientist and the founder of The Extended Mind. She creates decision tools to advance social and behavioral science into emerging technologies. She focuses on virtual and augmented reality because of their potential to give people new experiences of understanding data, co-locating across distances, and how embodiment can influence decision-making. She is the author of a book on cognitive biases in product development and another on decision-making. She is the creator of the online course the Tech Ethics Toolkit offered Spring every year, blogs at www.extendedmind.io/blog and is on Twitter @theextendedmind.



ERIKA PEACE

Erika Peace is a government-industry product manager at Unity Technologies. Erika is responsible for ensuring Unity products address the challenges faced by public sector customers. Prior to Unity, Erika was a leader in IBM's Federal Interactive Experience practice and was instrumental in creating solutions that improve the way citizens and employees interact with government technology. Erika Peace is an accomplished strategist and leader whose wealth of experiences bring a unique perspective to creating technology solutions that solve real-world problems. At IBM, she was responsible for shaping and maturing product offerings, establishing the go-to-market approach and pricing strategy. Additionally, she led a team of 47 creatives, developers, and consultants responsible for human-centered design, mobile, XR, digital commerce, and Adobe practices. Erika's focus on government is fueled by her passion for solving human problems with technology. She created solutions that helped improve the security of US diplomats and their families abroad; hands-free apps that improved the safety of railroad inspectors; and a DevSecOps platform as a service that reduces the time to deploy mobile apps on DoD networks by 80%. Erika is a graduate of Florida A&M University and lives in Washington, DC, with her son and sheepdog.



MICHAEL PRESTON

Michael Preston is the Executive Director of the Joan Ganz Cooney Center at Sesame Workshop, a research and innovation lab focused on children’s learning and wellbeing in the digital age. The Cooney Center conducts research on emerging education technologies and collaborates across sectors to put research into action. Prior to joining Sesame Workshop, Michael’s work focused on using technology to improve teaching and learning, drive student agency and interest, and create models for systemic change in K-12 and university contexts. He is a co-founder of CSforALL, the hub for the national Computer Science for All movement. He designed and led digital learning initiatives at the NYC Department of Education and at Columbia University’s Center for Teaching and Learning. He earned a PhD in Cognitive Science in Education from Teachers College, Columbia University and a BA in East Asian Studies from Harvard University.



SUSAN PERSKY

Dr. Susan Persky is an Associate Investigator, Head of the Health Communication and Behavior Unit, and directs the Immersive Simulation Program (ISP) within in the National Human Genome Research Institute, National Institutes of Health. She earned a Ph.D. in social psychology from the University of California, Santa Barbara where she studied at the Research Center for Virtual Environments and Behavior. She founded the ISP, an immersive virtual reality (VR)-focused experimental research lab in 2006. Dr. Persky’s programmatic research investigates the function of new genomic knowledge about common health conditions like obesity and diabetes in interactions between health care providers and patients and in community contexts. She has published a body of scientific work related to VR and behavioral science methodology and has presented her work in venues such as the Smithsonian Institution and the National Academies of Sciences, Engineering and Medicine. She is a member of the World Economic Forum Global Future Council on Virtual and Augmented Reality.



ASH RICHTER

Ashley (Ash) M. Richter is an archaeologist, anthropologist, engineer, and technologist. She leads the investment strategies and collaborative investments in mixed reality, spatial computing, and the metaverse (or whatever we want to call it), as well as the related technologies in gaming, smart cities, and surveillance systems at In-Q-Tel. Ash’s on-going research and subsequent work in spatial computing focuses on digitizing time and space and intertwining its analytic layers, with an emphasis/obsession on terrestrial LiDAR and other forms of real data capture as the visual 3D anchor for visualization in immersive reality systems for human visualization and as the machine-readable analytical map for autonomous systems development. Much of her work has involved digitizing world monuments and facilities in multiple imaging formats and building immersive augmented systems

for annotation, analytics, and operations on top of those digital scaffolds. Ash has also worked on data integration and smart facility/city challenges for international engineering mega-corp AECOM and for assorted data visualization start-ups and non-profits, including CyArk. She is on the cusp of leaving In-Q-Tel and the United States for high industry with BHP in Australia to continue to push on her research.



DAVID VASKO

Dave Vasko is the senior director of Advanced Technology at Rockwell Automation where he is responsible for applied Research and Development and Global Product Standards and Regulations. Throughout his 36 years of experience in Industrial Automation he has held technical leadership roles. He was a significant contributor to the development and international standardization of the CIP (Common Industrial Protocol) IEC 61158 and the CIP Safety communication protocol IEC 61784-3. He holds over 70 granted US patents in industrial communications, distributed control, agent technology, security and functional safety, has authored 20 papers and contributed to 3 books. In 2005 he was recognized as Rockwell Automation's Engineer of the Year for his contribution to the development of the CIP Safety communication protocol. Dave is a member the Visiting Committee for Advanced Technology at the National Institute for Standards and Technology, (NIST). A board member of the 5 Lakes Institute and the IoT Talent Consortium and a senior member of the IEEE and ISA. He is also the Host of the State of the Industry Podcast.



STEPHEN YADZINSKI

Stephen Yadzinski is the senior innovation officer for JFF. In this role, Steve works with JFF leaders and teams to identify new opportunities, establish new partnerships, and transform JFF programs and service lines to meet an evolving and dynamic education and workforce ecosystem, leveraging the fields of technology, innovation, and investment to further our mission. Passionate about the role technology can play in creating business aligned education and workforce social impact, Steve also leads the JFF Labs Acceleration work and team, JFF Labs' social impact technology accelerator. Previously, Steve founded the Innovate+Educate Employment Tech Division in response to the critical need to improve workforce readiness for high-demand jobs in key U.S. industries. Earlier in his career, Steve founded and led his own branding, communications, and technology consultancy. A graduate of the Rochester Institute of Technology, Steve lives with his wife and two children in Santa Fe, New Mexico, and enjoys backpacking and skiing in the Sangre de Cristo Mountains near his home.

