Object Management Group Publishes Aviation and Aerospace Journal of Innovation

3rd September 2024

“The JoI now has an expanded scope to include articles from OMG’s consortia, including the OMG Standards Development Organization, the Augmented Reality for Enterprise Alliance (AREA), and Digital Twin Consortium® (DTC),” said Bassam Zarkout, CEO of IGnPower and Co-chair of OMG’s Thought Leadership Group. “We are thrilled to present the latest edition of the JoI under the expanded scope. This edition explores the theme of Pioneering Innovations in Aviation and Aerospace.”

The three articles in this edition include:

- Guiding Supply Chain Security in Aeronautic Development – by MITRE and Boeing – Assessing aeronautics supply chain risks is complex due to the lack of standardized risk sets, evaluation practices, and result communication methods. This article proposes leveraging System of Trust™ (SoT) to address these challenges. The article also discusses NASA’s effort to demonstrate real-world consequences and cost impacts on Boeing and Airbus due to supply structure changes and volatility. This work leveraged MITRE’s efforts to standardize security measurement and demonstrate its application and outcomes.
- Advancing Space Technology for ISAM Maturity and Success – by Dassault Systèmes – Like the golden age of flight 100 years ago, today we are in the golden age of commercial space. New space missions – in this case, In-Space Service, Assembly, and Manufacturing (ISAM) – enable space capabilities to expand the space economy, improve life on Earth, and extend our use of space farther than ever.
- Digital Engineering Enables Innovative Hardware Integration Opportunities in Aerospace – by SimVentions – Avionics systems need reliability and redundancy but face budget and time constraints. The US Navy’s Hardware Open Systems Technology (HOST) standard provides a modular and open approach for hardware interoperability and reuse. However, reliance on

homegrown tools limits its long-term value and data reliability. SimVentions' research for the US Navy led to the creation of the HOST Hardware Integration Toolkit (HHITS), demonstrating DE's value in enabling transformative automation and integration for avionics systems.

JoI articles have covered diverse topics and themes, including industry digital transformation, data in the industrial internet, solutions at the digital edge, the role of IoT in enabling rapid response to Covid, industrial artificial intelligence, intelligent transportation, innovations in digital twins, smart cities, smart factories, trustworthiness, and many more. Download current and past editions of OMG's JoI.

About OMG
When tech organizations, governments, and academia must solve discrete pieces of a technology puzzle or discuss matters of common interest, they often seek to join or form a consortium. Since 1989, Object Management Group® (OMG®) has created and nurtured a productive community with common technology interests and problems to resolve. OMG communities include Augmented Reality Enterprise Alliance (AREA), Consortium for Information and Software Quality™ (CISQ™), Digital Twin Consortium® (DTC), and OMG Standards Development Organization (SDO®). OMG is global, not-for-profit, and vendor-neutral. Visit OMG.

About the AR for Enterprise Alliance (AREA)
The AR for Enterprise Alliance (AREA) is the only global membership-funded alliance helping to accelerate the adoption of enterprise AR by supporting the growth of a comprehensive ecosystem. The AREA accelerates AR adoption by creating a comprehensive ecosystem for enterprises, providers, and research institutions. AREA is a program of Object Management Group® (OMG®). For more information, visit the AREA website.

Augmented Reality for Enterprise Alliance Announces the AR Security Infographic

3rd September 2024

The infographic has ten sections for AR Security. The sections contain the risks and considerations related to the topic within AR. Each section has a summary to the left when it is clicked on. There is a detailed page for the section when clicking the 'LEARN MORE' button.

"AR headsets pose unique security risks for businesses. Traditional mobile security isn't enough," said Mark Sage, Executive Director of the AREA. "Vendors, IT departments, and users share responsibility for securing AR."

The sections include:

Attack Surface—Pathways to infiltrate and corrupt data.

- **Connection Abuse—**Enterprises contain AR devices that connect many mobile devices. Understanding the network connections and potential threats at all levels is essential.
- **Physical Breach—**AR devices pose unique security risks because they collect real-world data (audio, video, location), unlike traditional IT systems.
- **System Breach—**AR devices introduce new security risks beyond those of mobile devices.

Data Domains – Nefarious agents use these domains to eavesdrop, pilfer, and exploit enterprises.

- **Trust Exploitation/Data Extraction—**AR devices pose unique security challenges due to their ability to interact with the physical world.
- **External Services/Physical World Data—**AR devices collect vast user data through cameras, sensors, and microphones.
- **Environment/Object/Visual Manipulation—**AR devices introduce unique security risks for businesses. Unlike traditional IT systems, AR devices collect real-world data (audio, video, location) that attackers can exploit.

Considerations –

- **Configuration & Management/Integrity Protection—**AR devices face mobile device security challenges, including logging, malware detection, and incident response.
- **Root of Trust/Physical Security—**AR devices require a hardware root of trust for core security functions due to their unique hardware and complexity.

- **I/O Security/Identity—**AR's unique hardware and data collection require careful security assessment of all components to minimize confidentiality, integrity, and availability risks.
- **Access Control/Monitoring & Analysis—**AR's new voice, gesture, and gaze controls make strong passwords difficult for secure access. Biometrics offers a solution, but integrating them securely company-wide is complex.

The AREA Security Committee member companies and Brainwaive LLC contributed expert insight to completing the AR Security Infographic.

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Augmented Reality for Enterprise Alliance Elects New President

3rd September 2024

As President, Ryan will serve as the organization's primary advocate, fostering partnerships, driving

strategic direction, and ensuring the successful execution of programs and initiatives. Ryan replaces Boeing Technical Fellow Paul Davies, who served as AREA President for more than eight years, and continues as part of the AREA Executive Committee and as Vice President of the AREA Enterprise Segment.

At Collins Aerospace, Ryan leads the RTX XR Working Group, helps lead the RTX XR Community of Practice, and co-chairs the RTX Immersive & Interactive Visualizations Technology Interest Group. Ryan has also led teams that have invented numerous visual analytics and virtual reality-enabled applications.

“We’re excited to announce Ryan Wheeler as President of the AREA,” said AREA Executive Director Mark Sage. “With his technical background in AR/XR technologies and proven track record of working with AR/XR communities, we are certain he will steer the organization’s efforts to make it easier for enterprises to adopt interoperable AR-enabled systems that fully deliver on their promises. I would also like to thank Paul Davies, Technical Fellow at Boeing, who has served as President for many years, and he will continue to actively be involved in the AREA.”

About the AREA

The Augmented Reality for Enterprise Alliance (AREA) is the only global non-profit member organization. Whether you view it as the next computing paradigm, the key to breakthroughs in manufacturing and service efficiencies, or the door to unimagined applications, AR will have an unprecedented impact on enterprises of all kinds. AREA is a program of Object Management Group®. Visit https://thearea.org for more information.

Augmented Reality for Enterprise Alliance Publishes Latest Research on the Adoption of Real-Time AR-assisted Inspections for Quality and Compliance

3rd September 2024

“AR-assisted inspections can greatly benefit aerospace and defense, oil and gas, and healthcare industries due to intricate processes and inspection protocols, strict safety and quality compliance guidelines, and the high cost of downtime,” said AREA Executive Director Mark Sage. “AR solutions enhance task performance, reduce mental workload for frontline users, minimize errors, and allow for better utilization of resources.”

Common barriers to the adoption of AR-assisted inspections include:

- *Technological barriers* can be mitigated by establishing innovation hubs outside of their IT infrastructure to enable close evaluation of potential AR solutions for quality and compliance inspections.
- *Economic barriers* can be addressed by implementing scalable proofs-of-concept (POCs) that show tangible ROI for solutions using data and performance-driven KPIs. This showcases the potential savings and efficiency gains and provides flexible pricing models and financial incentives to lower the initial investment barrier.
- *Organizational barriers* require effective change management strategies. These include engaging stakeholders at all levels, providing comprehensive training programs, and designing intuitive, user-friendly AR solutions.
- Collaboration with governing and compliance bodies to establish clear guidelines and standards for AR-assisted inspections can mitigate *regulatory and compliance barriers*.

Please view an executive summary of the research report on The Adoption of Real-Time AR-assisted Inspections for Quality and Compliance from the AREA website. Vertical Realities completed the research report on behalf of the AREA.

The full report includes a comprehensive view of the factors affecting the adoption and implementation of AR solutions for inspection use cases and a template for measuring the direct impact of AR-assisted inspections (available to AREA members).

Please also consider the website’s executive summaries of other AREA resources and enterprise guidance. To learn about AREA membership, visit the AREA website.

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The AREA Welcomes Net4 Connect as a Member

3rd September 2024

"We are delighted to join the AREA community. Becoming part of a network sharing our enthusiasm and passion for augmented reality was easy. The opportunity to share and gain knowledge with fellow members will be invaluable, benefiting us and our clients," said Alex Taylor, CEO of Net4 Connect. "Through our membership, we hope to gain new insights, foster innovative collaborations, and stay at the forefront of industry advancements, ultimately enhancing our service offerings and driving success for our clients. We look forward to contributing to and growing with this vibrant community."

"Net4 Connect is a welcome addition to the AREA," said Mark Sage, AREA's Executive Director. "We look forward to the contributions they will make to our alliance in the use of augmented reality and

their knowledge and expertise in AI, IoT, and 5G.”

About Net4 Connect

Empowering Innovation with Cutting-Edge Technology Solutions. Visit our website: https://net4connect.com/.

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The Growing Irish Immersive Technology Sector

3rd September 2024

Note: This article is shared on behalf of a member company, EIRMERSIVE, and does not represent the work of the Augmented Reality for Enterprise Alliance (AREA).

The Irish immersive technology sector is emerging as a significant player on the international stage, with organizations generating over €92 million annually. According to the Irish Immersive Economy report 2022, the sector was valued at over €43 million. The global immersive technology market, which includes augmented reality (AR), virtual reality (VR), spatial computing, and mixed reality

(MR), is currently valued at $65.5 billion and is projected to grow to $936.6 billion by 2030.

To capitalize on this growth potential, Cultural & Creative Industries Skillnet (CCIS) and Eirmersive have developed the Irish Immersive Technology Strategy for Growth (IITSG). This strategy aims to address the barriers to growth and provide strategic support to ensure Ireland's place in the global market.

However, without immediate and sustained investment, Ireland risks falling behind other European countries that are actively investing in their immersive technology sectors, such as Finland with its "Finnish Metaverse Initiative".

The IITSG was developed with input from a diverse range of stakeholders, including industry, government, large enterprises, SMEs, research, and education sectors. The strategy will be regularly updated to reflect ongoing developments in the field.

Read the full article here: Irish Immersive Technology Strategy for Growth

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Augmented Reality for Enterprise Alliance Announces the AR Safety Infographic

3rd September 2024

BOSTON, MA – MAY 9, 2024 – Today, the Augmented Reality for Enterprise Alliance (AREA) announced the AR Safety Infographic, a new tool that explores the benefits and potential safety risks of using AR in the workplace. By carefully considering safety before deploying AR solutions, organizations may be able to avoid issues before they occur.

Each section contains the benefits and challenges of using AR and includes a summary to the left when it is clicked on. There is also a detailed page for the section when clicking the 'LEARN MORE'

button to help you understand the benefits and potential risks and how to manage them.

"Our mission is to help companies in all parts of the AR ecosystem achieve greater operational efficiency through the smooth introduction and widespread adoption of interoperable AR-assisted enterprise systems," said Mark Sage, Executive Director of the AREA. "Our AR Safety Infographic provides reliable guidance that makes the path to AR adoption surer, shorter, and smoother."

The sections include:

AR Experience – integrates the digital and physical worlds seamlessly, and any interactions should feel like you are interacting within a real-world environment.

Cognition – Effective use of technology-based environments and augmented reality reduces cognitive load by scaffolding information and lessons' contents

Sensory – Engaging in immersive experiences can offer many benefits, catering to personal growth, entertainment, education, and even therapeutic purposes.

Environmental – Augmented Reality has all the trapping to encourage sustainability in the energy sector; AR is being used to power renewable energy systems by providing a more detailed understanding of energy sources and their potential.

Physical – The most prevalent benefit is the AR headset experience, enabling users to see their physical surroundings while interacting with virtual assets. This allows not only safety for the user by seeing their surroundings but also mobility.

Devices & Accessories – Augmented Reality Devices encompass various hardware, each offering unique immersive experiences.

See the AREA website for member companies contributing to the AR Safety Infographic.

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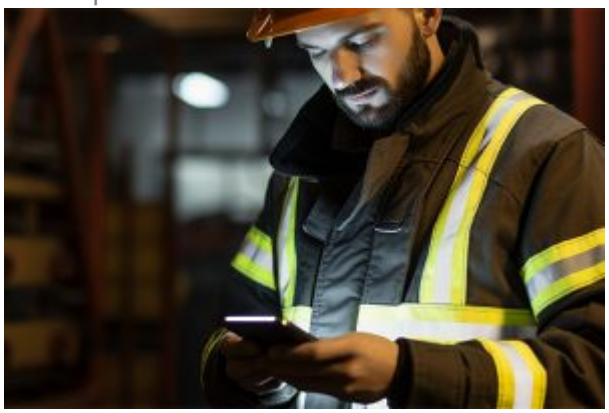
The evolution of delivering immersive media over 5G/Cloud

3rd September 2024



This blog post introduces a white paper from Ericsson, an AREA Member. The full paper can be read here.

Introduction

With the availability of more Augmented Reality (AR) and Virtual Reality (VR) headsets, people are starting to experience more realistic and interactive immersive services. Thanks to the advanced technology embedded into the headset we are getting more powerful devices, able to compute and render images of increasing resolution and quality. Yet the development of longer and more realistic experiences is progressing slowly, limited by battery consumption, device form factor, and heat dissipation constraints. Many service providers have started to deploy services in the cloud to address these issues. However, running the application in the cloud imposes additional challenges: latency, bandwidth, reliability, and availability of the service. 5G cloud architecture can overcome those issues with solutions that can be applied incrementally, each differently affecting the complexity of the application, but each improving the ultimate experience for the user. Additionally, the ultimate vision for 5G architecture as applies to immersive experiences calls for new relationships among the ecosystem members – the consumer, communications service provider, hyperscale cloud provider, and developer/service provider.

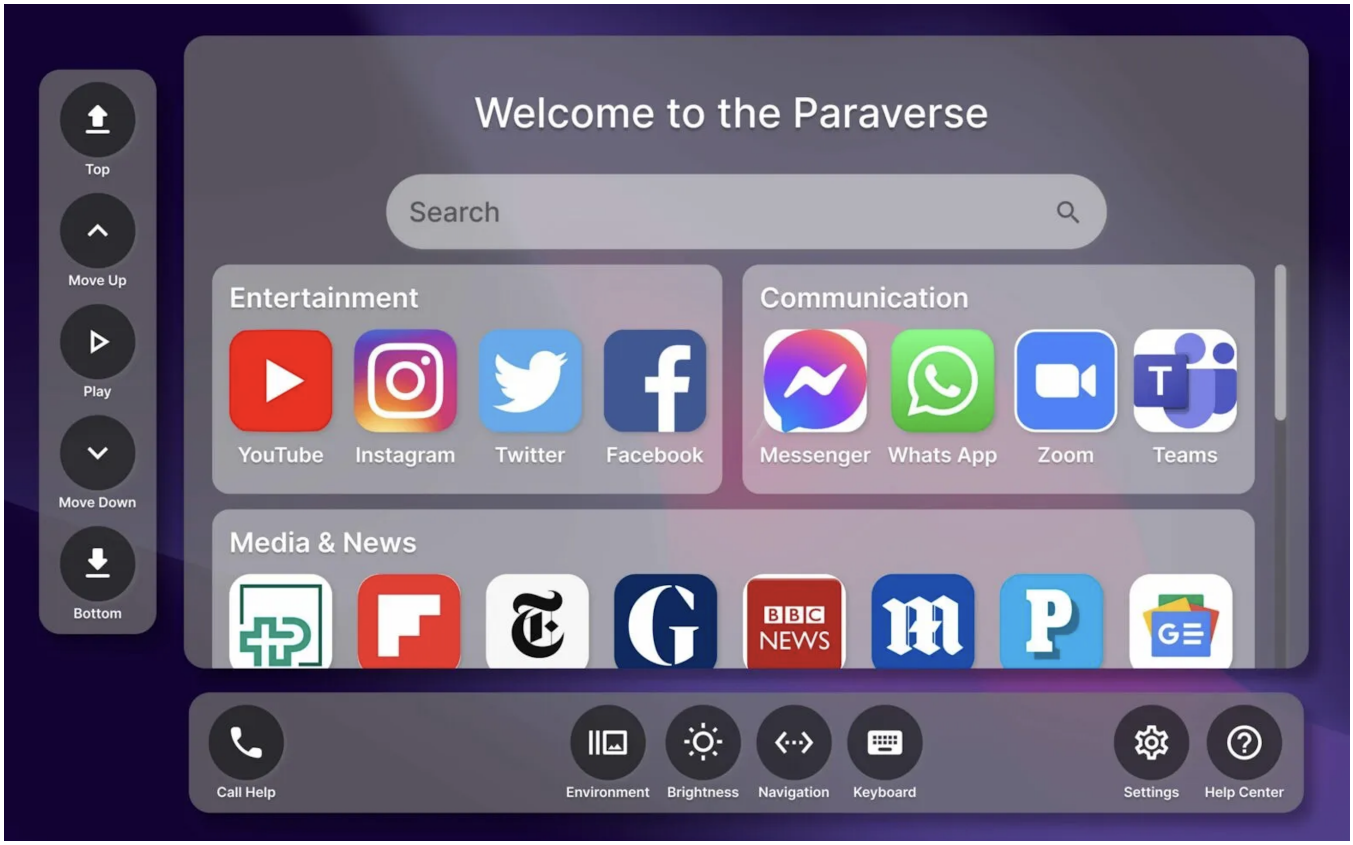
This paper examines key aspects to launch an immersive service using 5G cloud infrastructure. First, reviewing recent offerings and developments, then walking through a set of use cases each exploiting more and more offload to the cloud. We follow with a description of 5G technologies that satisfy the use cases, and finally, reflect on the evolution of the stakeholders' ecosystem in relation to their technical and commercial relationships to establish an immersive service using 5G.

Augment IT Breaks New Ground with Paraverse-Platform for Paraplegics and Prepares it for Apple Vision Pro

3rd September 2024

Augment IT, a leading international Extended Reality (XR) company, continues to develop the groundbreaking Paraverse platform for AR devices. The platform, which is specifically tailored to the needs of paraplegics, is already available for Magic Leap 2 and will be optimized for use with Apple Vision Pro.

Augment IT developed the Paraverse platform on the initiative of the Swiss Paraplegic Center (SPC) and tested it in close collaboration. Over more than a year, the team gained valuable insight into what tetraplegics and paraplegics need and how those needs can best be met. People with spinal cord injuries are currently confined to their beds and require constant assistance, even turning a page in a book.



This image is a screenshot of the product and may not represent the final version.

The Paraverse-platform provides users with barrier-free access to the digital world. This includes core functions such as making phone calls, reading messages, surfing the Internet, or continuing education and entertainment on video platforms – all controlled with the eyes.

In addition, high-resolution panoramic photos, and videos, especially the Vision Pro's 3D videos, allow you to relive memories in a whole new way – as if you're part of the experience. With the new 3D Personas, users can connect with family and friends outside the clinical environment using FaceTime or Microsoft Teams and thus maintain relationships.

Apple Vision Pro's precise eye tracking allows them to make decisions completely on their own. This greatly enhances their quality of life. Privacy is also protected because, unlike traditional screens, only the patient is able to see the content in the headset.

The feedback from the limited number of initial trials of the Apple Vision Pro has been very encouraging. Patients have been very enthusiastic, and we have gained valuable insights for further development this year.

The goal is to make the platform available to hospitals and specialty clinics worldwide. The software currently runs on the Magic Leap 2 and will soon be available for the Apple Vision Pro.

Luca Jelmoni, CEO of SPC, emphasizes the importance of the Paraverse platform for patients: "The possibilities to communicate with their loved ones, reflect on experiences, learn new things

independently, or transform the space you see every day into a completely new world – these possibilities can transform and significantly enrich the lives of our patients."

The Paraverse platform is more than just a technological innovation. It improves the quality of life and can be a great help in coping with everyday life, especially in the beginning. This enormous added value has been confirmed several times by patients in the early stages of the project. The product is now being continuously developed and will gradually be made available to other clinics.

Reto Grob, CEO of Augment IT, is especially pleased with the positive feedback: "It was clear to us that immersive technologies create entirely new user experiences in many application areas. Paraverse is an initiative close to our heart because the value for the user is enormous. We have already proven this with Magic Leap 2 – and now with the launch of Apple Vision Pro, we have another technically outstanding platform in our long-term plan to significantly improve the lives of people with disabilities."

About Augment IT
Augment IT is a leading international company in the field of Extended Reality (XR) with a clear focus on industry, transportation, and healthcare. The company delivers innovative XR software solutions that create real value for its customers. With well-known customers such as ÖBB, Hilti, and Arxada, and offices in Switzerland, Germany, and North Macedonia, Augment IT is consolidating its position as an ambitious XR start-up.

Top 2024 Enterprise AR Trends To Watch

3rd September 2024

As we ease out of the first month of 2024, we are now fully engaged in the new year. In the past 30 days, I've had an opportunity to learn from my peers, such as Tom Emrich of Niantic (trend watches on his newsletter) and the co-chair of the AREA Research Committee, Samuel Neblett of Boeing, and to reflect on the projects in which I'm involved.

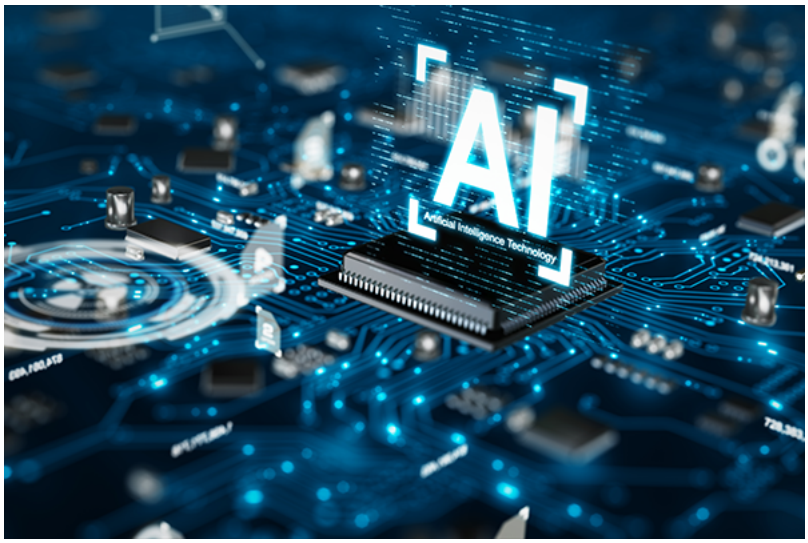
I've compressed my vague sense of hope and excitement down into a few enterprise AR trends I will be watching over the next 11 months. These are not predictions but significant areas of focus that I believe will drive innovation and the adoption of enterprise AR. I'm now officially keeping track of these trends to see where, how, and if they come about.

Please share these with your colleagues and your partners. Do you have evidence that either

confirms or questions any of these trends in your companies? I hope you will share your evidence, feedback, and ideas with me at cperey@perey.com.

Artificial Intelligence

The convergence of AI and AR is the most significant and least surprising of the trends to watch in 2024. The signs are everywhere.



#1 **Enterprises are beginning to internally test Generative AI (GenAI), including LLM lakes and private co-pilot solutions. Early adopters will increasingly combine these capabilities with AR tools.** There are dozens of ways that the use of AI improves workflows and reduces the costs of enterprise AR. Well-positioned and programmed AI can extract relevant content from corporate data sets for visualization**.** Here are a few examples of where and how GenAI could boost AR:

Using Digital Twins for baseline and AI for detecting and matching features in 3D environments (rare in 2023), we expect enterprises to expand their interest in and need for spatially-aware apps and services. For example, we will see a proliferation of AR-assisted Visual Positioning Services for navigation and risk detection based on 3D maps.

Combined with advances in hardware (see below), GenAI will permit the automatic generation of richer AR experiences for hundreds of use cases, including but not necessarily limited to 3D spatial maps. Multi-modal LLMs, an advanced type of AI that can understand and generate not just text but other types of data, such as images, audio, and possibly even video, are on the rise. These Multi-modal AI models incorporate previously captured scenes into new instructions. They will detect sounds from the environment and predict risks or propose the user to respond in specific ways without being programmed/coded in advance.

#2 **AI and computer vision advancements could address concerns over privacy in data collection and handling.** Privacy and sensitivity to security risks from the use of cameras and other sensors in the workplace continue to be obstacles to large-scale AR deployments. With AI, real-time image and feature detection, blurring, and obfuscation methods can be combined with AR displays (or their associated services and software) with lower cost and power. Enterprise AR solutions for protecting the privacy of things, places, and people (AR device users and those around them) with AI in the loop will proliferate in response to the need for compliance with corporate privacy policies as well as national and international regulations.

Hardware

#3 **Aside from a few roles (e.g., architects or those viewing medical imagery), knowledge workers don't need to spend their time or money on large, virtual screens (aka Apple Vision Pro).** Video see-through isn't a viable substitute for Optical see-through in the workplace, where employee tasks require hands-free AR and peripheral vision. Video quality issues, including distortion, fixed camera IPD, high ISO, low dynamic range, low camera resolution, and low frame rate, are exceedingly difficult (think: high power use) to overcome. However, a lot of money will be invested, and marketing campaigns will make people try. Try though they will, the entire Video see-through headset push will not make a significant dent in reducing the optical see-through requirement for enterprise AR displays. I've heard repeatedly that any risk manager who would approve the use of video see-through XR displays for use in a production environment where risks are high is risking their employment.

#4 **Smaller, more powerful, and less power-consuming sensors will be more economical to deploy and manage.** In addition to the lower cost of implementation and management of IoT, more specialized semiconductor solutions, especially those specialized in computer vision but also for processing audio and motion, are increasingly being added to AR display devices. Imagine sensors on the device detecting the user's need for corrective lenses and then generating the corrected version of the real world (enhanced with AR, of course) without the user's being aware or needing to wear two pairs of glasses. The improvements in display capabilities, combined with cheaper hardware distributed in the user's environment (think: intelligent spaces) and connected to AI in the display or on edge computing hardware, are making context awareness less expensive to acquire and more reliable. A deeper understanding of context translates to many of the other trends identified below.

#5 **More companies will introduce lightweight, cheaper (and less capable) AR glasses to the market.** Not all users need or want a full "computer" on their heads. There are more ways to add value than a helmet or a heavy and powerful wearable AR display. Some devices are offloading processing to tethered phones. Others offer wireless, monocular AR glasses to display only heads-up messages to users. We will also watch for the audio-only AR glasses segment to expand where voice prompts and AI-enabled audio responses satisfy the use case requirements.

UX

#6 **New modes of interaction are beginning to complement/replace/displace the need for controllers and virtual keyboards.** We are already starting to see more use of eye tracking, gaze, and natural gestures (e.g., pointing with better hand tracking) for inputs. Improvements in hand gesture tracking technologies will, in many cases, translate to lower cognitive loads and lower computational loads. Neural inputs using a headband or muscular signals via a wristband allow users to control all their digital devices using natural human interfaces. The user's tongue might even become a source of input. Also, look out for brain sensing with EMG.

#7 Similarly to #6, **due to new and different sensors in devices, there will be developments in how users receive/perceive the digital data in context in the workplace.** In addition to animations, video clips, still images, and text, we will see rapid experimentation and exciting opportunities to use spatial audio and to provide just-in-time instructions and information to users using combinations with other wearables (e.g., watches and smart garments).

Infrastructure

#8 **Private 5G networks, combined with 5G compatible hardware and cloud and edge computing, will permit richer experiences without heavier or power-consuming devices.** While the verdict is still out on the cost-effectiveness of private 5G networks based on current implementations and use cases, they are gradually improving. There will be more 5G support in the next-generation AR displays. These core enabling technologies will lead to increased adoption of AR experience streaming and collaborative AR experiences.

#9 **Security for AR experiences may be addressed in the network using improvements in off-device and automatic authentication of AR users and devices.** Ensuring corporate

cybersecurity is an enormous concern for all IT departments, and most AR devices are ill-equipped to meet all the requirements. Expertise in security risk reduction is not a core competency of most AR providers. Innovations to ensure high corporate data protection, privacy and reduce exposure from AR user intentional or inadvertent actions will come from network technology providers. They and their service provider customers have solutions that are emerging from research and will be tested in the near future.

Software

#10 **Low-code/no-code will continue to gain traction with the assistance of AI.** There are now dozens of low-code/no-code solutions available. The problems are figuring out which ones meet the enterprise requirements, including but not limited to security concerns. While AI eats away at the need to manually code experiences, subject matter experts are becoming the authors of more and more custom experiences. The biggest winner from this trend will be medium-sized companies without the necessary engineering resources to meet all their AR use case needs. With the low-code/no-code options reaching greater maturity and ease of use, the need for dedicated and highly paid AR experience developers and tools with steep learning curves will diminish.

#11 **Standards are increasingly relevant and, combined with the expanded support of open-source libraries, reduce the need to develop and maintain display-specific apps and content for delivering experiences across a range of AR devices**. Although W3C WebXR continues to evolve slowly, the processing requirements for Web-based solutions are being increasingly met by the hardware in a broader range of AR display devices. The improvements in network infrastructure also make more edge processing possible. Using the Web to provide AR experience content is highly scalable and can be entirely deployed in a company's Intranet. Khronos Group's OpenXR is already widely adopted on AR hardware and, combined with support for glTF, is significantly simplifying the development of content creation platforms (fueling the no-code/low-code trend). We expect that other standards will be adopted for AR experiences.

#12 **AR developers' skill sets and tools become more specialized, and the learning curves become steeper.** On the one hand, AI and adopting standards simplify and accelerate the creation of AR experiences; they also introduce new risks. These are golden opportunities for specialization. AR developers and those with expertise in adjacent fields will increasingly have new offerings, such as deeper integrations with Learning Management systems, Enterprise Resource Planning, and Product Lifecycle Management platforms. Editing of AR experience recordings to

preserve knowledge and accelerate its transfer will combine AR expertise with AI tools.