



Shaping Tomorrow: Building Compelling AR-VR Solutions

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Gunjan Agarwal



- Built innovative products at Meta, Nutanix, and Amazon, combining vision with execution to deliver exceptional results.
- Passionate about Engineering Craft, Growing talent and building metric driven autonomous teams capable of solving complex challenges.
- Led the development of Nutanix's Support Portal, achieving 90+ NPS and recognition as a top support site for two consecutive years.
- Currently advancing AR/VR innovation at Meta, shaping the future of technology.

Disclaimer:

The views and insights shared in this speech are my own and do not reflect the opinions, strategies, or practices of Meta. This presentation is based entirely on my personal experiences and independent research, with no connection to my professional role or responsibilities at Meta.



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What is XR ?

XR (Extended Reality) is an umbrella term that encompasses all immersive technologies, which blend the physical and digital worlds. XR includes Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR).

- **Why XR Development is More Relevant Than Ever**
- **Transforming Industries:** XR is revolutionizing gaming, healthcare, education, and retail with immersive experiences.
- **From Concept to Reality:** Once futuristic, now mainstream with products like Meta Quest, Vision Pro, and HoloLens.
- **Popular Use Cases:**
 - Gaming (PlayStation VR2, Valve Index)
 - Healthcare (Osso VR, XRHealth)
 - Education (ENGAGE XR, VictoryXR)
 - Retail (IKEA Place, Sephora Virtual Artist)
 - Social (Horizon Worlds, Horizon Workrooms)

\$250B+

Explosive Growth by 2027, fueled by rapid device adoption and heavy investments from Meta, Apple, Microsoft, and more.



XR Development vs. Mobile/Web Development

Key Development Differences

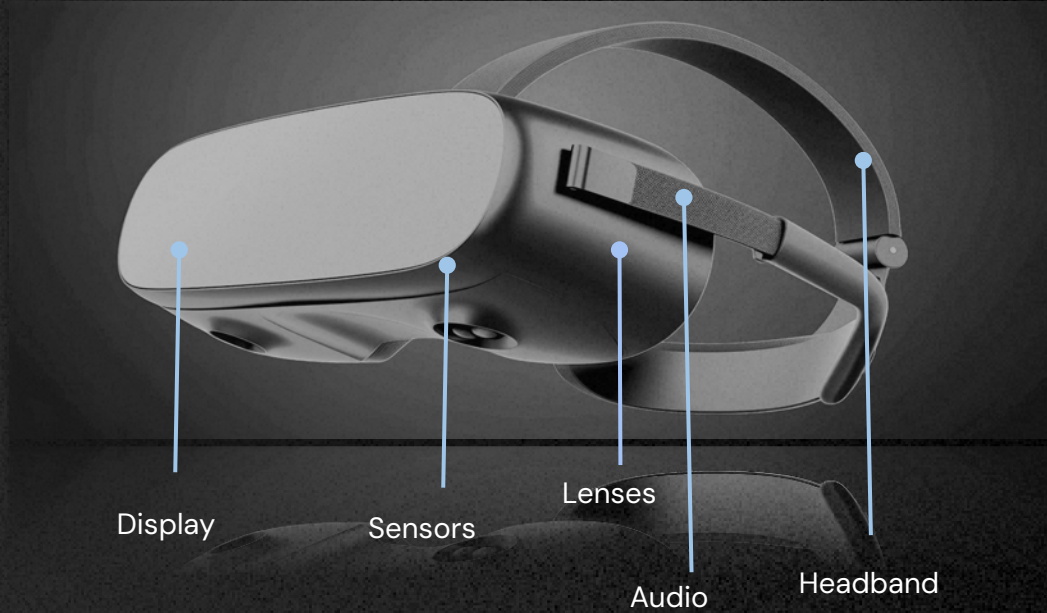
- **3D vs 2D:** XR operates in real-time 3D environments, requiring skills in 3D modeling, rendering, and physics.
- **Spatial Awareness:** Depth perception and user position are critical for immersion.
- **Real-Time Processing:** Low latency and high frame rates (60–90 FPS) are crucial to avoid discomfort.

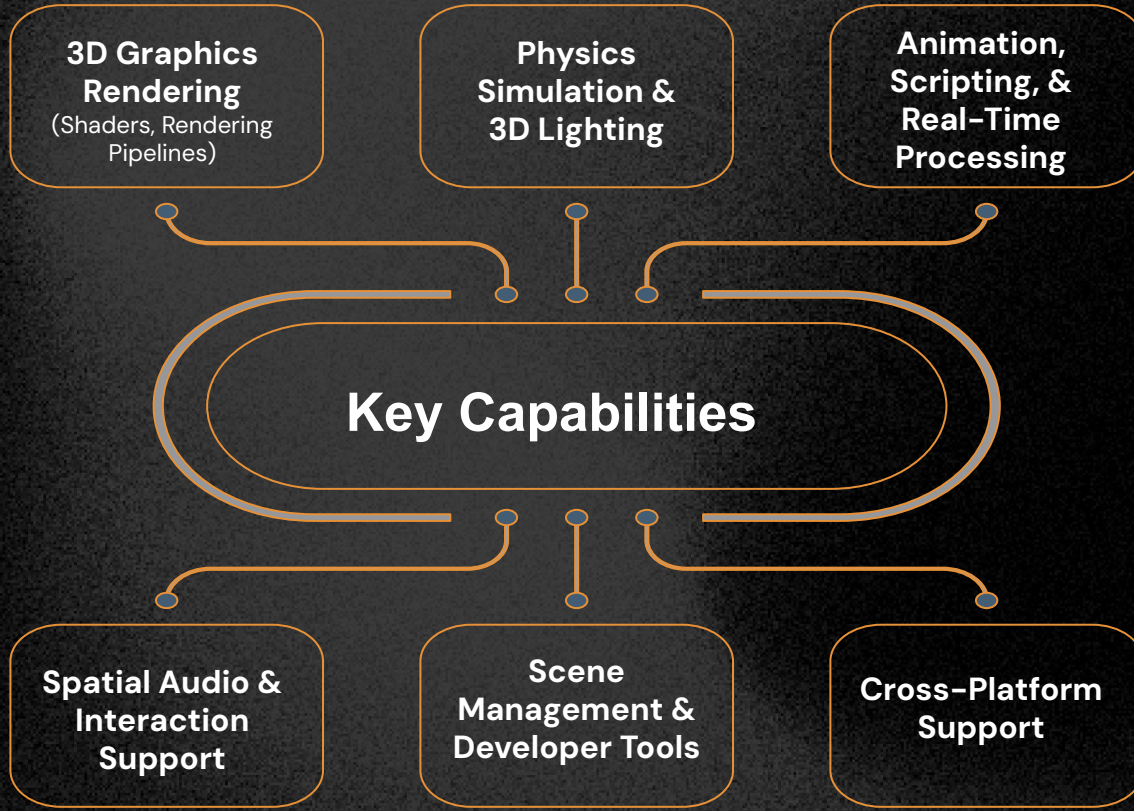
Unique Technical Considerations

- **Tech Stack:** Game engines like Unity/Unreal are used for 3D rendering and interactivity.
- **Hardware:** Focus on headset ergonomics, display, and motion tracking.
- **Interaction:** Users interact through gestures, eye movements, and spatial tracking.
- **Content & Security:** 3D asset optimization and unique privacy concerns in shared XR spaces.



● Anatomy of a MR Headset

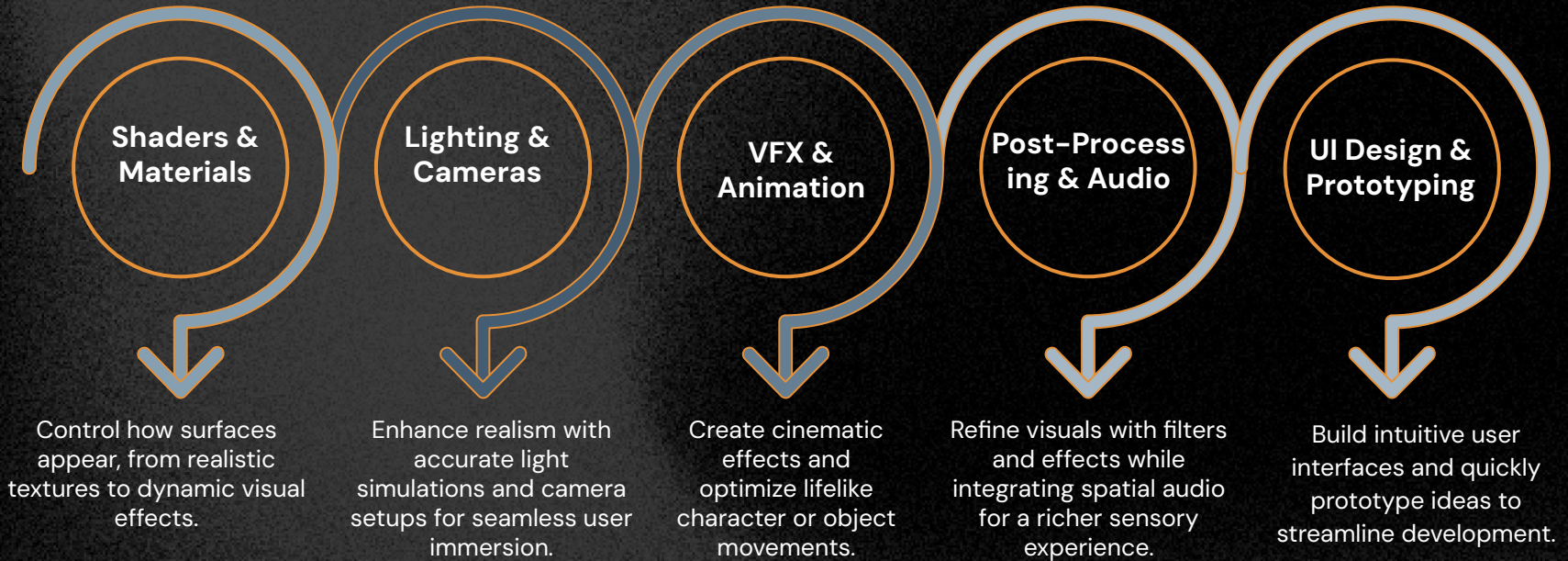




XR Development Overview – Game Engine



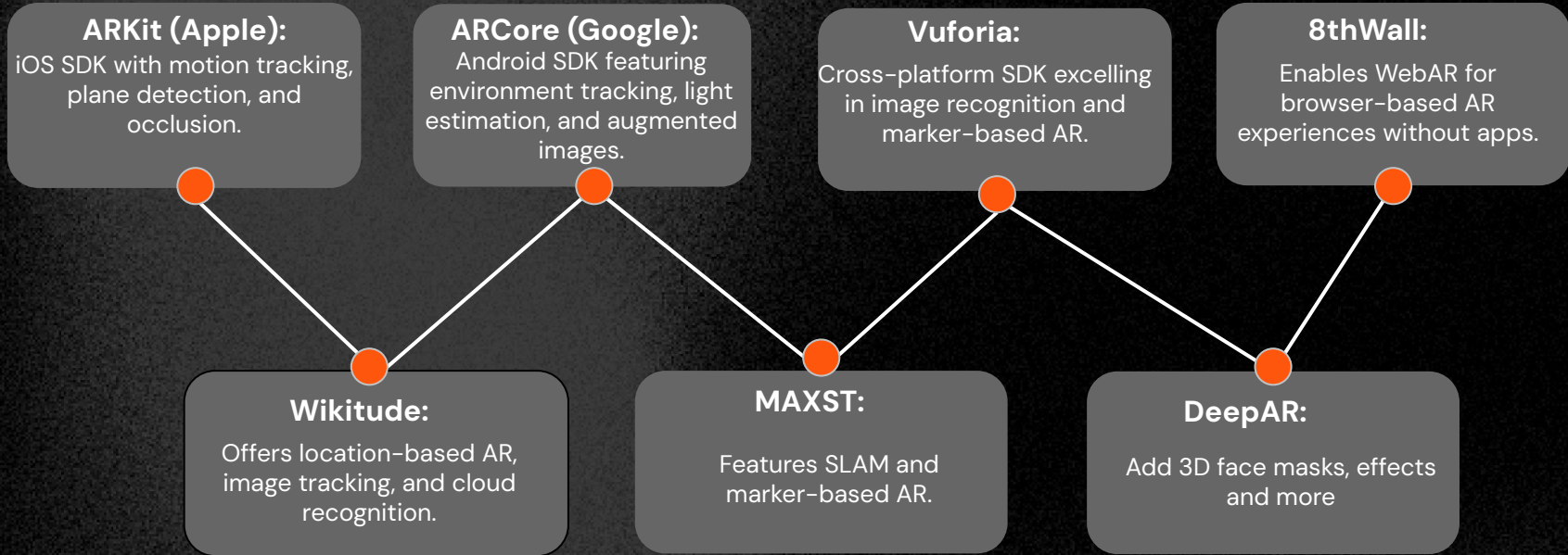
XR Development Overview - Creative



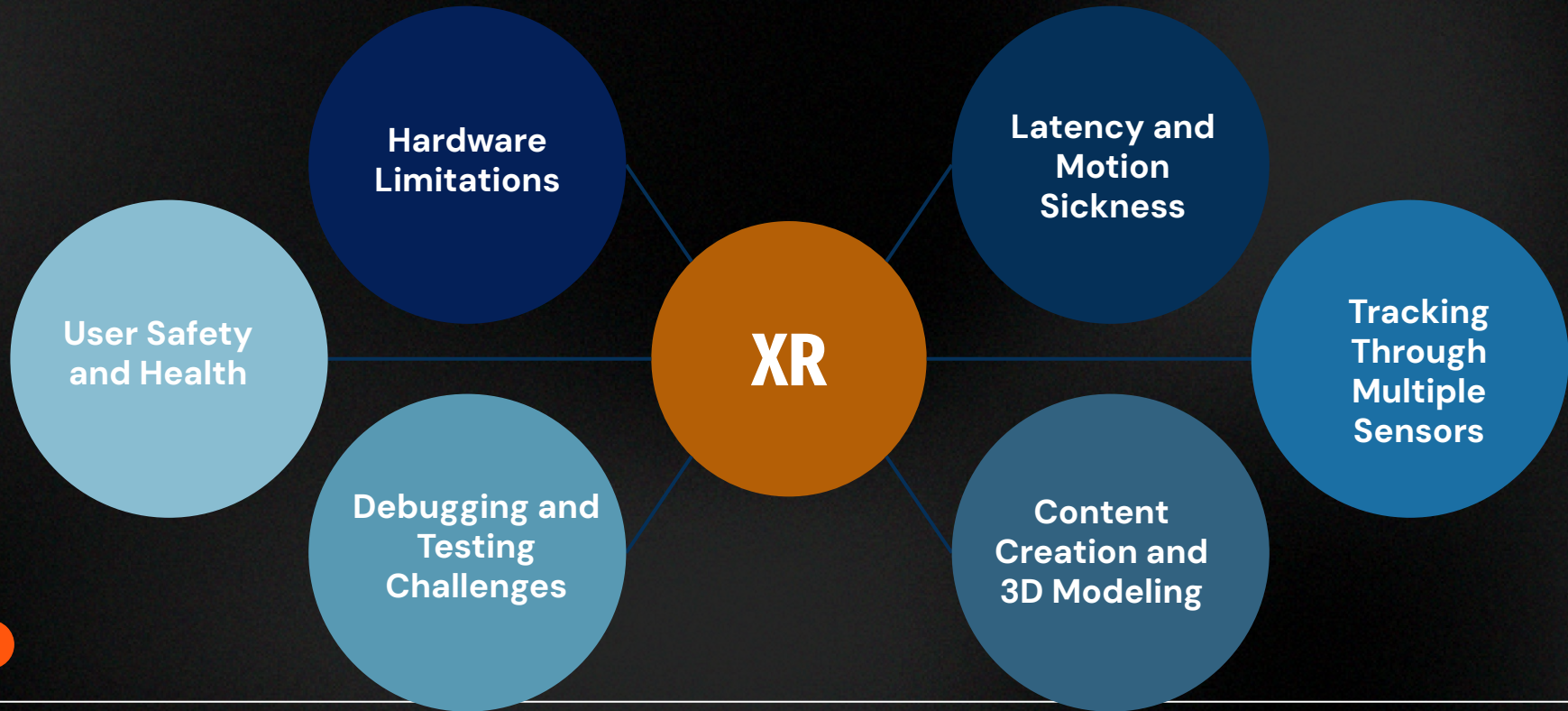
Tools: Blender, Unity Pro-builder, Maya for creating 3D assets

AR SDKs (Software Development Kits)

SDKs provide pre-built tools and functionalities for AR.



Challenges unique to XR Development



Building a Lovable and Scalable XR Product

Focus on User Experience Design

Spatial Design

Adaptive UI/UX

Environmental Variability

Optimize Performance

Low Latency Architecture

Minimise Bandwidth

Optimize 3D content

Focus on Interoperability & Ecosystem Integration

X-Device Compatibility

Standard tools and skills

X-Platform Compatibility



Leveraging AI to Elevate XR Experiences

Creating compelling XR products demands significant effort, but AI accelerates development, enhances user experiences, and empowers creators.

Enhancing AR/VR Development

- **Automated Asset Creation:** AI tools like MidJourney and Leonardo.ai generate high-quality 3D models and textures effortlessly.
- **Realistic Physics & Animations:** AI-driven simulations bring lifelike motion and environmental interactions.
- **Procedural Generation:** Tools like Runway generate dynamic, adaptive environments for immersive experiences.
- **Testing & Debugging:** AI optimizes workflows, identifying and fixing issues faster.



Leveraging AI to Elevate XR Experiences

Improving User Experiences

- **Personalized Interactions:** AI adapts XR content in real-time based on user preferences or biometrics (e.g., emotion tracking).
- **Natural Language Processing (NLP):** Power conversational interactions in VR simulations and education with tools like ElevenLabs.
- **Spatial Audio:** Enhance immersion with personalized soundscapes powered by deep learning.
- **Emotion Detection:** Real-time adaptation of VR environments improves outcomes in gaming, training, and therapy.



Leveraging AI to Elevate XR Experiences

Empowering Creators

- **AI Animation:** Tools like DeepMotion simplify animation and video creation.
- **Content Assistance:** Generative AI tools draft stories, scripts, and narratives in real-time.
- **Real-Time Translation:** AI can be used to enable multilingual VR interactions.
- **Low-Code Tools:** Platforms like Unity Muse democratize XR development for creators with minimal programming skills.



Thanks and Credits !

Vecteezy.com for Headset Image



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