



**SIGGRAPH 2023**  
LOS ANGELES+ 6-10 AUG

**K H R O N O S**  
G R O U P



# OpenXR: Enabling Cross-Platform VR/AR Experiences

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# XR Development



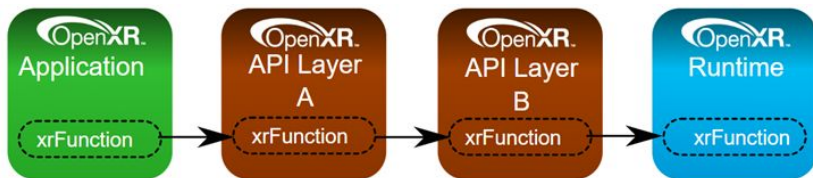
# What is OpenXR?



OpenXR is a royalty-free, open standard that provides high-performance access to Augmented Reality (AR) and Virtual Reality (VR) - collectively known as XR - platforms and devices.

# What is OpenXR?

OpenXR is the specification...

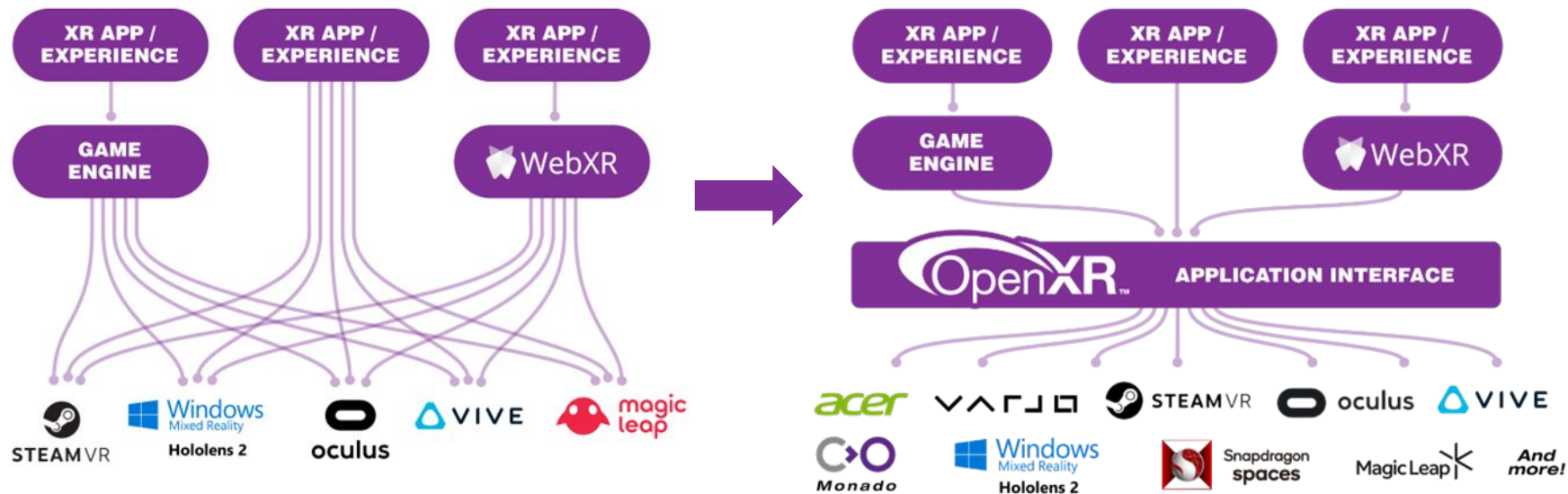


...and Extensions  
and API Layers...

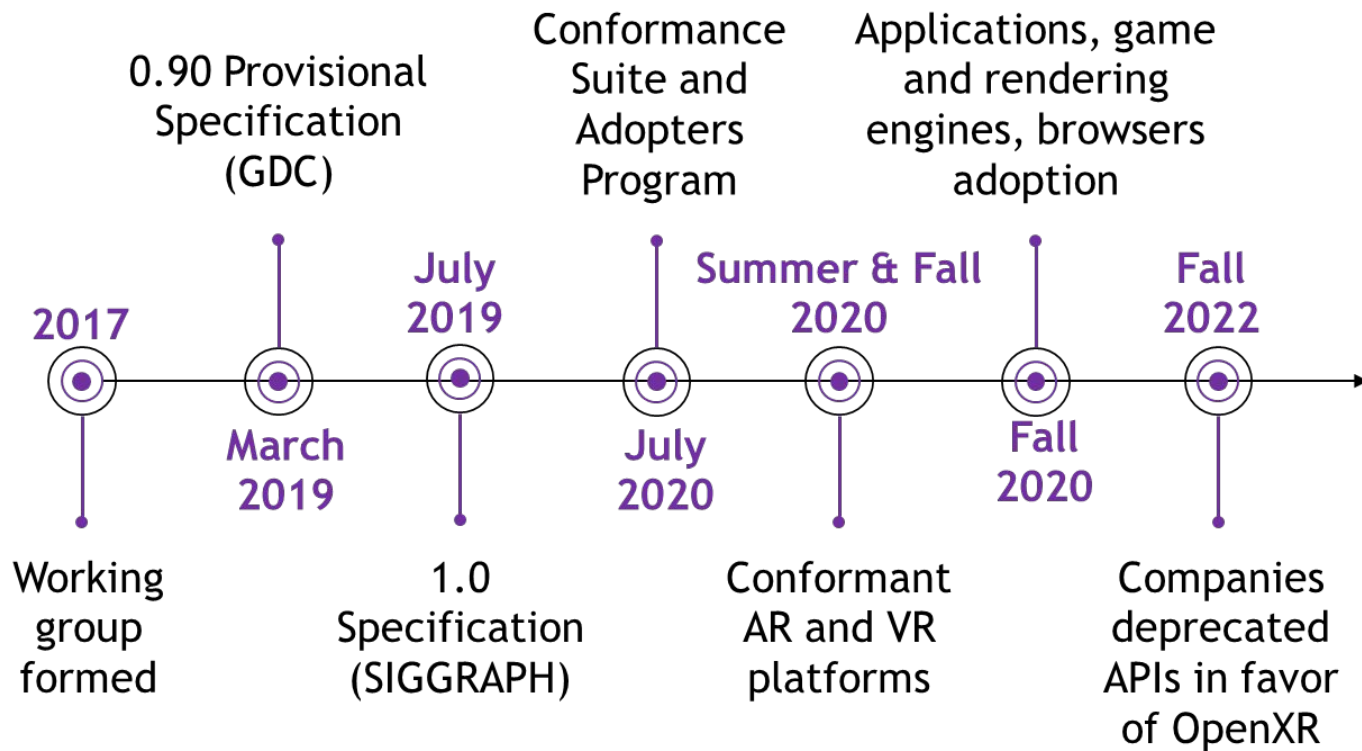
...enforced by the Conformance Test Suite (CTS)


























# OpenXR is Cross Platform XR App Development









# History of OpenXR



# OpenXR Adopters

  <b>Microsoft</b>	  <b>Meta</b>	  <b>hTC</b>
HoloLens and Mixed Reality Headsets. Hand and eye tracking extensions	Rift S, Quest, Quest 2 and Quest Pro. Meta Deprecated own API for OpenXR	Vive Focus 3, Vive Cosmos, Vive XR Elite, Vive Wave Runtime
 <b>STEAMVR™</b>  <b>VALVE</b>	 	 
Valve Deprecated OpenVR APIs in favor of OpenXR	All Varjo Headsets are fully compliant (VR-1, XR-1, XR-3, VR-3)	Collabora's Monado open-source OpenXR Implementation
  <b>Magic Leap</b>	  <b>XREAL</b>	 <b>Snapdragon spaces</b>
Magic Leap 2	XREAL Light and XREAL X	Qualcomm Snapdragon Spaces XR Development Platform
  <b>acer</b>	  <b>ByteDance</b>	  <b>SONY</b>
Spatial Labs Display Series	Neo 3 and Pico 4	Spatial Reality Display (Conformance expected summer 2023)

# Engines and Browsers with OpenXR Support

		
<p>Unreal has been providing support since 4.24. UE 5.0 support OpenXR</p>	<p>Unity's OpenXR plugin available since 2020 LTS</p>	<p>Godot provides OpenXR support since March 2023 (Core 4.0 Alpha 4)</p>
		
<p>Open source mixed reality library for building HoloLens and VR applications</p>	<p>NVIDIA Omniverse and CloudXR Platforms</p>	<p>WebXR in Chrome, Edge and Firefox uses OpenXR as the default backend</p>

# OpenXR Games and Applications

				
Blender uses OpenXR for native scene inspection in VR	Adobe Substance 3D Modeller uses OpenXR for VR support	Kitware's Paraview uses OpenXR for VR support	Meta Horizon Workrooms	OpenBrush uses OpenXR for Desktop and Quest support
				
War Thunder now uses OpenXR	Cubism uses OpenXR for VR support	Vermillion uses OpenXR for VR support	The Light Brigade uses OpenXR for VR support	XPlane12 uses OpenXR for VR support
				
Minecraft uses OpenXR for desktop VR support	Microsoft Flight Simulator uses OpenXR for VR support	Supports over 27 devices thanks to OpenXR	Phasmophobia switched from OpenVR to OpenXR	Beat Saber Alpha branch uses OpenXR

# OpenXR SDK 1.0.28 - July 2023

- Hand tracking and interaction improvements



- Improved support for Android-based devices
- Mac Development
- New Meta extensions: face tracking and virtual keyboard

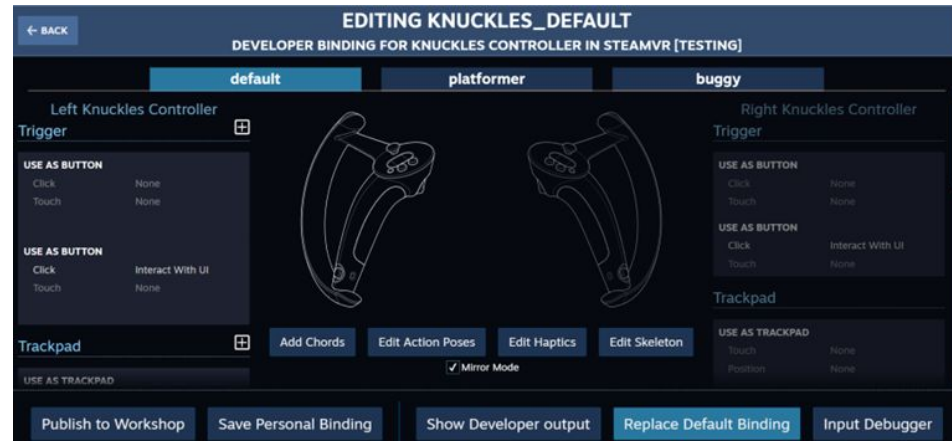
# OpenXR CTS 1.0.27 - May 2023

- Improvements for Android
- Tests for all supported rendering formats (Vulkan, D3D12, etc)
- Console Only Testing



# Current Funded Projects

- OpenXR Tutorials
- Open-Source Runtime Improvements
- Input Rebinding UI





# Coming soon...

- Increased accessibility
- Expanded haptics support
- Controller render models (glTF)
- XR\_EXT\_FUTURE



# Get Started



OpenXR Specification



OpenXR SDK GitHub

[openxr.org](https://openxr.org)





HOLOCHIP

# OpenXR

Enabling Cross-Platform VR/AR Experiences

Steven Winston, Andrew Apodaca



# HoloChip

- Founded in 2004 and based in Torrance, CA
- Develop adaptive optics technology to support 3D display
- R&D of advanced 3D display technologies
- Focus on light field display in 2017, OpenXR in 2019
- Extensive patent portfolio
- Active programs with US DoD, Khronos, Tech Giants



# Holochip and Khronos

- Active work in Vulkan, OpenCL development and testing
- Custom Runtime Development
- Extension Development
- Integration with Existing Applications and Rendering Solutions

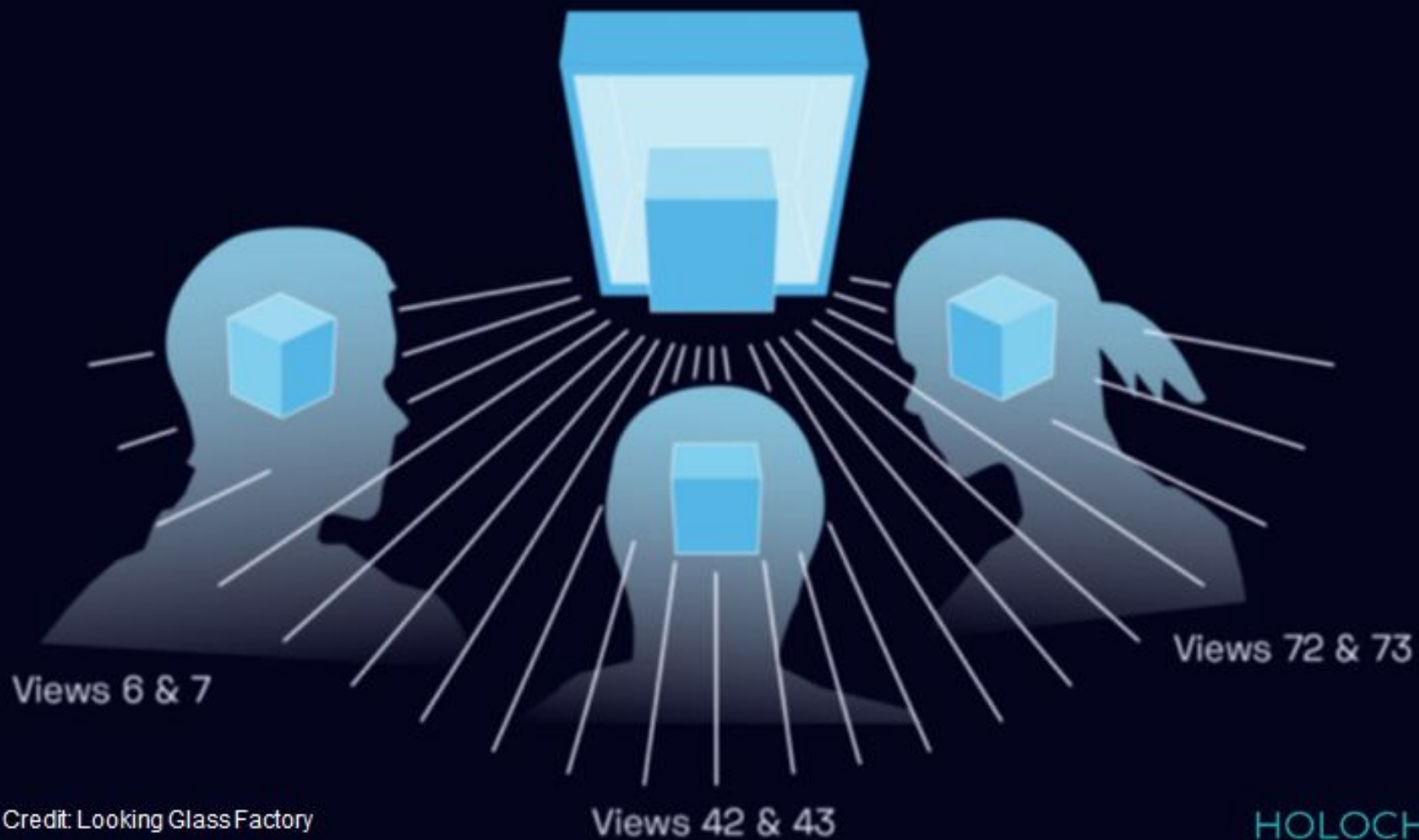


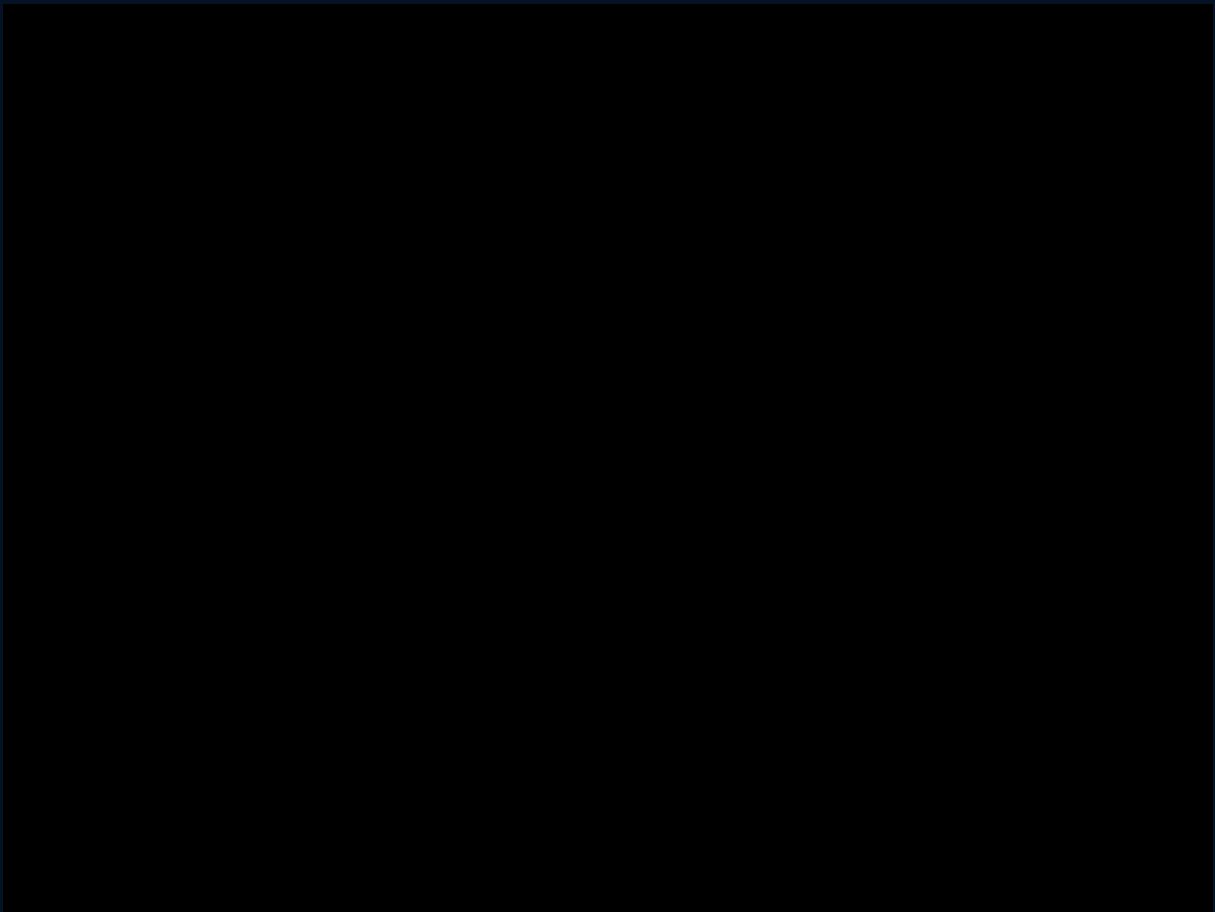
**ADE by Holochip**  
Collaborative Visualization













**ADE by Holochip**  
Collaborative Visualization





# Challenges (1 / 2)

- OpenXR Runtimes have varying degrees of Vulkan support
- Only Windows has support for keyboard and mouse context capture
- Poor support for Vulkan Synchronization
- Poor support for Validation Layers
- Several other missing things that are Vulkan core



## Challenges (2/2)

- User Experience (UX) Design when porting from 2D to VR
- Enabling advanced Vulkan rendering features in OpenXR (e.g., ray tracing)



# Future Work

- Add driver support for HoloChip runtime for XR Headsets and light field displays
- Implement support for additional types of controllers
- Enhance UX through control modification and environmental interface
- Improve game performance through platform-specific rendering optimization



# Q&A