



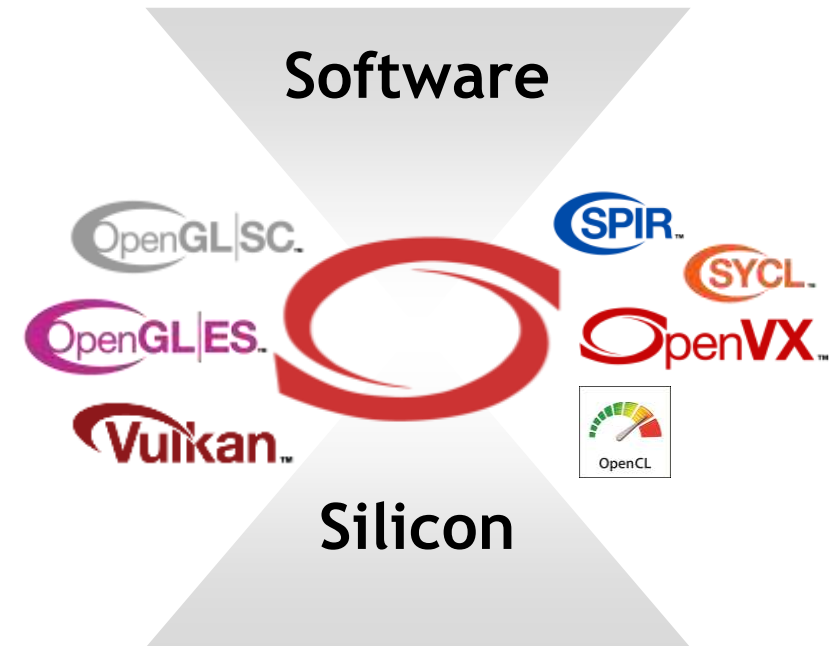
Hardware API standards

And why silicon acceleration is the foundation for AR
AR in Action, January 2017, MIT Media Lab, Boston

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Connecting Software to Silicon



Khronos is an Industry Consortium of over 100 companies
We create royalty-free, **open standard APIs** for hardware acceleration of
Graphics, Parallel Compute, Neural Networks and Vision

Why Does AR Need Standard APIs?

Without API Standards



Platform
Fragmentation



Everything
runs on CPU



With API Standards



Application
Portability



Silicon
Acceleration



Khronos Open Standards

3D for the Web

- VR/AR and games in-browser
- Efficiently delivering runtime 3D assets

COLLADA



NNEF™



Vision and Neural Networks

- Tracking and odometry
- Scene analysis/understanding
- Neural Network inferencing

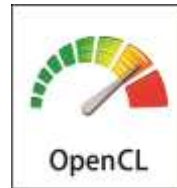


Real-time 2D/3D

- Virtual and Augmented Reality displays
- Cross-platform gaming and UI
- CAD and Product Design

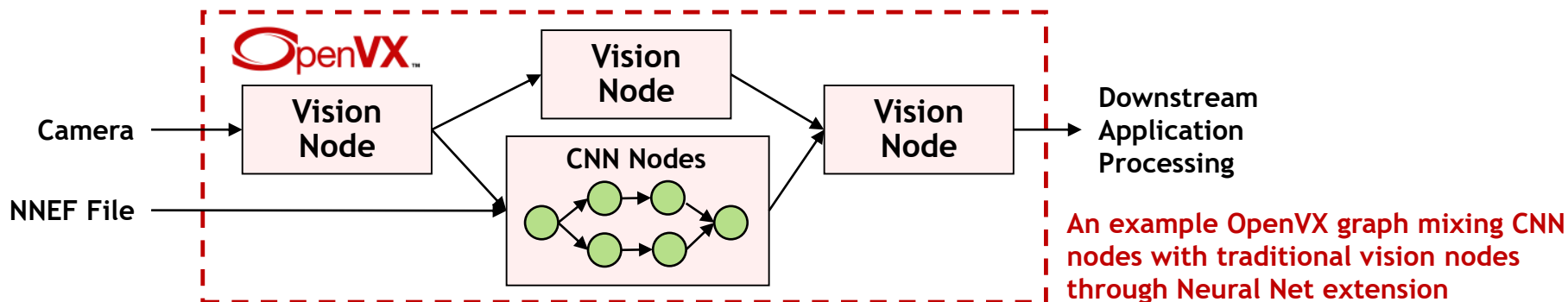
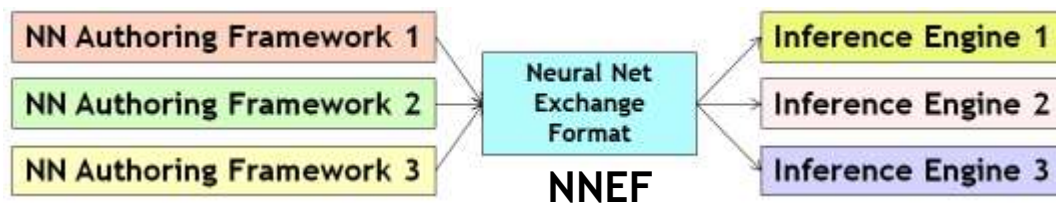
Parallel Computation

- Machine Learning acceleration
- Embedded vision processing
- High Performance Computing (HPC)

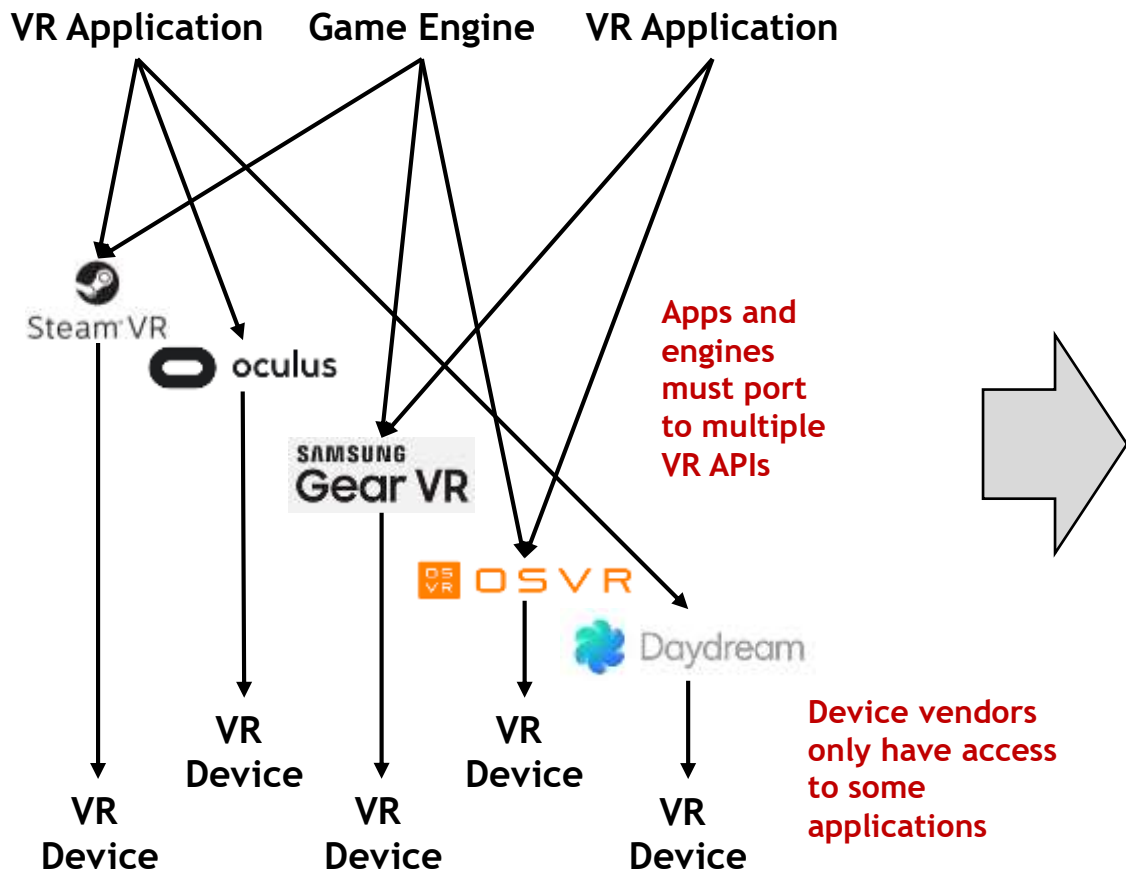


OpenVX and NNEF (Neural Network Exchange Format)

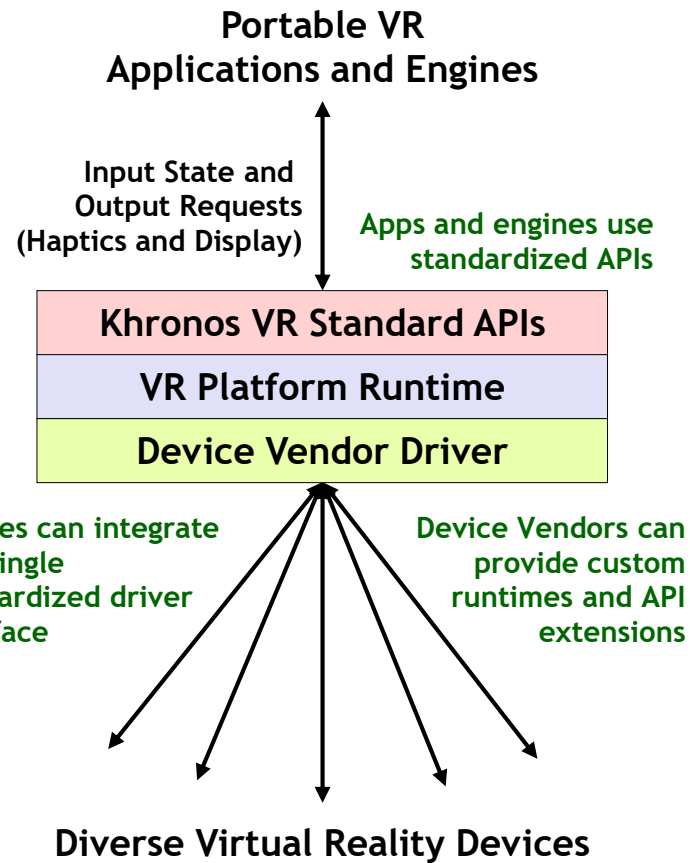
- OpenVX developers express a graph of image operations ('Nodes')
 - Nodes can be on any hardware or processor coded in any language
- Convolutional Neural Network topologies can be represented as OpenVX graphs
 - Layers represented as OpenVX nodes connected by multi-dimensional tensors objects
- NNEF encapsulates a cross platform capture of a trained network
 - Network structure, data formats, operations (e.g. convolution, pooling, normalization)
- OpenVX will be able to import NNEF files



Khronos VR Initiative (and AR too!)



Industry growth limited by costs of application porting and device integration



Standardized hardware/software interfaces encourage industry diversity and innovation

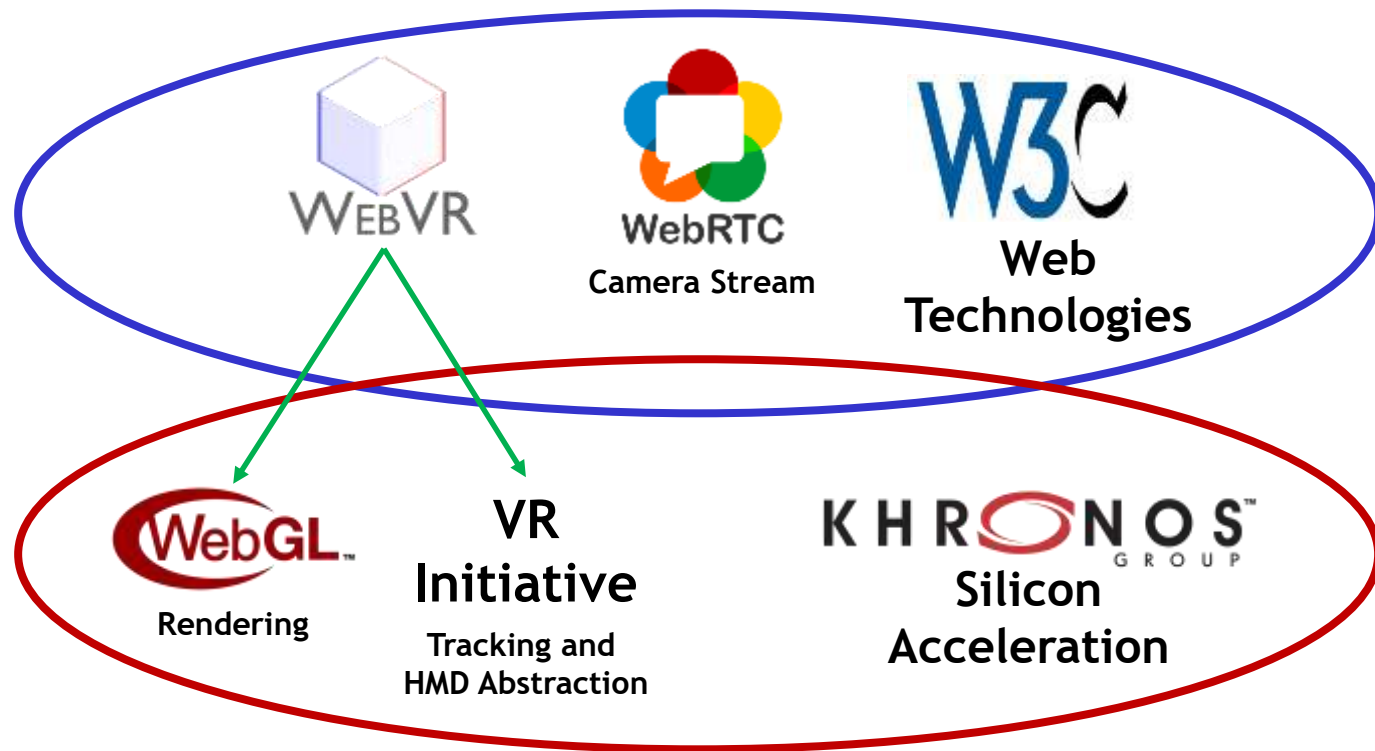
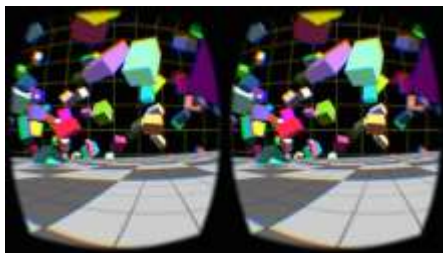
VR (and AR!) Initiative Call for Participation!

- Why at Khronos?
 - All VR Platform vendors are already members
 - Concentration of GPU and vision expertise
 - Proven process
- Now is the perfect time to get involved!
 - The work has just started
 - This is your chance to influence its direction!



WebGL, WebVR and the VR Initiative

WebVR - experimental JavaScript API to access Virtual Reality devices, such as the Oculus Rift, HTC Vive, Samsung Gear VR, or Google Cardboard, in your browser
<https://w3c.github.io/webvr/>



Khronos VR Initiative can boost WebVR by solving native level VR platforms fragmentation
WebGL extensions to expand support for VR functionality:
Direct display access, multi-projection, time-warp, space-warp ...

Please Consider Joining Khronos!

Understand early
industry requirements!

Ship products that conform to
international standards!

Influence how
standards evolve!

Access draft specs to
build products faster!



Khronos is proven to RAPIDLY generate hardware API standards
that create significant market opportunities

Any company or organization is welcome to join Khronos
for a voice and a vote in any of its standards!

www.khronos.org