

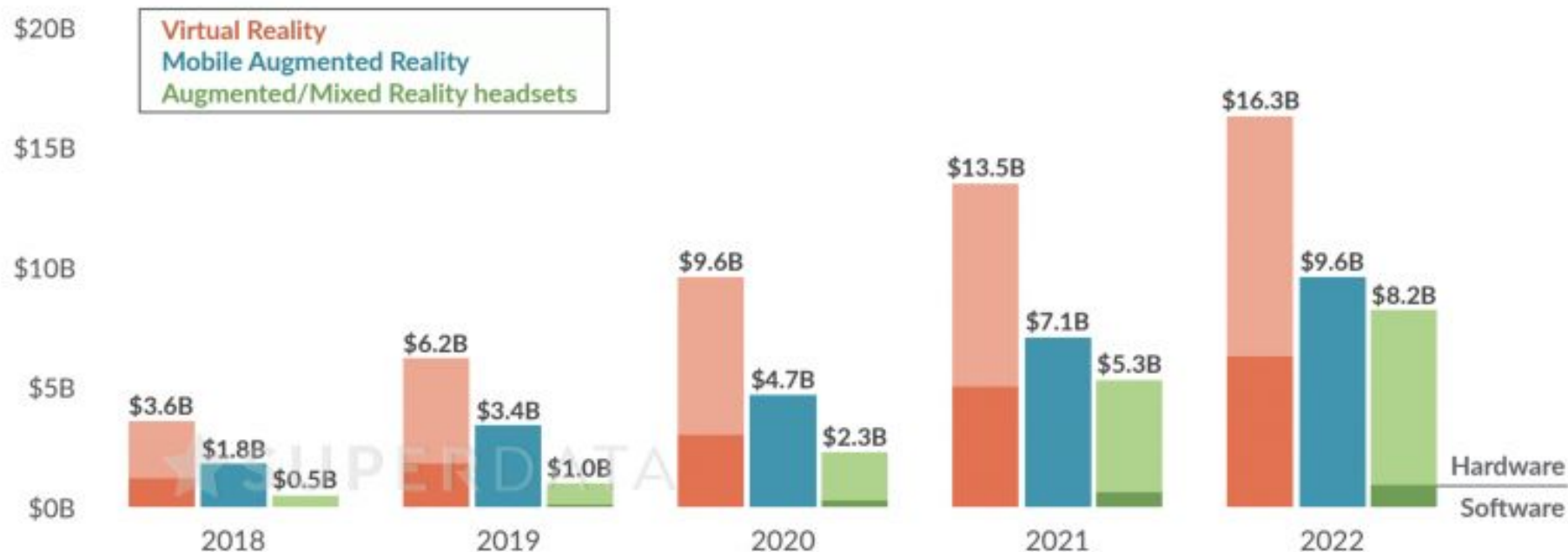
moz://a

# Integrating Mixed Reality into Existing Content Ecosystems: XR and the Web



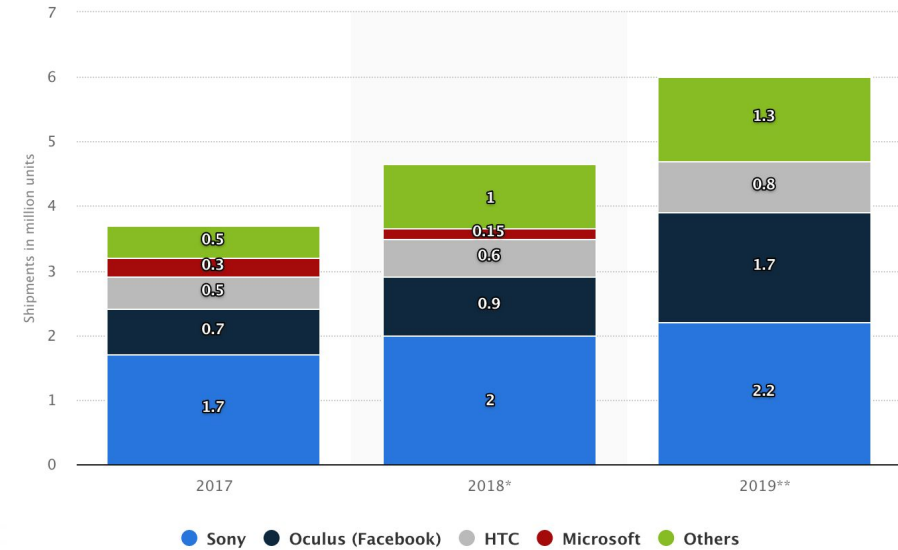
# The Immersive Market

Hardware and consumer software revenue: 2018-2022  
Billions of USD, worldwide



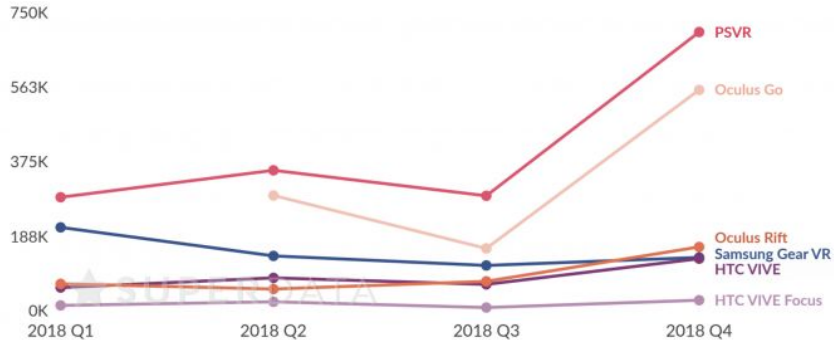
# Soon be a lot of VR Devices

And AR Expected to Surpass VR!



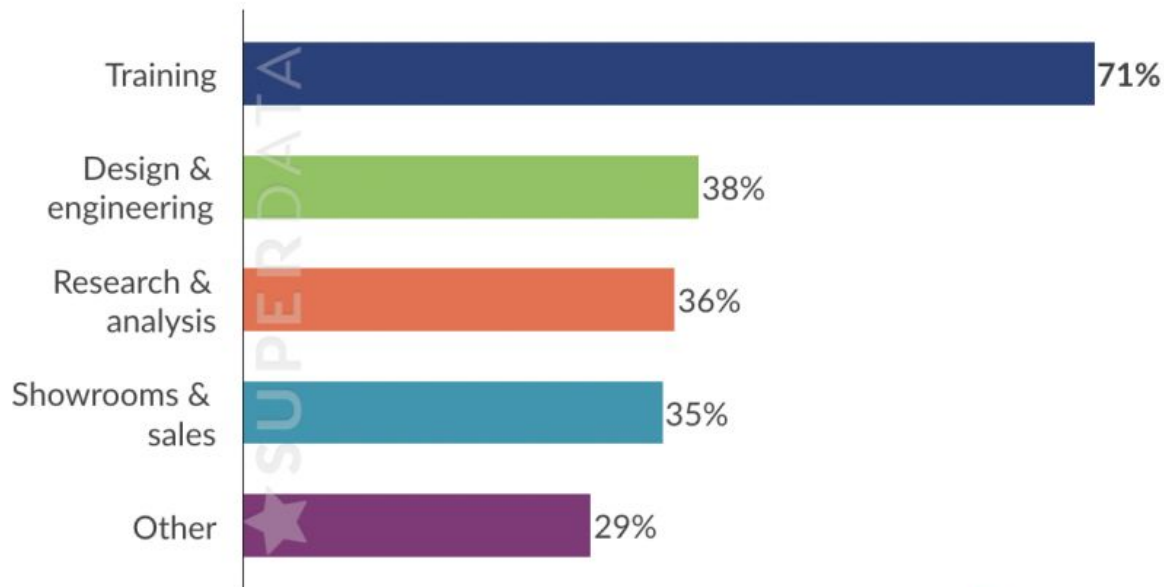
## Virtual Reality Headsets

Sell-through shipments: Q1 2018-Q4 2018  
Thousands, worldwide



# VR Use By Enterprise

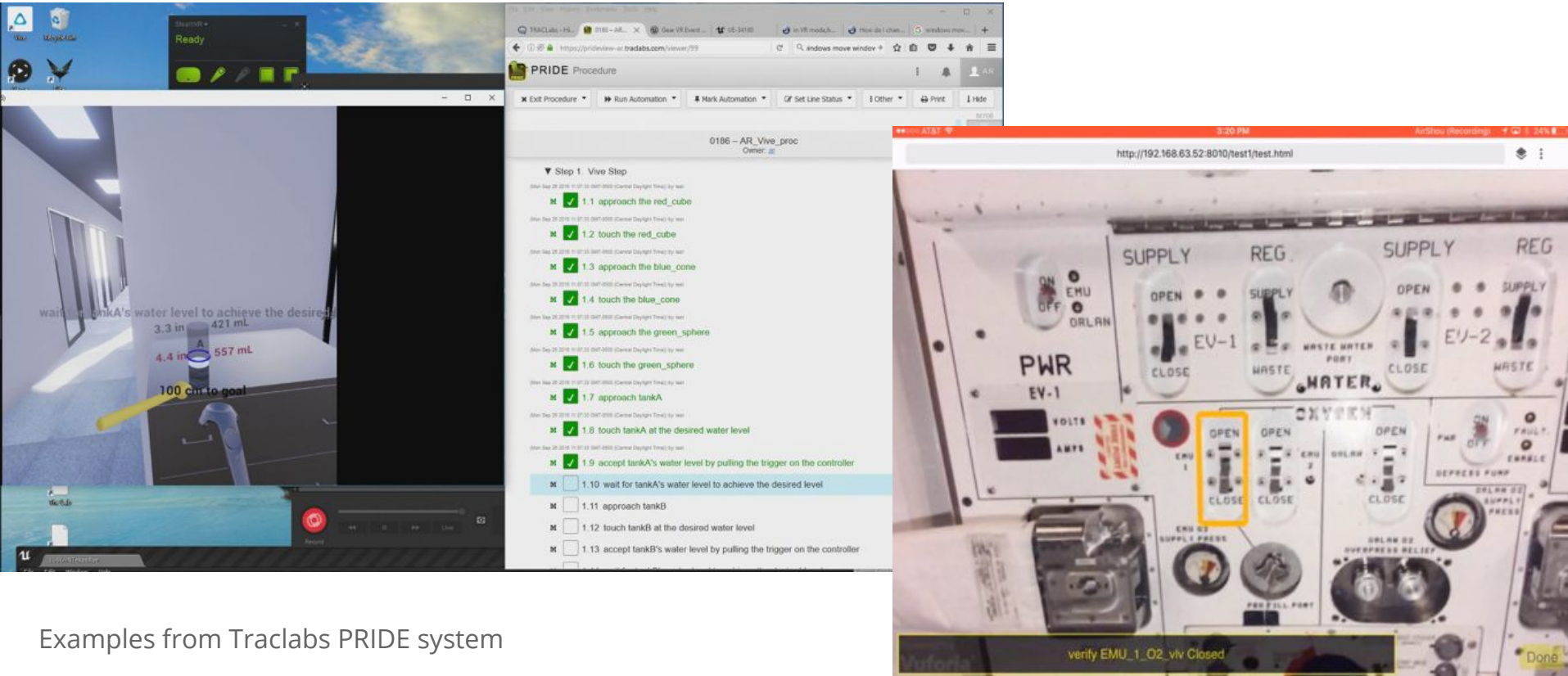
Share of demand-side firms using VR across key segments, Q4 2018



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# Mixture of AR and VR Training





# Need Easy Integration with Existing Content Ecosystem

Enterprise a Mix of SaaS, On  
Premise Systems, Client  
Applications and Web Clients

PRIDE Procedure

Procedure Actions

0876 - 1.407 - EMU CHECKOUT (scratch)  
Run Mode ▾ Owner: test

▼ Step 5. UIA

(Thu Dec 08 2016 12:09:54 GMT-0600 (CST)) by test

- ✓ 1 □ EMU\_1\_pwr\_switch = "OFF"
- ✓ 2 □ EMU\_1\_pwrVoltsLED = "OFF"
- ✓ 3 □ EMU\_1\_pwrAmpsLED = "OFF"
- 4 □ EMU\_1\_O2pressGauge = "850" to "950"

▼ Step 6. Crew Lock: Service and Cooling Umbilical (SCU)

- 1 remove EMU\_1\_SCU from stowage straps and pouches.
- 2 transfer EMU\_1\_SCU to

▼ Step 7. Display and Control Module (DCM)

- 1 remove DCM Cover and affix with Velcro to EMU\_1\_DCM
- 2 EMU\_1\_SCU → EMU\_1\_DCM
- 3 □ EMU\_1\_SCU is locked
- 5 turn EMU\_1\_PowerSelectorSwitch --> BATT

Completed Instructions

Current Instruction

Ontology Object References

Ontology Verb References

CAUTION

PRIDE

US EVA 23 (EV1)

23.2 US EVA 23 (EV1)

Figure 2. V-Guides

4 STBO AFT V-GUIDE INSTALL. (00:15)

- Retrieve V-Guide (L) (use MWS RET if desired)
- Translate & BRT to P1 HR 3649
- Align and zip V-Guide (L) bolts (2)
- Release tether from V-Guide

5 STBO FWD V-GUIDE INSTALL. (00:15)

- Retrieve V-Guide (R) (use MWS RET if desired)
- Translate & BRT to P1 HR 3649
- Align and zip V-Guide (R) bolts (2)
- Configure PGT
- 1 - Fully Zip and drive V-Guide Bolts (4) with PGT (minimize side loads), expect ~1 turn if fully zipped. Report torque (18.4 N-B)
- Record Data Text to Link (Comment) (Lower Round, Upper Round)
- Record Data Text to Link (Comment) (Lower Round, Upper Round)

Properties

Property	Value
Default Location	
Default Role	
Meta Data (*)	

System Representation

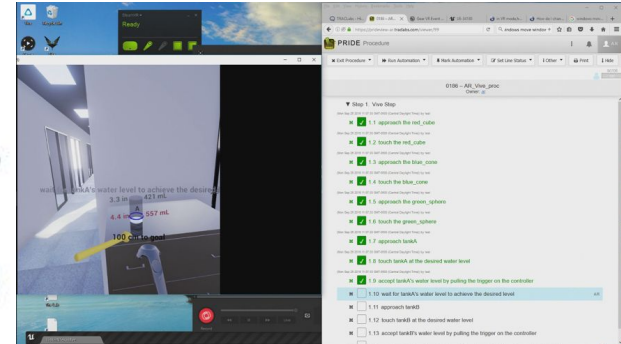
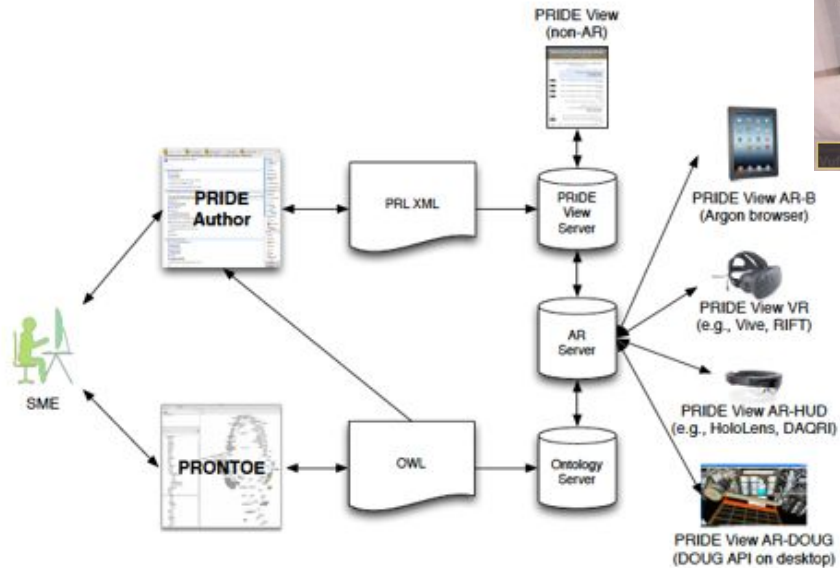
file/Users/scott/Docum Browse

nasa2: owl

Smoke

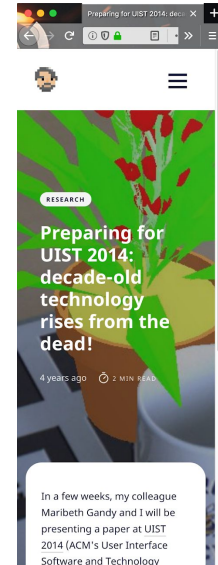
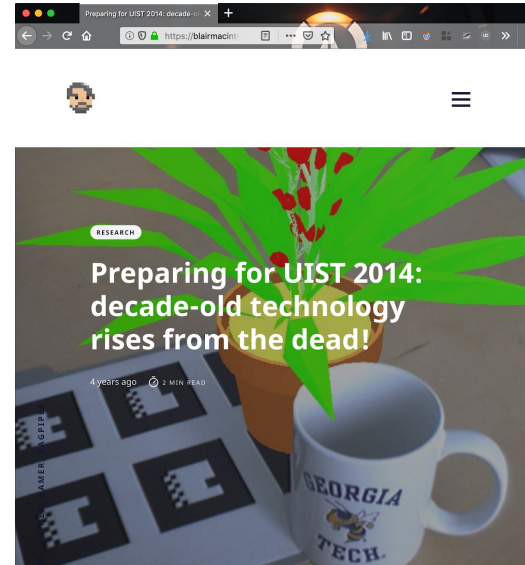
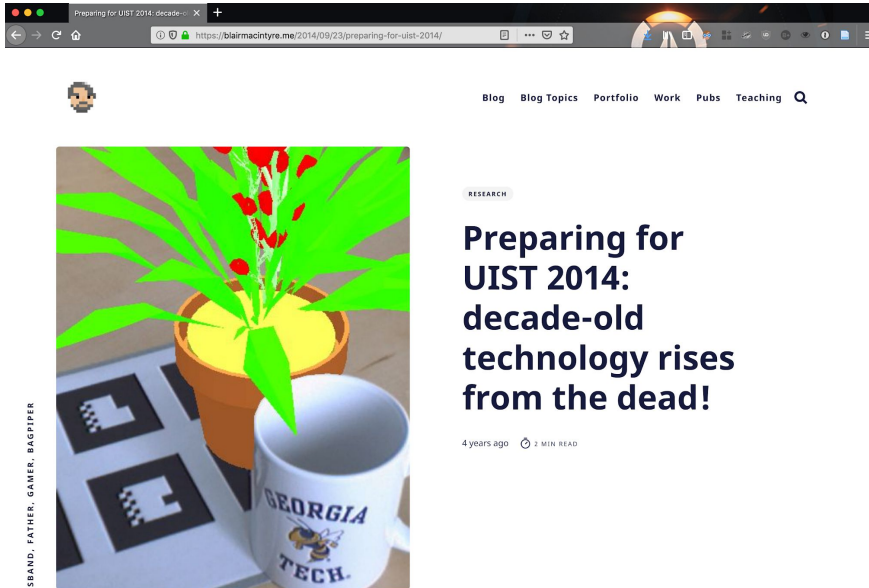
- CarbonDioxideRem
- CdrGasValve
- SmokeDetector
  - Initiate BIT
  - Enabled/Disab
  - Failure Status
  - Test Status
  - SmokeDetectorA
  - SmokeDetectorR
  - SmokeDetectorS
- AntennaAssembly
- ArticulatingPorta
- BCDU&DCSU&MBSU
- Battery\_Charge\_Disc
- BetaGimbalAssembly
- BrakeHandleAssembly
- Camera
- CargoTransportConta
- ControlPanelAssemb
- CoolantLoop
- CoolantPump
- Cover
- Crew & Equipment.T
- Crew & Equipment.T
- DCtoDCconverterUn
- Direct\_Current\_Switc
- DriveLockAssembly
- Experiment
- Floating\_Potential\_M
- Floating\_Potential\_M

# Need Easy Integration with Existing Content Ecosystem



# The Web Model Becomes Increasingly Important w/ XR

- Privacy/Security
- Distribution/updates
- IP Rights/Content Protection
- Adapting to different device capabilities





# Progressive Refinement, AR/VR as "one possible mode"



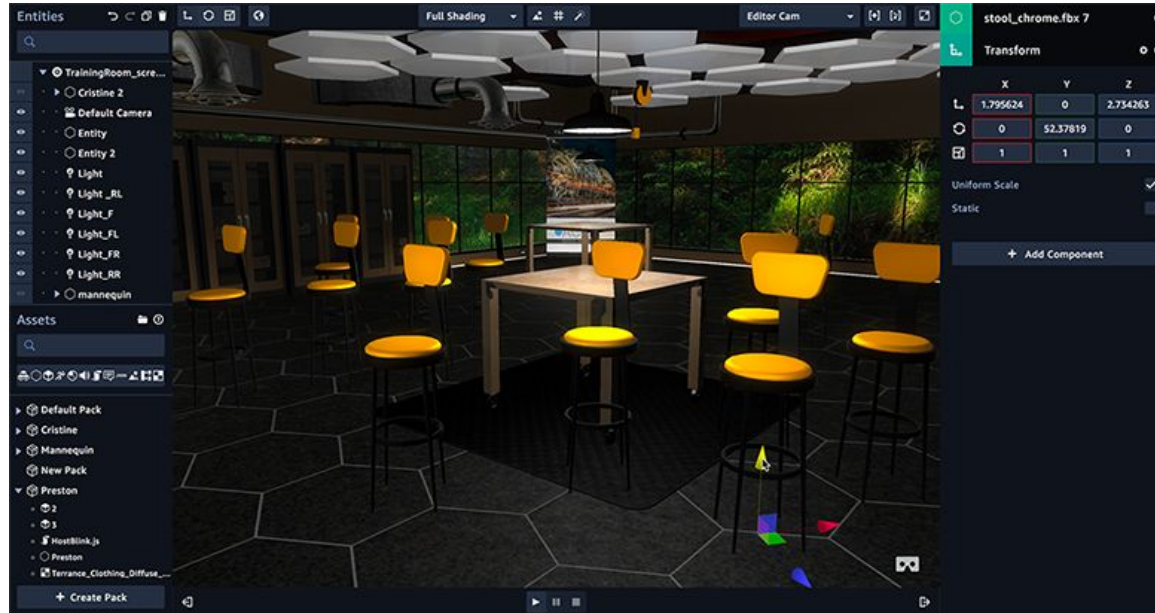
<https://blog.mozvr.com/progressive-webxr-ar-store/>



<https://unboring.net/workflows/progressive-enhancement/>

# Problem: Tools (esp. for VR) Aimed At Game Devs

Unity, Unreal, **Sumerian**, etc. targeted at low level custom authoring and creation



Add in multiple users, heterogeneous devices, adaptive training, etc

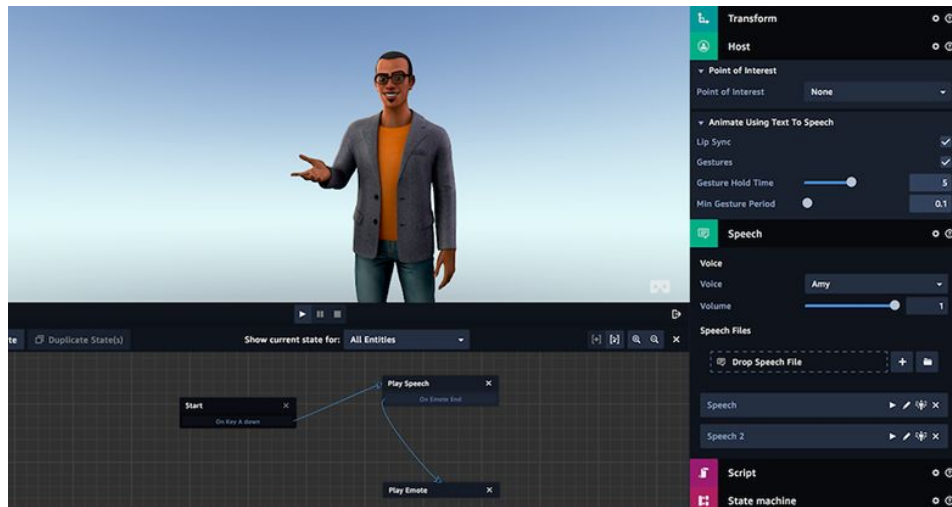
# Need Tools to Enable *Existing* Devs to Create Content That Integrates with Enterprise-Scale Systems

AI-based / Scriptable Avatars

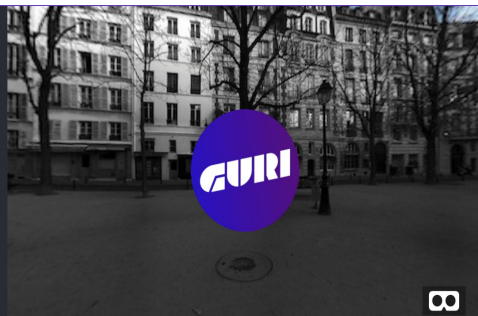
Automatic Generation of  
“unimportant detail”

Pervasive support for  
networked / multi-user

Domain specific high level  
languages based on  
semantic knowledge

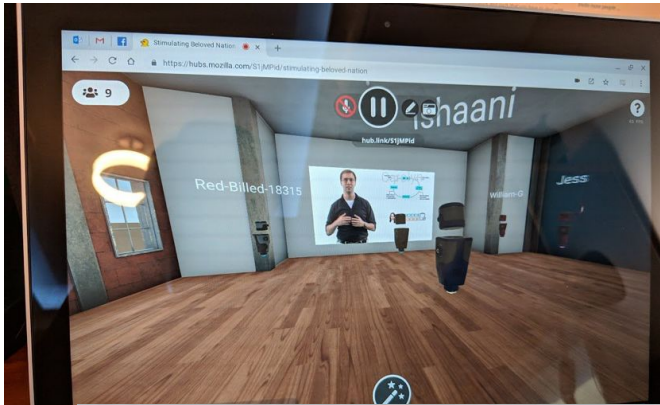


```
1 You not need to be a coder to create VR
  experiences. The GuriVR editor interprets your
  words and creates the world you described.
2
3 Try adding some scenes. For example my first scene
  will last 500 seconds and display an image located
  at https://s3.amazonaws.com/gurivr/logo.png along
  with a text saying: "Guri is cool!" to my left and
  a panorama located at https://s3.amazonaws.com
  /gurivr/pano.jpg
4
5 Try adding more scenes...
6
7 hint: Try with words like audio, panorama, text,
  videosphere, voiceover and chart. You can also
  drag your files into the editor and get back a url
  or even find images and panoramas enclosing the
  search terms inside double quotes 🤖
```



# Rethink Pedagogy in XR Supported Learning Environments

How do we generate environments on the fly to support training and learning



**Using hubs for  
Online Learning  
Community  
Support**

**David Joyner,  
Blair MacIntyre**



**Using Projection AR to Add Design Studio Pedagogy to a CS Classroom**

**Amber Solomon, Blair MacIntyre, Betsy DiSalvo, Mark Guzdial, Ryan Jones, Ashwin Kachhara**

