XR Design & Development

- definitions
- where and why XR is being used
- what the future holds
- XR design considerations
- essential elements
- practical demonstration: photogrammetry

EWAN FINDLEY

What is Extended Reality (XR)?

The reality-**virtuality continuum**...

Extended Reality (XR)

Mixed Reality (MR)

Real & virtual interacting

Real environment

Augmented Reality (AR)

Blending some virtual elements
with the real world

Augmented Virtuality (AV)

Blending some real elements
with the virtual world

Virtual Environment (VR)

Completely virtual world

■ Where XR is being used now

Already being used across many industry sectors…

…improving productivity, social interactions, preserving resources, reducing risks and minimising costs

+ entertainment
+ engineering
+ construction
+ training
+ education
+ retail

+ media production
+ product design & manufacture
+ architecture
+ fitness
+ healthcare
+ wellbeing
+ more

Apple Vision Pro: MR device capable of AR, MR + VR!

Mixed Reality head mounted display (HMD), due 2024
Eye tracking, natural language input, hand gestures.

Source: apple.com

Virtual Production on The Mandalorian

Virtual Production using LED tiles is changing how films are made. Offering dynamic rendering based on the position and perspective of the camera.
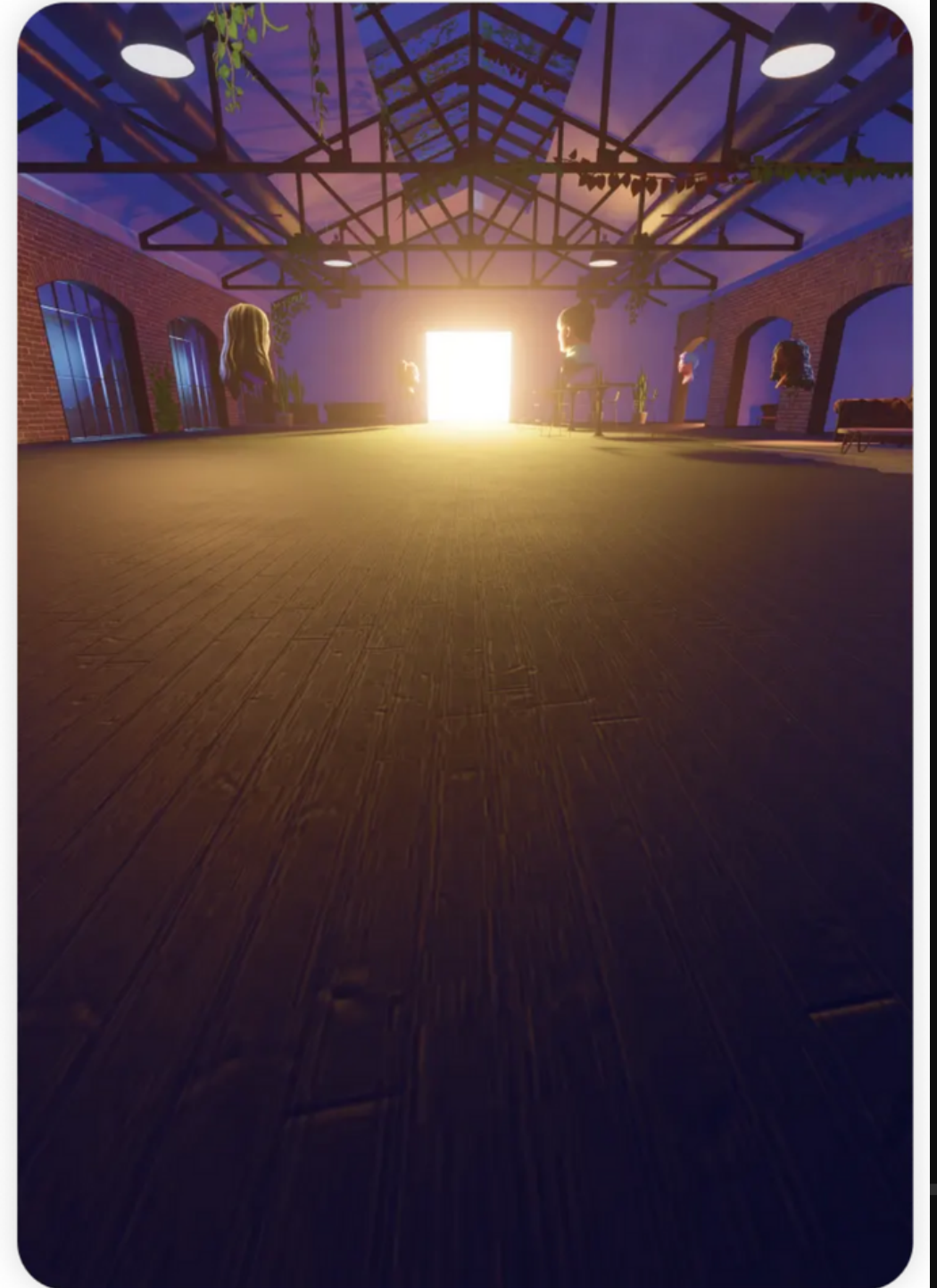
Source: https://www.starwarsnewsnet.com/2020/02/new-behind-the-scenes-video-of-the-mandalorians-virtual-production.html

Gravity Sketch: 3D modelling in VR

Modelling in VR means you can walk around the object or experience it life-size.

Source: https://www.gravitysketch.com/products/

Mozilla Hubs: Web XR

Open source social VR platform accessible on all devices with a web browser.

Social VR affords embodied avatar - people can play with representation
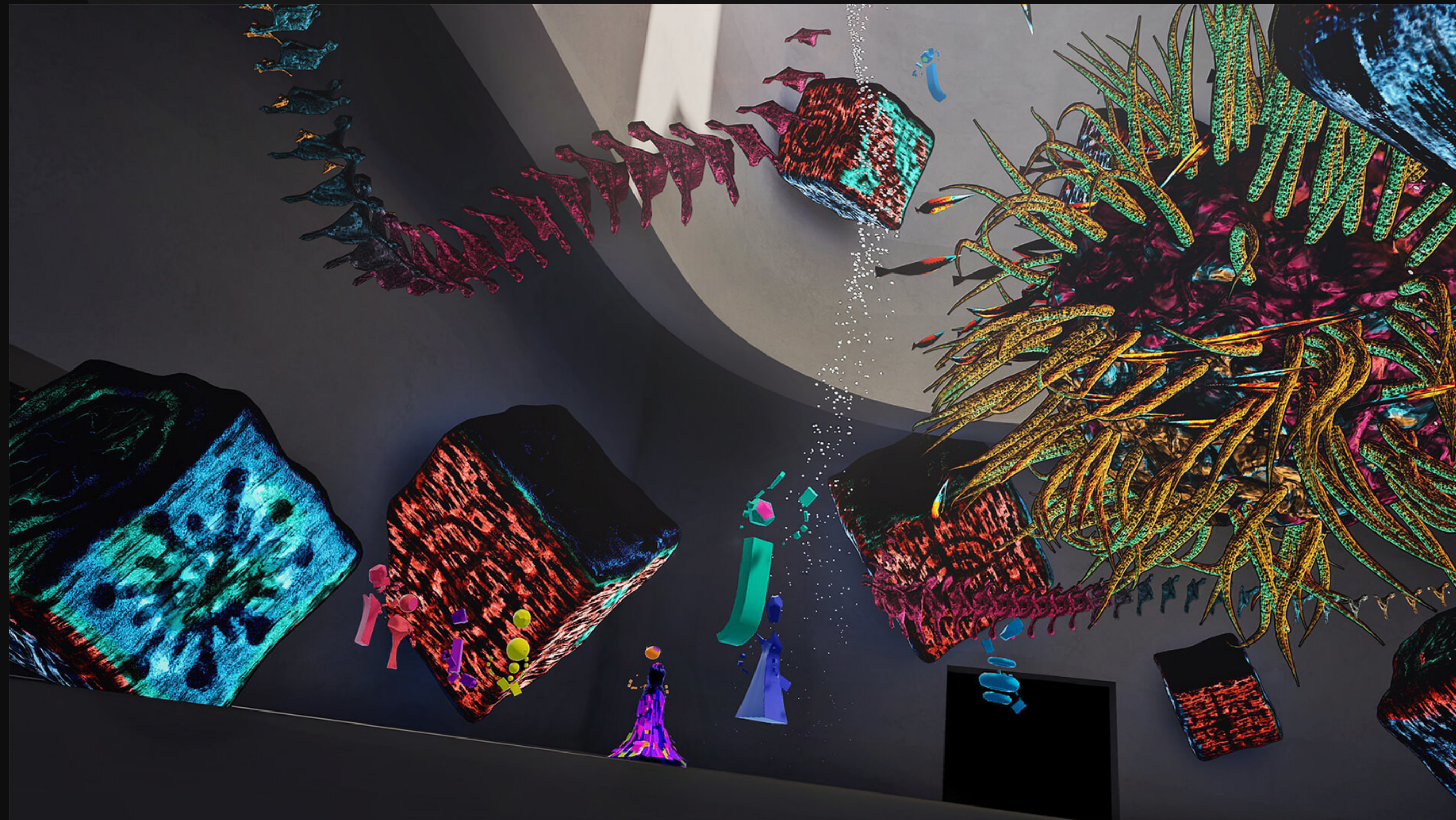
Source: https://hubs.mozilla.com

Engage VR: Fatboy Slim live concert

"The 45-minute concert showcased a true live concert,
but without the boundaries of the physical world."

Source: https://engagevr.io/portfolio-item/test-iteam

Museum of Other Realities: VR art gallery

"An immersive multiplayer art showcase in virtual reality, the Museum of Other Realities is a space to connect, share, and experience a growing collection of mind-bending VR art with others."

Source: https://store.steampowered.com/app/613900/Museum_of_Other_Realities/

Spatial computing offers new ways to interact with digital information

Now is a thrilling time to work with XR!

These technologies are still young and rapidly advancing.

New possibilities + opportunities.

Abstract experiences can now be created as active first person interactive experiences due to new affordances.

Our brains perceive immersive worlds as real due to embodiment and presence.

What might be possible in the future?

XR will have a profound impact on us, but we don't know exactly what that looks like yet.

The **metaverse... a network of 3D virtual worlds** focused on social and economic connection.

...all the missing parts are **actively being worked. Platforms such as VRChat and Roblox already offer this in proprietary closed garden forms.**

XR designers will be the architects of how humans interact with one another and computers in the next stage of the information age. How can the new tech be combined?

Apple Vision Pro mixed reality headset coming 2024 + set to have a big impact due to device specs + prior Apple history.

The METAVERSE

Metaverse article

Considerations for XR Design & Development

Ethics

- Collecting **more personal data than ever before**
- **How will this be stored, shared and protected?**
- Legal considerations e.g. GDPR
- Diversity and equity
- Abuse and harassment

Ethics article

Accessibility

- Designing to include marginalised groups?
- Head mounted displays (HMDs) need stereoscopic vision
- **Sexism in design**

Ecosystem Immaturity

- **Some aspects may take a lot of energy/time to get working**
- Self learning necessary
- Fast turnover of devices - support may be dropped quickly

XR Design & Development Essential Elements

+ **Project planning**
  - Consider collaborations
  - Timeline
  - R&D tools e.g. **knowledge graph Logseq** / notes
  - Cloud file storage
  - Version control
  - Financial plan

+ **Define your audience**

+ **Audience experience**
  - How does the experience change them?
  - **Think about all five senses... audio often overlooked**
  - User interface, user experience - old metaphors may not be relevant with new affordances

Essential Elements (continued)
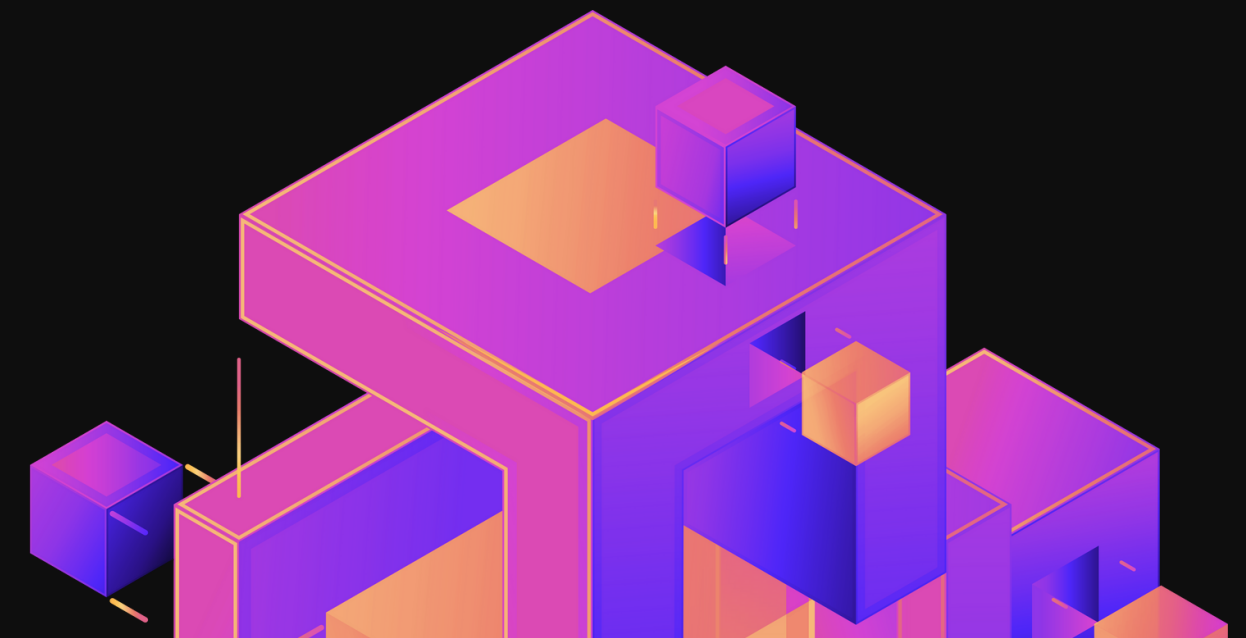
Story is central to experience design
- That the audience experiences
- Helps drive decision making during development

Choosing Technologies
- **Affordances of different mediums**
- More than one way to achieve something
- Think about how to combine tech
- Watch for rabbit holes
- Steep learning curves, but stick at it!
- **Many free resources available online... XR community is good with lots of sharing**
- **Sensors - what live data can be brought into an experience to make it interactive**

Tool choice
- **Realtime graphics for interactivity: Web XR, Games engines Unity and Unreal**
- **Node-based procedural programming**: TouchDesigner, Notch, Houdini, Max, Reaktor
- Languages & libraries; Processing, P5
- AI to assist with programming
- 3D modelling: Blender, Gravity Sketch
- Photogrammetry or LiDAR for 3D scanning: Metashape, Capturing Reality.
- Audio production: Reaper, Ableton, Bitwig

Final Essential Elements

Distribution
- **App stores: Apple, Quest, Steam?**
- Location based?
- Solo or multiplayer?

Development
- **Iterative Agile / Lean approach**
- **Rapid prototyping**
- **Test early on real users for valuable feedback**
- Define > Design > Develop > Test > Iterate > Deploy

Research approaches
- Explore ideas, use mood boards
- **Wikipedia useful starting point, follow references to research, read papers, books**
- Log your exploration- bookmarks, quotes etc
- Store references as you go e.g. using EndNote, Zotero

- You are in a rare position to begin using XR technologies at an early stage

- You could be first to do something new

- Use your imagination to visualise what could be possible, then have a go!

- When you encounter barriers, seek help from fellow students, university staff and online communities to find solutions
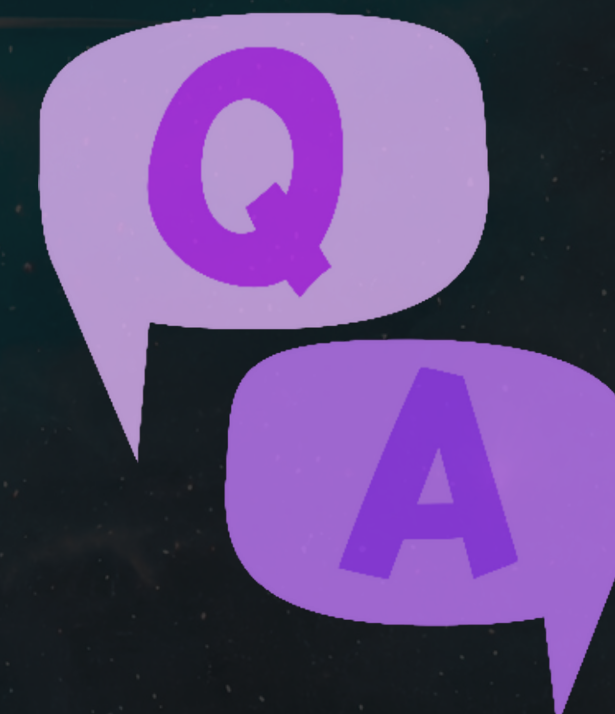
- Tip: Voices of VR podcast (1270+ episodes interviews with creators & industry pros since 2014). https://voicesofvr.com

Essential Elements

Full Presentation

Downloads

Q A

Questions?

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