

An Open Protocol for the Metaverse

**TELEPORT VR**

Roderick Kennedy

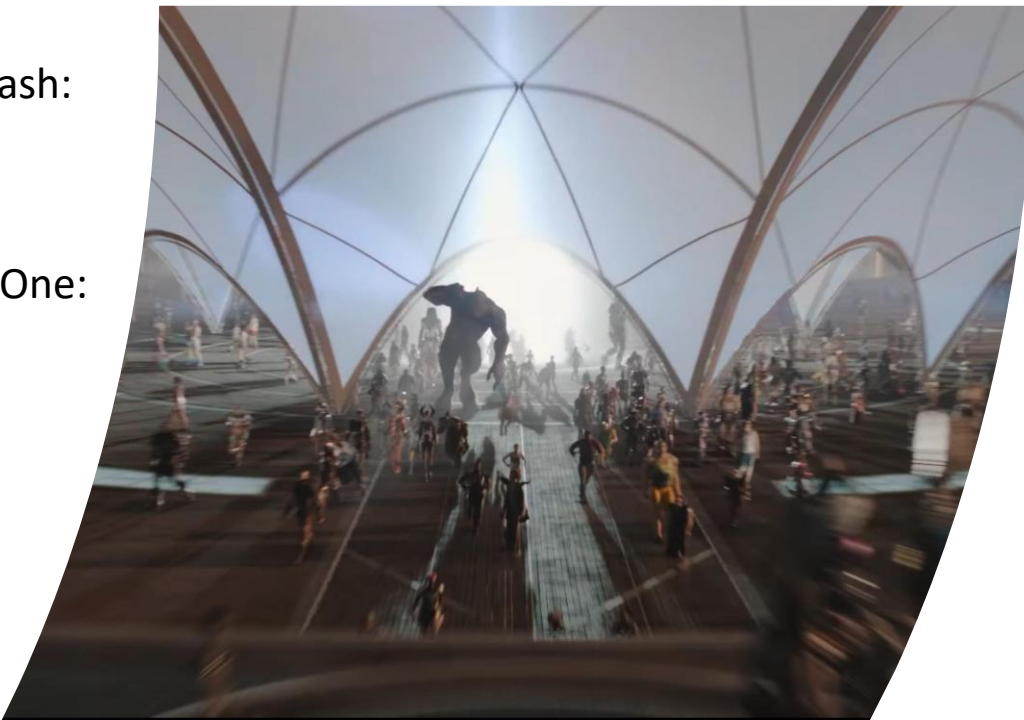
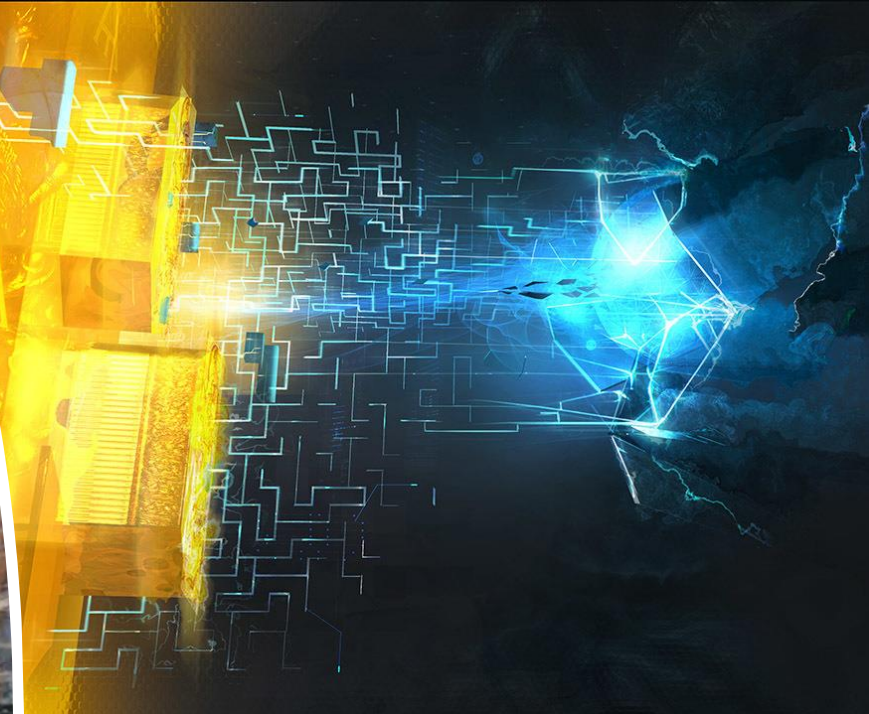
teleportvr.io

Simul Software Ltd

# Metaverse

## The spatial internet

- 1984: William Gibson, *Neuromancer*:  
“Cyberspace”, “The Matrix” (!)
- 1992: Neal Stephenson, *Snow Crash*:  
“The Metaverse”
- 2011: Ernest Cline, *Ready Player One*:  
“The OASIS”

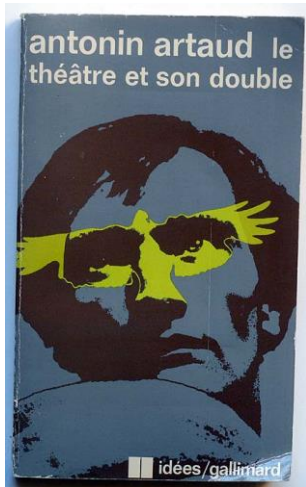


- 3-dimensional
- Immersive
- Shared, common virtual space
  
- Not “metaverses”, not “a cyberspace”.
  - *The Matrix*
  - *Cyberspace*
  - *The Metaverse*
  - *The OASIS*

# Virtual Reality

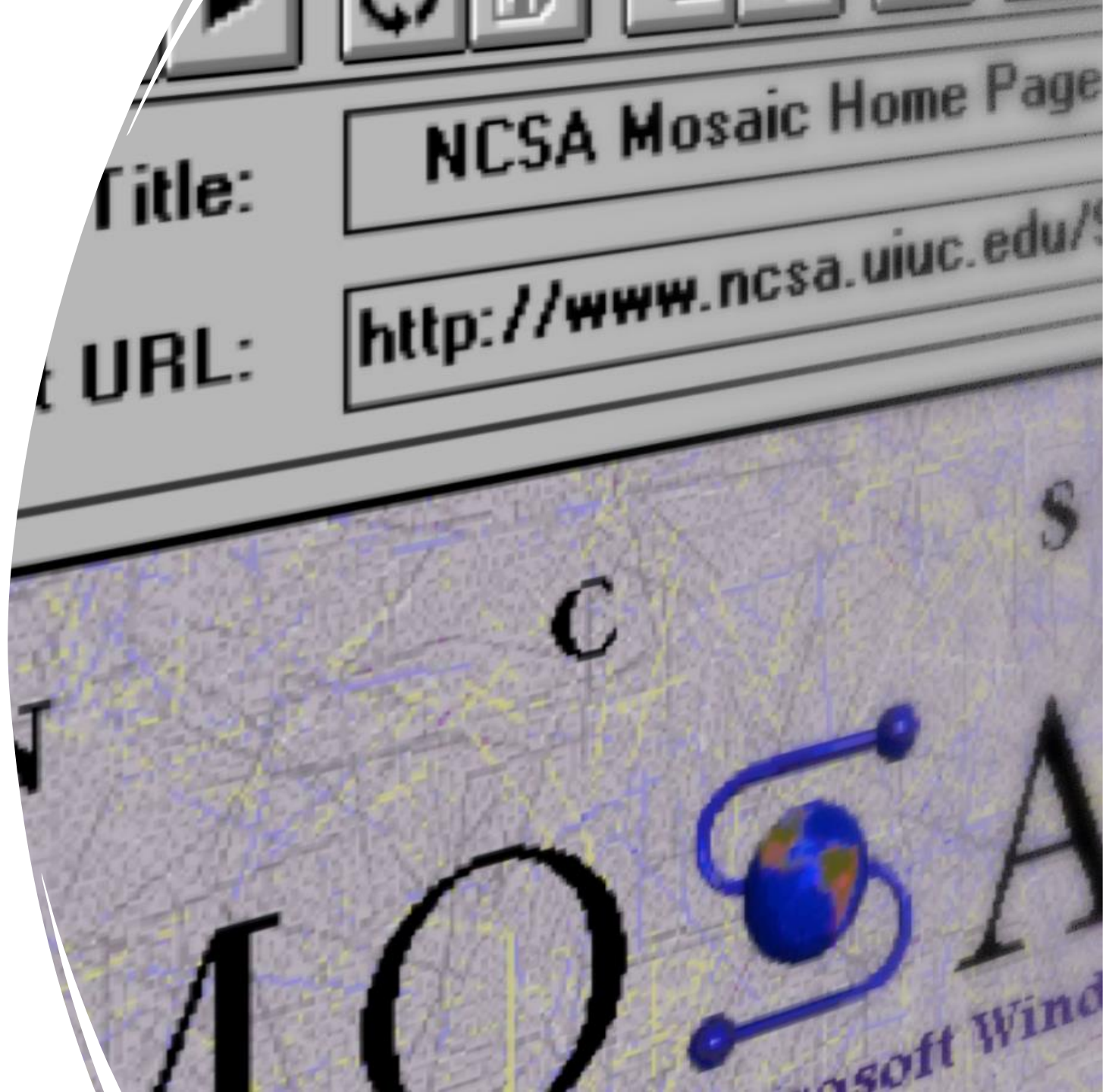
## Futures past

- 1938: Antonin Artaud: “la réalité virtuelle”
- 1965: Ivan Sutherland: “Sword of Damocles”
- 1984: Jaron Lanier: VPL: “virtual reality”
  - DataGlove
  - EyePhone



## Meanwhile in another part of Cyberspace

- 1989: Tim Berners-Lee: The World Wide Web
  - CERN: built for scientists
  - Not the first attempt at networking information
  - HTTP and HTML
  - URI's to static pages
  - Low overhead, low maintenance
  - No security
  - One-way links

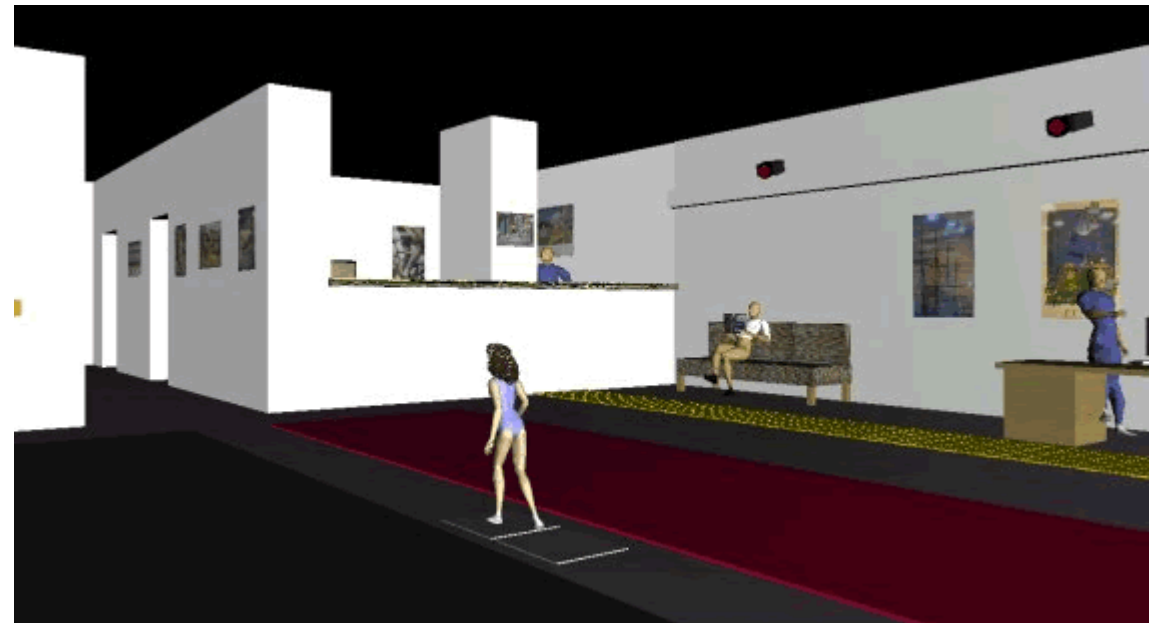


# Meanwhile in another part of Cyberspace

- 1989: Tim Berners-Lee: The World Wide Web
- 1994: D Raggett, M Pesce, B Behlendorf: VRML
  - “Extending WWW to support Platform Independent Virtual Reality”
  - Virtual Reality Markup Language
  - Document format: an **“html” for VR**
  - A solution in search of a problem?
  - A-Frame... WebVR... WebXR... The Metaverse?

```
#VRML V2.0 utf8

Shape {
  geometry IndexedFaceSet {
    coordIndex [ 0, 1, 2 ]
    coord Coordinate {
      point [ 0, 0, 0, 1, 0, 0, 0.5, 1, 0 ]
    }
  }
}
```



# Is the Web the Metaverse?

## Can it be?

- Open
  - Open standards, open by design.
- Discontinuous
  - Each request returns a specific, finite response.
- Stateless
  - Server is never required to retain information about client between requests.
- One-dimensional
  - A scrolling window on a document... VRML, A-Frame, WebXR
- Unidirectional
  - Links are one-way, don't need permission from the target server to link it
- Anti-Capitalist
  - Lots and lots of workarounds

# Is Facebook Horizon/VR Chat/Neos/Rec Room/Roblox the Metaverse? Can they get us there?

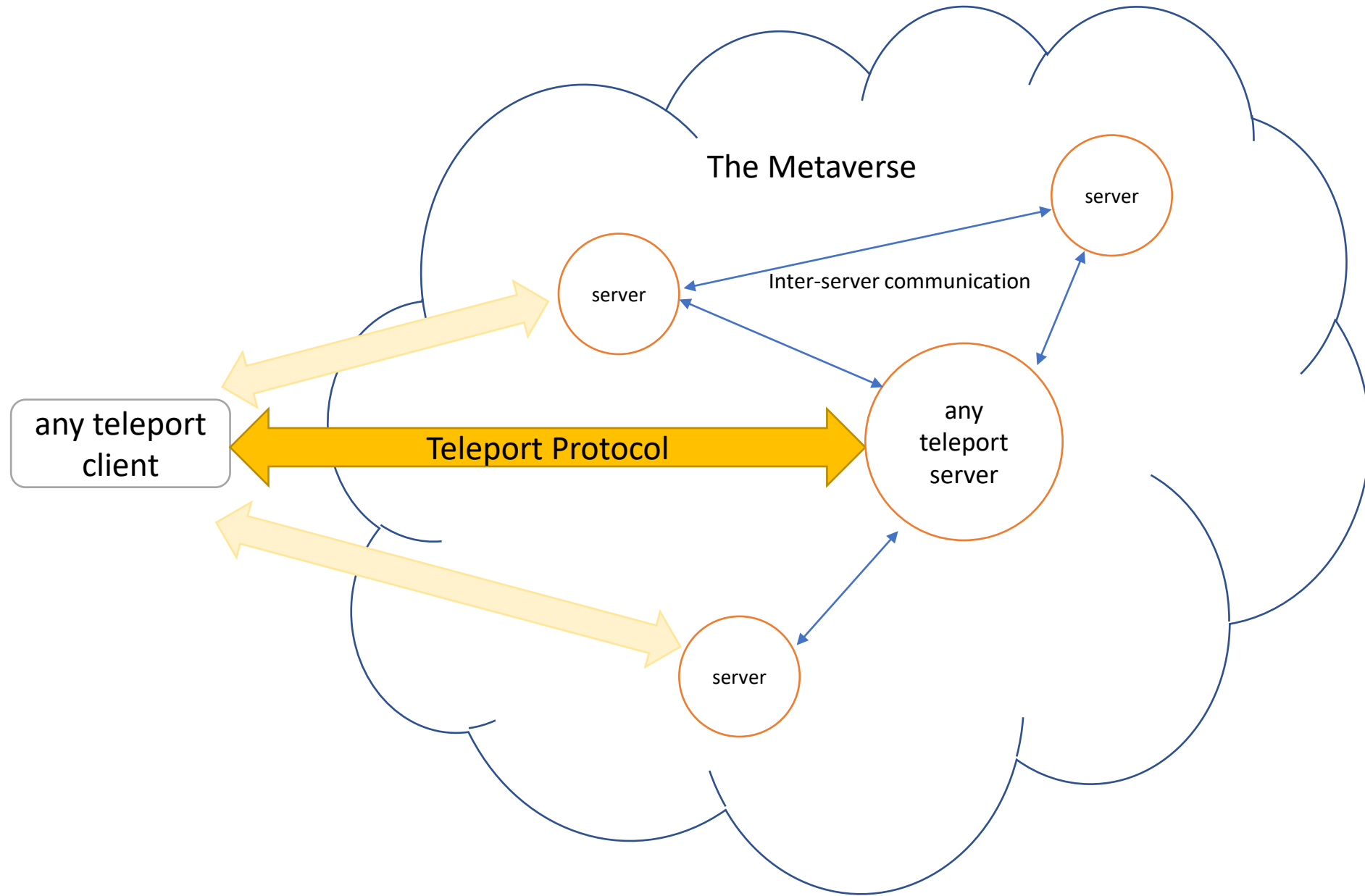
- Closed
  - Proprietary standards with some open features.
- 3-dimensional
- Immersive
- Shared, common virtual space?
  - How do I get there from here?



# Teleport VR

## An Open Protocol

- Client-server XR system
- Thin client
- Real-time protocol
  - Fundamentally real-time
  - Static data is secondary
- Open and native protocol
  - Anyone can create clients
  - Anyone can create servers
- Any application
  - No download
  - No install
  - Browser-like navigation
- **An “http” for VR**



# Teleport VR Protocol

## SERVER to CLIENT

- Streamed video
  - Optional
  - Background
  - Depth
  - Spherical or frustum
- Streamed audio
  - Prerecorded sound files
  - Live sound from server or other clients
- Streamed geometry
  - Meshes: vertices, faces, skeletons
  - Nodes: position, orientation, hierarchy
  - Materials: PBR
  - Animations
- Commands
  - Reparent node
  - Change material
  - Movement

## CLIENT to SERVER

- Control Inputs
  - OpenXR-compatible
  - Head pose
  - Hand poses
  - Other tracking
  - Button-presses
  - Analogue inputs
- Audio-visual
  - Microphone
  - Cam

# Teleport VR

## Division of Labour

### ULTRA-THIN CLIENT

- Render video
  - Background: distant objects
- Render local geometry
  - e.g. hands, body
  - Nearby objects
- Control
  - Move viewpoint
  - Move hands, body
  - Send all control to server
- Communicate
  - Connect/disconnect
  - User identification
  - Stream microphone

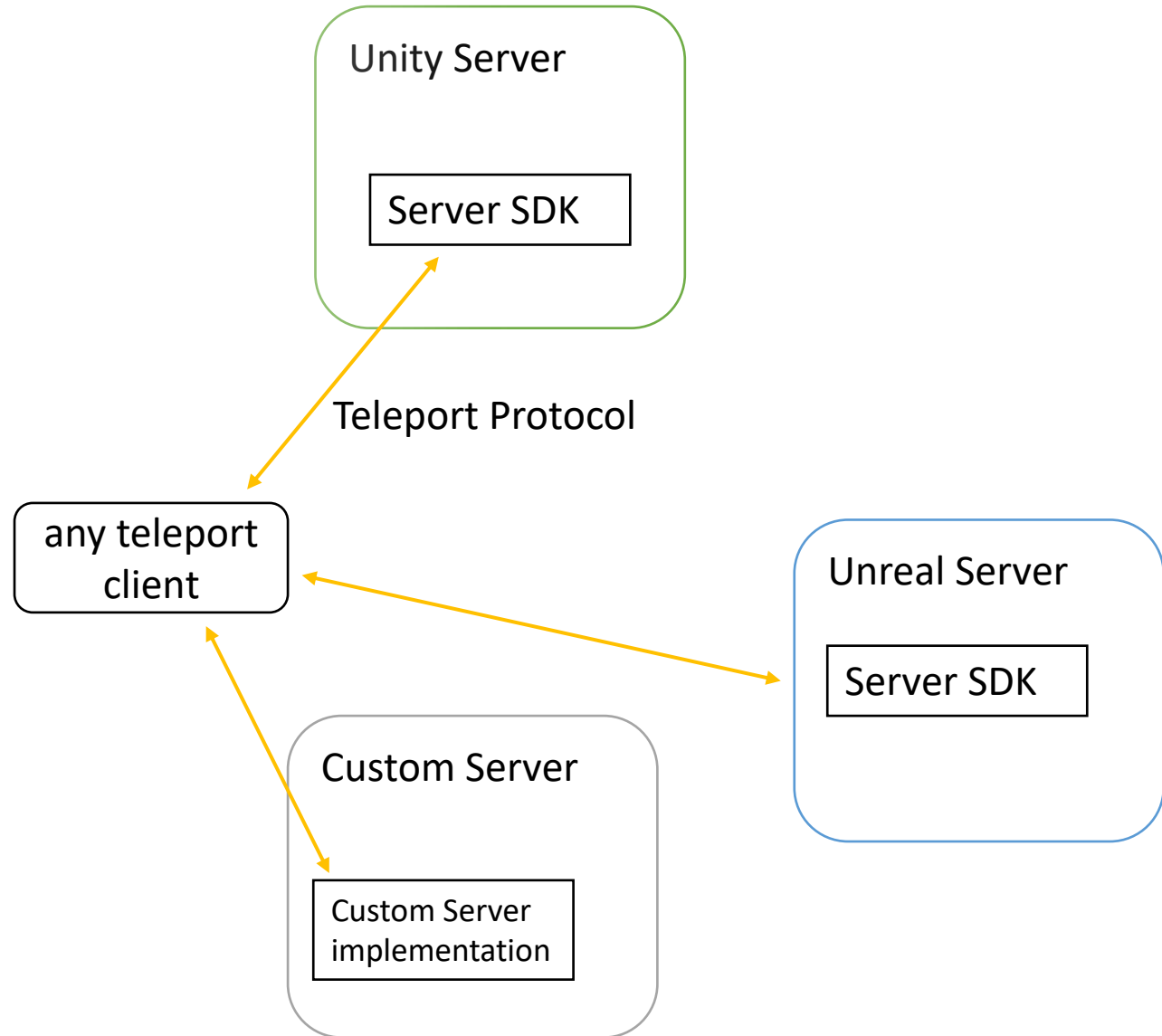
### SERVER

- **Everything Else**

# Simul

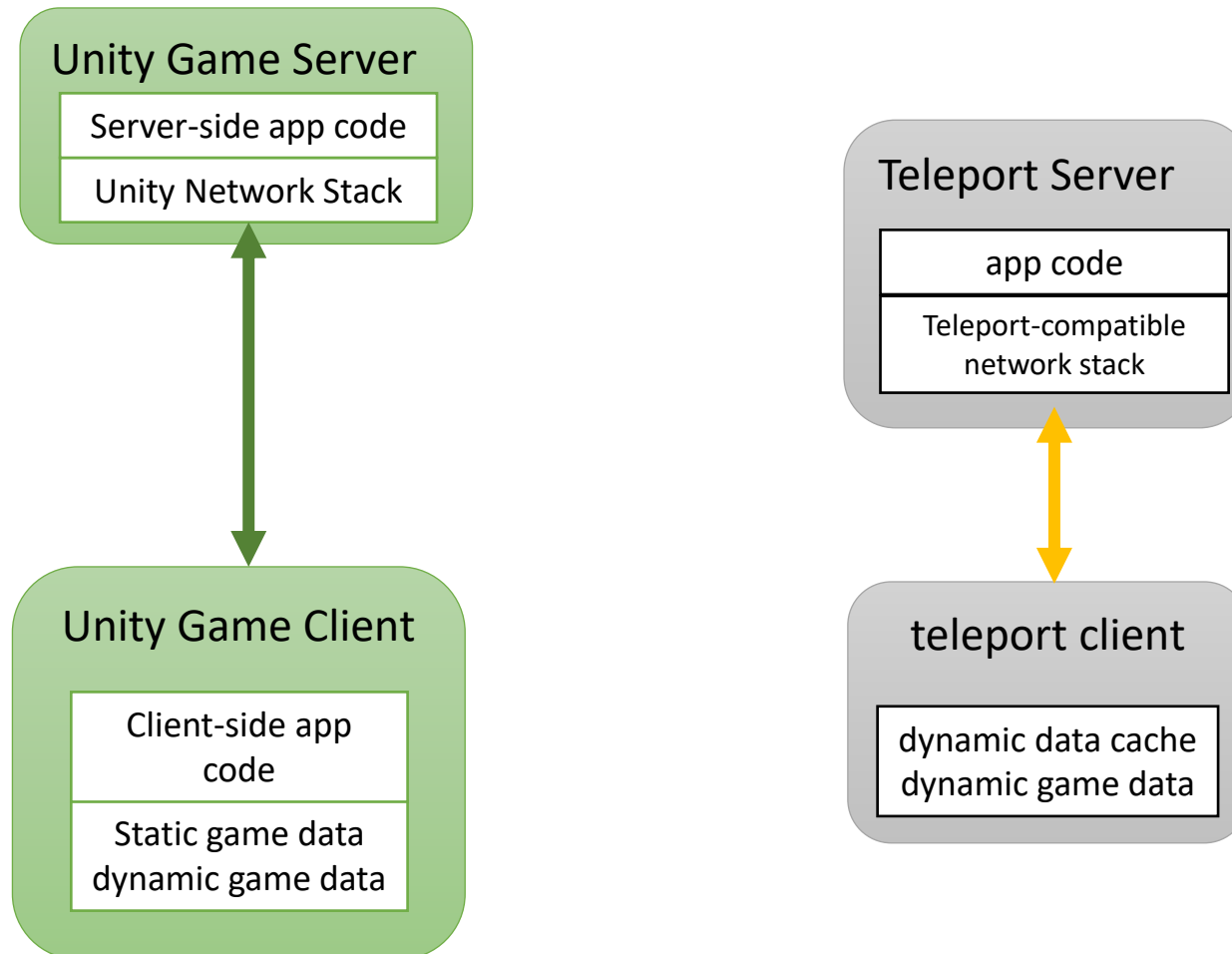
## What we provide

- Server Software
  - Unity, Unreal plugins
  - Server SDK
  - free
- Teleport Protocol
  - open
  - native
  - free
- Client Software
  - light, minimal
  - thin client
  - free



# Teleport VR

## Alternatives: game engine clients



- Game Engine Clients

- VR Chat
- AltSpace
- Rec Room
- Engage
- Horizon

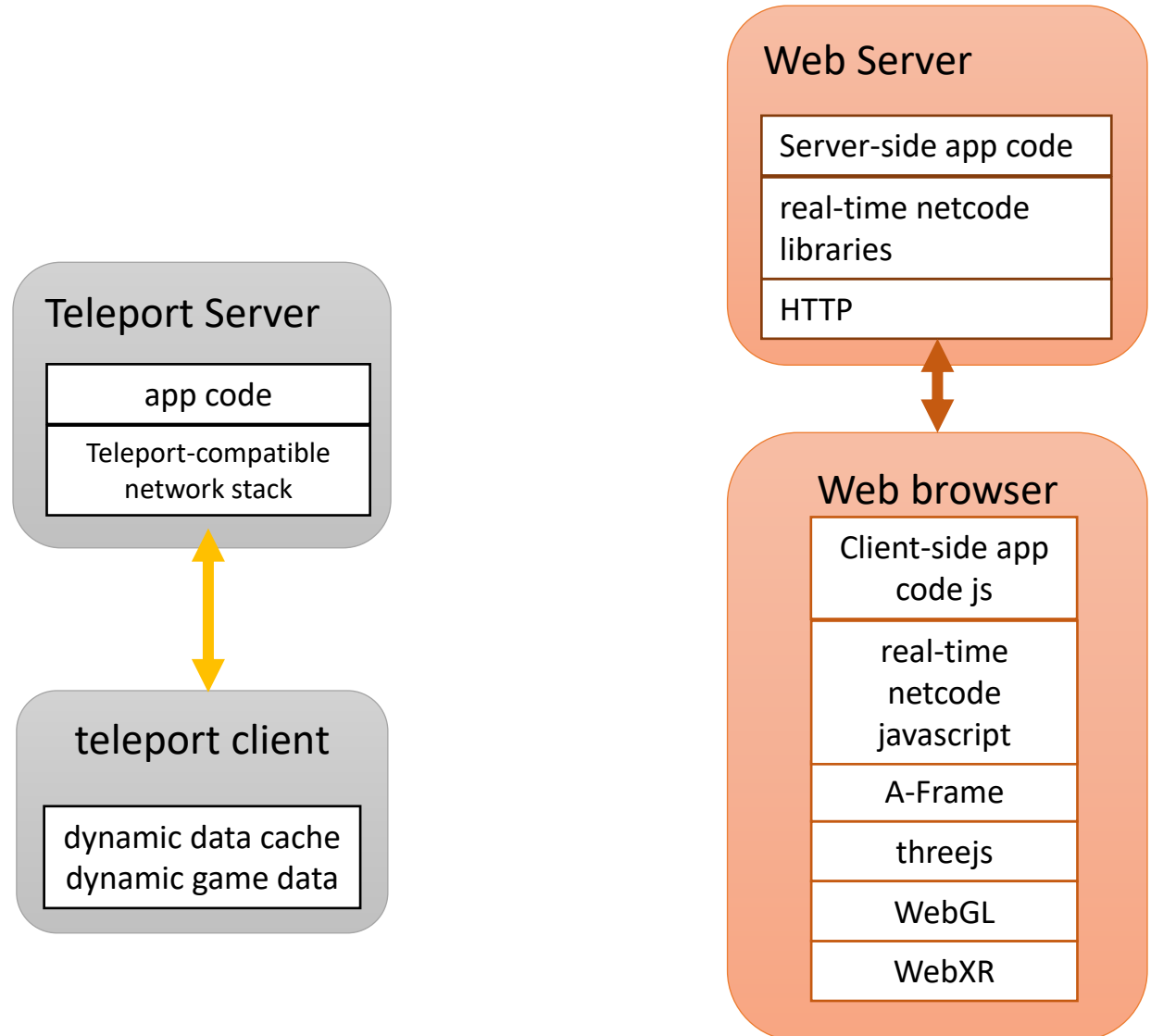
- One Client, One Server

- Every app has its own install
- Its own onboarding
- Its own rules and logic

# Teleport VR

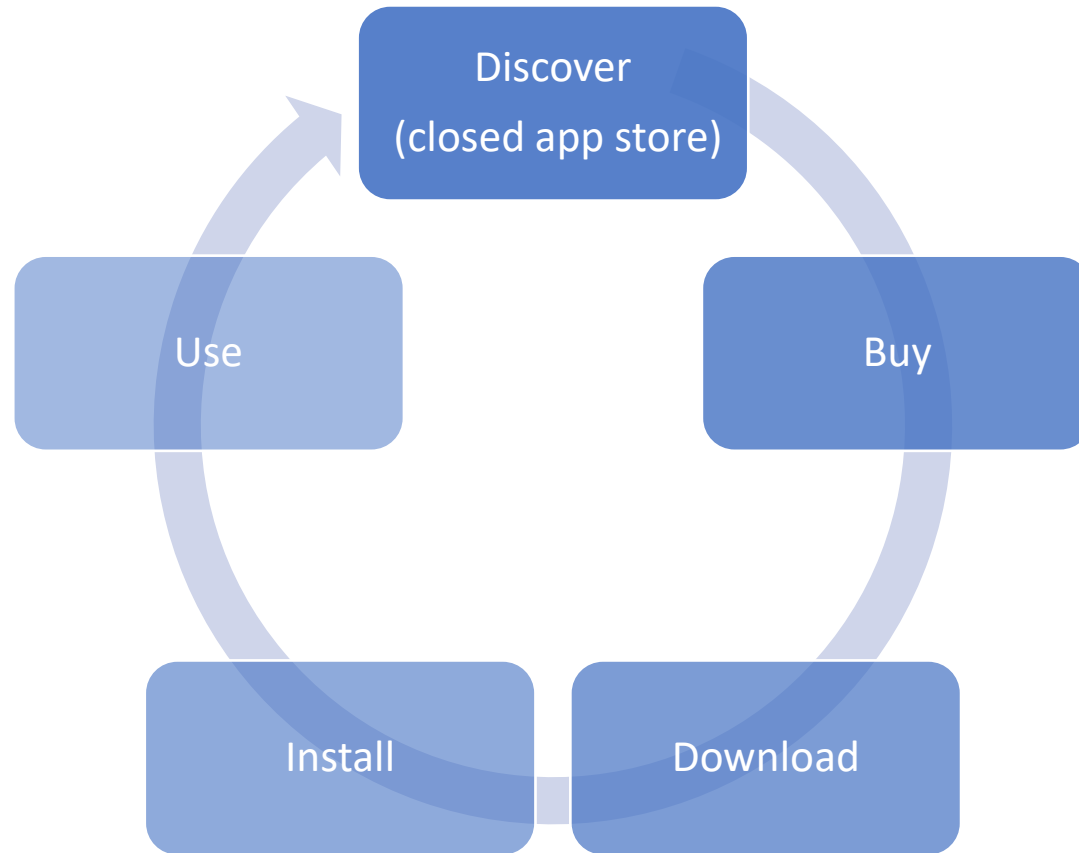
## Alternatives: WebXR

- What is WebXR?
- What is missing?
- A WebXR Metaverse?
- Teleport on WebXR
  - The best of both worlds...



# VR Today

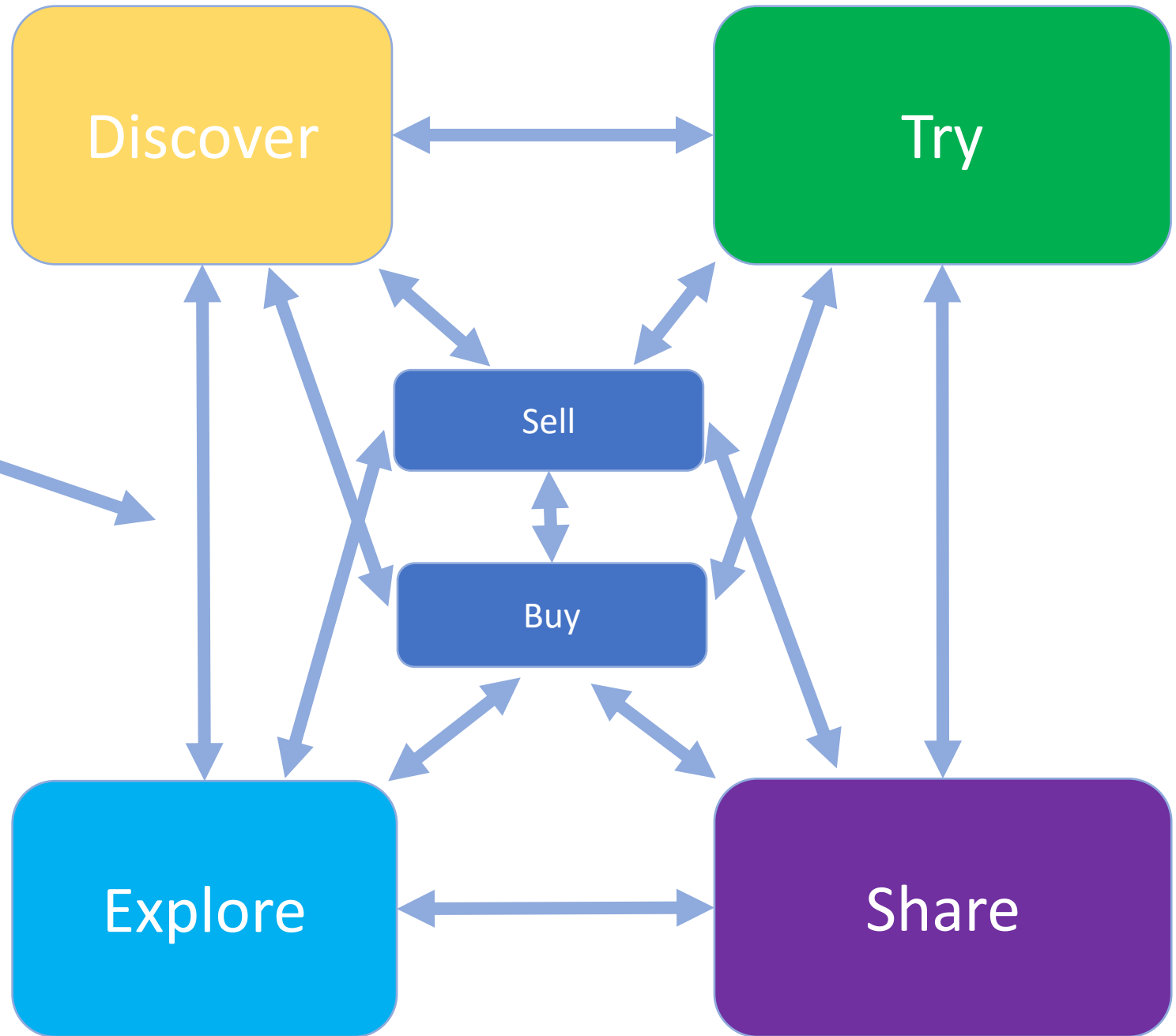
## Closed ecosystems



# VR Tomorrow

An Open Metaverse?

Install client  
ONCE



# Demo

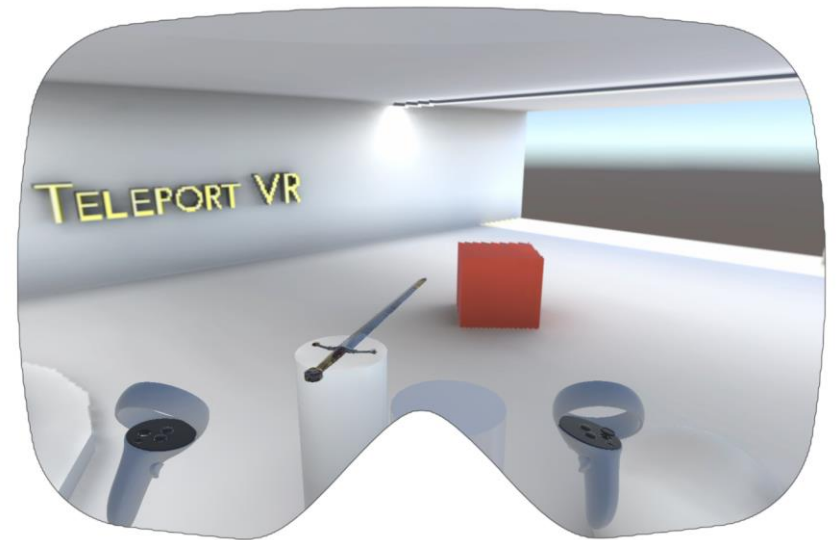
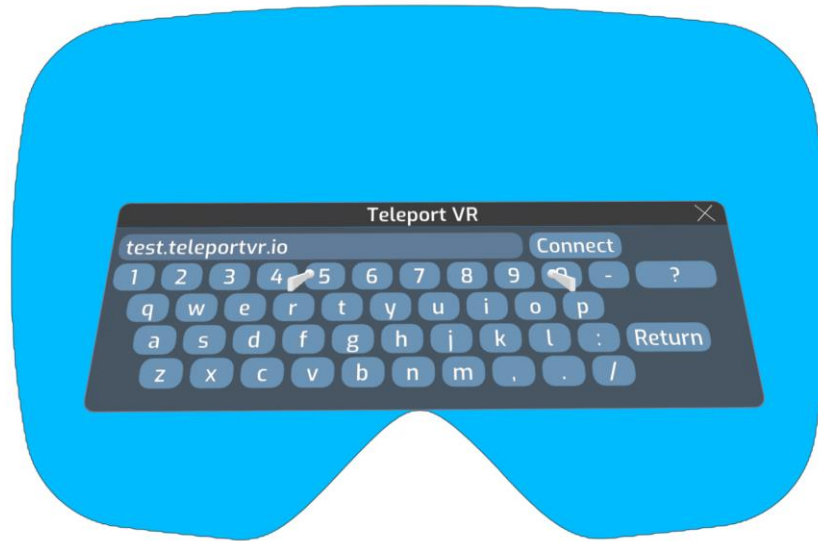
## Teleport Reference Client



# Usage

## VR “Browser”

- Connect by URL
- Navigate by URL/link/portal
- What do “links” look like?
  - One-way links
  - Two-way links?
  - Link iconography?
  - Distinguish links to external domains?
- Composable technologies
  - Avatar systems
  - Social systems
  - Multiple server “tabs”
  - Payments
  - Ownership



# Summary

## An Open Metaverse?

- The Metaverse cannot be delivered by walled silos.
- The Metaverse is qualitatively different from the Web.
- If it isn't a single Metaverse, it isn't *the* Metaverse.
  
- With shared protocols we can build it.
  
- Real-time protocol vs REST.
- XR as a first-class citizen of the Internet.
  
- Documentation at [teleportvr.io](https://teleportvr.io)

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@teleportvr