

A group of people are seated around a table in a meeting room, all wearing VR headsets. They appear to be engaged in a collaborative session. The room has large windows in the background, and the overall atmosphere is professional and focused on technology.

# Usage of WebRTC in WebVR

**Combining communication with VR**

W3C WebVR Authoring Workshop 2017

Rick Hindriks

**TNO** innovation  
for life

## Some background



- › Largest R&D institute in the Netherlands
- › Media is one of our research areas
- › Standardisation, consulting, PoC developments
- › Shared research in European or national setting
- › Scientist / Innovator
- › Prototype development, experiments, research
- › Research on Social VR, 5G, Media Orchestration

# What about Social VR?



## Our goals



**Shared  
experiences**



**Interaction &  
collaboration**



**Photorealistic  
360° VR**



**See each other as if  
in the same room**

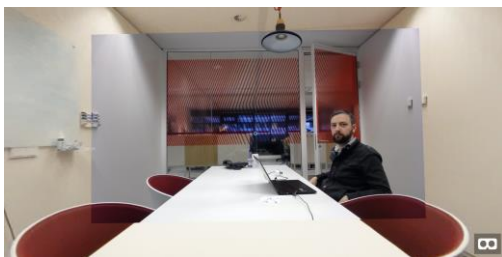
# Our experiments



**Watching video**



**Gaming**



**VR teleconference**



**Multi-user**

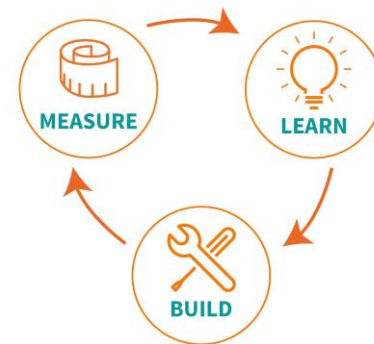
## Our approach



Web Building blocks



Consumer hardware



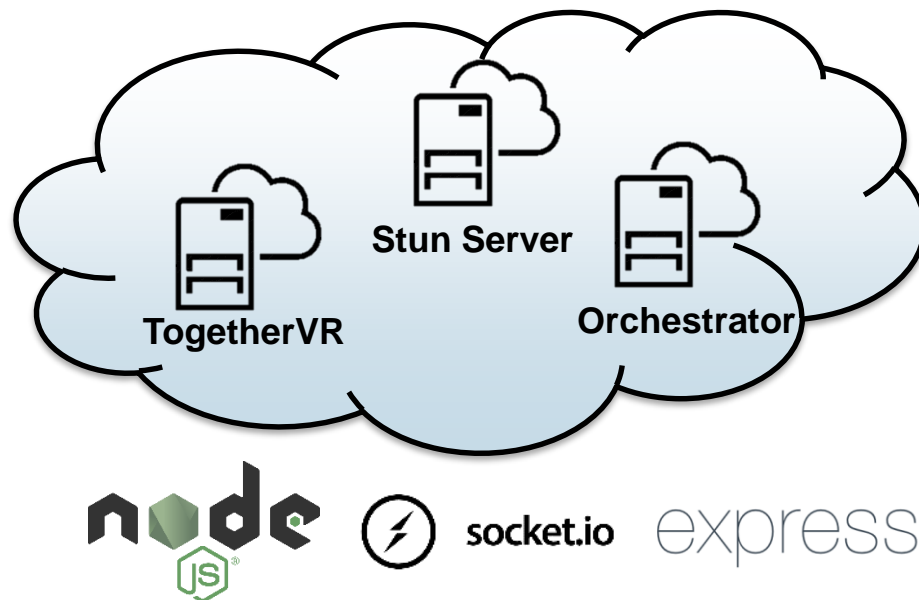
Rapid prototyping

# TogetherVR Framework

## Frontend



## Backend



## User Experiment @ IEEEVR '16

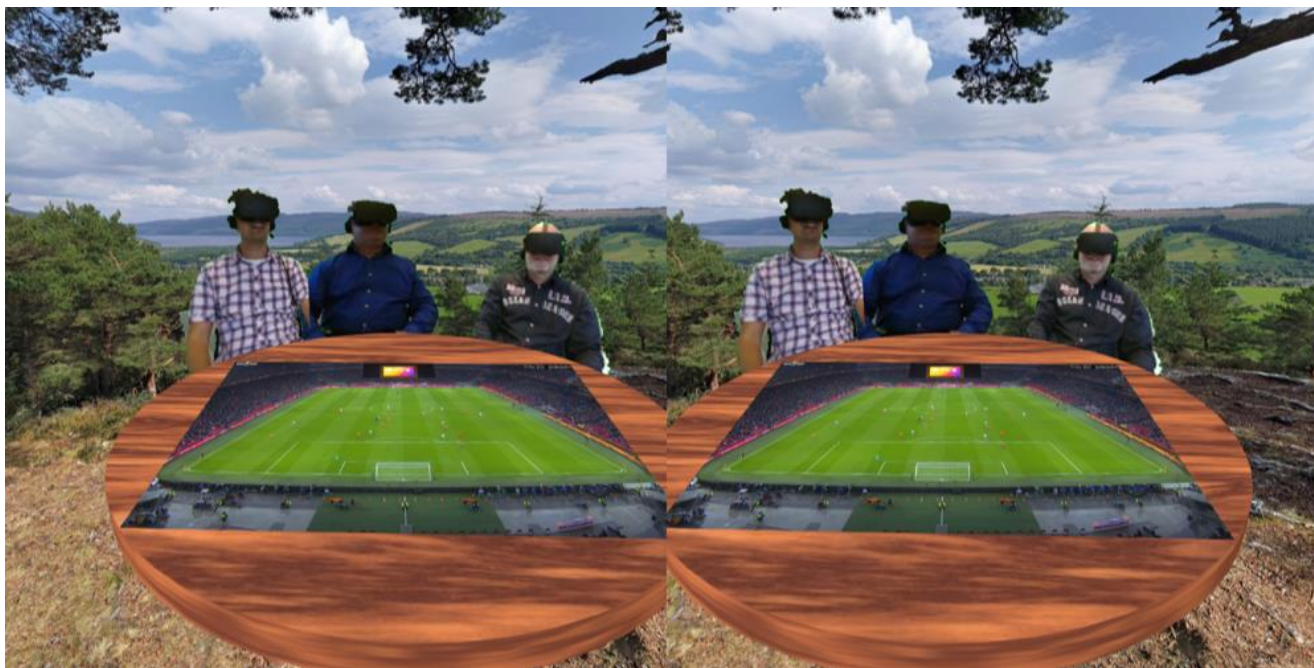


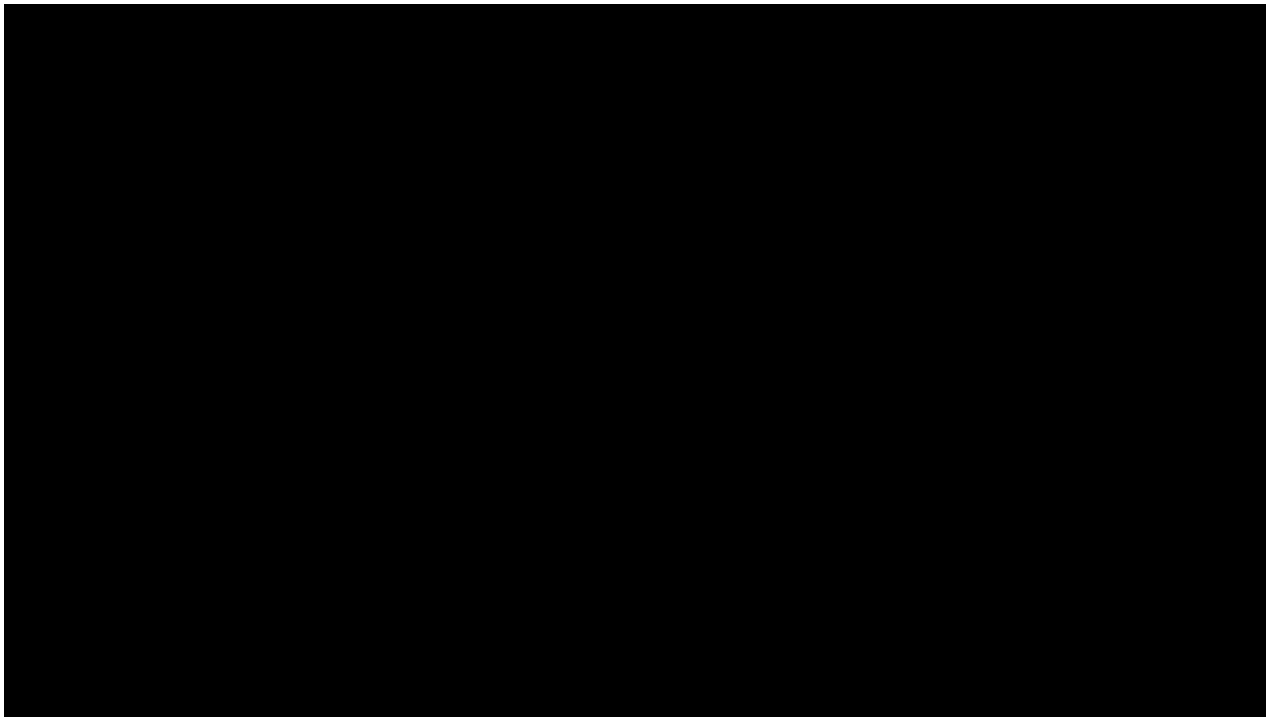


# Using WebRTC

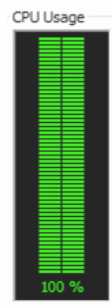
- › Framework currently based on the SimpleWebRTC library and NodeJS
- › Screen sharing
  - › 2D video
  - › Collaboration
  - › Play a (2D) game in a virtual room
- › Peer-to-peer media transmission
  - › Also 2D video
  - › Transmission of recordings of users
  - › Media Orchestration framework for dynamic positioning and sessions
  - › Scalable?

## Four person table arrangement

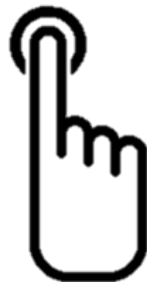




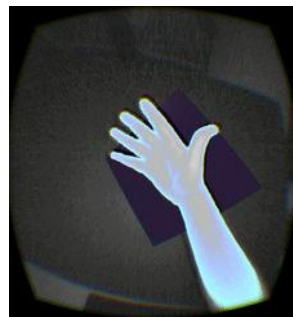
# Challenges



**Browser  
performance**



**VR UI  
interaction**



**Self-view**



**Orchestration**

# VR TOGETHER



- › Creating shared and interactive VR experiences



## In conclusion

- › Combining WebRTC with WebVR provides us with high degrees of interaction and immersion.
- › Web technology makes testing Social VR cases simple(r).
- › Experimental approach allows for rapid learning & improving.



Checkout the demo

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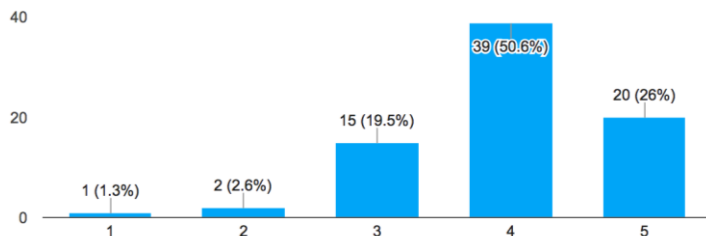
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<https://tnomedialab.github.io/>

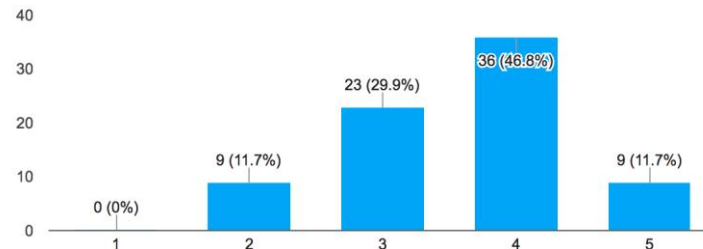
# Survey Results

How would you classify the overall experience? (77 responses)



67% are positive about the experience

How would you classify the overall video quality? (77 responses)

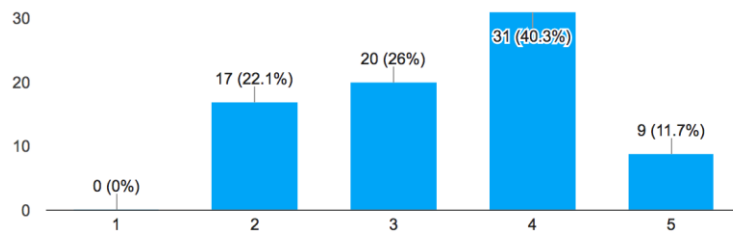


59% said the video quality is ok



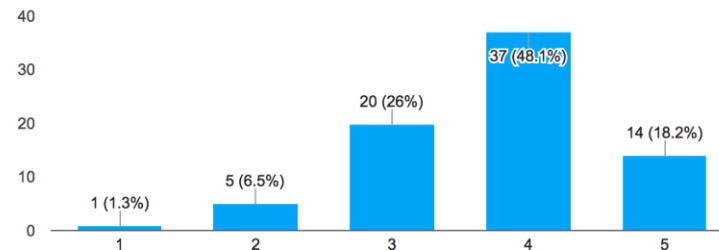
# Survey Results

How life-like did you perceive other people? (77 responses)



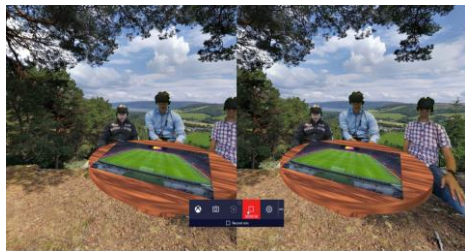
According to 52% the other participant was life-like

How compelling was your sense of being there (in the living room)? (77 responses)

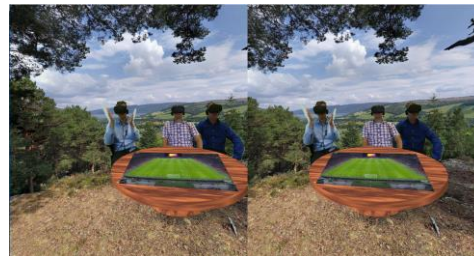


Sense of presence was compelling to 2/3<sup>rd</sup> of the participants

# Seating arrangement



**User 1**



**User 2**

**User 4**



**User 3**

