Game Experience Design

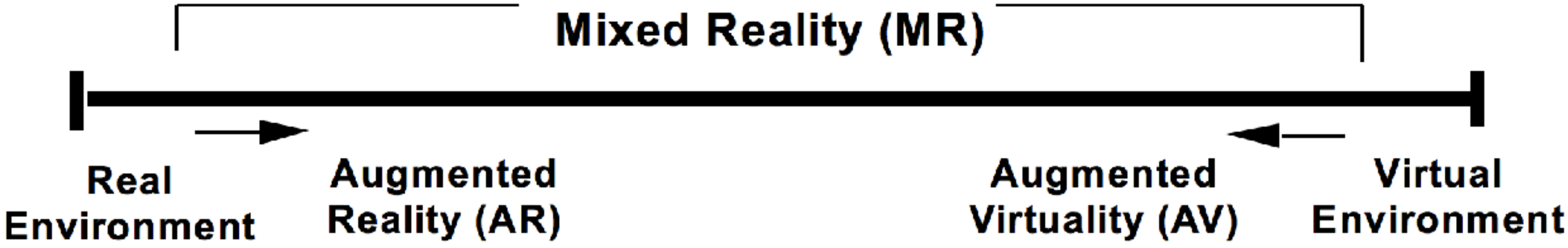
Virtual Reality

Prof. Dr. Jochen Koubek

11. Juli 2017

Reality Continuum

Milgram et al. (1994): Augmented Reality: A class of displays on the reality-virtuality continuum



Mixed Reality Experience Design

- Kognition
- Emotion
- Embodiement
- Kommunikation
- Subjektkonstitution
- Interfaces
- Sensory Design
- GUI
- Game Feel

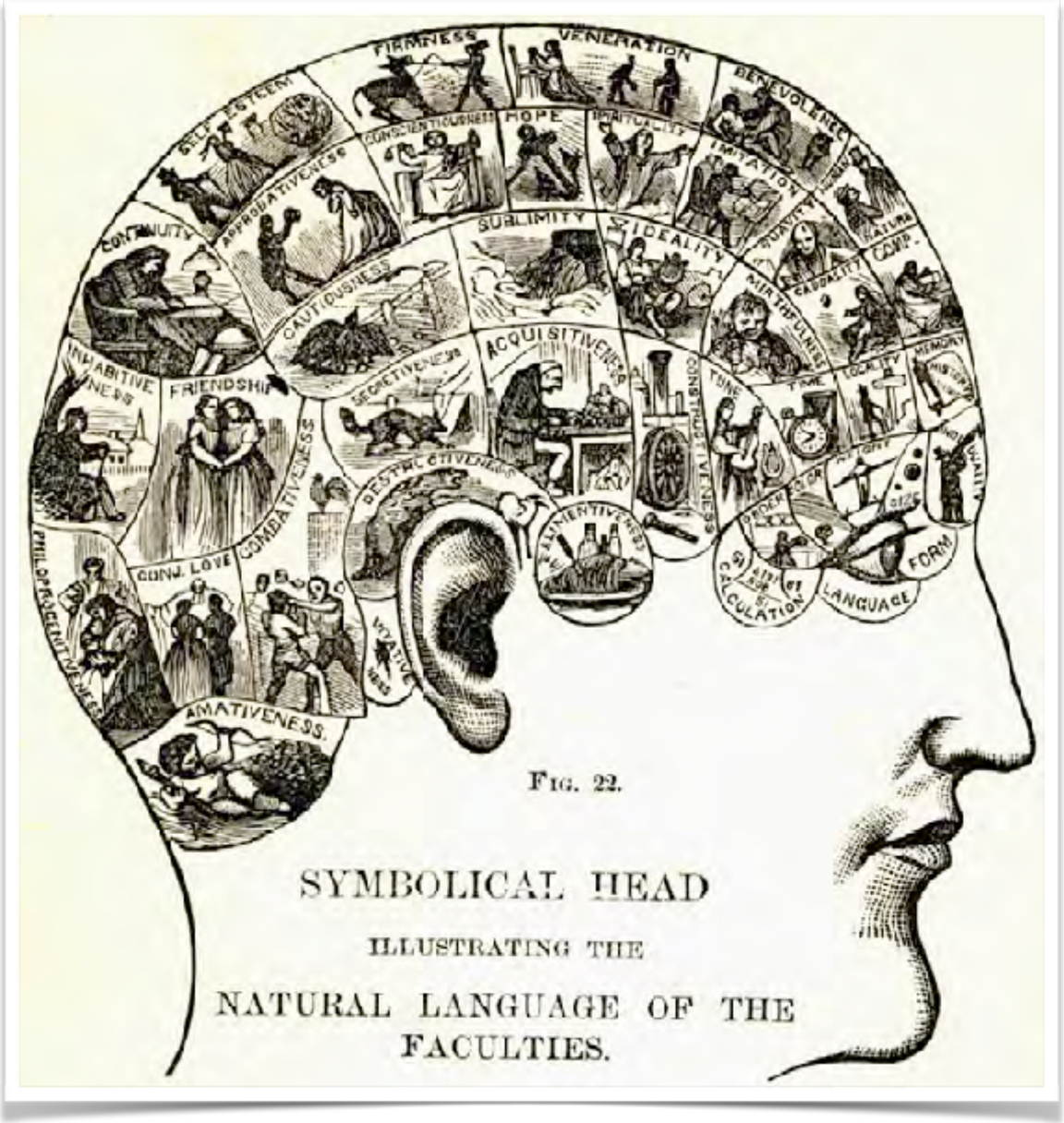


FIG. 22.

SYMBOLICAL HEAD

ILLUSTRATING THE

NATURAL LANGUAGE OF THE FACULTIES.

Kognition

Wahrnehmen und Erkennen

Aufmerksamkeit

Wissen

Mentale Modelle

Gedächtnis

Lernen

Lesen, Sprechen, Zuhören

Problemlösen, Planen, Begründen, Entscheiden

vgl. Anderson (2015): Cognitive Psychology, 8. Aufl.

Cognitive Psychology

Cognitive Psychology of Virtual Reality Basics, Problems and Tips

https://www.youtube.com/watch?v=81f_QHRxQOs

Control Attention

Put yourself in the user perspective

Use natural and direct interaction

Bring the interaction to the user

Don’t require unneccessary activeness

Control expectations

Create meaningful interactions

Avoid shallow interactions

Give clear cues to possible interactions

Overlearned actions can cause conflict

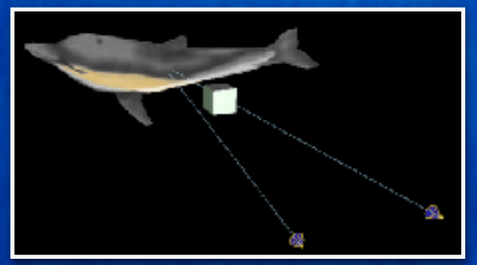
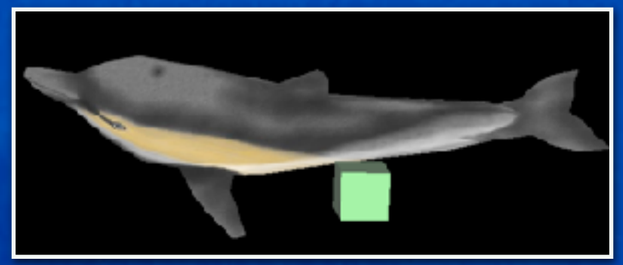
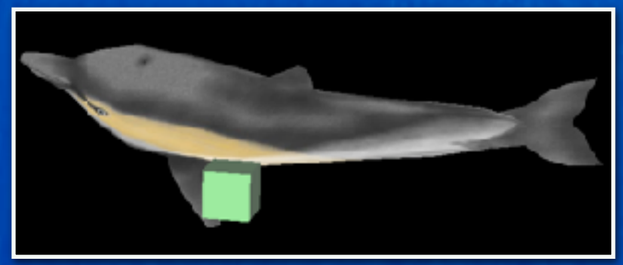
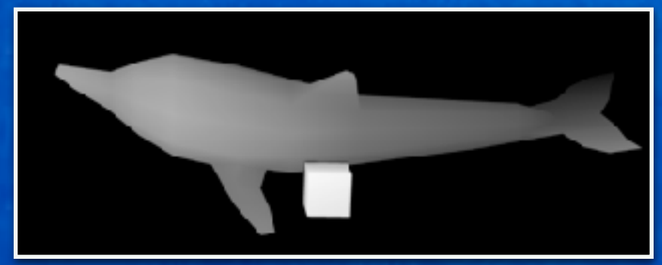
http://twvideo01.ubm-us.net/o1/vault/gdc2016/Presentations/Bedenk_Thomas_Cognitive%20Psychology%20of%20VR.pdf

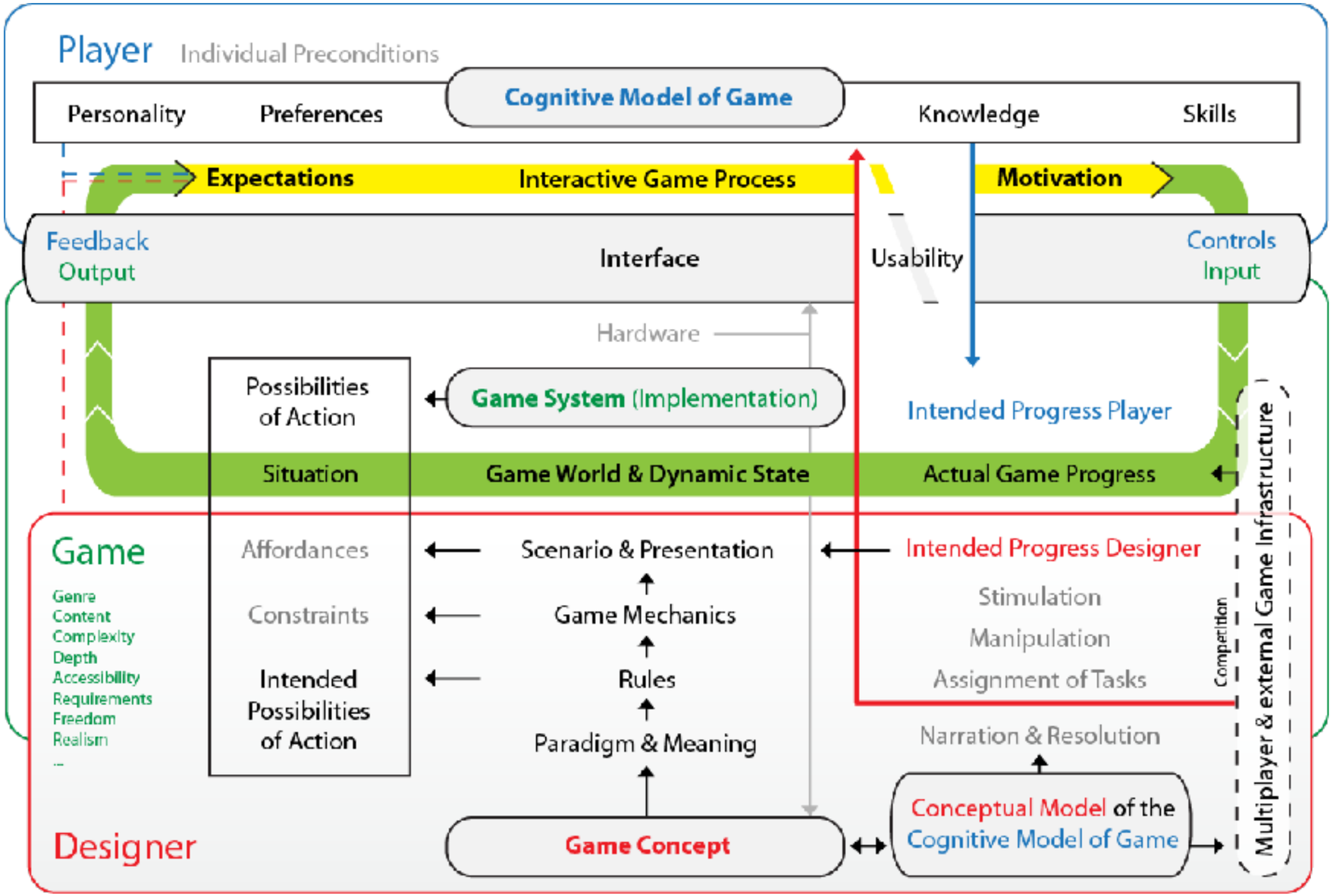
Räumliche Wahrnehmung

Depth Cue	0-2 m	2-30 m	> 30 m
Occlusion	✓	✓	✓
Relative Size	✓	✓	✓
Accommodation & Convergence	✓		
Motion Parallax	✓	✓	
Stereopsis	✓	✓	
Elevation		✓	✓
Aerial Perspective			✓

Use monocular depth cues to improve place illusion

interpupillary distance (IPD) matters a lot for size, gigantism & lilliputism

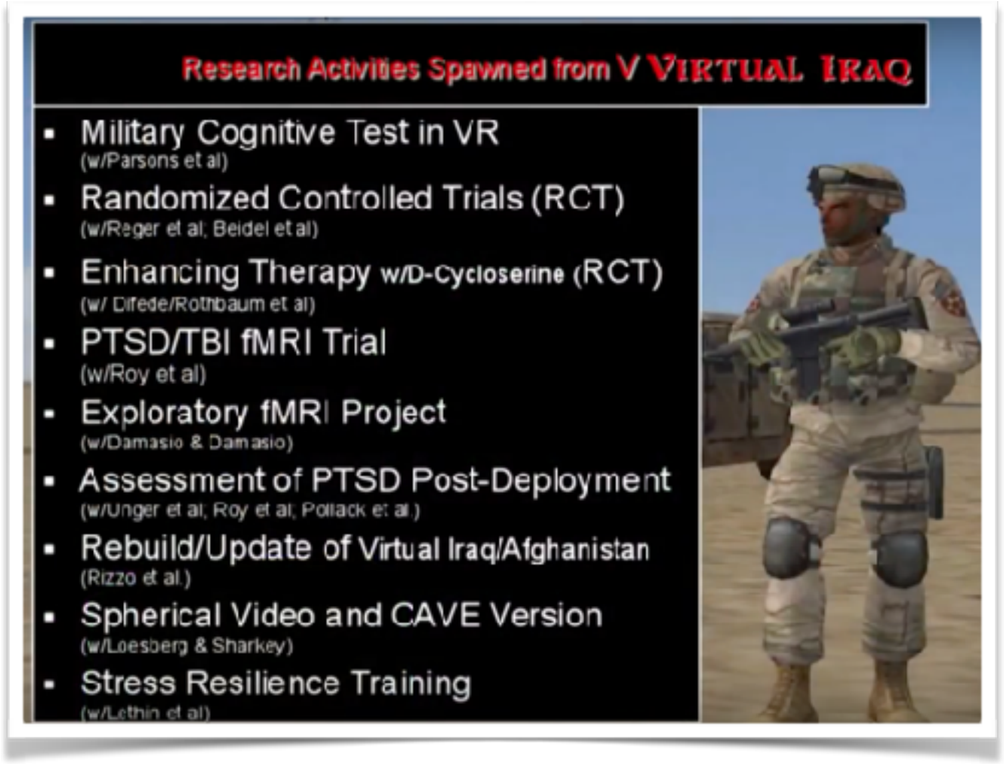







http://bedenk.de/sign/player-game-designer/

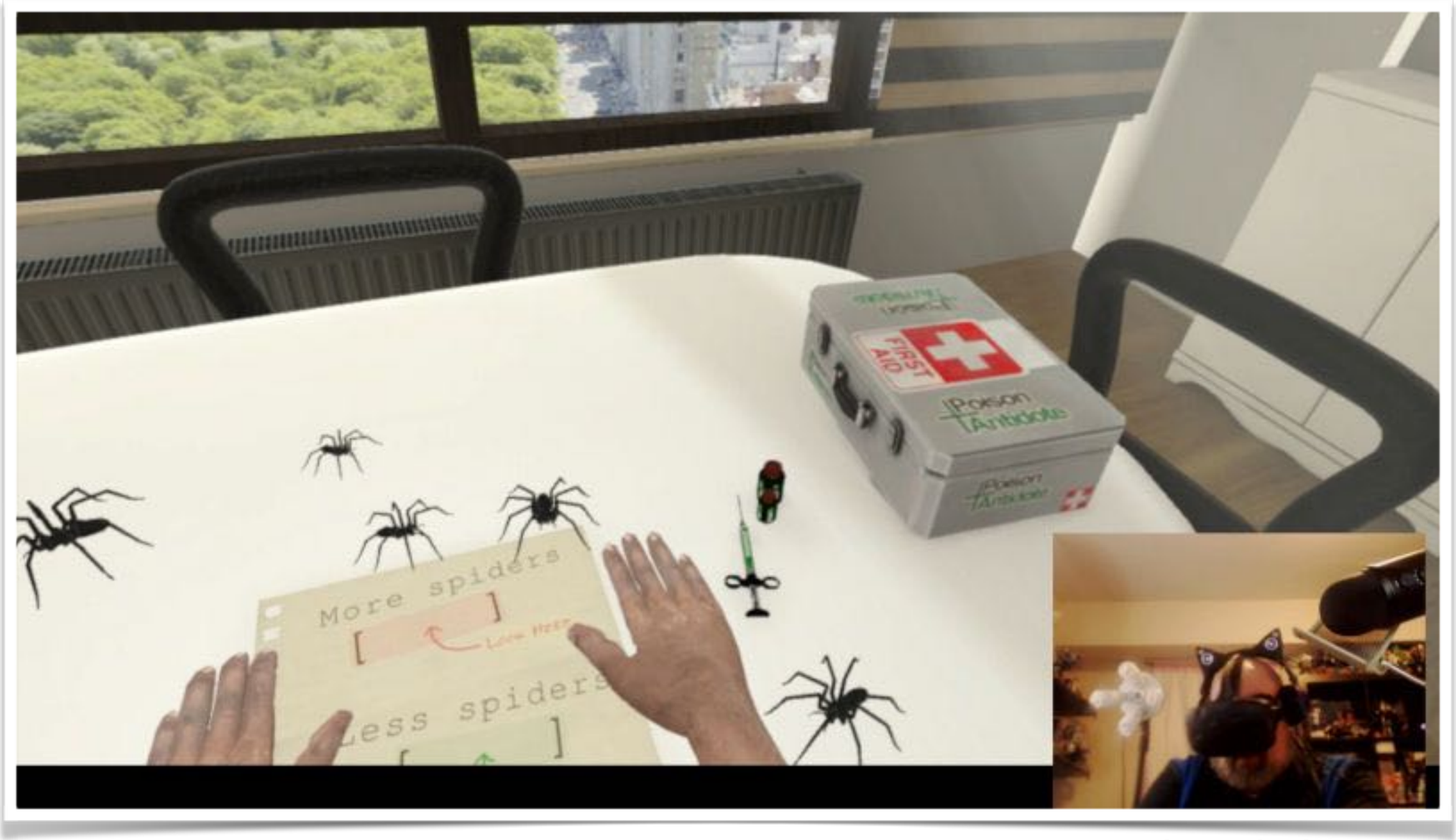
Emotion

The Psychology of Fear



The Psychology of Fear: Virtual Reality vs. Fear-Based Pathology -- Skip Rizzo at Mindshare LA
https://www.youtube.com/watch?v=TyIXO2oD8qs

Exposure Therapy



Arachnophobia

https://www.youtube.com/watch?v=RZL2uMJ7V1U

Social Interactions

Allow for social interactions in a common virtual room

Use strong feeling of empathy

Plausybility illusion hard to recover when lost

Responsibility

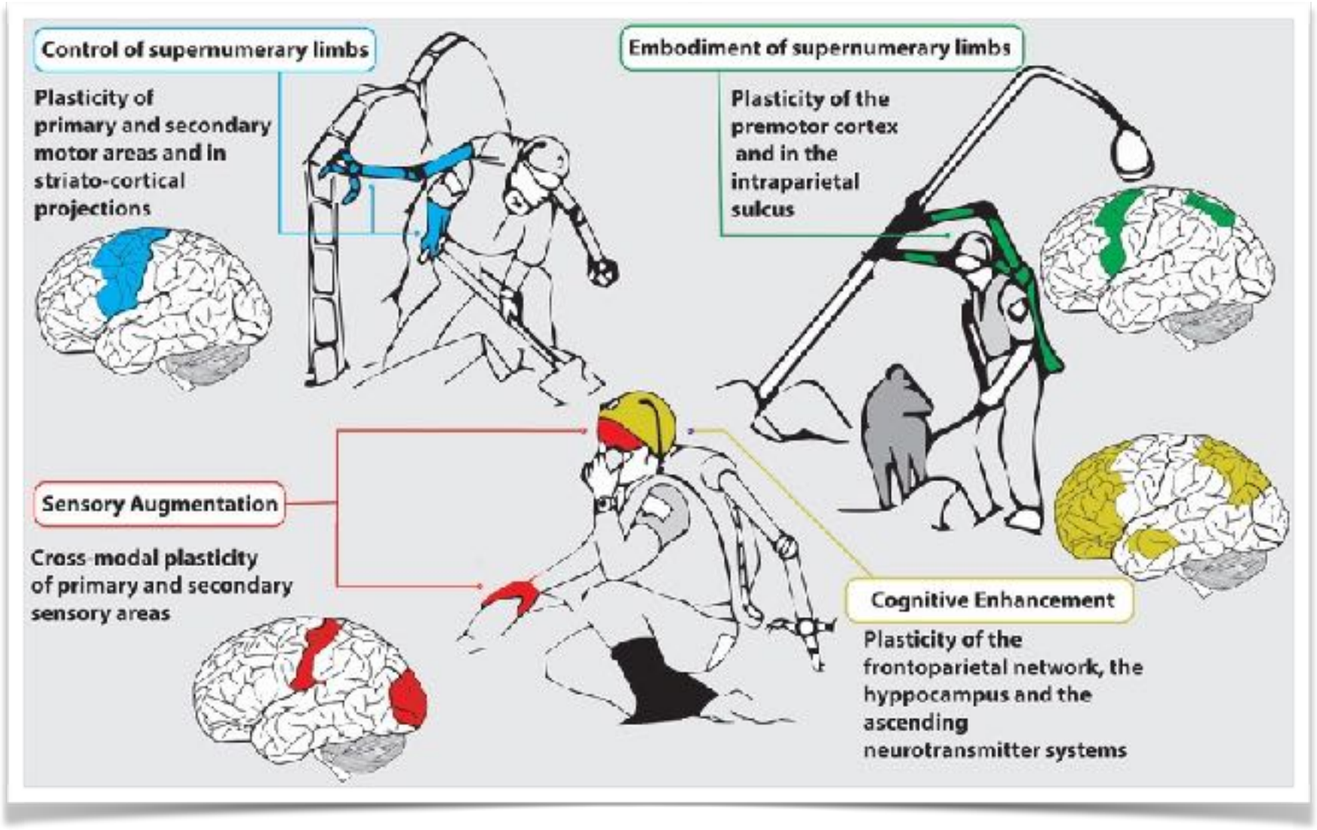
Our players place their trust in us when they place themselves in the rig

Responsibility in creating awareness around our experiences

VR is about trust and creating safe spaces

Embodiement

Neuroprosthetic body-transformation



Giovanni Di Pino et al. (2014): Augmentation-related brain plasticity

What are the … implications that should be studied and understood by scholars, policy-makers, and the producers and users of neuroprosthetic body-transformation and substitution technologies?

One way in which we can explore such questions today is by playing video games – and studying and reflecting on that experience

gamers and game desigerns are pioneers operating at the frontier of body-schema re-engineering

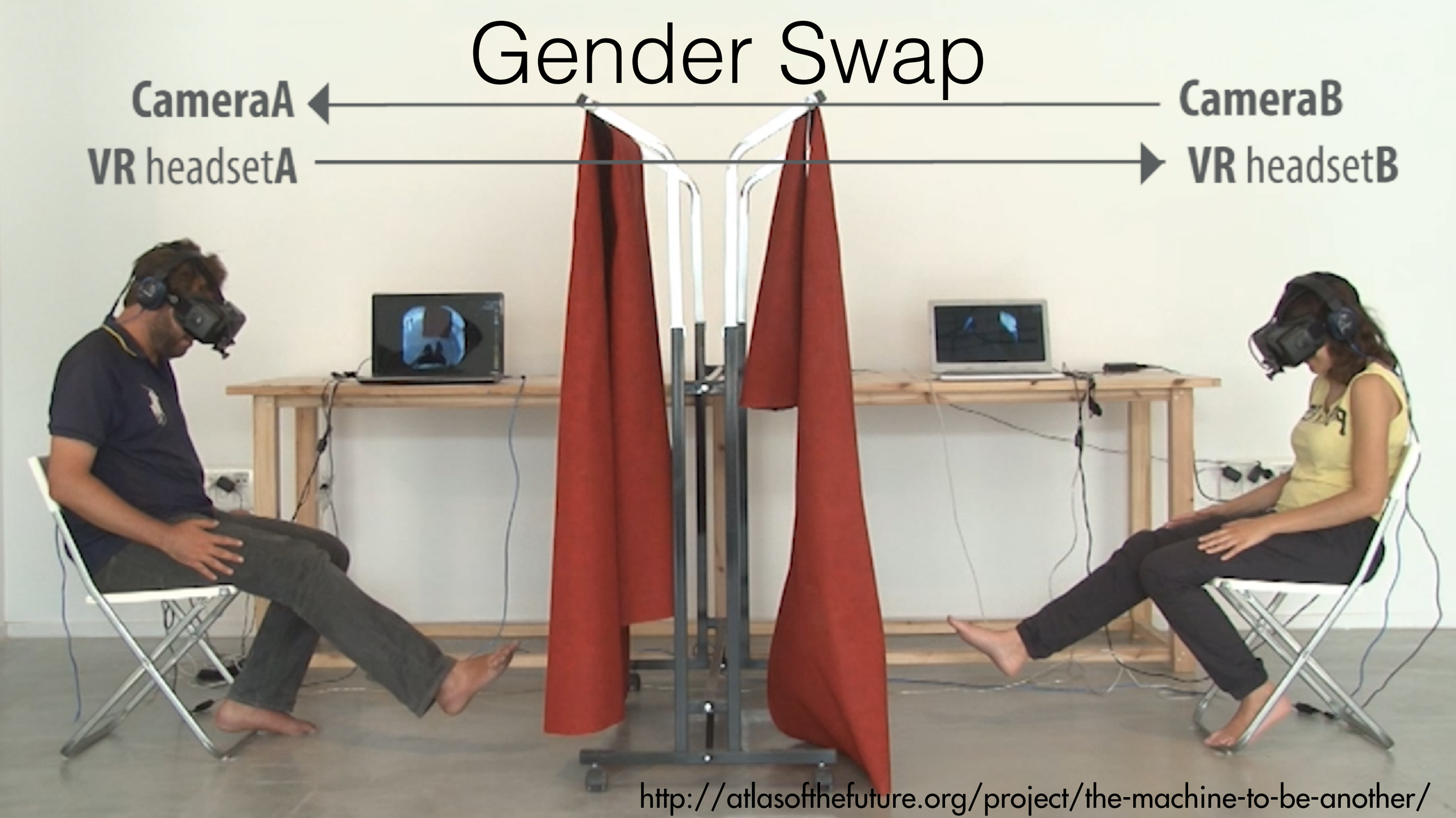
Gamers are not simply 'simulation' body transformation; they are accomplishing it

Matthew E. Gladden: Cybershells, Shapeshifting, and Neuroprosthetics, https://www.youtube.com/watch?v=Ruu52x28jjg 54:53

Body Schema Extension

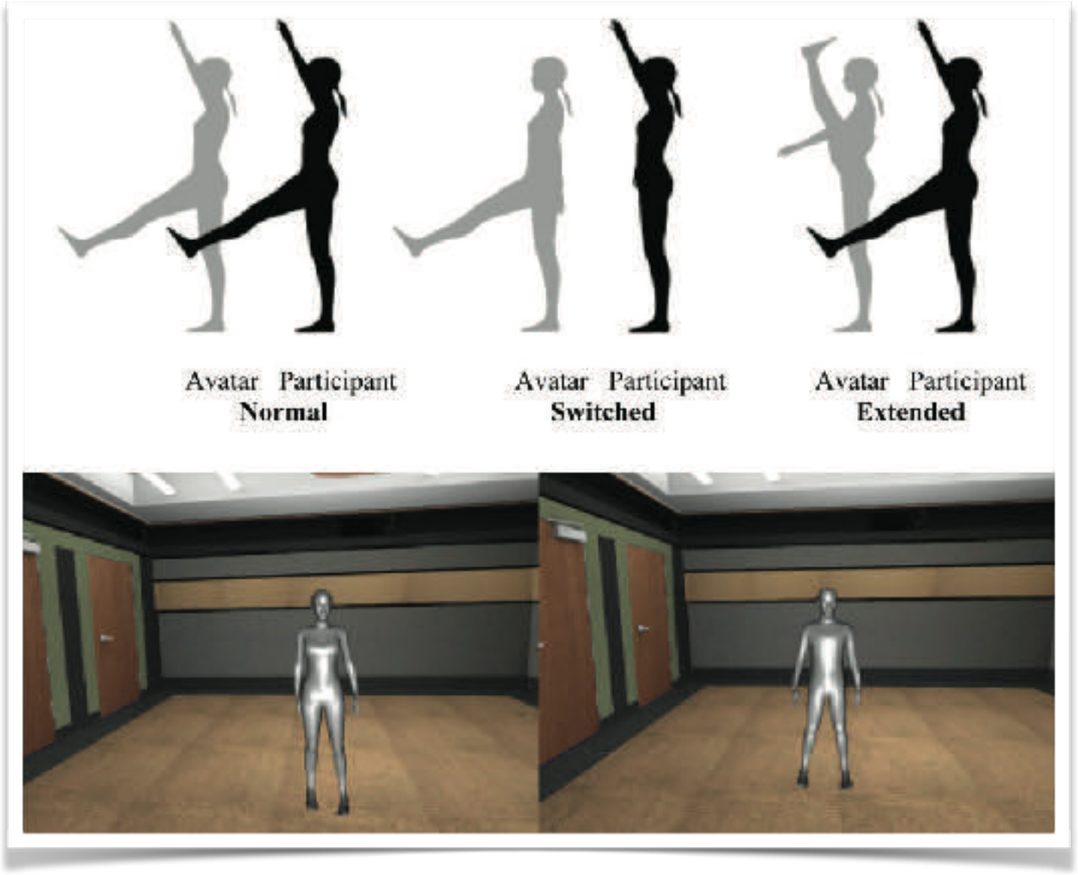
Old Friend

Gender Swap



http://atlasofthefuture.org/project/the-machine-to-be-another/

Body Movement



Homuncular Flexibility in Virtual Reality
http://vhil.stanford.edu/pubs/2014/won-jcmc-homuncular.pdf

Avoid non-matching body visualization

Adjust to player. Height, movement, speed, IPD

Keep consistence in graphics and scaling

More sense for space in arms length

Include sound the body would make

Use haptic feedback when possible

Bedenk: Cognitive Psychology of Virtual Reality Basics, Problems and Tips

Kommunikation

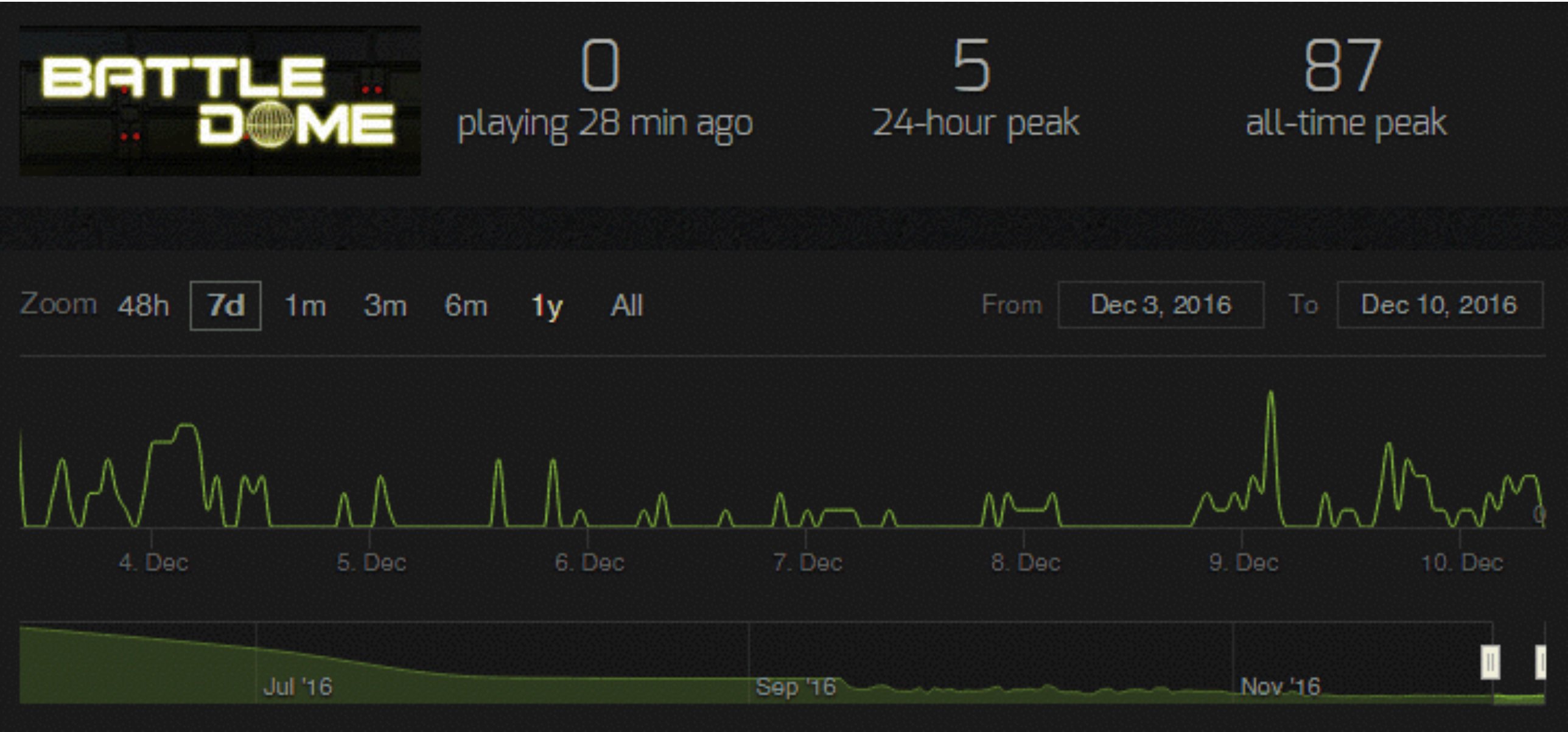
Multiplayer

vTime

Keep Talking and Nobody Explodes

Star Trek: Bridge Crew

Spielerzahl



Co Presence

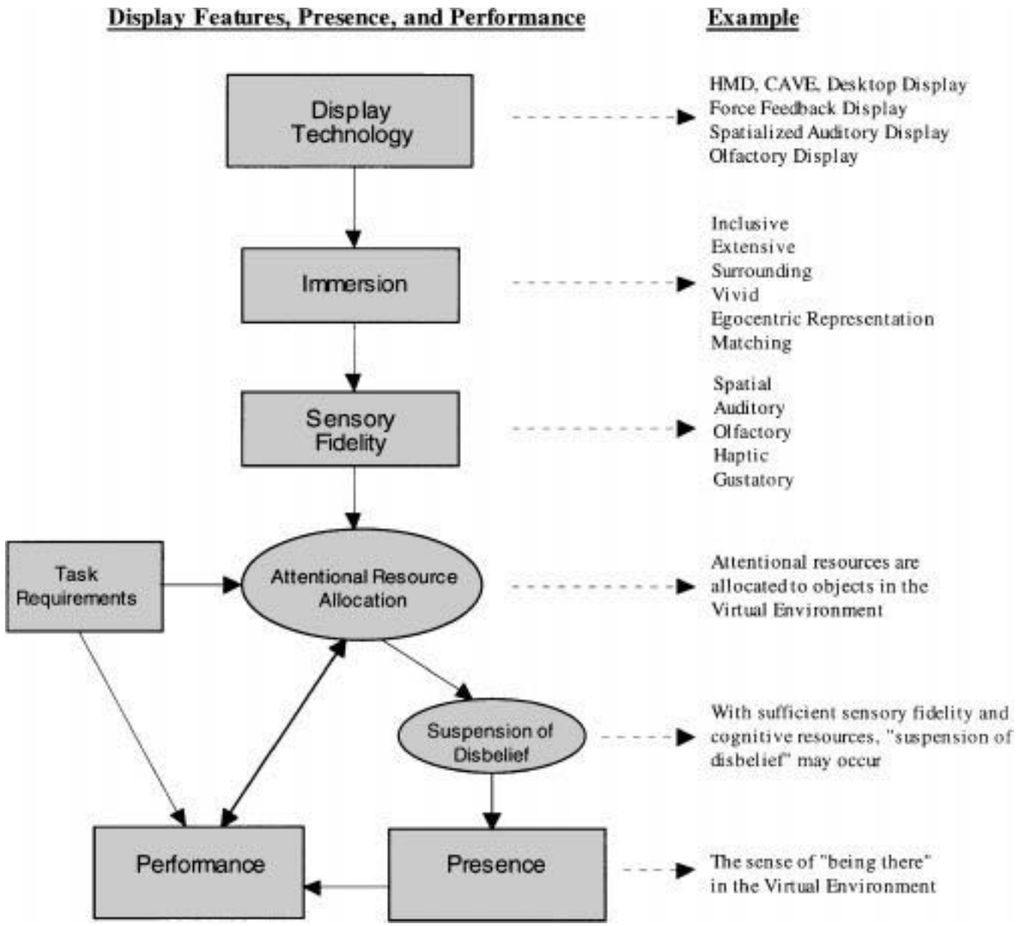
1. Bring people together
2. Keep player counts low
3. Players need some downtime — and something to do
4. Encourage good sportsmanship to minimize toxicity
5. Pay attention to all player feedback

"We don't want players to be able to negatively affect each other in VR, and it's more important in VR especially if you have a human avatar, because people can get into your personal space and it's upsetting. It's important for anyone making a multiplayer VR game to consider harassment."

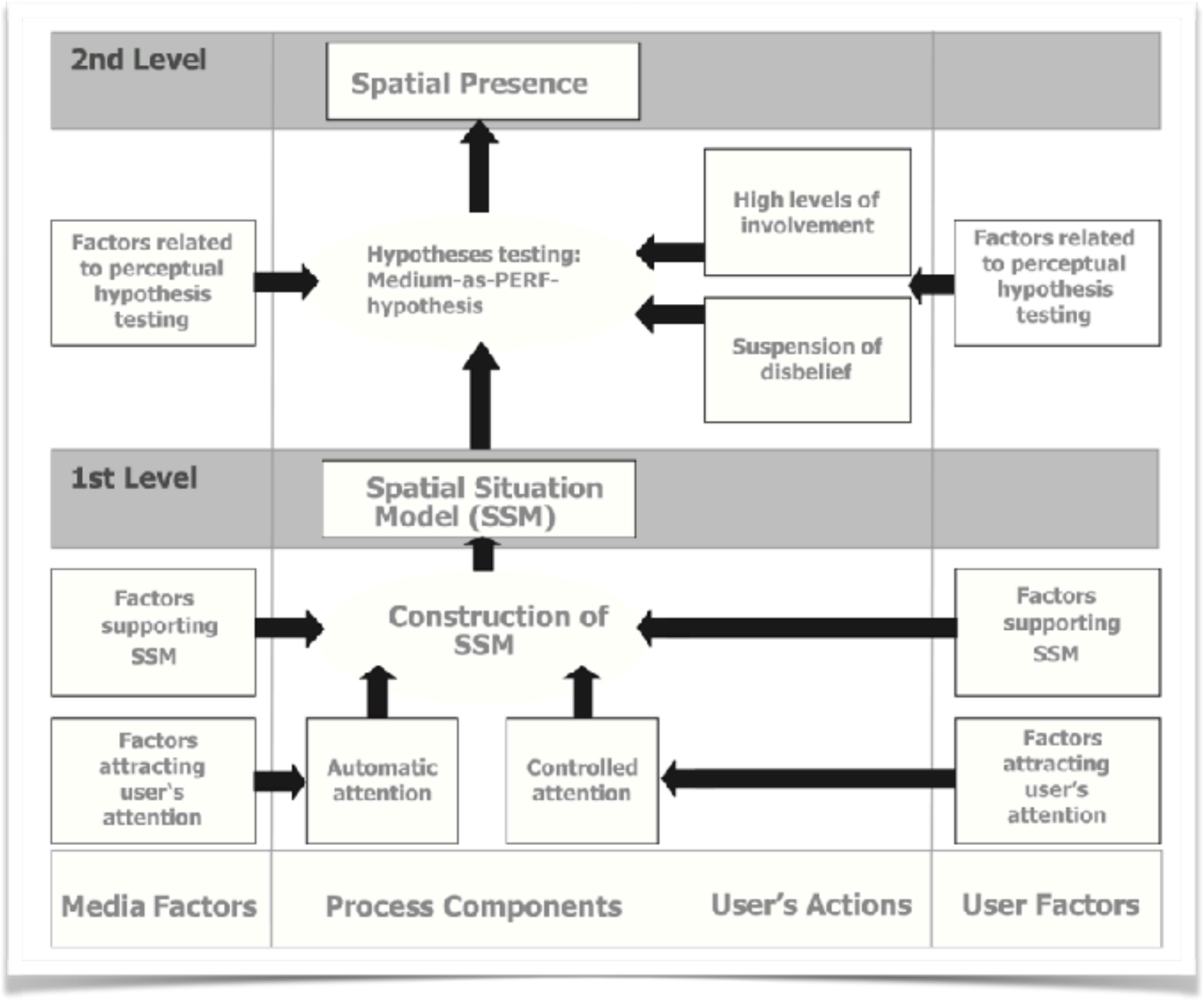
https://www.digitaltrends.com/gaming/vr-developers-explain-how-to-make-good-virtual-reality-multiplayer/

Subjektkonstitution

Immersion | Präsenz | Involvierung



Karl-Erik Bystrom Woodrow Barfield Claudia Hendrix (1999): *A Conceptual Model of the Sense of Presence in Virtual Environments*



Wirth, Werner, Tilo Hartmann, Saskia Böcking, Peter Vorderer, Christoph Klimmt, Holger Schramm, Timo Saari, et al. "A Process Model of the Formation of Spatial Presence Experiences." Media Psychology 9, no. 3 (2007): 493–525.

Spatial Presence

"perceptual illusion of nonmediation" (Lombard & Ditton, 1997)

„das Gefühl, sich in der mediatisierten statt der realen Welt aufzuhalten (feeling of being there)"
Wirth et al.: Präsenzerleben, S. 161

„spatial presence is strongly related to our ability to understand, envision, and navigate the complex virtual environments that are part of many modern games."

Madigan: *Getting Gamers*

Job Simulator

Measuring Presence

Control Factors

Degree of control

Immediacy of control

Anticipation of events

Mode of control

Physical environment modifiability

Sensory Factors

Sensory modality

Environmental richness

Multimodal presentation

Consistency of multimodal information

Degree of movement perception
Active search

Distraction Factors

Isolation

Selective attention

Interface awareness

Realism Factors

Scene realism

Information consistent with objective world

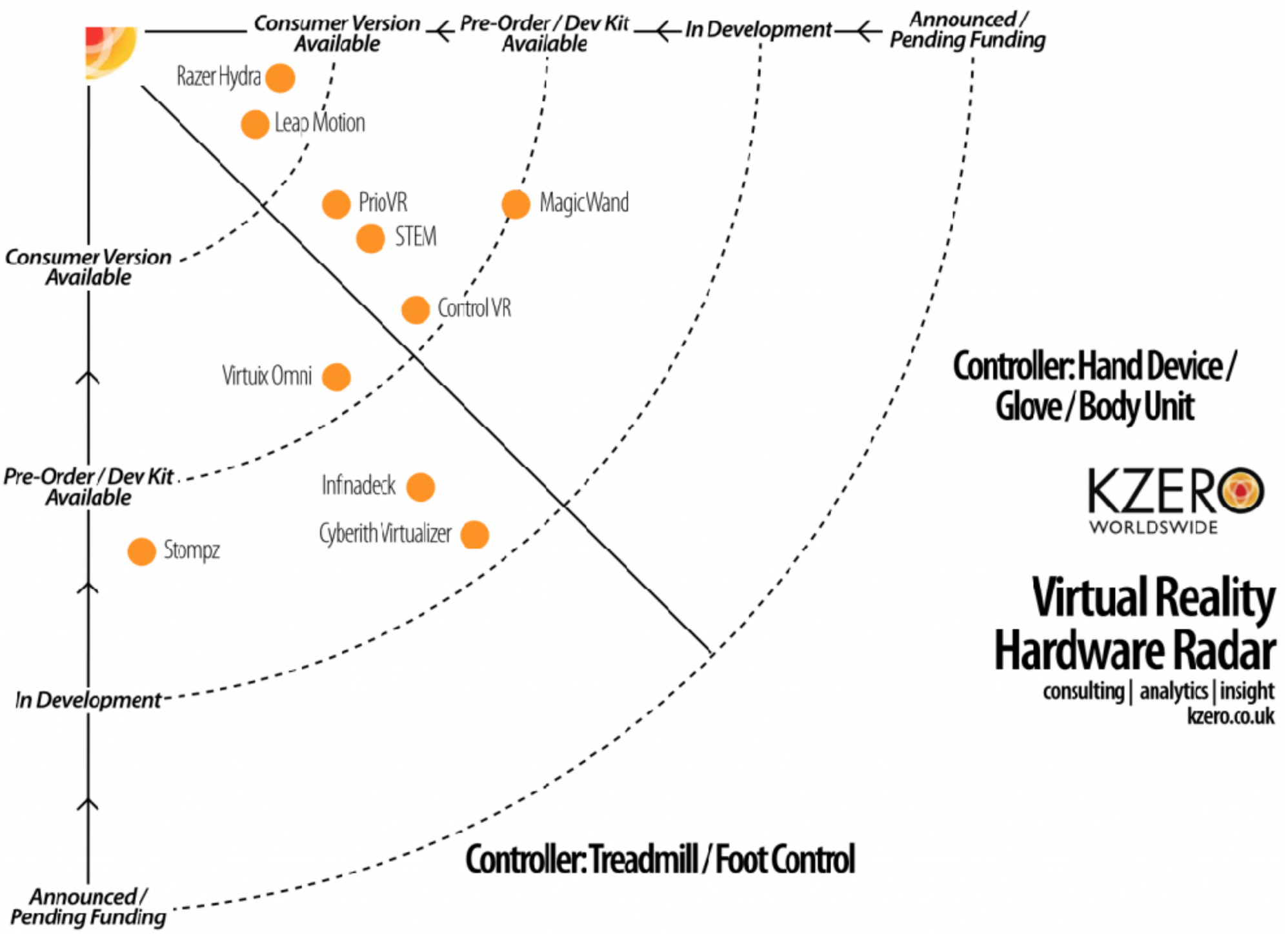
Meaningfulness of experience

Separation anxiety/ disorientation

Bob G. Witmer; Michael J. Singer: Measuring Presence in Virtual Environments: A Presence Questionnaire

Interface

http://www.icaros.com/

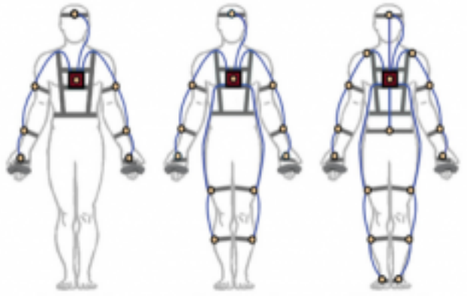


KZERO WORLDSWIDE

Virtual Reality Hardware Radar

consulting | analytics | insight
kzero.co.uk

Controller: Hand Device / Glove / Body Unit



PrioVR
priovr.com

Control VR
controlvr.com

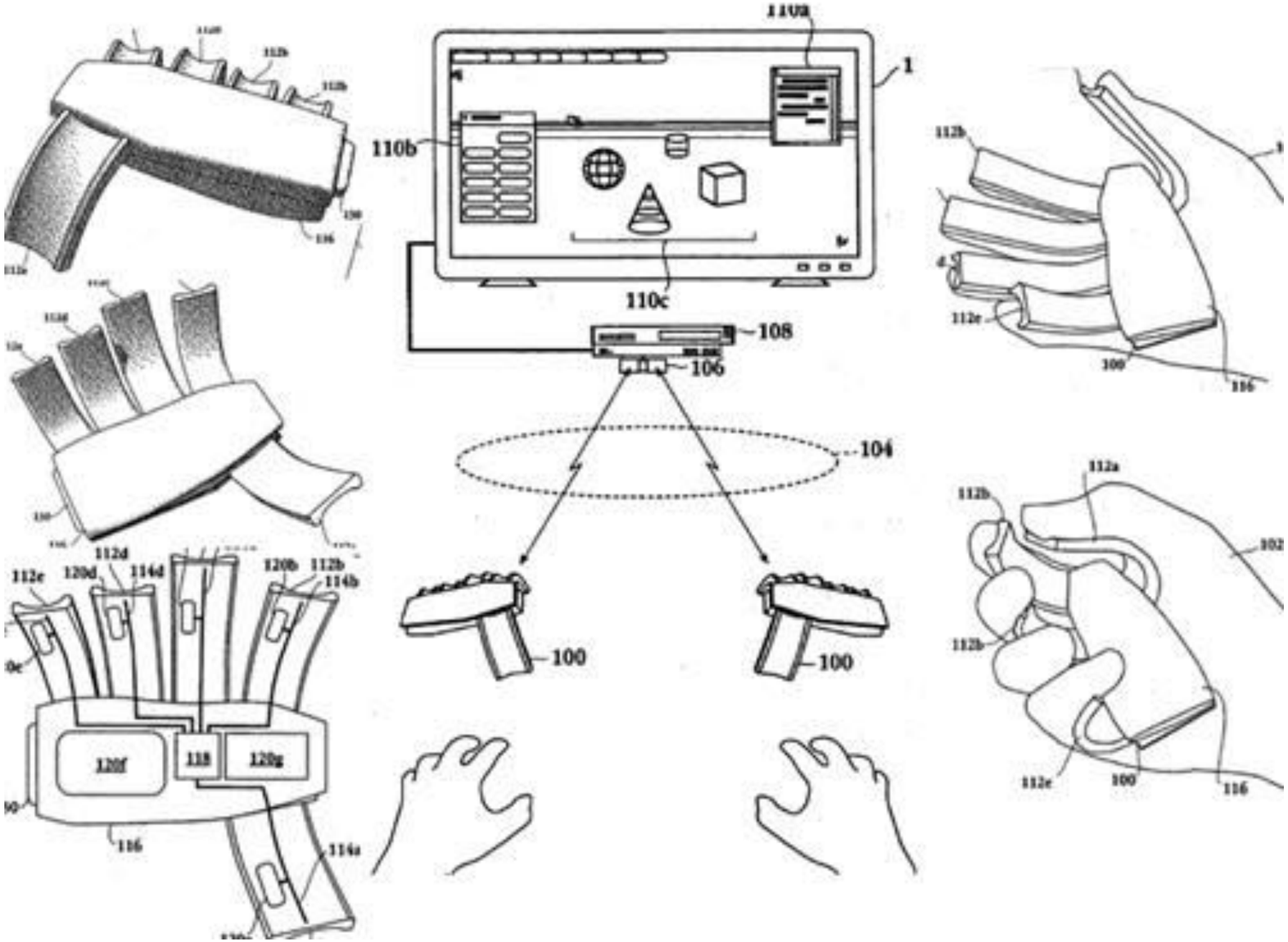
STEM
sixense.com

Magic Wand
technicalillusions.com

Leap Motion
leapmotion.com

Razer Hydra
http://sixense.com/

KZERO WORLDSWIDE



http://www.unwiredview.com/2007/04/13/vr-controller-for-your-ps3/

Sensory

Morton Heilig, Sensorama, 1962

The Sword of Damocles

Ivan Sutherland, 1968

https://www.youtube.com/watch?v=NtwZXGprxag

Simulation Sickness

uncontrolled camera movement

player locomotion

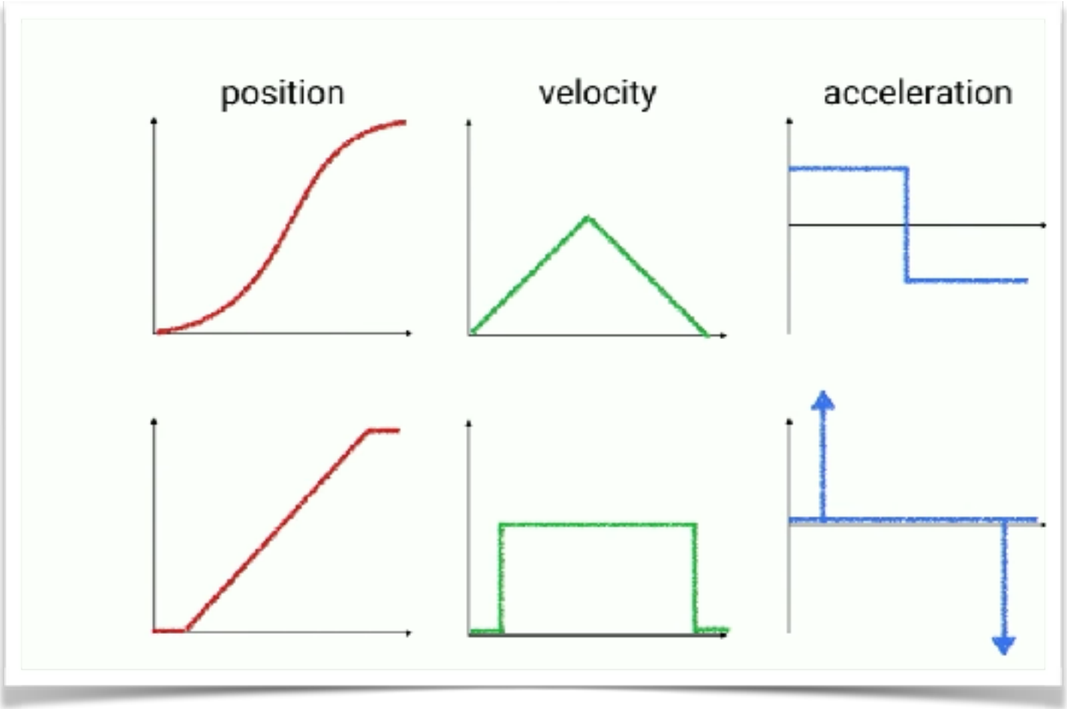
linear movement

acceleration

rotation

both

Motion Sickness Counter Measure



Constant Acceleration

Blink Teleporting

Narrow FOV

Control Optical Flow in peripheral vision

Render at 2*60 fps

Don’t accelerate camera independent from user

Keep horizon aligned

Don’t take away head orientation control

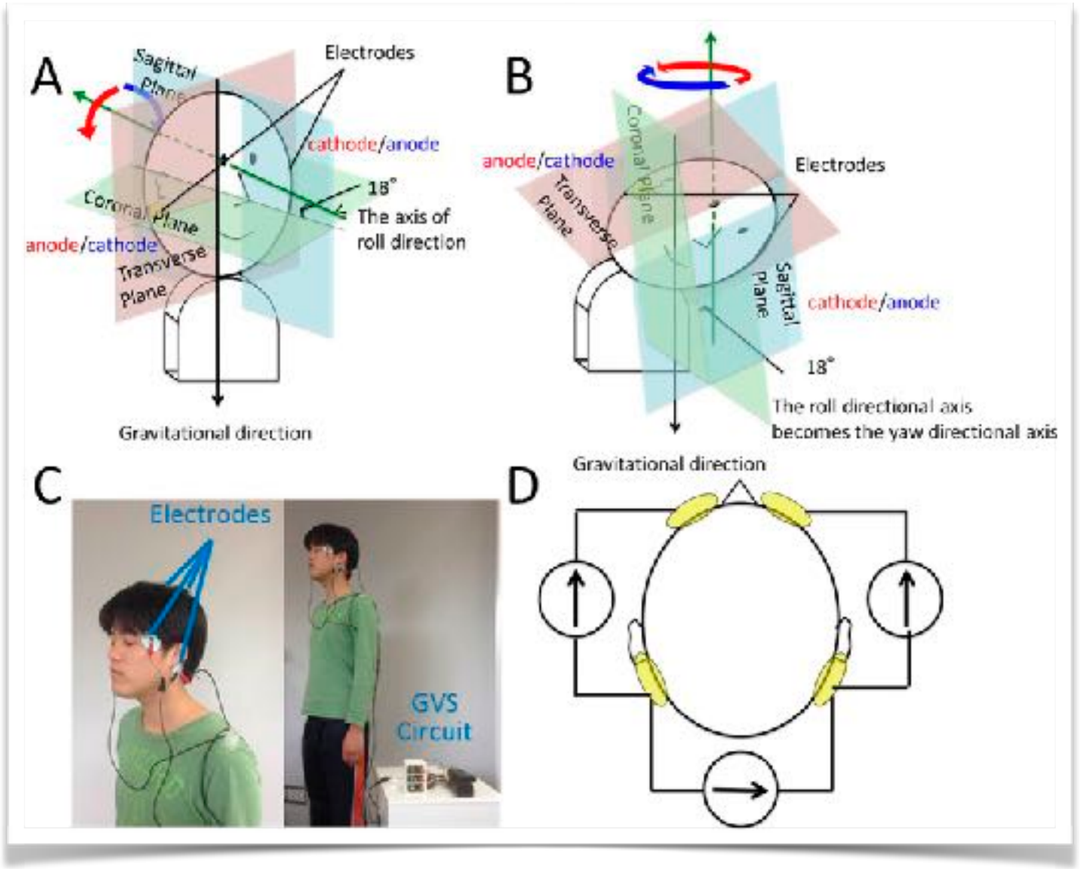
Always consider user posture and context, sitting, walking, public, chair, couch

Teleport

Rollercoaster VR

https://news.samsung.com/global/six-flags-and-samsung-partner-to-launch-first-virtual-reality-roller-coasters-in-north-america

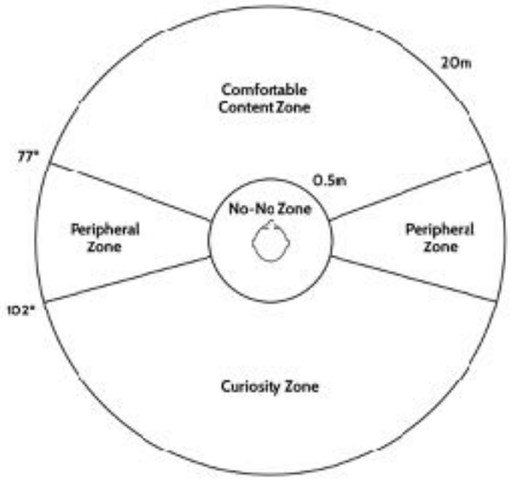
Galvanische Vestibulär-Stimulation



Four-pole galvanic vestibular stimulation causes body sway about three axes

Entrim 4D
https://www.youtube.com/watch?v=yZ_G_zbObWU

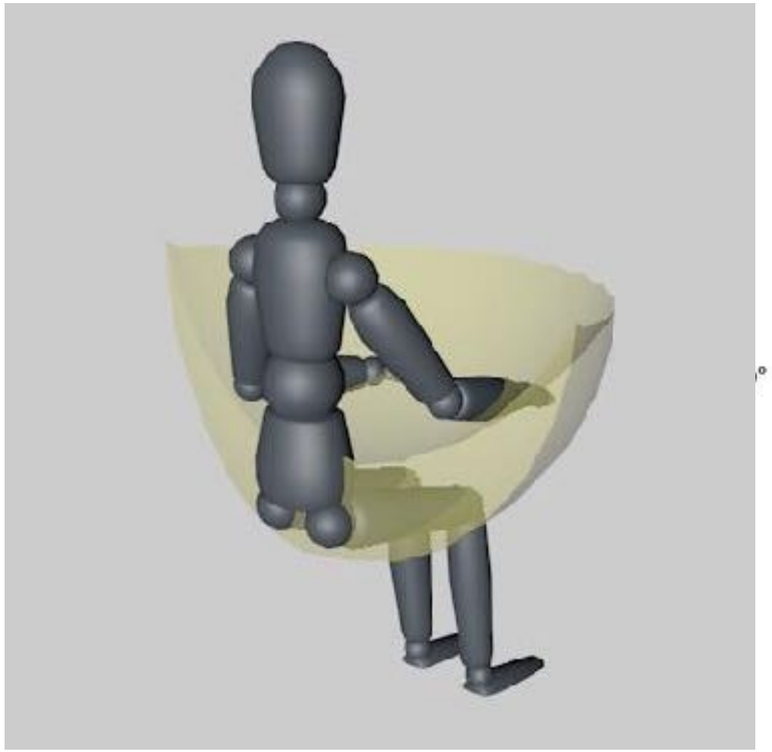
GUI

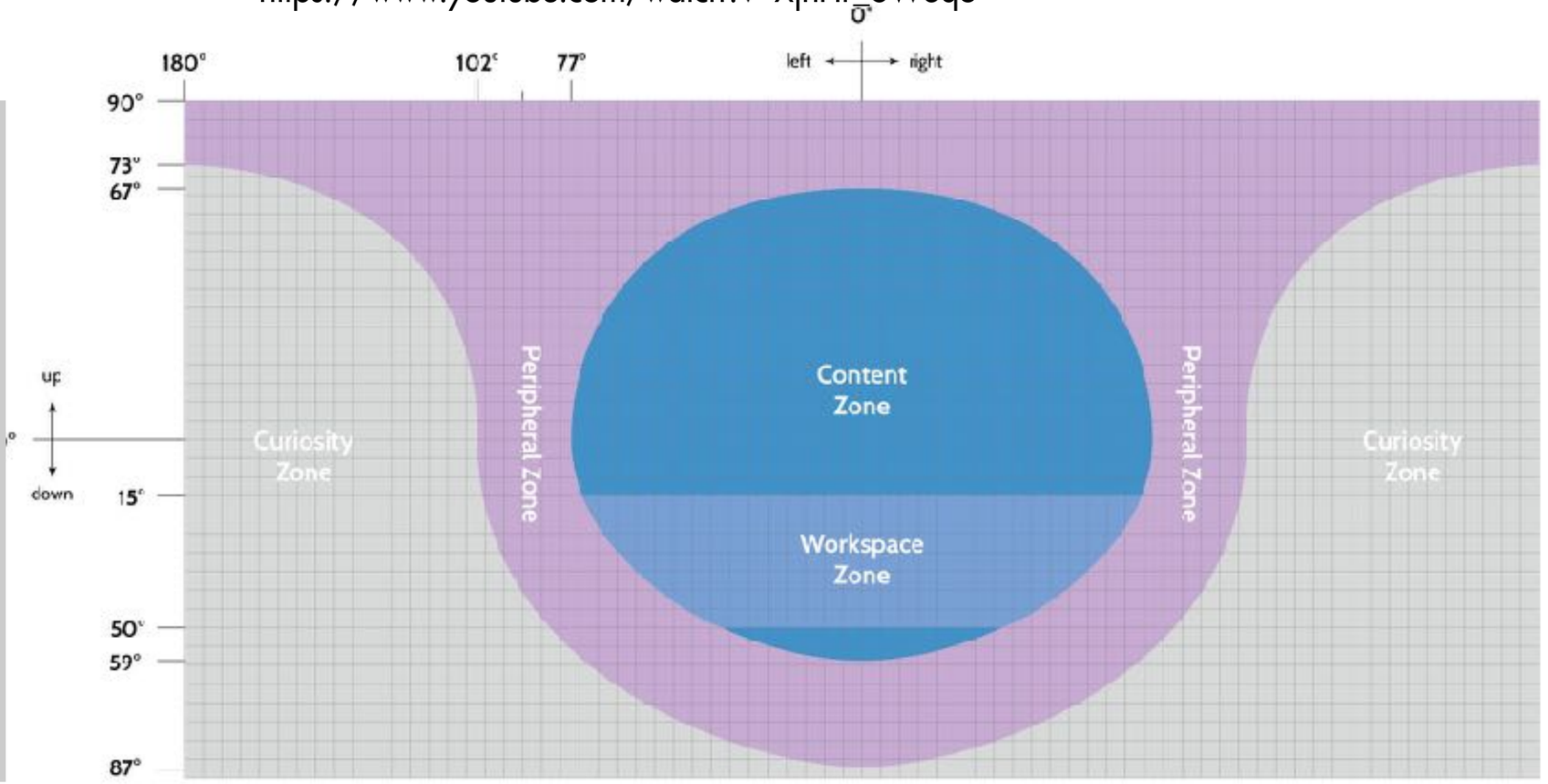


Workspace Zone

VR Interface Design Pre-Visualisation Methods
https://youtu.be/id86HeV-Vb8?t=5m33s

ALex Chu: VR Design: Transitioning from a 2D to 3D Design Paradigm
https://www.youtube.com/watch?v=XjnHr_6WSqo





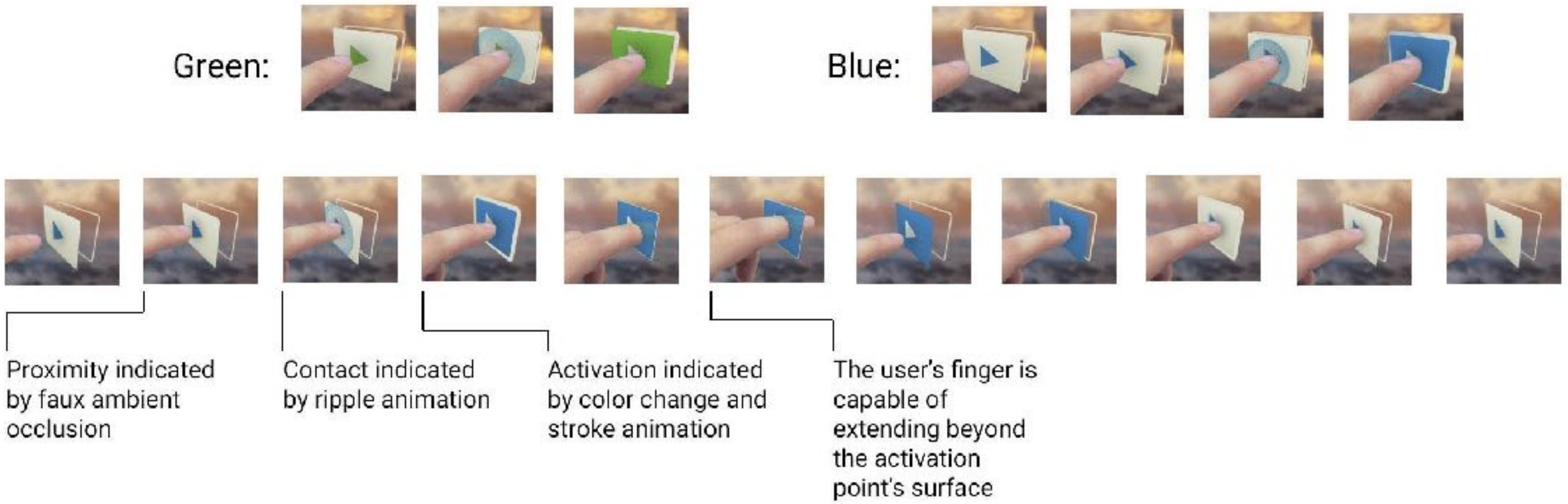
VR Interfaces

https://youtu.be/id86HeV-Vb8?t=11m48s

3D UI in VR

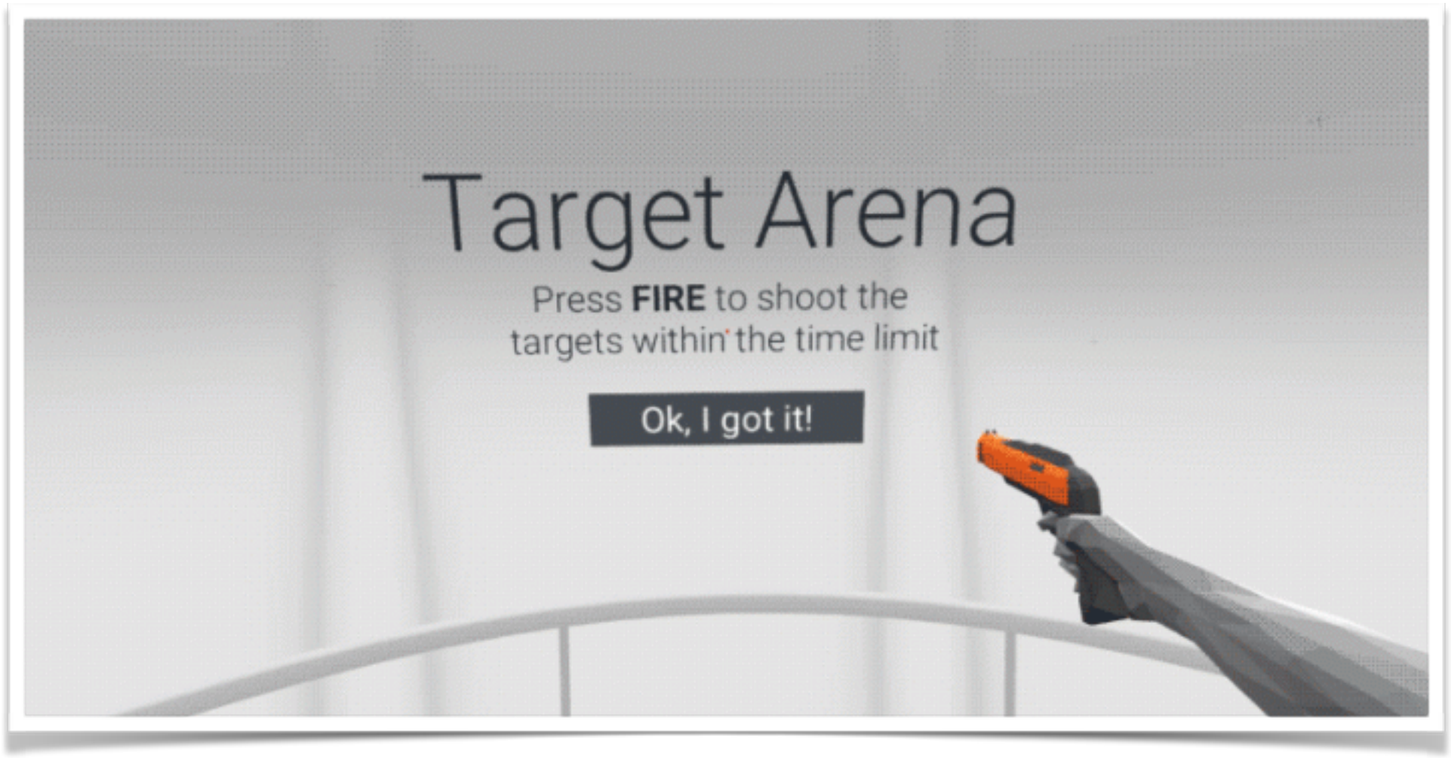
Riho Kroll: How Crytek Builds 3-Dimensional UI for VR
https://www.youtube.com/watch?v=Sq9NOukgxQc

Widget



Visual Design Methods for Virtual Reality, S. 33
https://drive.google.com/file/d/0B19l7cJ7tVJyRkpUM0hVYmxJQ0k/view

GUI und Text



Don’t force eye re-focus to read pop-up text

Reading text in VR is hard

Integrate GUI in the world

Game Feel

Locomotion with linear Velocity, no easing

No Screen Shake. Ever.

No Pushback

Indicate interaction possibilites (cursor, projected in the world)

Fidelity Contract

World and physics rules

Interactive expectations / affordances

Unconscious expectations

Desires

Narrative expectations

THOMAS‘ VR UX CHECKLIST V0.5

Positive

- meaningful interaction
- natural spacial interface / mapping
- interactive story-telling
- multi-sensory
- emotionally relevant
- technical fidelity
- believable and consistent
- validity through social interaction

Negative

- shallow / no interaction
- non-diegetic GUI
- linear story-telling
- proprioceptive disconnect
- impersistent and conflicting world
- performance lag
- breaking expectations
- void of life