

# Virtual Reality

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What is VR



.. mostly

# What is VR

- “A computer generated digital environment that can be experienced and interacted with as if that environment were real.” (The VR Book, 2016)
- “An artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment.” (Merriam-Webster, 2015, 2021)
- “Simulated experience that can be similar to or completely different from the real world.” (Wikipedia, 2021)

Not covering: Mixed Reality, Augmented Reality and “other realities”.

Hardware

# Hardware

Overview, but not the focusing point today...

Oculus Quest 2	300 €	Standalone	1832x1920 per eye	90 Hz
Valve Index	1000-2000 €	Not standalone	1600x1440 per eye	120 Hz
HTC Vive Pro 2	800-1400 €	Not standalone	2440x2440 per eye	120 Hz
HTC Vive Cosmos	670 €	Not standalone	1700x1440 per eye	90 Hz
HTC Vive Focus 3	1500 €	Standalone	2448x2448 per eye	90 Hz
Sony PlayStation VR	300-900 €	Not standalone	1080x960 per eye	120 Hz

# Hardware

Still, thank you Oculus.

- 2012 crowdfunding
- 2014 acquired by ..
- 2016 last Rift
- 2021 discontinued

# Hardware

Too many

Consumption point of view

# Hardware

## Problems

- Usability
- Hardware related
- Other

# Hardware

Question to listeners

Software

# Software

## Whats and hows

- Content creation
  - Story before everything. Simple and clear.
  - Believability instead of photorealism.
  - VR: Experience instead of technology.
- Environmental design
  - Basic structure of the world needs to be self-explanatory.
  - Important for immediately start experiencing the world.
  - VR: Is it really different from 3D everything else?
- Interaction
  - VR: Different. And growing.

Goal: Transport user into a new environment, shut out the physical space.

# Software

## Development

- How it works
  - Make objects that exist in a virtual 3D space.
  - Add sensory feedback to give a sense of presence.
  - Emerge user in interactive elements.
  - Iterative dev.
- Dedicated SDK-s
  - Can include lib, samples, guides
  - Or general?
- Game engines
  - Unity, UE, Cryengine
- 3D modeling
- Version control
  - Question to listeners

# Software

Examples

Games

But not only

# Software

## Pain example case

The perception of pain is strongly affected by factors other than just stimulation of skin. Expectation, attention, distracting stimuli, hypnotic suggestion. Example: phantom limb pain. Is it possible to ease the pain?

VR is used to distract the patient while removing bandages.



# Software

## Where

- Entertainment
- Education
  - Medical
  - Military
- Rehabilitation
- Business
  - Meetings
- Marketing
  - e-commerce

...

# Software

## Problems

- Target audience and then lose it
- World
  - Wayfinding example and not using it
- Photorealism instead of believability
- Latency
  - < 20ms for stable world
  - < 4ms for smooth experience and strong subconscious presence
  - 90Hz ends up around 11ms
- Controls, interaction, platform fragmentation...
- Yes, and the motion sickness

# Software

Question to listeners

Why it is not everywhere?

# Why it is not everywhere

I asked.

Answers.

# Why it is not everywhere

Question to listeners

# Why it is not everywhere

Contradictions

# Why it is not everywhere

Physical movement

Turning regular games to VR

# Regular games to VR

- No, you can't.
  - Warnings, rules, everything will be bad. At first.
- Or, actually you can.
  - Time.

# Regular games to VR

## Book

- Minimize sickness effects
- Aesthetics secondary
- Study human perception
- Reuse assets
- Focus on geometric detail
- Appearance of hands, arms, body
- Careful with zooming

## Others

- Not only perception but also study being in a new world
- Travel methods need changing
- Interactions are more important
- Movement methods need agreement
- Testing importance (incl motion sickness)
- Not too hard rules
- Iterate quickly, fail fast, learn what works best

# Regular games to VR

Absolute minimum

- Disagreements
- Lack of experiments

# Regular games to VR

What does it take to do it well

- Let go of the idea of “experiencing everything and a lot”
  - Avoid super detailed world
  - Less can be more with actions
  - Super cool fights with a lot of things happening in it work differently
  - Need to learn how to move, assumptions may not work
  - Too much intensity is uncomfortable
  - A lot of visible “buttons” can lead to a disappointment..

# Regular games to VR

What does it take to do it well

- Find ways to tell stories that don't need camera to control it
  - Less movie, more game
  - Long scenes where camera shows everything you see don't work
  - Camera view is eyes at all times
  - Following a needed path needs guidance (a lot)
  - You never know where the player is looking. So don't cheat.

# Regular games to VR

## What does it take to do it well

- Consider that players take things slower in VR than in a flat screen game

“People slow down so much [in Half-Life: Alyx],” says Valve's designer and writer Sean Vanaman. “That's in contrast to how fast your character moves in Half-Life games traditionally. You're very, very, very fast in those games, and at the furthest end of the bell curve on the other extreme is how slow people go [in VR].”

# Regular games to VR

## What does it take to do it well

- If you make something look interactive, it has to **be** interactive

“If anything looks interactable, it has to be interactable,” says Apex Construct creative director Odeldahl. “The player has to be able to touch it, lift it, throw it or press it, whatever the interaction may be. I think that’s the most important [rule] of all.”

- Interacting means different ways for different people

# Regular games to VR

What does it take to do it well

- Movement needs planning (a lot)
  - Yes, the motion sickness again
  - But not only
  - Teleportation can make you interact less instead of more
  - Natural movement can be an advantage, preferred for some
  - Feeling lost when many different movement options
  - Moving in VR can take much more time if fully experienced

# Regular games to VR

Question to listeners

How can I contribute

# How can I contribute

Hardware

# How can I contribute

Software

# How can I contribute

Educational

# How can I contribute

Question to listeners

Questions

# Sources

1. Internet (my collection of links [here](#))
2. Book: The VR Book. 2016. J.Jerald.
3. People (yes, actual people I talk to and torture with my questions)

Thank You