Psychological Issues for Designing XR Spaces

From Usability to Humability

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- Passion: Ethics in the Metaverse and thereby establishing a research focus on "Humability"

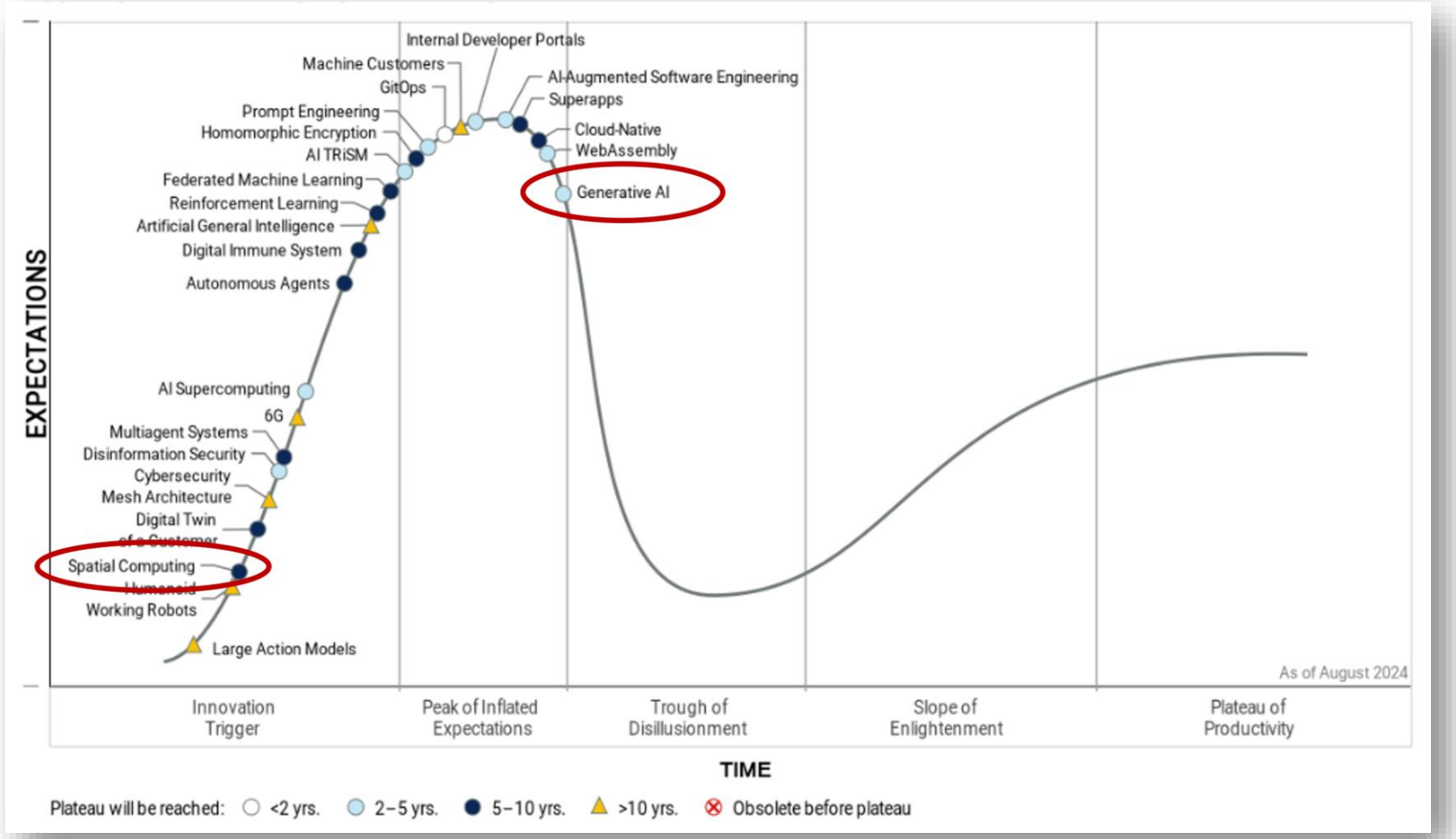
Metaverse as XR Space of our future society

What are we talking about?

- A **digital parallel world**, with people as avatars: to connect, play, work, and learn.
  2021: Meta (Facebook) sparked a global hype.
- According to **McKinsey**, almost **$180 billion** were reportedly invested in metaverse technologies in 2021 and 2022.
- Countless **start-ups, but also** tech giants like **Microsoft**, committed themselves to the vision.
- **Success forecasts** topped each other: **Citi Bank** projected "the metaverse industry could be worth $13 trillion by 2030."
- **The problem:** What was available in 2021, 2022, and still today in terms of real **technology doesn't even come close to what Meta and other companies' ad campaigns** promised.
- **But:** Technologies are getting better, and **the dream isn't over for many**.
  The **Industrial Metaverse** remains a trend.

Hard to predict: When and whether…..

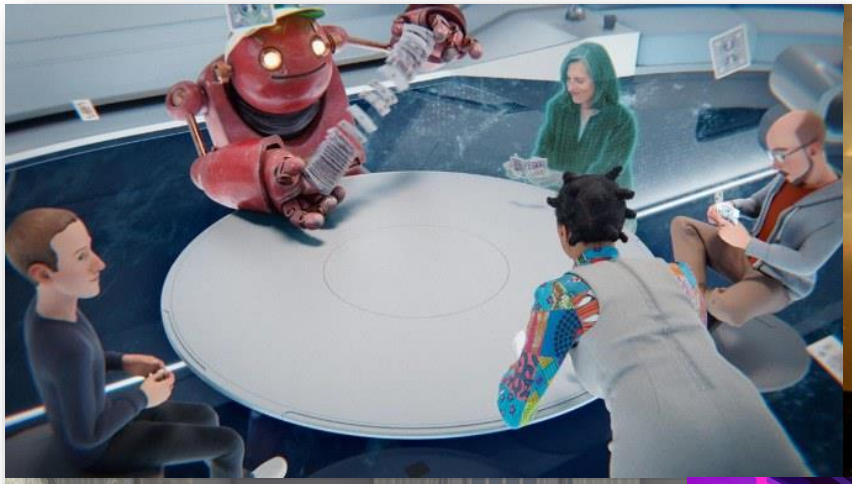
Gartner Hype Cycle



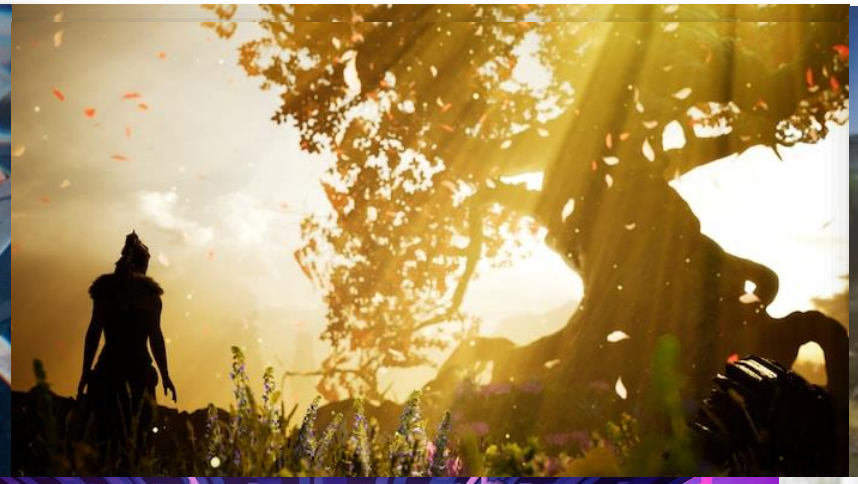
- Metaverse = Spatial Computing + XR
- A widely used metaverse in the private sector will become a reality in 5 to 10 years at the earliest – if at all.
- **But it is important to decide NOW how it will happen, because once it is there, it will be too late….**

Application Fields – not so far away

Socializing



Immersive Gaming



Travelling

Shopping

Art / Culture

Education

Indications of psychological risks to mental health

Literature review of key disciplines within psychology

Developmental Psychology
intra-individual changes in human experience and behavior across the entire life span

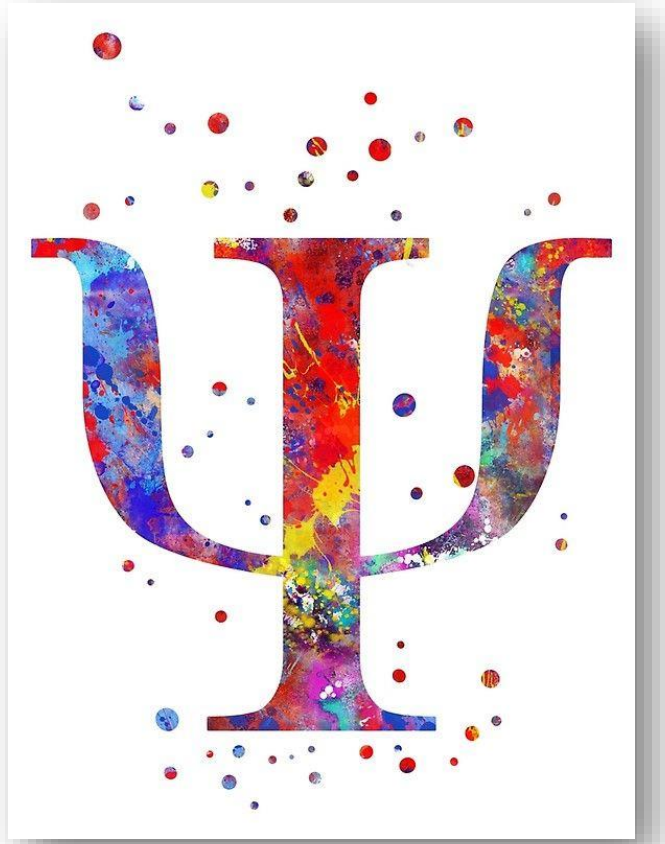
Social Psychology
social behavior between individuals and within or between social groups.

Industrial and Organizational Psychology
behavior in the workplace regarding work processes, social work structures, and personnel

Cognitive Psychology
attention, memory, perception, problem solving, creativity, and reasoning. It aims to understand how we think, learn, and make decisions, and how these processes affect our behavior and emotions.

Personality Psychology
patterns of thoughts, feelings, and behaviors that make individuals unique.

Clinical Psychology
emotional and behavioral disorders or illnesses



Development Psychology

Results

Difficulties in finding identity for adolescents

- first findings that show that a strong identification with an avatar in a game context is **negatively related to self-concept clarity.** (Green et al., 2021).

- it cannot be ruled out that the personal manifestation as an avatar can also **influence the evaluation of one's own body.**

Eating Disorders

Tambone et al. (2021) could show that the shape of the **virtual body of avatars had an influence on the eating behavior** of the test subjects: If the virtual body was slimmer than the subject's own, calorie-rich foods were avoided to a greater extent.

Social Psychology

Results (1/2)

Danger of radicalization*: Echo chamber effect* (Cinelli et al., 2021)

- In contrast to real life, in which one must deal with different views and characters, in self-selected, virtual spaces, one's own opinion is likely to be mirrored and thus reinforced.

Moral Disengagement: Franks (2017) :

- "[t]hese technologies present new possibilities to act out increasingly realistic fantasies of sex and violence", which could impact behavior towards others in virtual environments.

Uncanny Valley Effect

- Avatars that are "almost human" provoke eeriness and discomfort (Shin et al., 2021)
- Increased realism can impair social perception: Accuracy in assessing traits like extraversion & agreeableness (Shin et al., 2021)
- Eeriness disrupts information processing and thin-slice judgements (Shin et al., 2021; Mori et al., 1970)
- weakens social connectedness & mental wellbeing (cf. Shin et al., 2021; Mori et al., 1970; [21])

Social Psychology

Results (2/2)

Escaping Reality: Escapism & Avoidance Coping

- XR used to flee **negative emotions & stress** (TCIU, Kardefelt-Winther, 2014 [24]): Short-term relief, long-term **depression, anxiety, loneliness** (cf. Tassi, 2022 [23]; Weinstein et al., 2022 [22])
- **Vicious Cycle**:: Real-life problems → XR escape → reduced real-world coping → **reinforced withdrawal**
  (Weinstein et al., 2022, p. 3 [22])
- **Compulsive Use & OCD Symptoms w**hen XR meets **social need gratification** (e.g., belonging, popularity) (Andreassen et al., 2017 [32]; Deci & Ryan, 2000 [31])

Industrial & Organizational Psychology

Results

Key Opportunities & Risks in XR Workspaces

- **Digital / Techno Stress:**
  Increased workload, surveillance, blurred boundaries
- *(Ragu-Nathan et al., 2008 [36]; Tarafdar et al., 2010 [37])*
- **Avatar Choice & Equality:**
  - Overcoming bias (e.g. halo effect, gender, race) in recruitment & assessment
    (Dion et al., 1972 [38])
  - Potential for more inclusive, performance-based evaluation
- **Proteus Effect:**
  Avatar traits influence confidence, assertiveness, even leadership style
  (Yee & Bailenson, 2007 [17]; Rosenberg et al., 2013 [39])

Cognitive Psychology

Results

Research has mainly focused on physiological issues like *Cybersickness*, *(Mittelstaedt et al., 2022 [41]; Rebenitsch & Owen, 2016 [42])*

But: Affective impact matters too: **VR scenarios trigger more shame** than 2D equivalents
(Lavoie et al., 2021 [43])

Slower reaction times post-VR, even without cybersickness: Possible attention impairment
(Mittelstaedt et al., 2022 [41]; Szpak et al., 2020 [44])

Personality Psychology

Results

Big Five traits predict real-life impact of virtual worlds: Not everyone is equally affected by XR experiences

- **High Conscientiousness**
  - Stronger alignment between real self & avatar
  - Weaker Identity shift: More stability across realities
- **High Emotional Stability**
  - low Emotional investment in virtual environments
  - low Risk of real-life behavioral changes
  - Better coping with taboo content (e.g. virtual violence)

Clinical Psychology

Results

- **Social Media as a Trigger**

  Depression & suicidal behavior in adolescents

  (Twenge et al., 2018 [51]; Lin et al., 2016 [52])

- **Depersonalization & Derealization**

  → VR can distort body ownership and self-perception

  (Rubber Hand Illusion [53]; Aardema et al., 2022 [54])

- **Body Image Distortion → Eating Disorders**

  Slimmer avatars cause higher food avoidance

  (Tambone et al., 2021 [55])

- **Uncontrolled Immersion augments PTSD risk**

  Realistic harassment in VR may cause trauma

  (Franks, 2019 [58]; Rizzo et al., 2011 [57])

- **Addiction & Escapism**

  FOMO as addiction amplifier

Humability

the extent to which a technical environment (of virtual and augmented reality) is harmless or beneficial to a person's (mental) health.

Humability: Research Questions

How should avatars be designed to support, not hinder, identity development—especially in adolescents?
→ Developmental psychology & media effects

How can XR experiences be designed to minimize escapism while still fulfilling users' psychological needs?
→ Clinical psychology & Self-Determination Theory

How can XR spaces be designed so that individuals with vulnerable personality traits do not experience unwanted behavioral changes in real life?
→ Personality psychology & avatar–self discrepancy

How can social XR environments be designed to prevent echo chambers, filter bubbles, deindividuation, and radicalization?
→ Social psychology & virtual community design

How should immersive XR applications in work contexts be designed to foster diversity, reduce stress, and promote authentic behavior?
→ Industrial & organizational psychology & technostress

Humability:
Initial Design Requirements based on psychological Insights

Focus Area	Design Requirements
Avatars & Identity	· Avoid near-photorealistic avatars (→ Uncanny Valley) · Promote healthy body image & self-concept
Social Interaction	· Implement safeguards against echo chambers · Design for respectful, inclusive communication
Escapism & Addiction	· Balance need fulfillment without overstimulation · Limit instant gratification and reward density
Personality Protection	· Enable adaptive modes based on personality profiles · Reduce emotional entanglement for vulnerable users
Cognitive Safety	· Offer cooldown phases & recovery time · Let users regulate immersion depth (distance vs. presence modes)

Thank You for Your Attention

Clinical Psychology

Results

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