

A group of people in a meeting room, some wearing VR headsets, interacting with a virtual avatar. The scene is dimly lit with blue and white light accents. A woman in the foreground is wearing a VR headset and looking towards a virtual avatar. The avatar is a woman with blonde hair, wearing a VR headset and a striped shirt, with her arms outstretched. Other people in the room are looking at the avatar with interest. A laptop is open on the table in front of them.

Communication and collaboration in virtual worlds The future of work?

Dr. Omar Niamut | S. Gunkel, T. de Koninck, M. Chen, G. Cernigliaro

Director of Science | TNO ISP

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XR AND THE FUTURE OF WORK

- **XR and immersive tech:** the value of social XR
- **XR and work:** are meetings in VR effective?
- **XR and learning:** can we practice technical skills at a distance?



WORK AFTER CORONA: EXPECTATION VS. REALITY

...we were hoping for the Metaverse...



WORK AFTER CORONA: EXPECTATION VS. REALITY

...we were hoping for the Metaverse...



...all we got was Zoom fatigue...



ZOOM FATIGUE: TOLL OF VIDEO MEETINGS

- Continuously watching other people in the eyes
- Continuously watching into a mirror
- Few non-verbal cues
- Limited movement

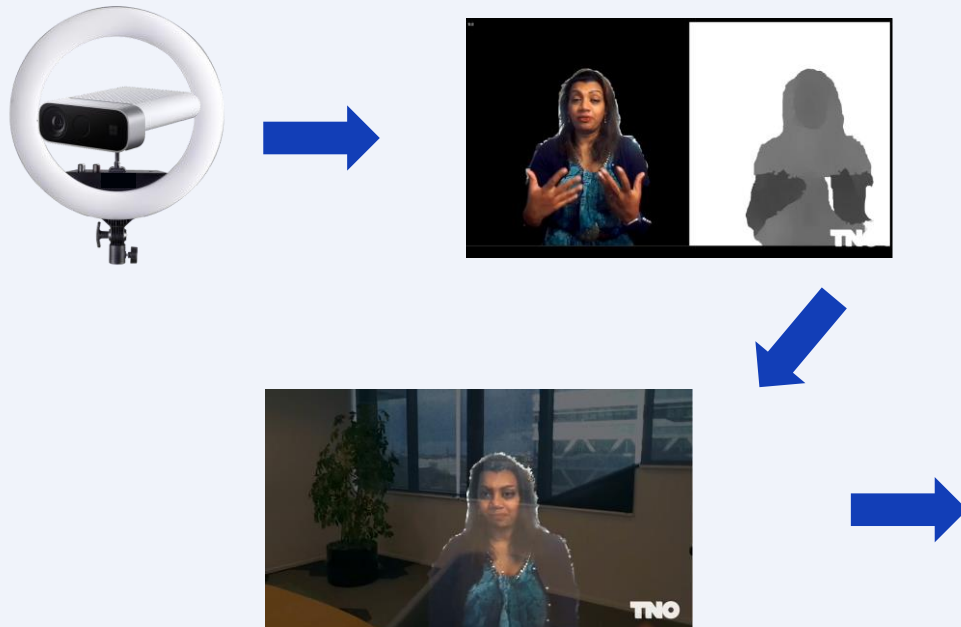
*“Remote work can feel more challenging or tiring than in-person collaboration. Do remote work and video meetings actually tax our brain more than in-person work? The brain science suggests, yes. **Brainwaves reveal remote meeting fatigue is real.**”*

Source: <https://tmb.apaopen.org/pub/nonverbal-overload/release/2>



COMMUNICATION IN VIRTUAL WORLDS: SOCIAL XR

- **Holographic** communications with volumetric video: the next frontier in visual media
- Real people captured as 3D volumes: **human presence** is crucial
- Processed and transmitted in **real time**: minimum latency interactions



EXAMPLES OF SOCIAL XR



Healthcare

Social interactions with elders

Psychotherapy



Remote Collaboration

Rescue missions

Hazardous situations

EXAMPLES OF SOCIAL XR



Expertise at a Distance

Industry training

Simulation



Corporate

Business meetings

Remote interaction

WORKING IN VIRTUAL WORLDS: ARE MEETINGS IN VR EFFECTIVE?

Social XR in the work environment: how do people experience work meetings with different forms of communication?

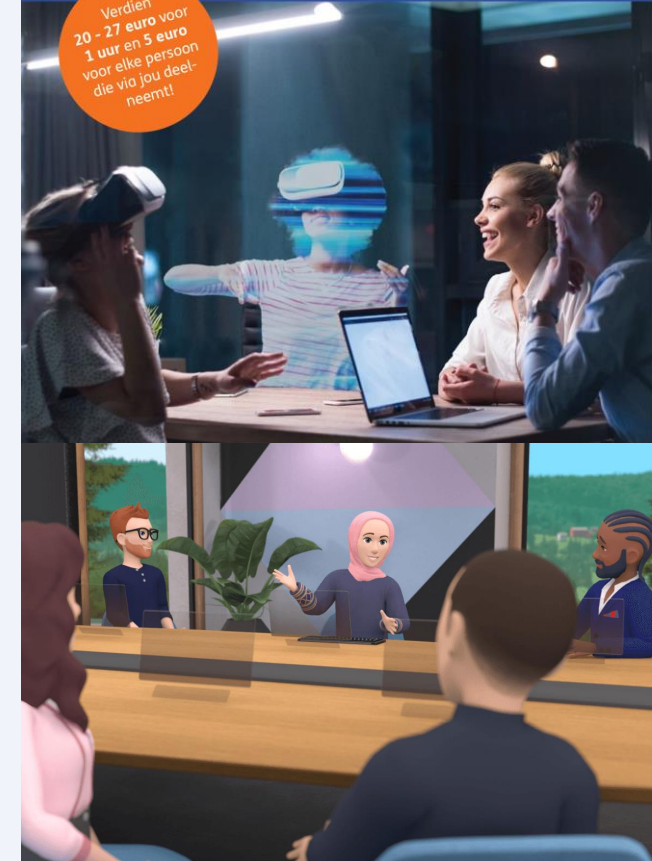
- Face to face
- Video conferencing (Microsoft Teams)
- Virtual Reality (Meta Horizon Workrooms)

Experience assessment: participants engaged in negotiations, meetings and task-related assignments

- Quantitative: controlled experiments with measurable KPIs
- Qualitative: field experiments with questionnaires

Doe mee aan ons onderzoek
over de toekomst van werk

Verdien
20 - 27 euro voor
1 uur en 5 euro
voor elke persoon
die via jou deel-
neemt!

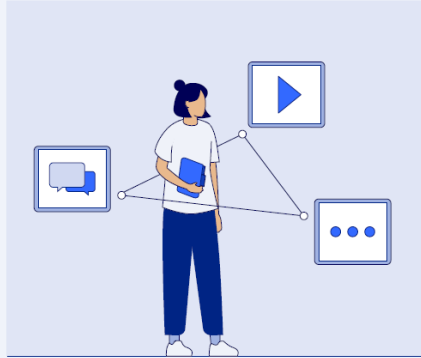


ARE MEETINGS IN VR EFFECTIVE?

How will we meet in the future?



Meeting in VR is perceived as very enjoyable.

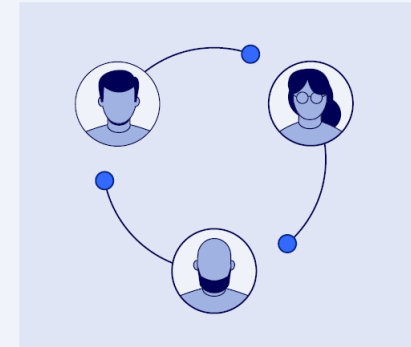


For the young generation, meeting setting does not have a lot of effect on experience.

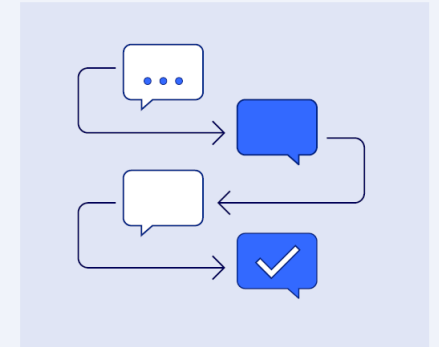


First indication speech analysis shows that VR conversations are more similar to F2F than Teams.

Social XR Meetings

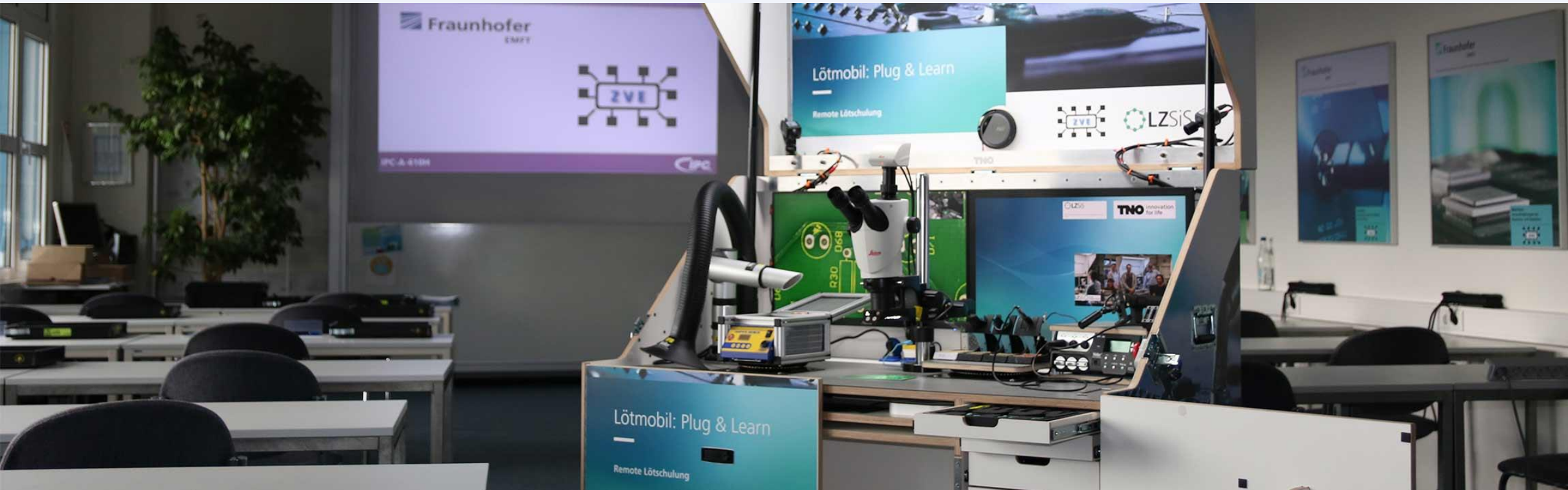


Can have more engagement, depending on the user's perspective of the avatars.



Have a better flow, as a result of easier turn taking and interrupting.

LEARNING IN VIRTUAL WORLDS: CAN WE PRACTISE TECHNICAL SKILLS?



LEARNING IN VIRTUAL WORLDS: CAN WE PRACTISE TECHNICAL SKILLS?

"XR is about enhancing the human experience with the real world and the Metaverse is about expanding that journey to be with others. Putting an AND between the real and the virtual."

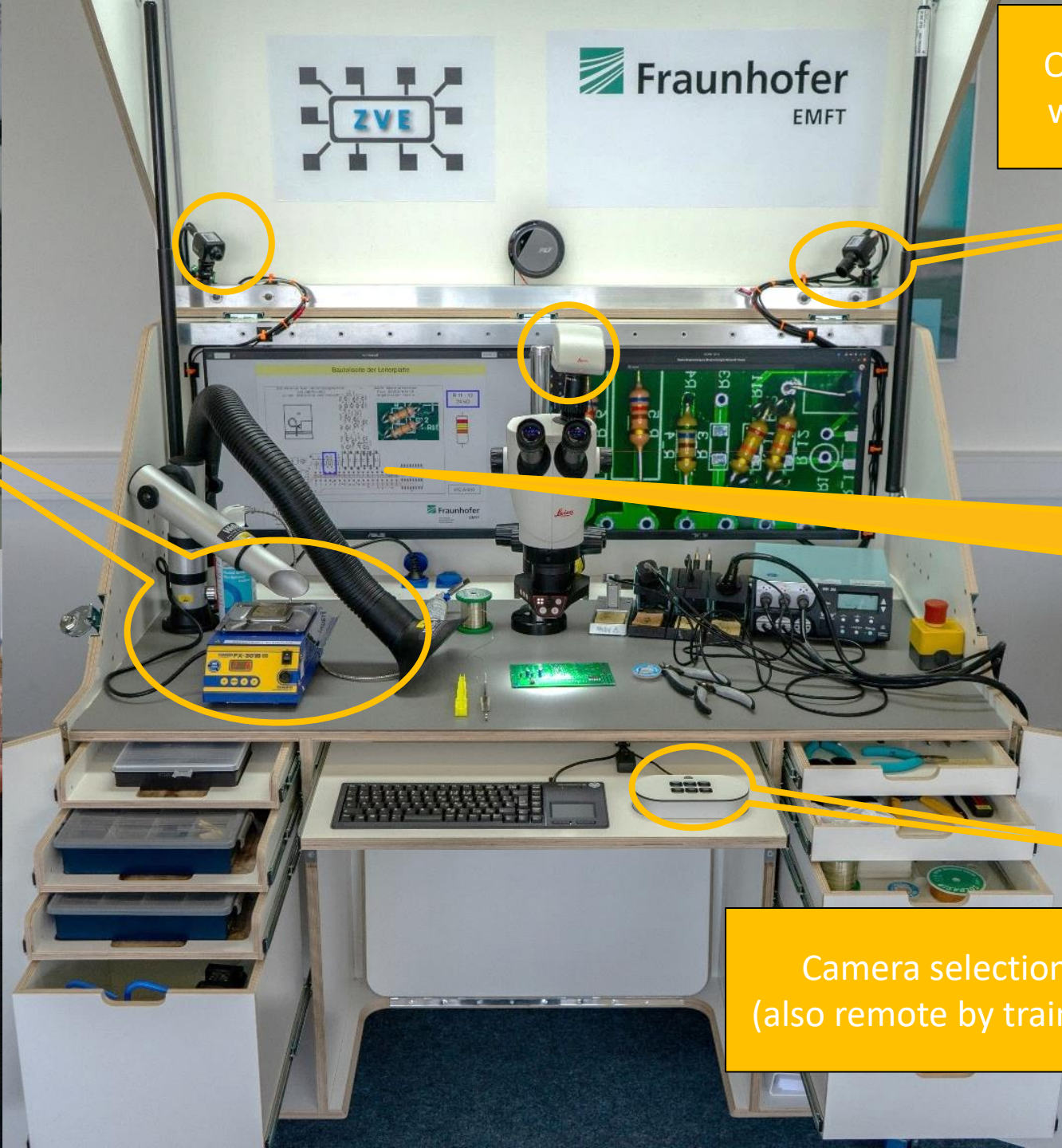


**Any space can become
a learning space.**





(Remote) view microscope



Observation cameras with different angles



Live Presentation by the trainer



Camera selection (also remote by trainer)

CAN WE PRACTICE TECHNICAL SKILLS AT A DISTANCE?

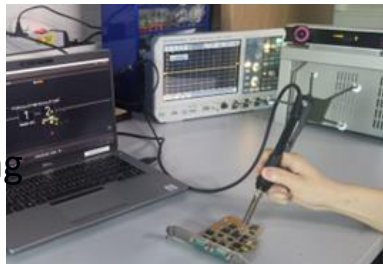
Use Case

- Plug and Learn
- ESA certified
- remote learning



- TNO Social XR

- 3D modelling
- Sensing and analysis
- Soldering trajectory tracking



Collaboration between

TNO innovation
for life

 **Fraunhofer**
EMFT

 **Fraunhofer**
IGCV

 **LZSiS**

Benefits

1. Integrate complex teaching anywhere
2. Easy access to experts
3. Training certifications



WHAT'S NEXT? VIRTUAL WORLDS GOVERNANCE

Study for EC DG Connect E.3 on the governance developments related to virtual worlds and the transition to Web 4.0.

- Assess the key developments in internet technologies and blockchain relevant to Web 4.0 and virtual worlds
- Facilitate an informed debate and derive a consensus-based set of governance principles and recommendations

You can participate!

- Check out the website web4hub.net and fill in the survey
- Join the High Level Conference on Governance for Web 4.0, hosted by EC on 31st March - 1st April 2025



FINAL THOUGHTS

Future of work in Virtual Worlds

- social XR enables human presence
- meetings in VR are more enjoyable
- learn and practice technical skills at a distance





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Thank you for your attention!