



Immersive telepresence

Ideation Workshop

Thursday 23 April

A. DIAGNOSIS

1. Technological locks

- Internet connection
- Device / Equipment
- HW for volumetric capturing of moving people in real-time (depth accuracy, framerate, synchronizing and calibrating multiple RGBD devices))
- Algorithms for real-time 3D reconstruction of moving people of high visual quality
- HW Resources Expensiveness
- 3D screen and projection
- Non-realistic enough visualizations

2. Psychological locks

- Frontier between work and private life
- Trust in the distance workers (that they are actually working)
- Telepresence illiteracy - people don't know what it is if they haven't experienced it
- reality continues (addiction)
- how different are the reaction of people in VR or in reality
- not as good as reality
- Body language
- is the avatar a real person?
- tech limitations can damage the experience at any moment, breaking the immersion and engagement of the user (presence/co-presence)
- (societal) limited access to XR equipment due to expensiveness

3. Organizational locks

- Company might not rely on distance work
- People still prefer to go to an office to share with people "for real"
- Sticking to specific systems, business culture inertia
- legal incentive to help companies to acquire hardware
- Hardware: companies would have to invest money to have some devices
- difficult to set up related to the equipment used by users
- less capital risk in Europe

4. Clients' needs or pains

- expensiveness of equipment
- Not many opportunities to test before to pay and have it

5. EU advantages/assets

- slow money in Europe(submissions, reports....)
- diversity, many skills
- public funding foundations
- University collaboration / Co-lab
- Europeans are masters of collaboration!

6. World competitors advantages or mistakes

- HW companies release new equipment in US and Asia at first
- quick money
- they trusted FB
- Google has got telepresence solution (big screen) in each small office

B. DREAM PROJECTS (coming from participants, individually)

Similar projects #1

Argyris: Lightweight XR equipment along with low-cost embodiment technologies (tele-presence) will allow users to easily augment their everyday reality with highly photorealistic virtualism (other users embodiment, real and virtual objects, etc.) enabling audio-visual communication to every daily activity (exercising, talking, eating together, etc.). Analytics will be available as well.

Vincent: headset AR system, with other users in your own environment, or any other visualization

Similar projects #2

Sylvain: telepresence became accessible from every mobile device that are now equipped with volumetric camera and background replacement that allow to connect from everywhere without the need of specific room/place

Stylianos "XR Skype" Unified AI-enhanced Telepresence Platform where people can collaborate & communicate physically (AR) and virtually (VR)

Similar projects #3

Gero: equip EU parliament with reliable volumetric hard- and software to be the first continent with holographic politicians who look after our planet by not traveling that much

Gero: volumetric capturing (phone) booths all over European cities

Dimitris: low cost Real time volumetric capturing platform for humans

C. PROJECTS FOR EUROPE (Dream projects are developed to fit the research agenda)

Project : Accessible Holographic Telepresence (Dimitris and Gero)

1. Description

Invest on the holographic/volumetric capturing platform (includes both HW and SW), that would allow 3D human capturing in real-time, enabling tele-presence scenarios. To make a first strong argument, the EU parliament and ministers/politicians should be equipped with holographic technology, instead of traveling (leading/pioneering role, saving travel money). Next step is to invest on low cost capturing platforms (be it like a booth), and in the long term to produce a mobile device capable of the above.

2. Big steps

- a. Horizon1: equip EU parliament with reliable volumetric hard- and software to be the first continent with holographic politicians who look after our planet by not traveling that much
 - b. Horizon2: low cost Real time volumetric capturing platform for humans (like booth spaces all over European cities)
 - c. Horizon3 : light mobile device (glasses) accessible for everyone
- 3. Technologies and knowledge to develop**
- a. 3D volumetric/holographic capturing equipment and technologies
 - b. Missing bricks: HW is one the missing bricks, because EU is not producing neither RGBD sensors nor AR helmets (Hololens)
- 4. User experience**
- 5. Why would companies use that tool?**
being innovative, save traveling money and time, attract more customers, be more accessible etc
- 6. Ethical consideration?**

Project : EU XR Collaboration Service for All (Sylvain, Stylianos)

1. Description

An ecosystem including a telepresence platform and a mobile device accessible to all, as easy and accessible as a mobile phone today. The ecosystem includes a hardware equipped with volumetric capture and background replacement to help people connecting from everywhere without the need of specific room and equipment, and a AI-enhanced Telepresence Platform where people can collaborate & communicate physically (AR) and virtually (VR).

2. Big steps

- a. Horizon1: Multi-access telepresence platform as first step, including different input options in terms of people representation (for example: 3D avatar + photo mapping instead of volumetric capture to start with)
- b. Horizon2: Fairly accessible hardware with volumetric camera (multiple cost tiers)
- c. Horizon3 : telepresence became accessible from every mobile device that are now equipped with volumetric camera and background replacement that allow to connect from everywhere without the need of specific room/place. "XR Skype"
Unified AI-enhanced Telepresence Platform where people can collaborate & communicate physically (AR) and virtually (VR)

3. Technologies and knowledge to develop

- a. AI-system for mediated avatar body communication
- b. Volumetric camera for mobile devices (hardware)
- c. Clearing camera background (software)
- d. MISSING BRICKS:
 - i. Common standards (to allow different manufacturers to offer this solution)

4. User experience

Easy to use, affordable, customizable, available both for professionals and general audience

5. Why would companies use that tool?

A must for cooperation and communication;
Low cost, democratic solution
ne mobile device to answer every needs

6. Ethical consideration?

Respect of privacy of tracked persons
Mediation opportunities for disabled persons

Project : AR headset for Natural Telepresence (Vincent, Pedro, Argyris)

1. Description

Lightweight XR equipment such as powerful AR glasses along with low-cost embodiment technologies (volumetric video and 4D representations) will allow users to easily augment their everyday reality with highly photorealistic virtualism (other users embodiment, real and virtual objects, etc.). To this end, this next generation XR will enable audio-visual communication to daily social activities (exercising, talking, eating together, etc.) having great impact to remote communication and interaction. Everyday analytics will be available as well.

2. Big steps

- a. Horizon1: EU Manufacturers to approach more actively one of the main drawbacks of XR, HW and HMD solutions/products
- b. Horizon2: High Quality, Real-time and Offline 4D Capture Systems that in comparison with new HW releases that will allow to step up to the wide use of XR technologies
- c. Horizon3 : Lightweight XR equipment along with low-cost embodiment technologies (tele-presence) will allow users to easily augment their everyday reality with highly photorealistic virtualism (other users embodiment, real and virtual objects, etc.) enabling audio-visual communication to every daily activity (exercising, talking, eating together, etc.). Analytics will be available as well.

3. Technologies and knowledge to develop

- a. Hardware Technologies:
headset (visualization, computation power, etc.), network connections, motion sensors, RGB-Depth-IR sensors, LiDAR, compact processing units
- b. Software Technologies:
3D AI for scene perception and human
- c. MISSING BRICKS:
 - i. Better, cheaper headset
 - ii. More robust 3D AI algorithms

4. User experience

natural interaction with others without travelling

5. Why would companies use that tool?

Saving time and money by avoiding travelling.
Dealing space constraints

6. Ethical consideration?

If the system remains cheap: could help dealing with small real spaces by creating large virtual space. Military applications. Capture of sensitive data.