

MULTIMODAL INTERACTION IN HCI

Eve Hoggan

OVERVIEW

Multimodal Interaction

The Haptic Modality

Multimodal Collaboration Systems

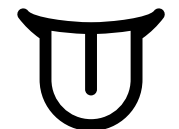
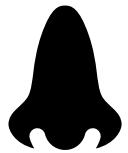
MULTIMODAL INTERACTION

MULTIMODAL INTERACTION

Interaction with the virtual and physical environment through natural modes of communication

- i. e. the five human senses (de fem sanser)
- Føle-, lugte-, smage-, høre- og synssansen
- This applies to input and output.

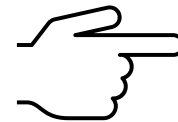
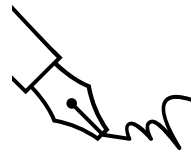
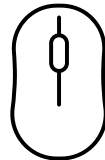
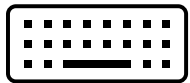
Human interaction with the world is inherently multimodal



DEFINITIONS

Multimodal input means using two or more types of input

- speech, pen, touch and multi-touch, gestures, gaze, head and body movements, and virtual keyboard.



DEFINITIONS

Multimodal output means the system gives feedback through two or more ways

- like a visual display with sound or touch feedback (e.g. your phone)



ADVANTAGES OF MULTIMODAL INTERACTION

Help **match** the user's **ability** to sense and communicate.

Combine computer skills with real-world tasks by making human-computer interaction feel more **natural**.

Improve **reliability** by using multiple sources of information.

Personalize the experience by using different types of input based on what the user prefers or needs.

- If one type of input isn't available (e.g., noisy places), another can be used to keep the interaction going.

PUT THAT THERE - BOLT

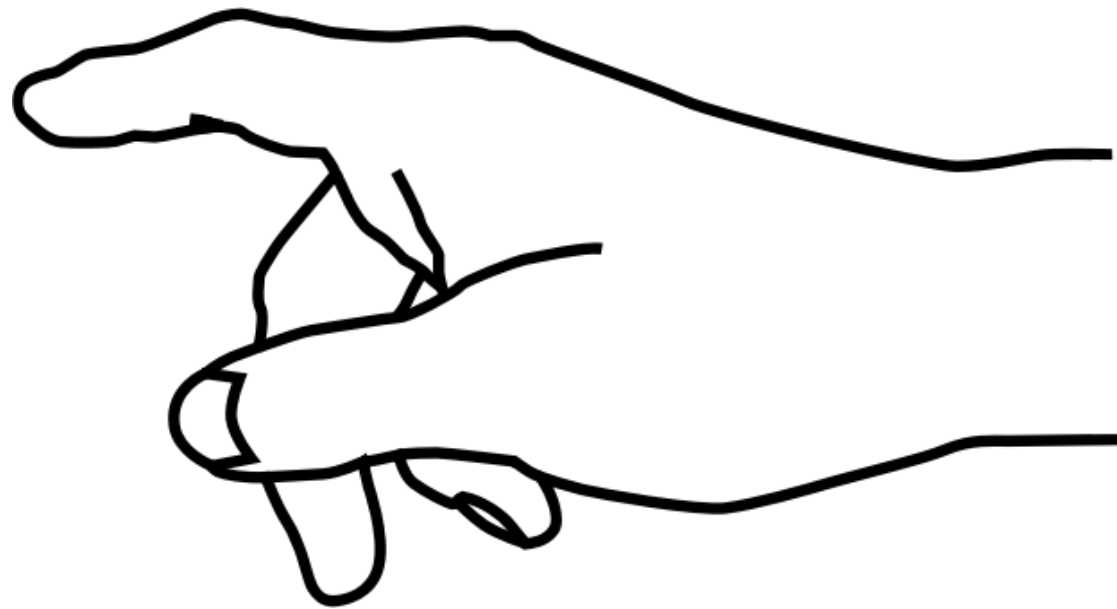
Bolt, R. A. (1980). *“Put-that-there”*: Voice and gesture at the graphics interface (Vol. 14, No. 3, pp. 262-270). ACM.

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HAPTICS (TOUCH)



HAP·TIC ('HAP-TIK)

adj. Of or relating to the sense of touch.

[Greek haptikos, from haptesthai, to grasp, touch. (1890)]

HAPTIC INTERFACES



The study of haptic interfaces focuses on human touch and interaction with the environment through touch.

Touch-based feedback is used less in today's interactive systems compared to sound and visuals.

By adding haptic feedback to user interfaces, we can recreate the physical sensation of pressing a button, holding a ball or even create completely new touch sensations.

MOBILE TOUCHSCREENS



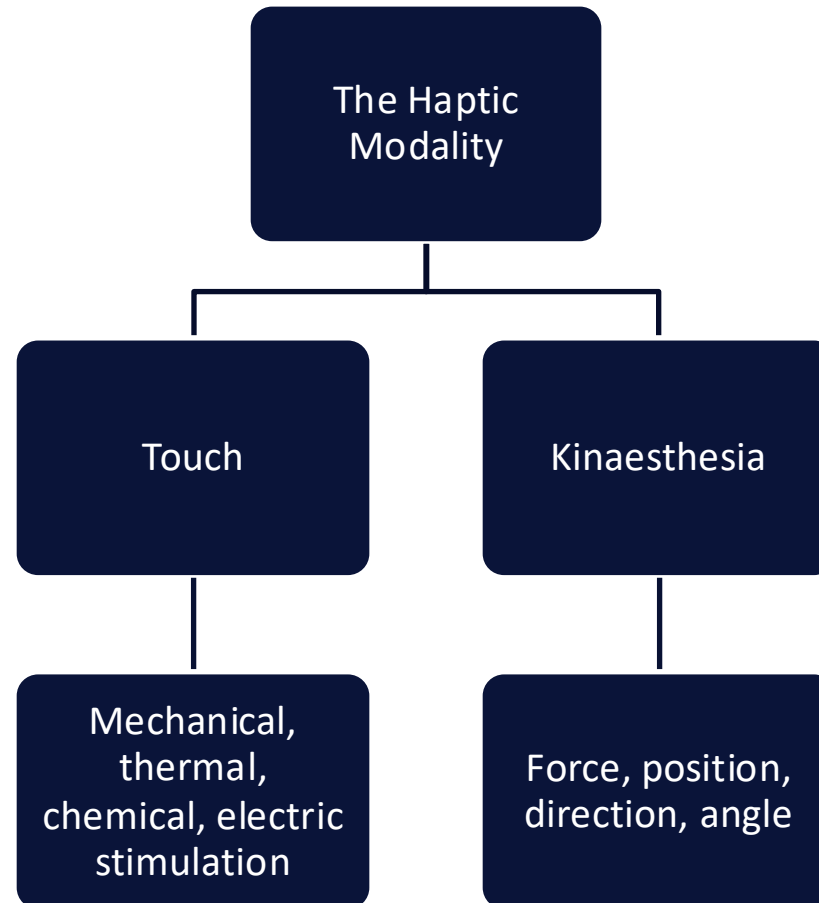
Touchscreens don't have physical keyboards

Touchscreen buttons cannot provide the natural haptic response that physical buttons can

Short vibrations when you touch buttons or icons on the screen make devices easier to use



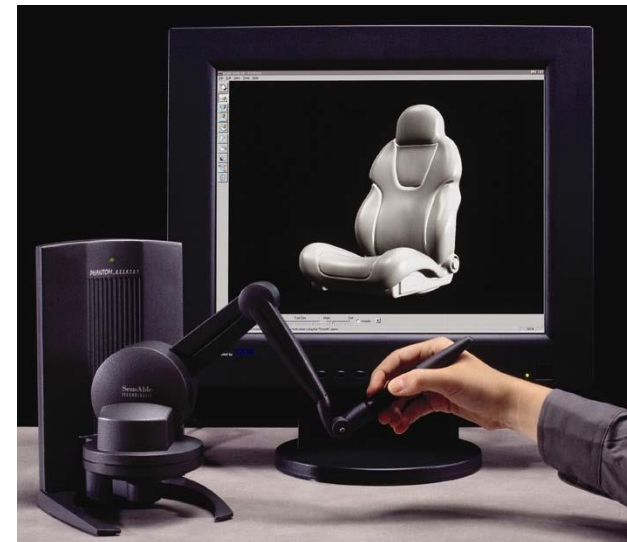
OTHER TYPES OF HAPTIC FEEDBACK



FORCE-FEEDBACK DEVICES

Force feedback devices apply pressure to the user's hand.

- Categorized according to the degrees of freedom (DOF).
 - 1 DOF: steering wheels;
 - 2 DOF: joysticks;
 - 3 to 6 DOF: high-precision devices



DYNAKNOB



Reshaping Interaction with Rotary Knobs: Combining Form, Feel and Function

Anke van Oosterhout
Eve Hoggan



DIS2020



MAGNETS

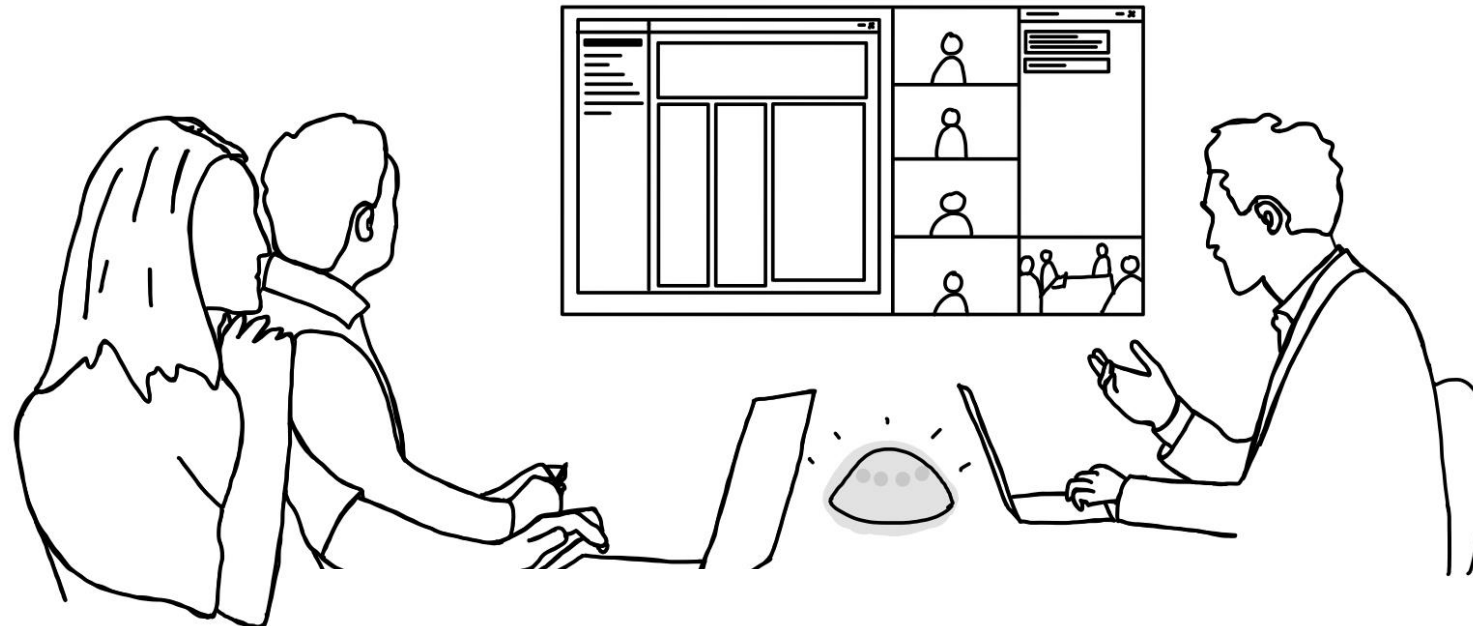
MAGNETIC HAPTIC FEEDBACK



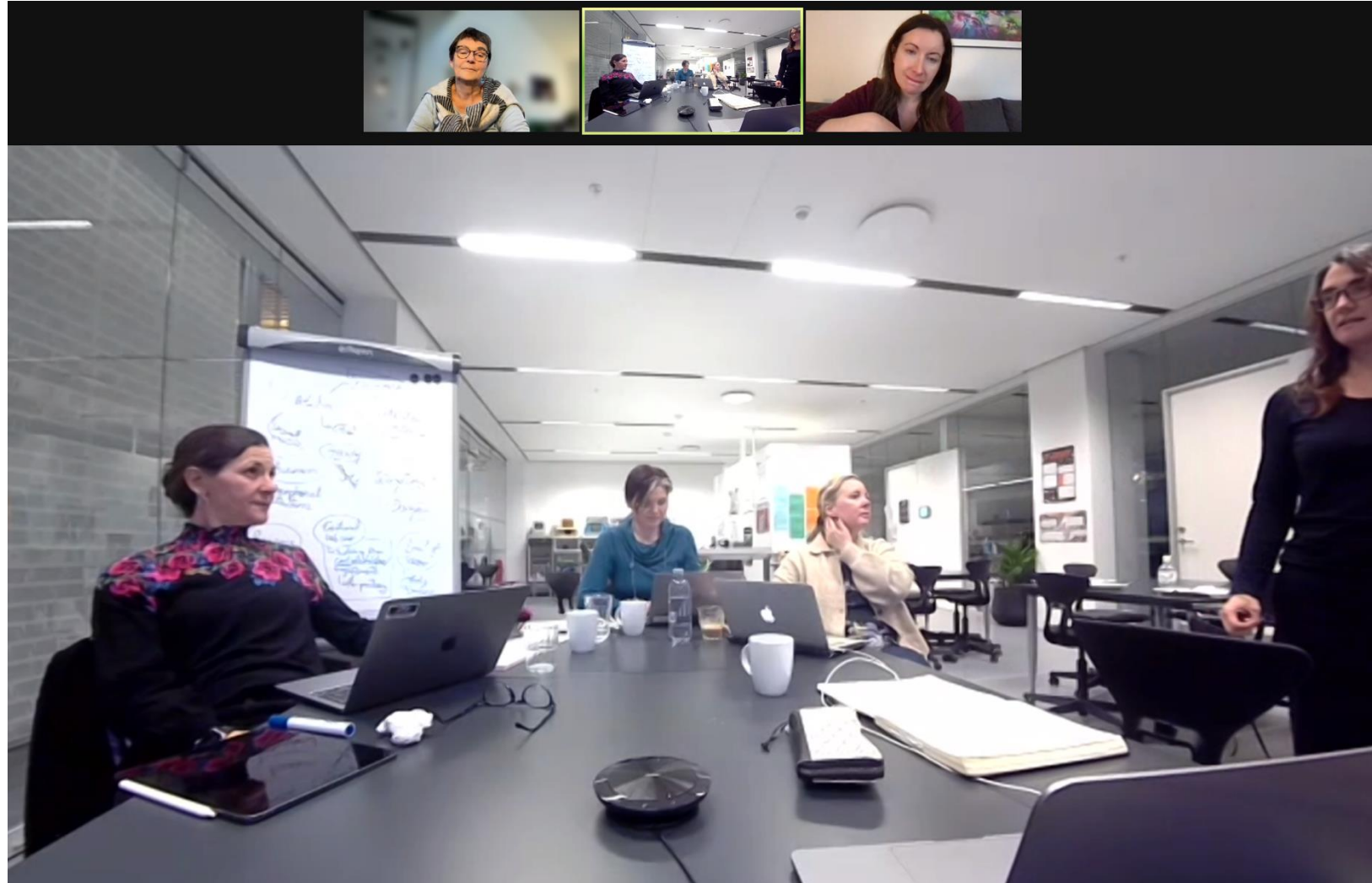
MULTIMODAL COLLABORATION SYSTEMS

HYBRID WORK

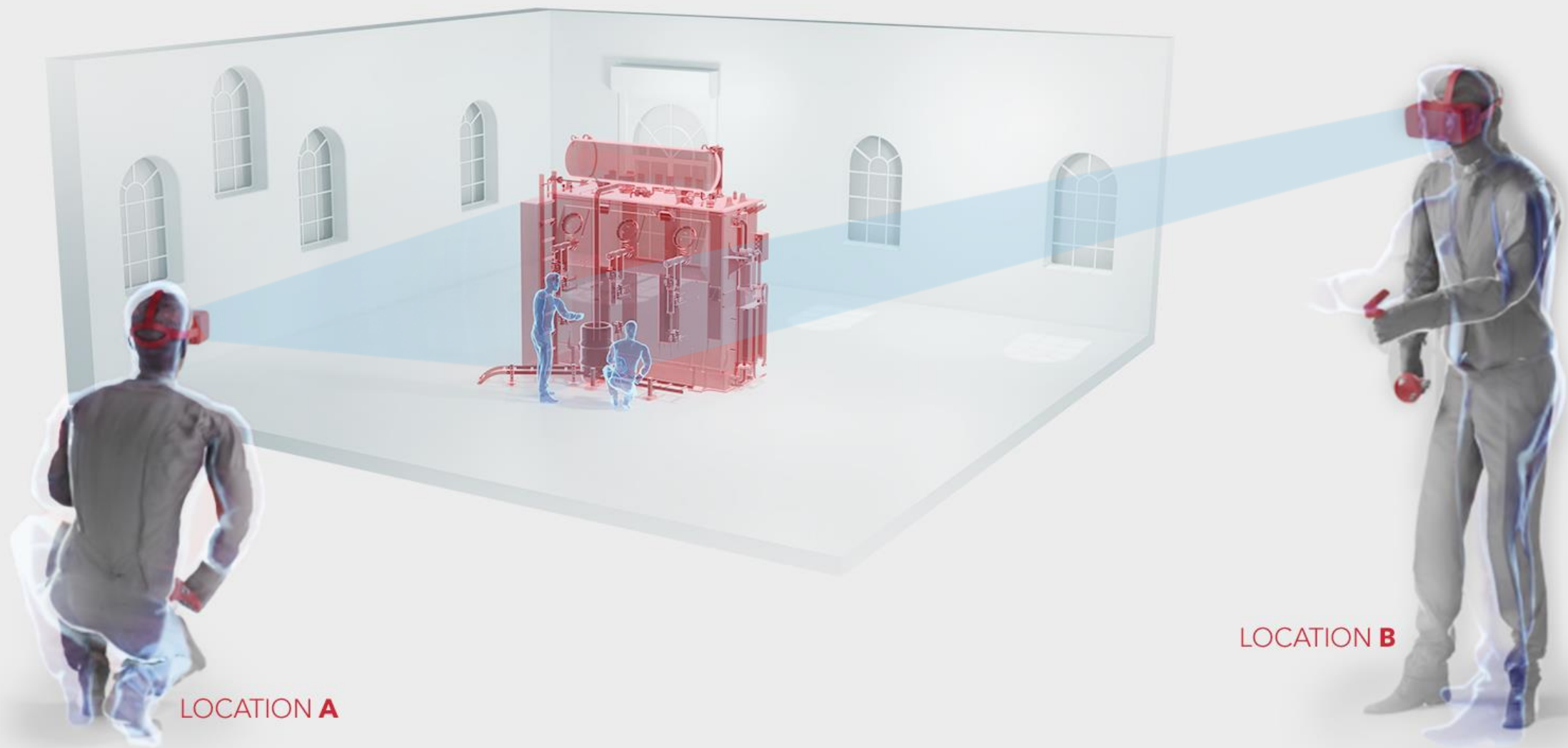
Hybrid work takes place when some participants are geographically distributed, while others are collocated.



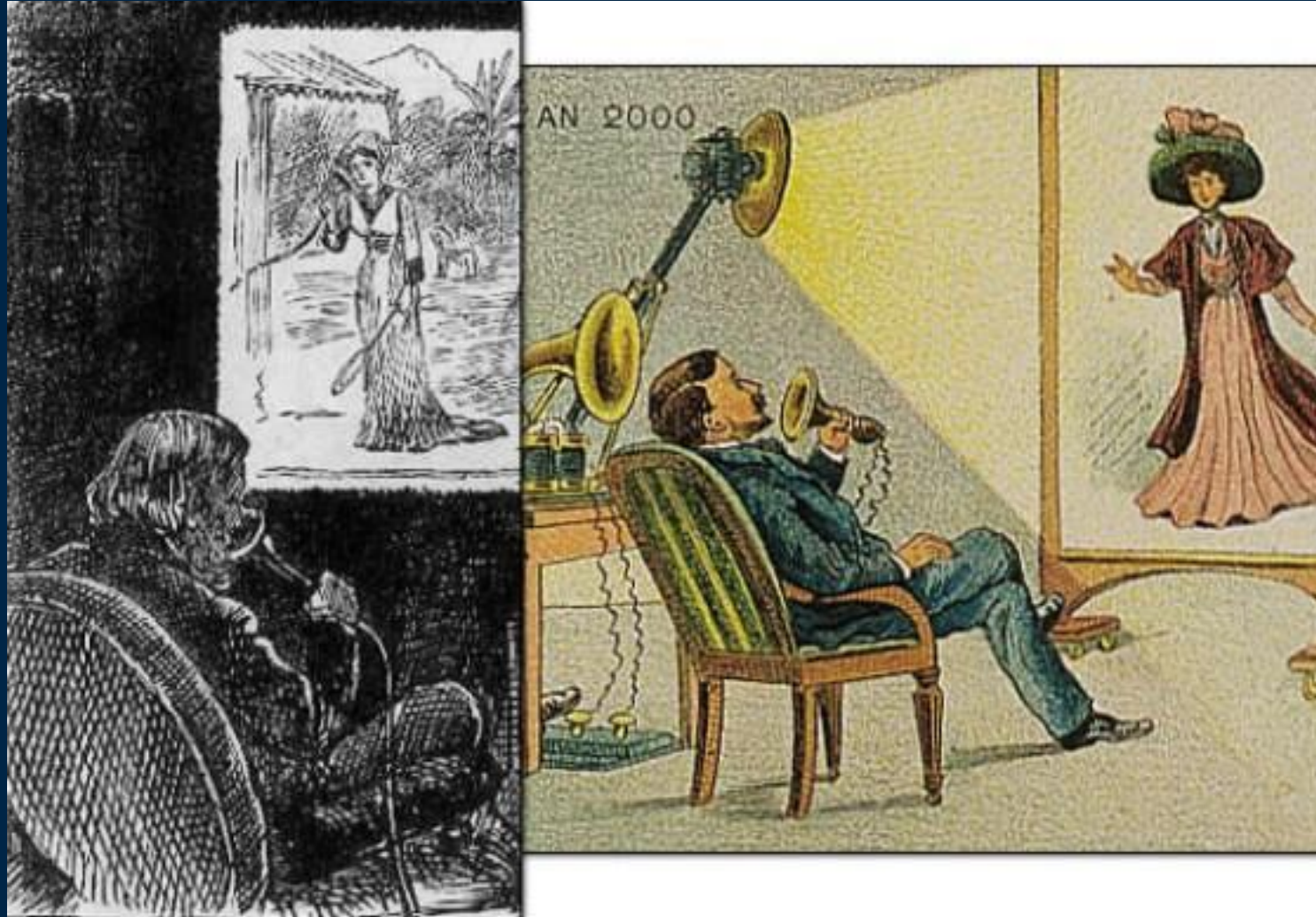
Cases of hybrid work



Cases of hybrid work



A short detour back in history



Images from: <https://www.technologizer.com/2010/06/14/videophones>

A short detour back in history



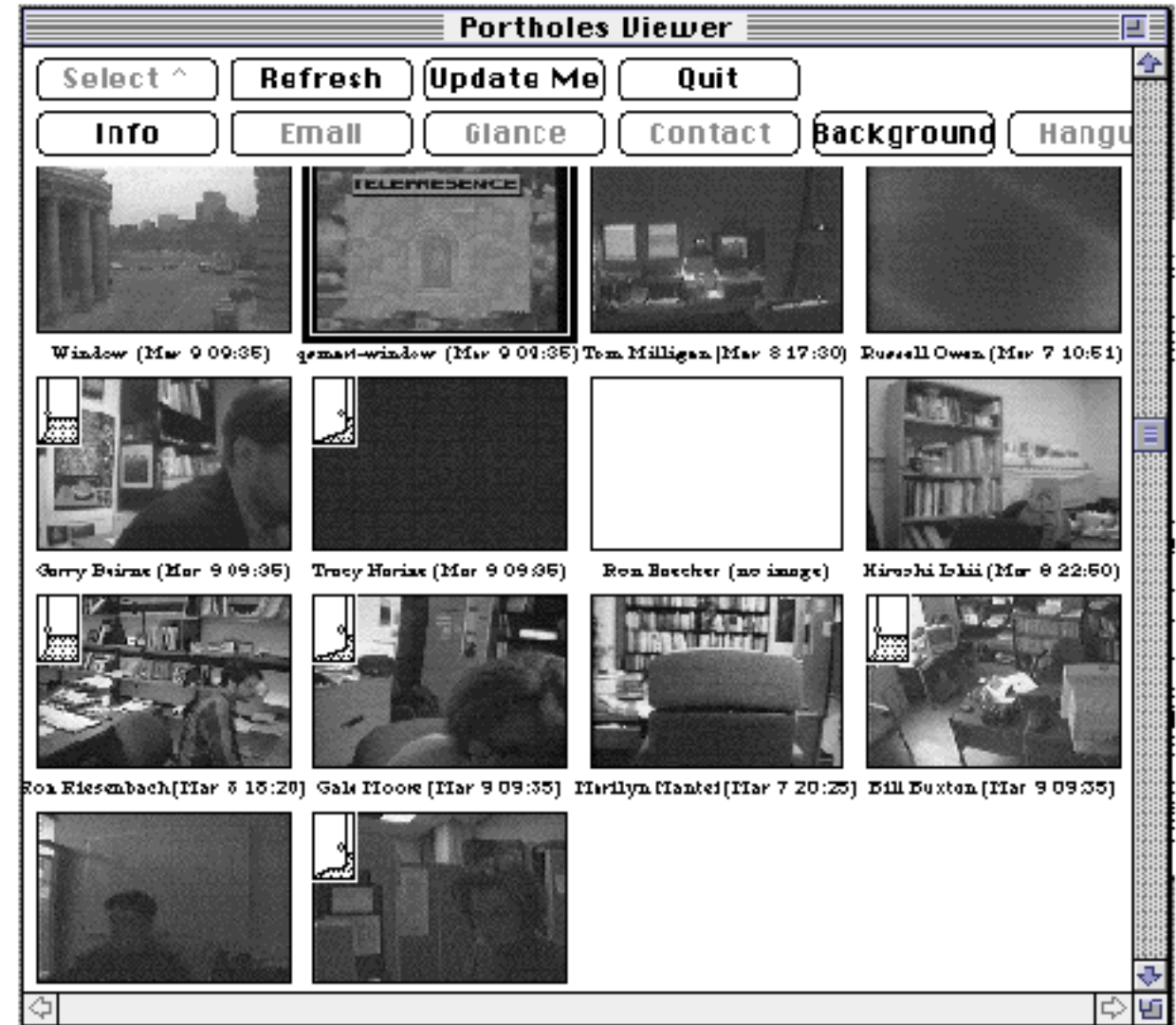
Images from: <https://www.vyopta.com/blog/video-conferencing/brief-history-video-conferencing/>

Groupware & Awareness Support

“The traditional computing paradigm sees the computer as a tool for manipulating and exchanging data.

The Groupware paradigm, on the other hand, views the computer as a shared space in which people collaborate; a clear shift in the relationship between people and information.”

Marca & Bock, 1992



Dourish, Paul, and Sara Bly. "Portholes: Supporting awareness in a distributed work group." *Proceedings of the SIGCHI conference on Human factors in computing systems*. 1992.

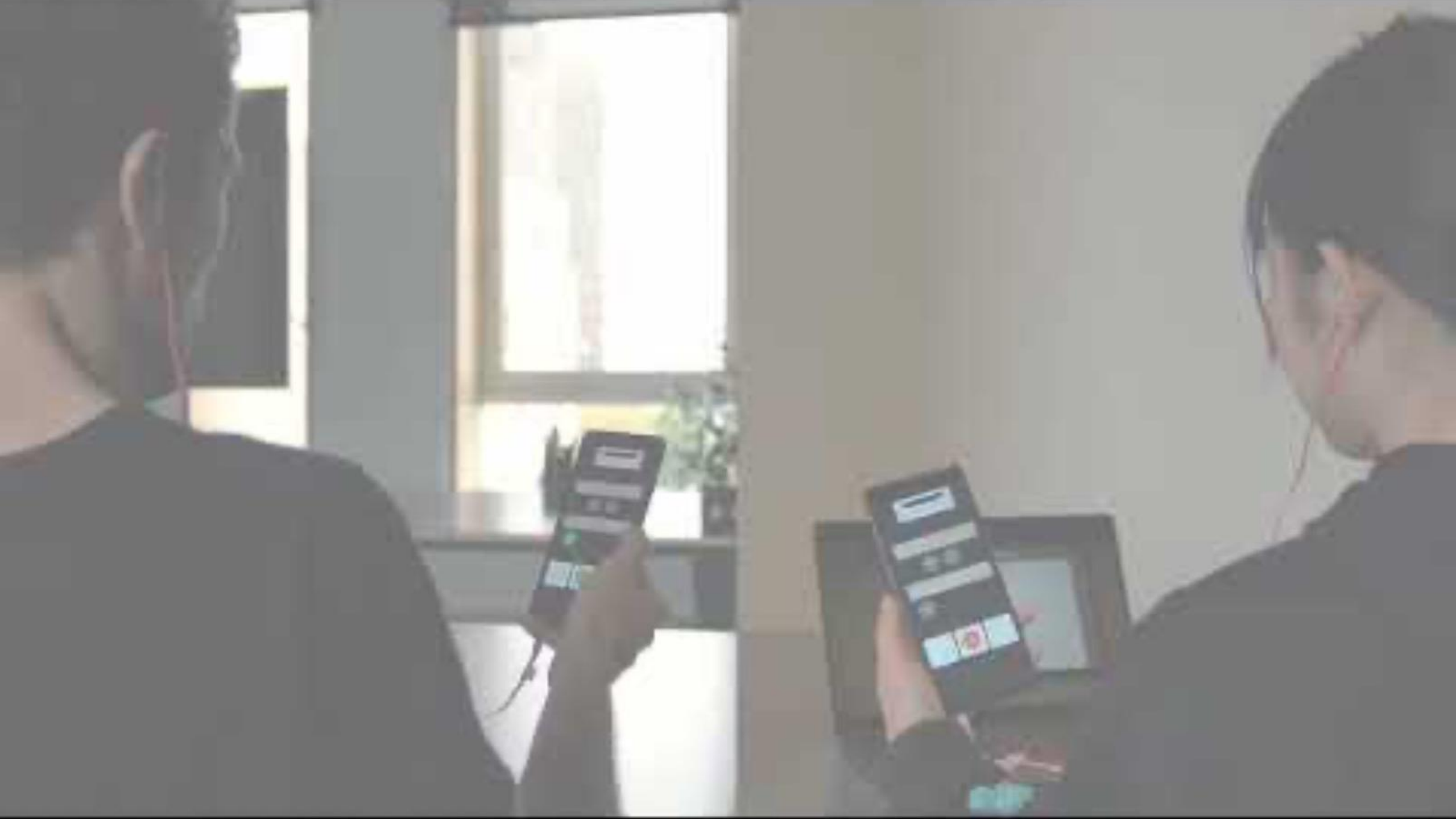
Is The Metaverse The Future of Hybrid Work?





Instead of Virtual Reality...

What about Blended Multimodal Realities?



TOOL PANEL

SCENARIO WORKSHOP

Ann...

NAVIGATION

ROOM INSPECTOR

NAME: Scenario Workshop

AUDIO FILTER:

ELEMENT INSPECTOR



PRESENTATION ROOM

| | | | |
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| | | | |
| | | | |
| | | | |

BREAKOUT ROOM 1

Wor Mo Hon

BREAKOUT ROOM 2

Doc HPE

BREAKOUT ROOM 3

Lap Sur Leo

USER

Ann

Ann

Organiz...



CLIENT

MacBo...



Ann

MacBo

AUDIBLE

Tom: Laptor

Liao: Work

Rasmus: iMac

Clement: Surface

Hoffm... Laptpr

Eliza: Home

Tim: Deskto

George: HPBoo

SUMMARY

Multimodal Interaction

The Haptic Modality

Multimodal Collaboration Systems

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