

Mediated Communication

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Thanks to Nicolas Roussel, Inria

How do you communicate?

Face-to-face

Mail

Telephone

Email

Instant messaging

Texting

Video conferencing

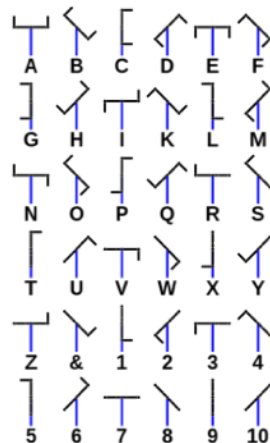
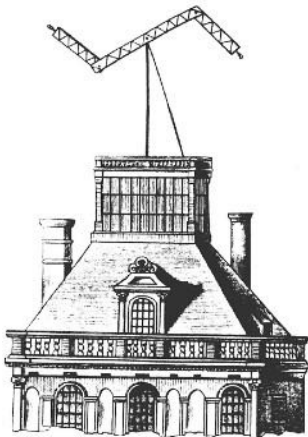
Other?

Before the telephone

Banging trees
Smoke signals



Télégraphe Chappe - 1780
Semaphors

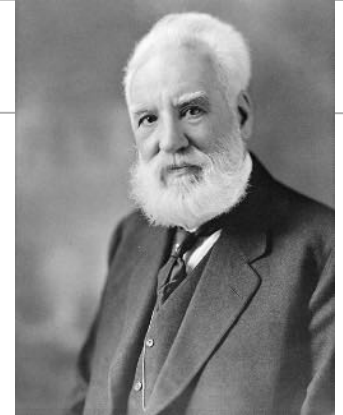


Morse telegraph - 1830s
Morse code



The telephone

1876: Graham Bell invents the telephone



From telephone to television

1927: First television transmission in the US



AT&T President Walter Gifford in New York (left) watches the moving image of Secretary of Commerce Herbert Hoover (right) in Washington, D.C., during the first demonstration of television transmission in the United States, April 7, 1927 (source : AT&T)

From telephone to picturephone

1964 World's Fair: "Survey results indicated that most people did not like PicturePhone. The equipment was too bulky, the controls were awkward and the picture was small."



2001 (Kubrick & Clarke, 1968)



1992

2001, A Space Odyssey (1968)



Videoconferencing rooms

Great hopes



DVE

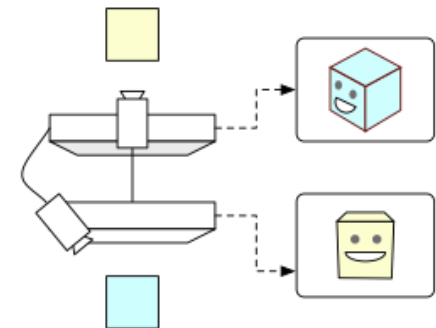


Polycom

Great disappointment

Expensive

Technical problems: sound, eye contact

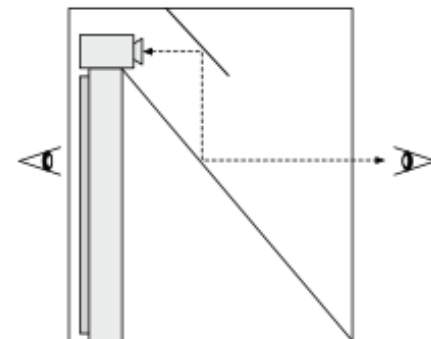


Some solutions

Video:

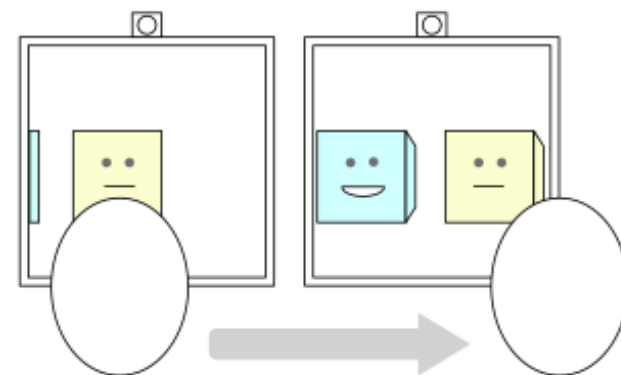
Eye-contact with a silver-mirror

Video Tunnel, Buxton & Moran, 1990



Explore remote space by head motion

Video window, Gaver et al, 1995



Multiple views

Hydras, Sellen et al., 1992





From room to desktop videoconferencing



Creative Labs Share Vision (1997)

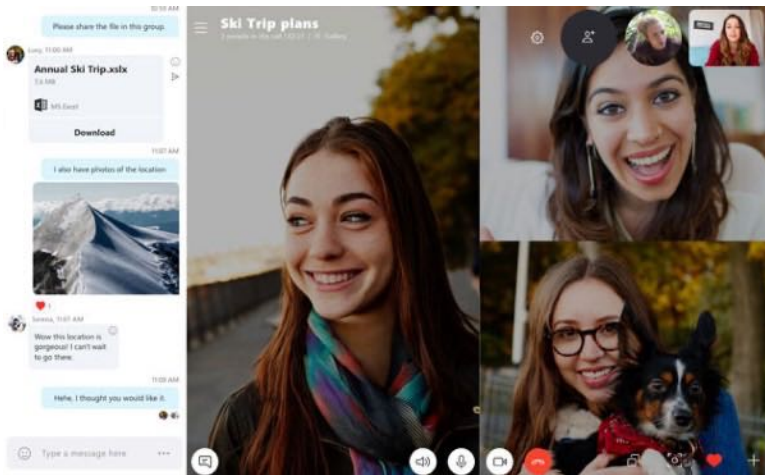


Microsoft NetMeeting (2002)



Apple iChat (2004)

Videoconferencing took over during the pandemic



Skype



Zoom



Teams



Webex

What are these systems for?

Supporting synchronous one-to-one **conversation** with a beginning and an end?



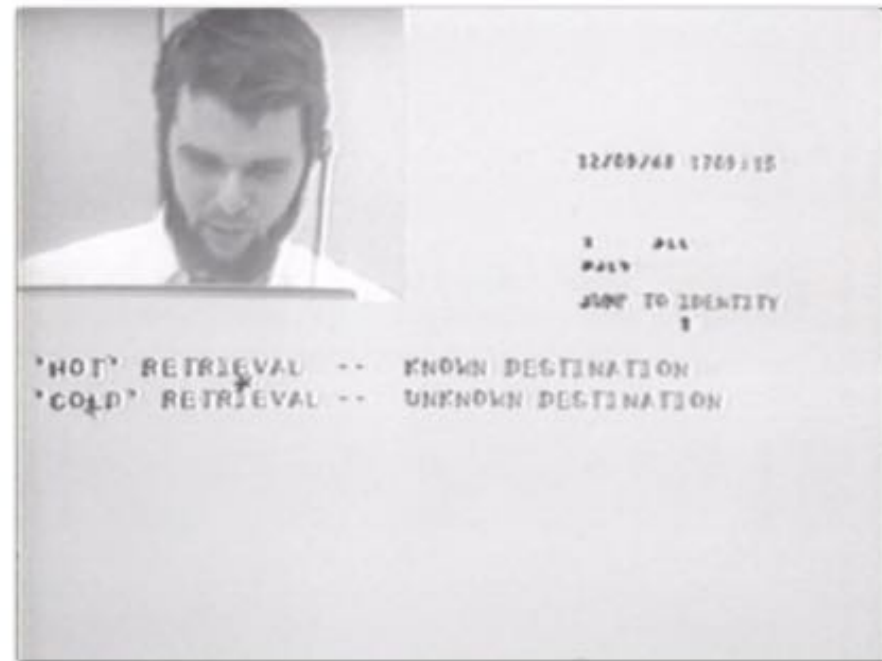
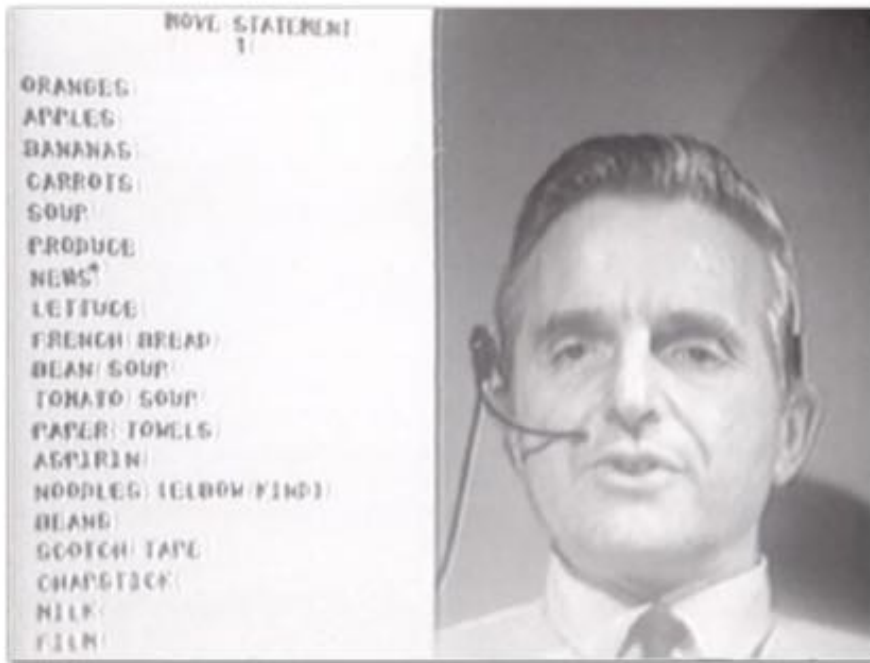
OR

Supporting **communication** while working on shared artifacts?

OR

Sharing **presence** of one or more other people?

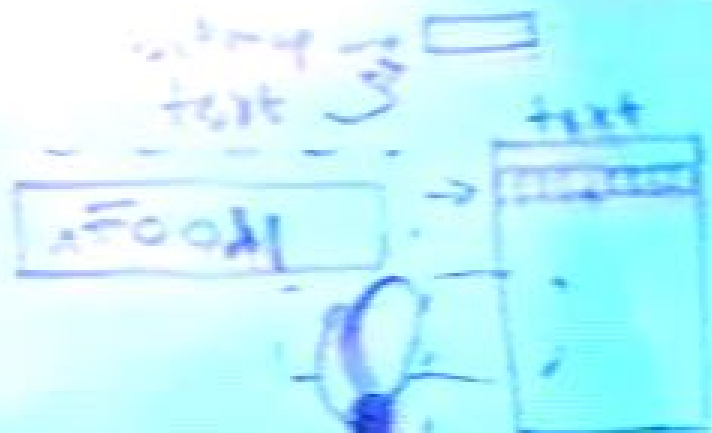
Communicating about shared documents



A Research Center for Augmenting Human Intellect
(Engelbart & English, 1968)



⇒ 30 symbols max



Pictures



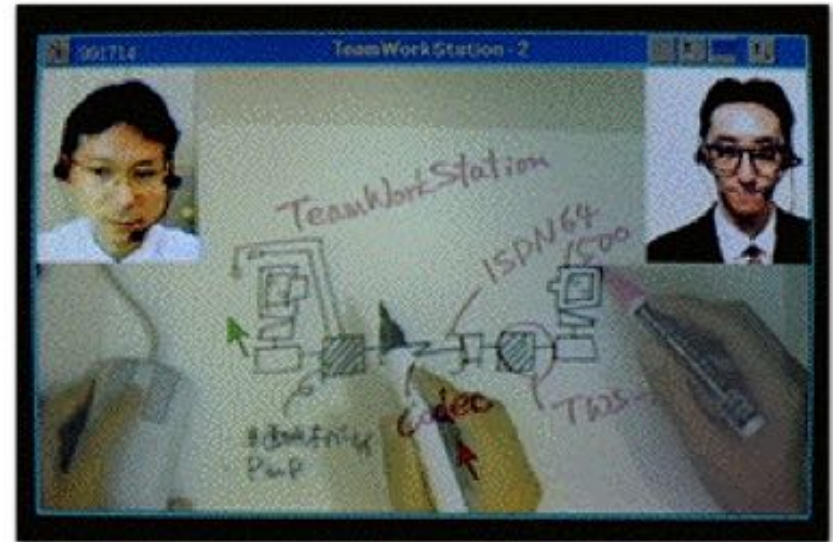
← "make bitmap"

← make self-drawing
pixel ed

smaller
space
layouts

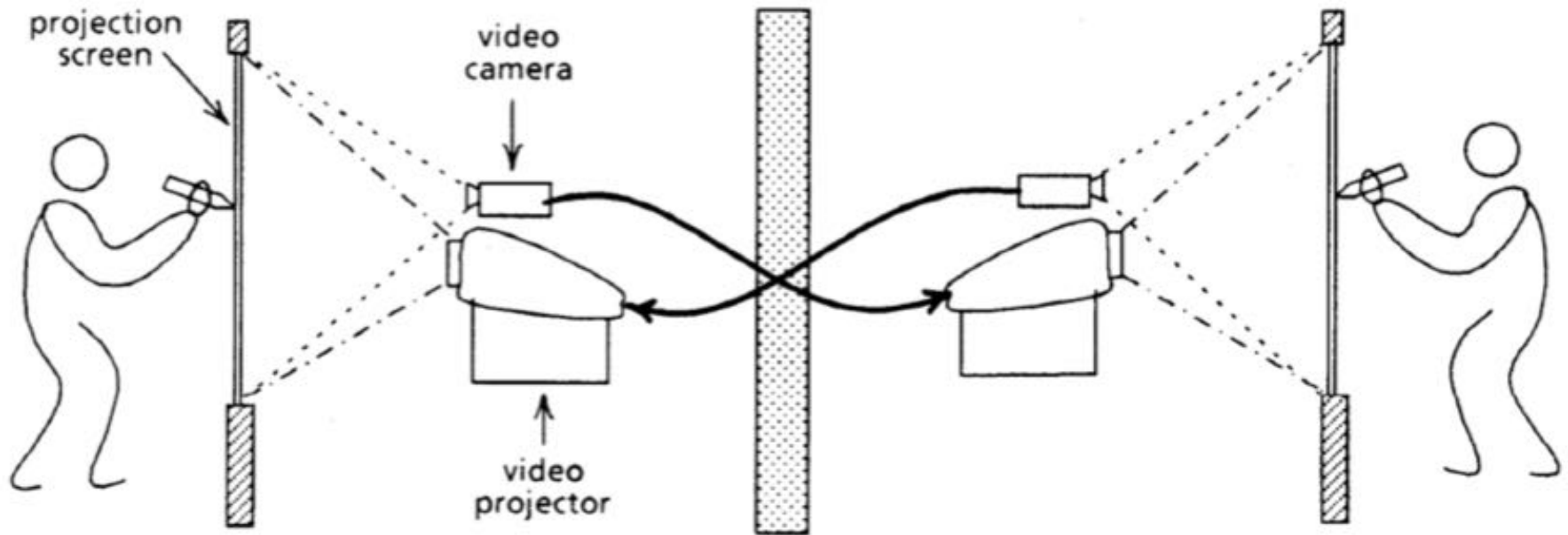
TeamWorkstation (Ishii et al., 1990)

Sharing a drawing tool with inset video streams

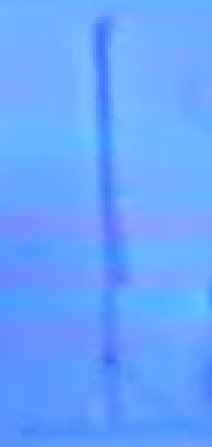


VideoWhiteboard (Tang & Minneman, 1991)

Larger drawing surface, an overlaid shadow of the whole body rather than just the hand



How to ...



ClearBoard (Ishii et al., 1992)

Overlays image of other participant with shared surface
Eye contact + Gaze awareness

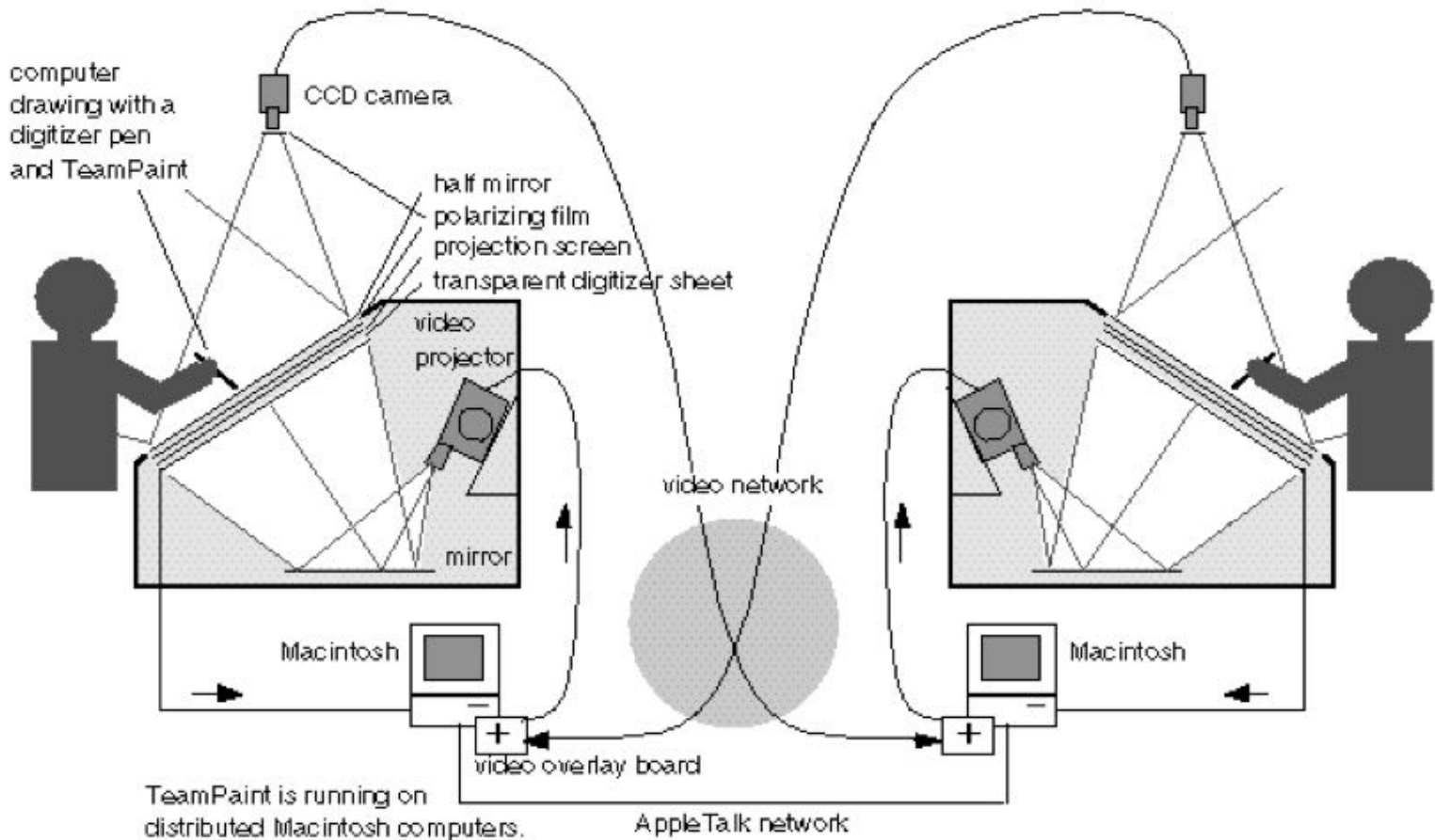
Concept tested with a prototype
Limited to 2 people





ClearBoard (Ishii et al., 1992)

A complex system



HyperMirror (Morikawa et al., 1998)

Mirror vs. transparent window: I see myself in the remote scene





The power of video communication

Instant recognition of the ability to communicate

Hole in Space (Galloway & Rabinowitz, 1980)

3-day audio-video link between Lincoln Center in New York
and Century City in Los Angeles



DAY ONE
NOV. 11, 1980



UNANNOUNCED

From formal to informal communication

Formal communication:

Planned in advance,
with an agenda and
a list of participants



Informal communication:

Unplanned, spontaneous,
serendipitous, open



Most often, both coexist

Media Space (Stults & Harrison, 1985)

Permanent audio & video link between the commons area of the office space of two parts of the same research group, in Portland and Palo Alto

People could not always tell if they had seen the person locally or remotely



VideoWindow (Fish et al., 1990)

"Imagine sitting in your work place lounge having coffee with some colleagues. Now imagine that you and your colleagues are still in the same room, but are separated by a large sheet of glass that does not interfere with your ability to carry on a clear, two-way conversation."

Analyzed 160 hours of video:

Fewer conversations

Hard to reciprocate

No privacy (side conversations)

Poor eye contact



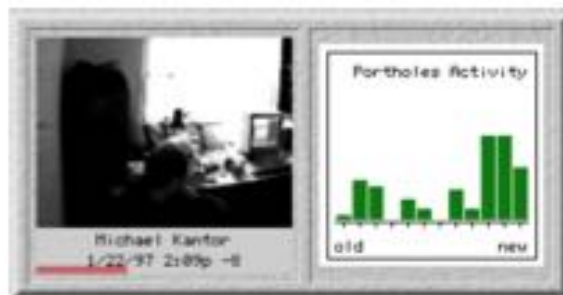
A collection of mediaspaces (1990s)

VideoWindow and Cruiser (BellCore)

RAVE & KASMER (Xerox), Cavecat (U. Toronto)

Argo (DEC), Montage & Forum (Sun)

Georgia Tech, U. Calgary, U. Paris-Sud, U. Grenoble, ...



Mediaspace services

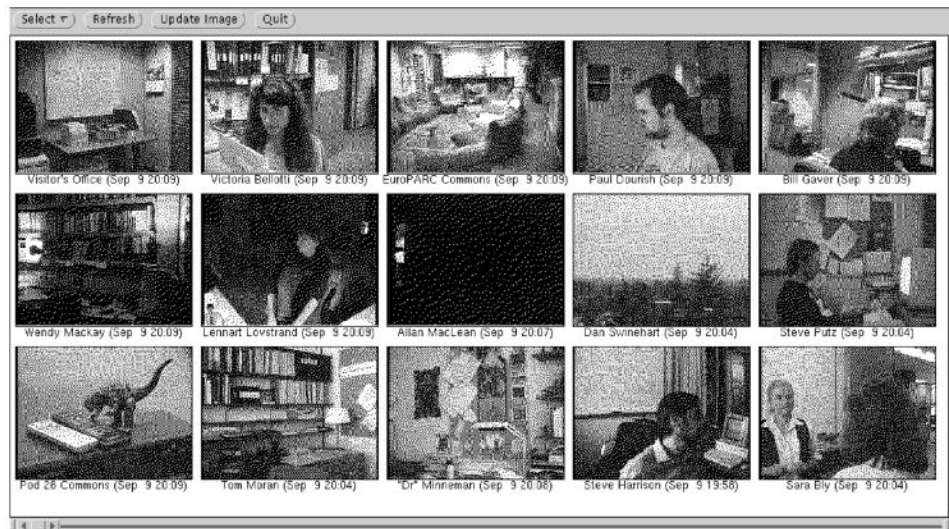
Mirror: see what video is sent

Glance: brief (3s) video-only two-way connection

Videophone: traditional one-to-one video call

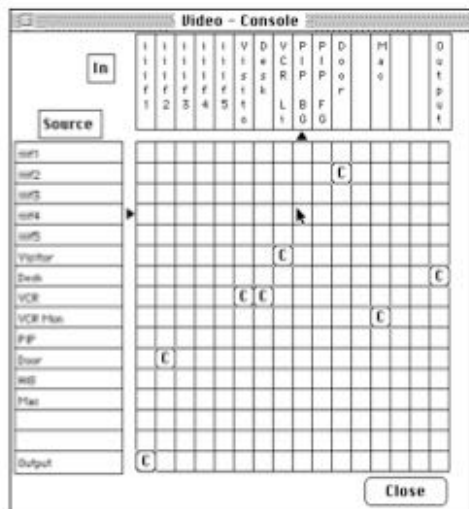
Office share: long-term, permanent audio-video connection

Awareness view: regular snapshots of each site (Portholes)

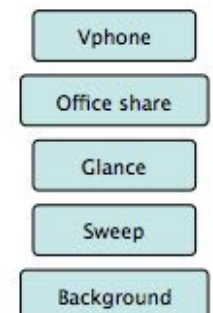


Portholes

Mediaspaces: user interface



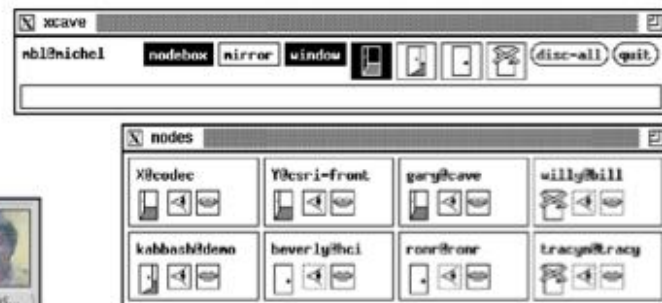
CAVECAT (University of Toronto)



RAVE (Xerox)



Montage (Sun)



KASMER (Xerox)



Ontario Telepresence Project



Ontario Telepresence Project



Ontario Telepresence Project

Mediaspace: integration into digital workflows

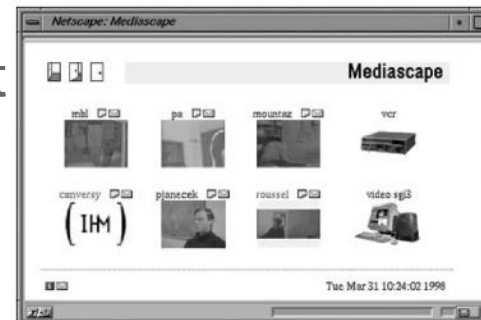
Ariel (Mackay, 1993):

Digital desk for annotating engineering blueprints
+ Mediaspace to communicate with relevant parties

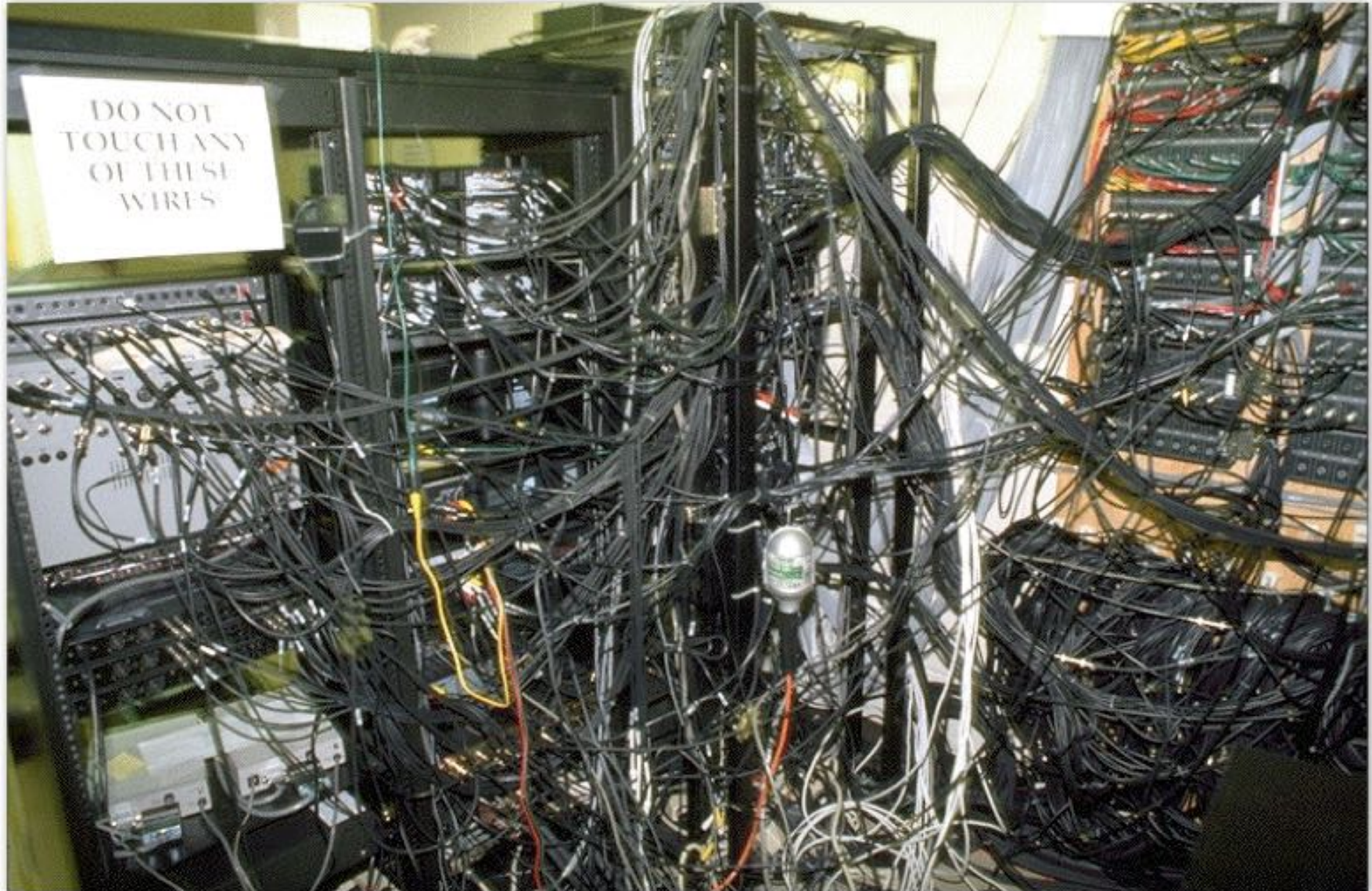


Mediascape (Roussel, 1998):

Digital video on the web
Transition from glance to video call
Leave a post-it note with an updated video snapshot
Record a video message
Connect from another document



Mediaspace: technical aspects



Mediaspaces: social aspects

Levels of engagement

Background (public view, overview, office share)

Short focused call (videophone, videoconference)

Interruption (glance)

Problem: how to control privacy

Few visual and auditory cues

How do I trust the system?

Solutions

No control but symmetry: *If I can see you, you can see me*

Explicit control: need to authorize every call

Selective accessibility

Mediaspaces: selective accessibility

Example (Ontario Telepresence Project)

Door metaphor:

Open: glance and video call OK

Ajar: glance OK, video call needs explicit OK

Closed: no glance, video call needs explicit OK

Locked: no glance, no video call

One prototype linked it to the physical door

Extensions to have different door states
for different people: too complicated

Leaves newcomers out



Some lessons from mediaspaces

Challenges the telephone model:

A call interrupts, and has a beginning and an end

Instead:

Access to a person is **negotiated**,
typically with a glance to see if the person is accessible,
and then a videocall

Communications can be (very) **long-term**:

office share for several years at Rank Xerox EuroPARC

Generalizes to **more than two participants**

BUT: social aspects are important

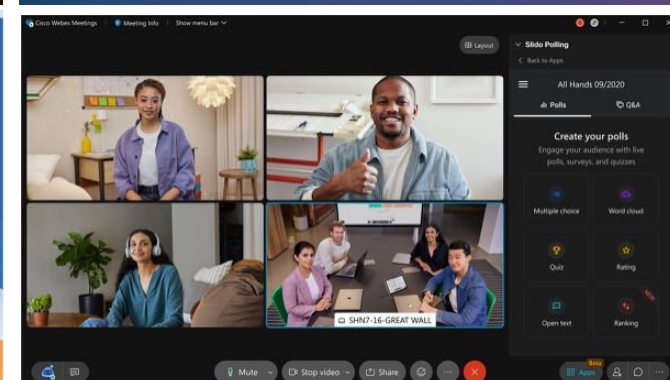
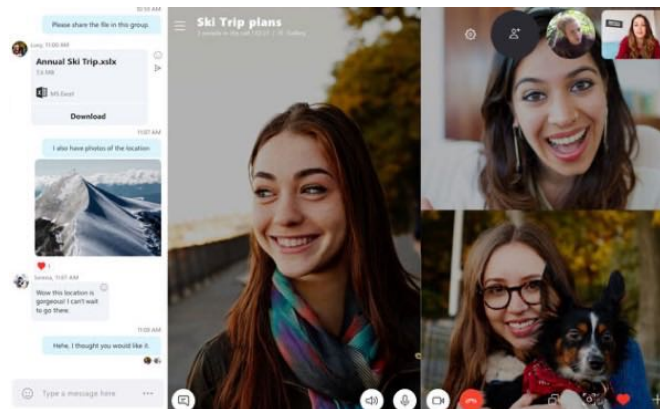
Users must be involved in the design and deployment

The failure of mediaspaces

While technology makes this more feasible,
there are no mediaspaces in use today

Skype, Zoom, Teams, Webex, Google Meet, BlueJeans, etc.
are **all the same**

Why?



Beyond Zoom: MirrorBlender (Grønbaek et al, 2021)



How do people communicate?

Direct, focused communication is covered
by many technologies: email, phone, instant messaging, ...

Staying in touch, peripheral awareness are **not** addressed
by current technologies

People want to share private messages with small groups
of close relatives, friends and co-workers

Social networks do not address this need
(although they want you to think they do)

InterLiving project

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With Wendy Mackay, Inria

interLiving project

European IST FET project (2001-2003)

Disappearing Computer initiative

Study communication within distributed families

Participatory and multidisciplinary approach

Over 70 family members in France, US and Sweden

Many observations, workshops, technology prototypes



interLiving

Designing Interactive, Intergenerational
Interfaces for Living Together. IST-2006-04028
<https://interliving.kth.se>

How to study technology that does not yet exist?

Technology probes (Hutchinson et al., 2003)

Simple “unfinished” prototypes,
with a single function,
designed to understand a need,
not to solve it

Three goals

Design: inspire both users and designers

Build: test a specific technology in-situ

Analyze: collect usage data



VideoProbe (Conversy et al., 2003)

A device designed for
sharing images of everyday life

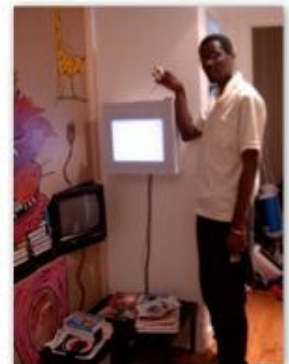
Automatically takes pictures
according to motion sensing

Automatically shares them
with a similar remote device

Automatically disappears images
after a few days

Explicit browsing of images

Explicit action to keep images long-term





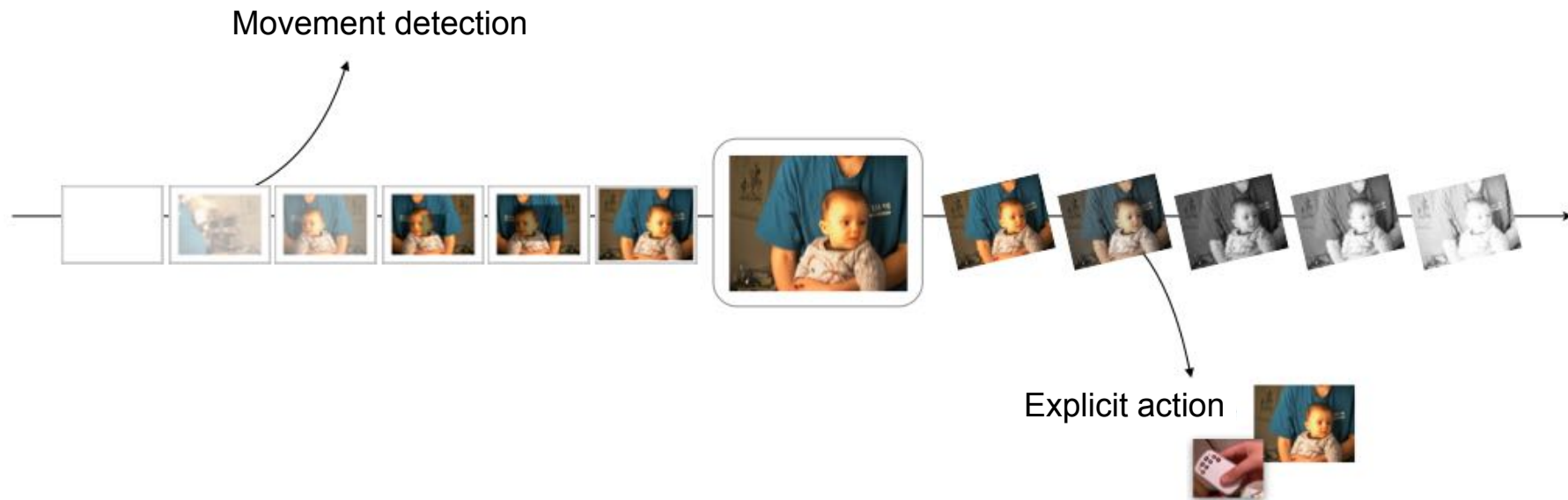


VideoProbe

Co-adaptation: participants use the device in unexpected ways



System mostly autonomous: Importance of transitions



VideoProbe: lessons learned

Families loved VideoProbe

- Implicit sharing of everyday life

- “day-at-a-glance” by browsing images

- Personal albums

- Becomes part of everyday routine

VideoProbe made families closer

- Better awareness of other family members

- Increased the number of phone calls

But VideoProbe was hard to deploy

- Good calibration of the autonomous aspect was hard

MirrorSpace (Roussel et al., 2004)

A video communication system that uses distance to support peripheral awareness as well as more intimate communication

A mirror-like frame features

- LCD display

- Micro-camera in the center

- Proximity sensor

2 devices are linked together

Local and remote images are merged

Image more blurry when far away, sharp when up close













MirrorSpace

Several installations in public exhibits



DC Jamboree
(Oct 2002)



Jeune Création
(Feb 2003)



Mains d'Œuvres
(Apr 2003)



Centre Pompidou
(Nov 2003 - Jan 2004)

Image overlay creates intimate communication

People who do not know each other move away

People who know each other play with the mixed image

Multiscale communication (Roussel & Gueddana, 2007)

Social protocol to engage in communication

Approach, Send signals to communicate

Reciprocate signal, Engage in conversation

Computer systems do not support these social protocols

Shifting from email to texting to phone call to videocall requires shifting from one system to the next

Multiscale communication supports such transition,
from peripheral awareness
to direct, focused communication
and back

=> multiple levels of detail in the communication

Embodied communication

Robots as remote surrogates

A face (LCD display), a mouth (loudspeakers)
eyes (a camera) and ears (a microphone)

Remotely controlled by the participant



Summary

Video communication is very powerful
(and with great power comes great responsibilities)

Most people want to communicate not with the world,
but with their close family and friends, privately

Communication is a process,
from peripheral awareness to direct, focused exchange

Current technology makes the wrong assumptions

- Technological mediation must be as transparent as possible
- Constant shifts between levels of engagement
- Privacy is critical

References

The Information, James Gleick

Video-Mediated Communication, Finn, Sellen & Wilbur, 1997

Media Spaces – 20+ Years of Mediated Life, Harrison, 2009

Media spaces: bringing people together in a video, audio, and computing environment, Bly, Harrison & Irwin, Comm. ACM 1993

Technology probes: inspiring design for and with families, Hutchinson, Mackay, Westerlund, Bederson, Druin, Plaisant, Beaudouin-Lafon, Conversy, Evans, Hansen, Roussel, Eiderbäck, ACM CHI, 2003