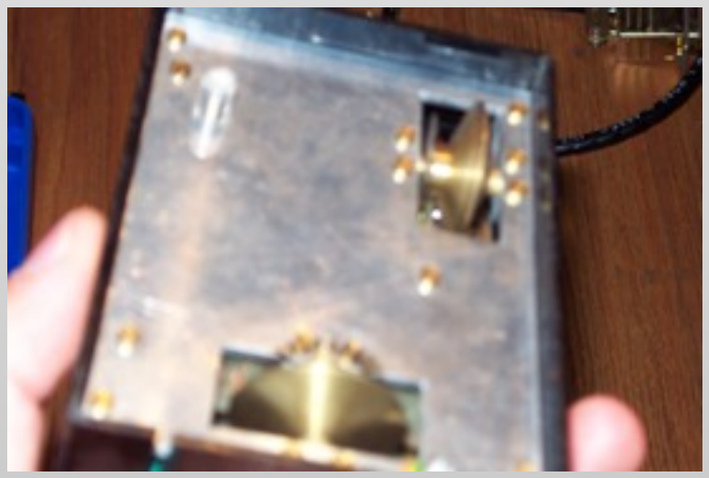
Review

- UI for programming before Von Neumann/Zuse architecture?
- Important eras: 0-D/1-D user interfaces?
- HCI innovations in
  - Memex
  - Sketchpad?
  - NLS?
- What made the Apple II a success?

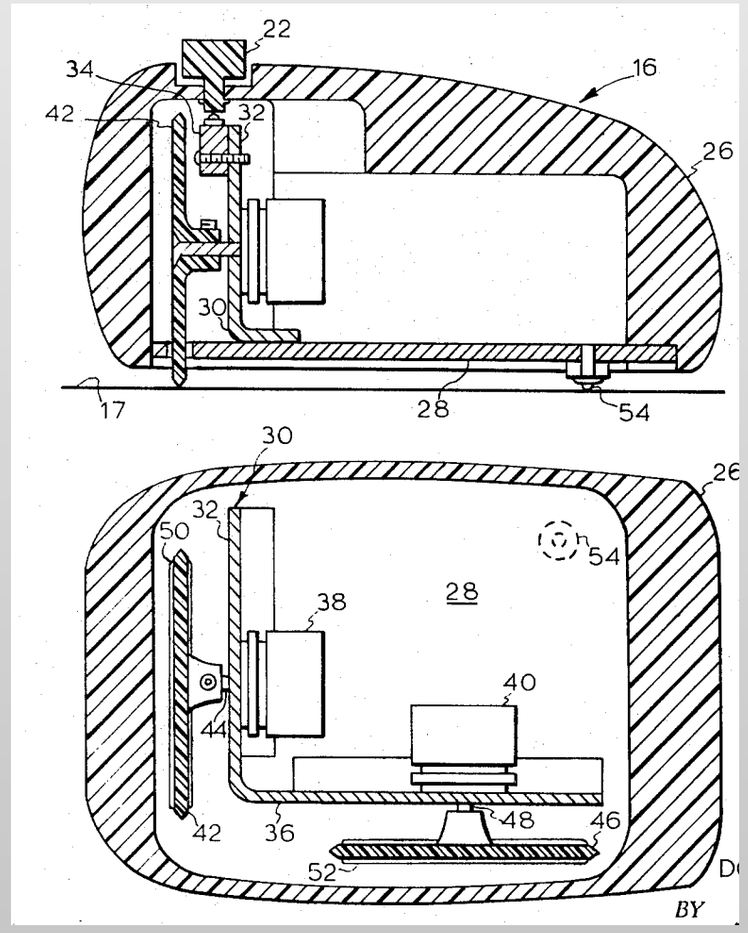
Interaction Design History of the Mouse

Engelbart's First Mouse (1964)

- Two wheels, wire is on the back, one button
- Won the test when comparing with other pointing devices at the time:
  - Light pen, tracking balls, foot-pedal, knee-operated devices, head-operated devices



NLS Mouse (1968)



- Two wheels, three button
  - Click
  - Command accept
  - Command delete (undo)
- E.g., Delete
  - Chord: d (3rd key)
  - Mouse: point at the beginning + click
  - Mouse: point at the end + click
  - Mouse: command accept

www.dougengelbart.org

Scientific Foundations of the Mouse (1974)

- Stuart Card aimed to create scientific process that guides the design rather than only evaluation
  - Use the theory to quickly indicate that a circuit for mouse movement during Xerox Star development was too slow
- Found that Fitts's law curve of mouse have slope about 10 bits/sec
  - Close to the hand movement ⇒ mouse theoretically almost optimal
- "The science doesn't design the mouse, but provided constraints to do it"

Xerox Alto (1973) and Star (1981)

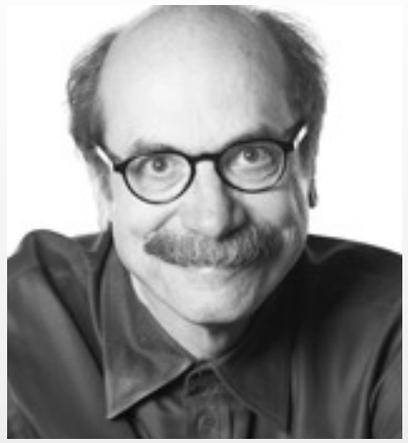
- Alto
  - Three buttons (descendant of NLS)
  - Steel ball
- Star
  - Two buttons

    Reduce confusion over button function
  - Optical tracking




Images: www.oldmouse.com

Apple's Lisa & Macintosh (1983–4)



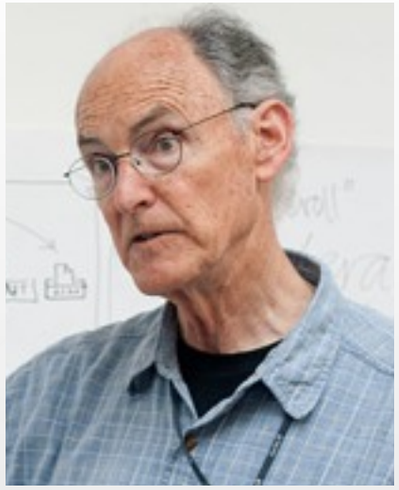
David Kelly

Larry Tesler

- Apple + David Kelly Design
- Single button decision
  - User study showed that it reduces selection error in text editing
- More reliable tracking mechanism
  - Two wheels that were read by LED + phototransistors
  - Tested with turntable: "Mouse miles"
- Less than 10% cost of Xerox Star mouse

Photo: Buxton Collection

Microsoft Mouse (1987)

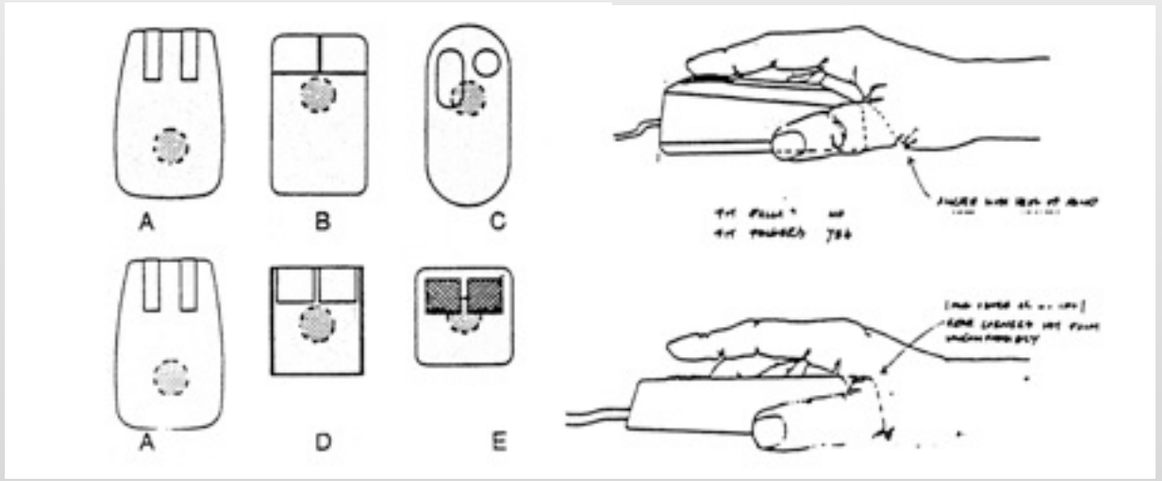


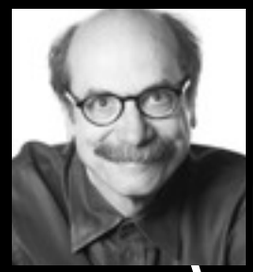
Bill Verplank

Jane Fulton Suri

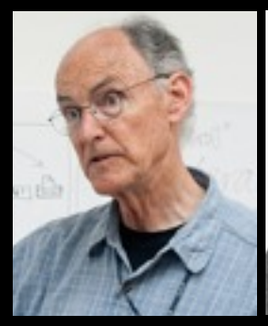
Paul Bradley

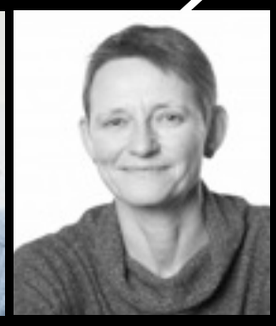
- Interdisciplinary collaboration ⇒ leads to IDEO
  - Interaction design: ID TWO
  - Industrial design:Matrix Product Design
  - Mechanical engineering: David Kelly Design
- Findings informed design
  - Move the ball forward for higher precision
  - Larger left button: people usually left click more
  - Enable holding by only fingers
  - Buttons extend to cover the entire front






Microsoft





Force Shifts During Phases of the Technology Lifecycle

Enthusiast Phase
(Hobby)
"Exploit me!"

Professional Phase
(Work)
"Help me work!"

Consumer Phase
(Life)
"Enjoy me!"

Baroque Phase
"Let me do it all!"

Sweet Spot

David Liddle


8
0:55
stop
Bagel
Defrost
KRUPS

Enthusiast Phase
(Hobby)

"Exploit me!"

Professional Phase
(Work)

"Help me work!"

Consumer Phase
(Life)

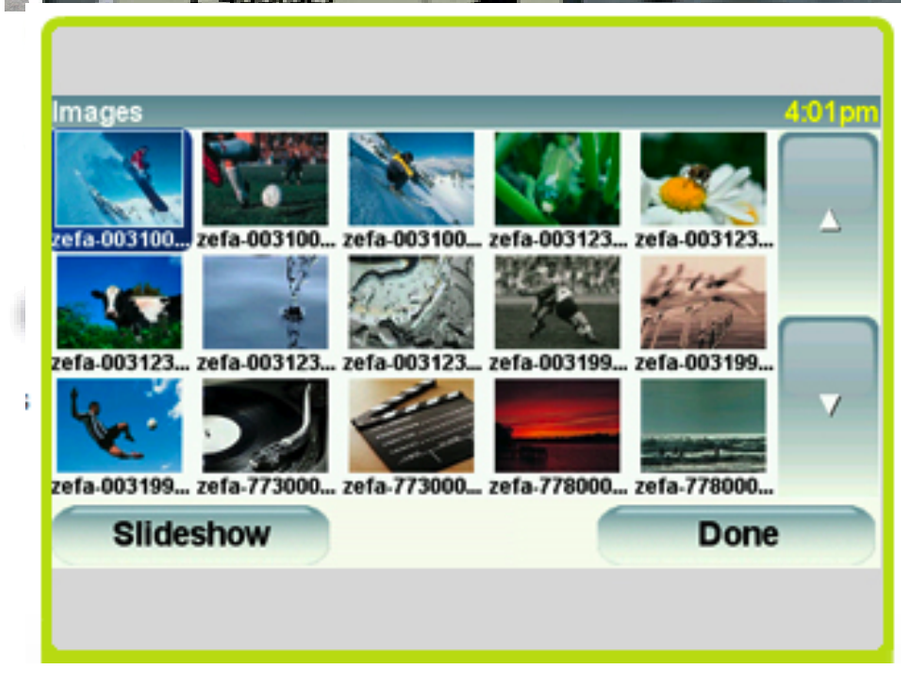
"Enjoy me!"

Sweet Spot

Baroque Phase

"Let me do it all!"

Adapted from Bill Moggridge



Enthusiast Phase
(Hobby)

"Exploit me!"

Professional Phase
(Work)

"Help me work!"

Consumer Phase
(Life)

"Enjoy me!"

Sweet Spot

Baroque Phase

"Let me do it all!"

Adapted from Bill Moggridge

Sweet Spot

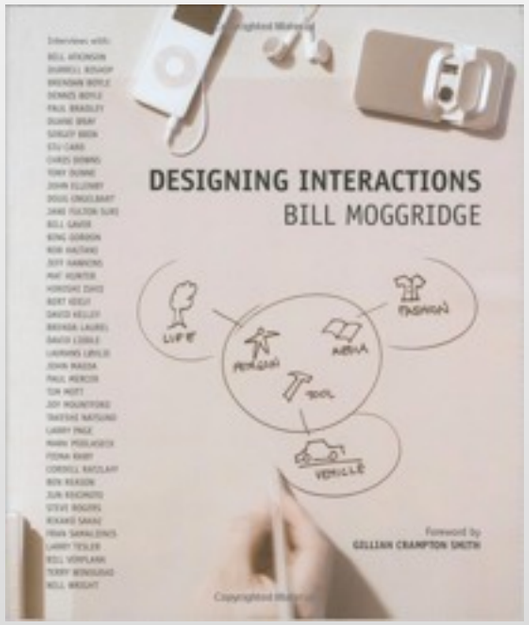
- Simplifies your life
- Rule-changing new functionality

Baroque Phase

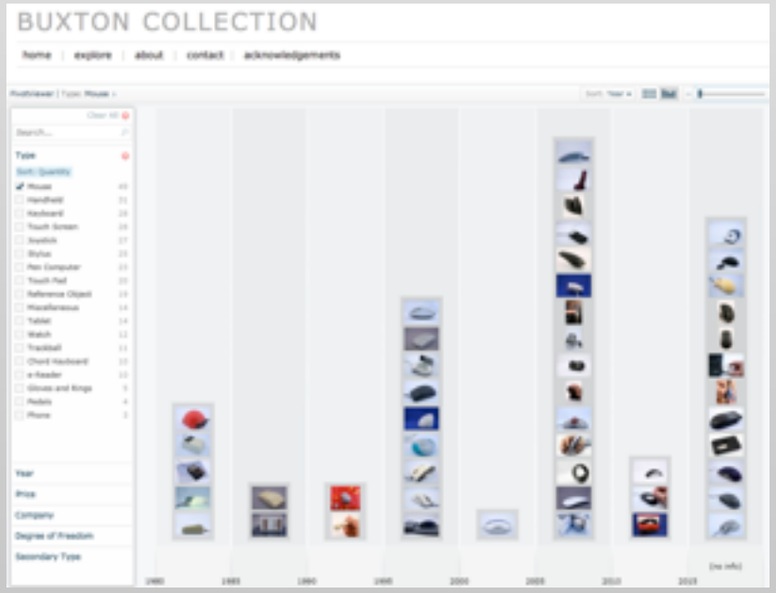
- Complicates your life
- Feature creep

Next Step…

- Bill Moggridge: Designing Interactions
  - Enjoyable coffee table book



- Buxton Collection
  - Input devices
  - http://research.microsoft.com/en-us/um/people/bibuxton/buxtoncollection/



Visions of HCI

Multimodal interfaces

- Put That There (MIT, 1980)
- Key advances:
  - Recognizing human gestures
  - Combining voice with other input modes

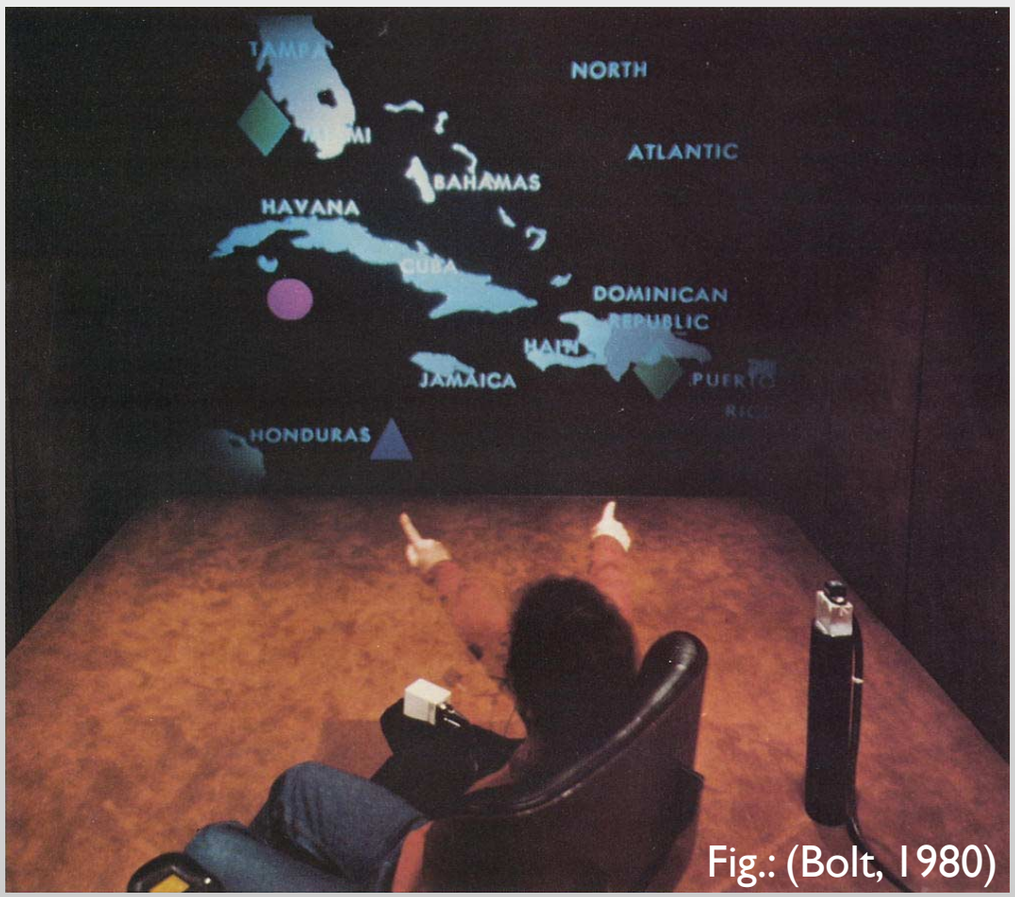


Fig.: (Bolt, 1980)


BAHAMAS
HAITI
JAMAICA
HONDURAS

Multimodal interfaces

- Apple Knowledge Navigator (1988)
  - Vision video mockup (not implemented)
  - Key advances: Got people enticed with ideas of user agents and multimedia

Fig.: Digibarn Computer Museum

Virtual Reality

- Key advances: Producing the illusion of being in a 3-dimensional world of computer-generated objects
  - Head-Mounted Display, Ivan Sutherland, University of Utah, 1967

World-Wide Web

- Tim Berners-Lee, 1989, CERN
- Key advances: Provided quick easy ways to view both text and graphics files from remote networked sites

WorldWideWeb
Info
Navigate
Document
Edit
Links
Style
Print... p
Page layout...
Windows
Services
Hide h
Quit q

Info

HyperMedia Browser/Editor

Prerelease b of Version 0.13

An excercise in global information availability

by Tim Berners-Lee

Copyright 1990,91, CERN. Distribution restricted: ask for terms. TEST VERSION ONLY

HyperText: Text which is not constrained to be linear.
HyperMedia: Information which is not constrained linear... or to be text.

This version of the WWW application can pick up hypertext infomation from files in a number of formats, from local files, from remote files using NFS or anonymous FTP, from hypertext servers by name or keyword search, and from internet news. Hypertext files may be editied, and links made from hypertext files to other files or any other information.

For more help, use "Help" from the menu. If that doesn't work, then your application has been incompletely installed.

If you have any comments or have bugs, please mail timbl@info.cern.ch. quoting the version number (above).

Navigation

< Previous | Back up | Next >

Home | Help

JFG Home

JFG's home page at InfoDesign

This home page demonstrates some simple concepts of the World-Wide Web infrastructure for global information sharing.

Today, I showed Tim's original Web browser to Marc Weber. I just took some notes about him and linked them to his name on the fly.

I use this World-Wide Web editor exactly like any word processor, with the power to create links from sensitive pieces of text to other places, for instance to personal notes or to any information source in the world.

WWW research stuff

- Hypertext Resources (IN-Box)
- Geographical list of WWW servers (at C… same list. Example : CERN phone book
- WWW project documentation (at CERN)

Links
Mark all A
Mark selection M
Link to marked L
Link to file...
Link to New N
Follow link
Unlink Z
Help

Style
Copy style 1
Apply style 2
Panel...

Style editor

Style name: List

<< | style of selection | >>

Apply style to selection

Apply style to all similar text

Find unstyled text

Style sheet
Open
Save as...

Format

First line indent: 100
Successive indent: 130
Font: Helvetica
Point Size: 12
SGML tag: <LI> Set

Tabs: 130 300

HotWired: What's New

Welcome to Yorb , the electr… neighborhood hits … Wired, 24 May. via … in On the R…

Flux Ned hears rumors of a deal between GN…

Fetish Solar…

Net Surf Pro…

Jenny Holzer's truisms take a turn for the Wel…

If you feel a need for speed ... surf t…

N…

What's a week without a Bill Gates j…

Corporate recruiting form letters = ti…

Alt.cynicism ... What's the Point?

D… free.

Weber -- /Hypertext

Marc Weber

A computer consultant, small publisher and freelance journalist who is currently investigating the early history of the Web, to be published in Wired. He loves HotWired.

Welcome To HotWired!

How to Join: Register Now Members Only:
Unguided Tour Overview Need Help? What's New
Your View © 1995 HotWired Ventures LLC

Powered by Silicon Graphics

JFG

World-Wide Web

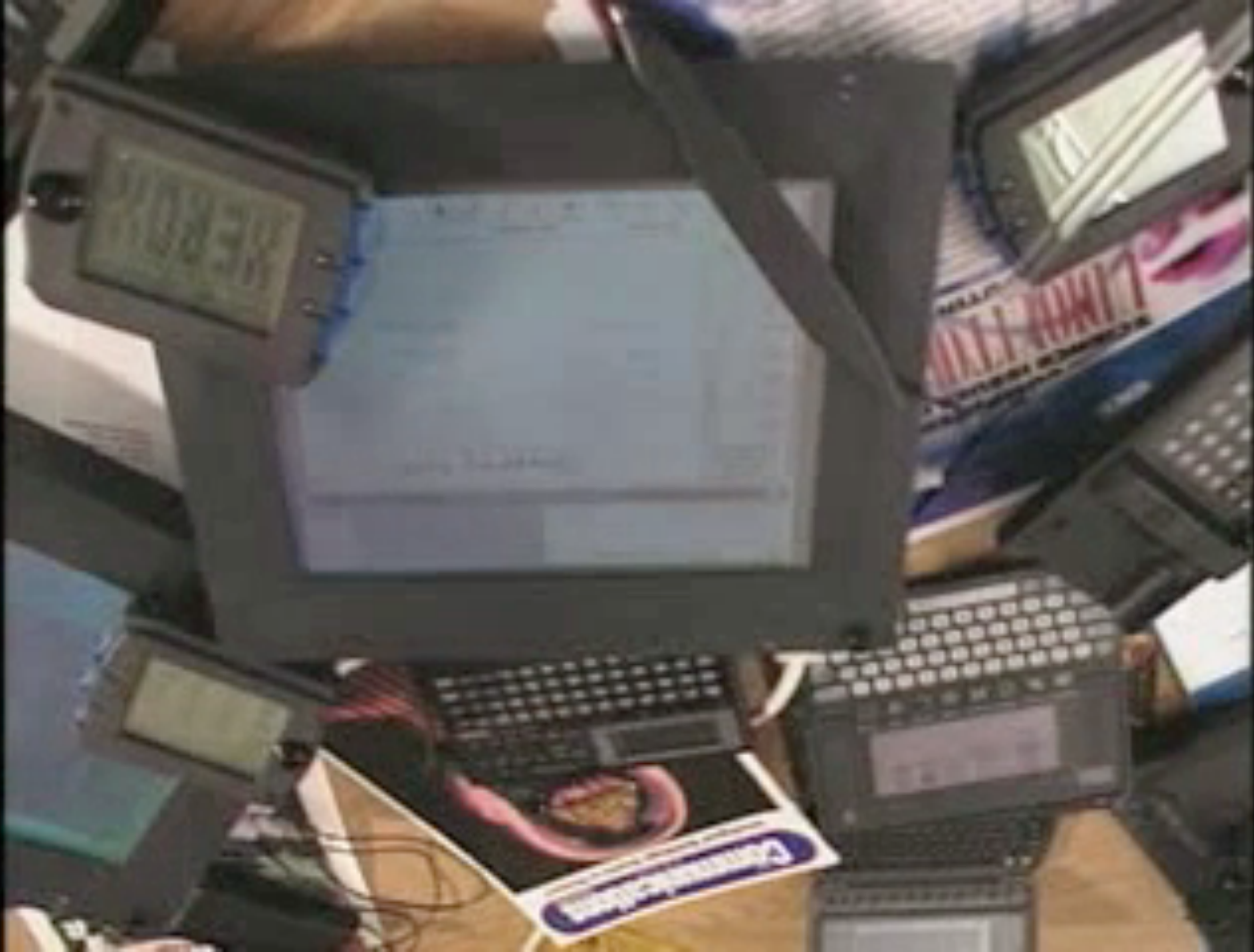
- Now getting closer to desktop-like fluid interactivity with AJAX, Web 2.0, etc.
  - Example: Google Maps

More in DIS2

Google maps Roman Colosseum, Rome, Italy

Ubiquitous Computing

- Mark Weiser, Xerox PARC †
- 1991: The Computer For The 21st Century
  - Most profound technologies disappear in fabric of everyday life
- Example: writing
  - Early scribes had to know how to make ink, bake clay,…
  - Today, writing is on candy wrappers
  - A modern world without writing?
  - In comparison, information technology is still at the "scribe" stage
- Example: motors
  - 1900: 1 engine per factory
  - Now 22 motors in your car, hard and unnecessary to notice



Ubicomp vs. PC, VR

- Ubicomp = disappearing computer = augmented reality
  = calm computing
- Goal is to activate the world, putting computers into everything
- "PC" is just a transition towards real potential of computing, which will focus on human environment
  - Carrying a super-laptop is like owning just one very important book.
    Even customizing or having millions of it doesn't unleash literacy.
  - Multimedia as used today makes machines even more attention-grabbing,
    not disappearing
  - Psychological reasons for disappearing technology: Heidegger's hammer, compiling
- ≠VR: VR lets you explore unreachable worlds but tries to simulate infinite variety of reality instead of augmenting it.

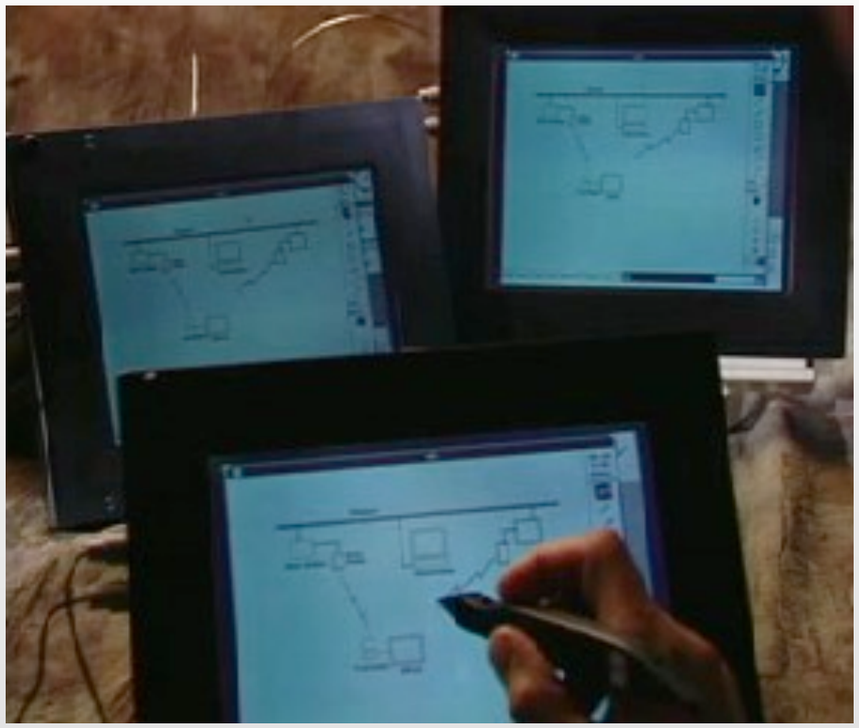
Ubicomp: PARC Devices

- Must know where they are (crucial to human perception)
  - Knowing room it's in can make computer adapt significantly, without any AI
- Tabs/Pads/Boards: inch/foot/yard scale, 100s/dozens/1 or 2 per room
  - A tab for each book spine

The PARC Tab

- 1993, ca. 50 deployed in PARC/EuroPARC
- Activated post-it note, can animate objects (find mislaid book,...), voting/consensus tool in meetings
- Use as active badge, identify wearer/object
- Use to shrink windows onto tab to carry with you
- Research product: assumed constant connectivity
- What is today's Tab? What's still missing?

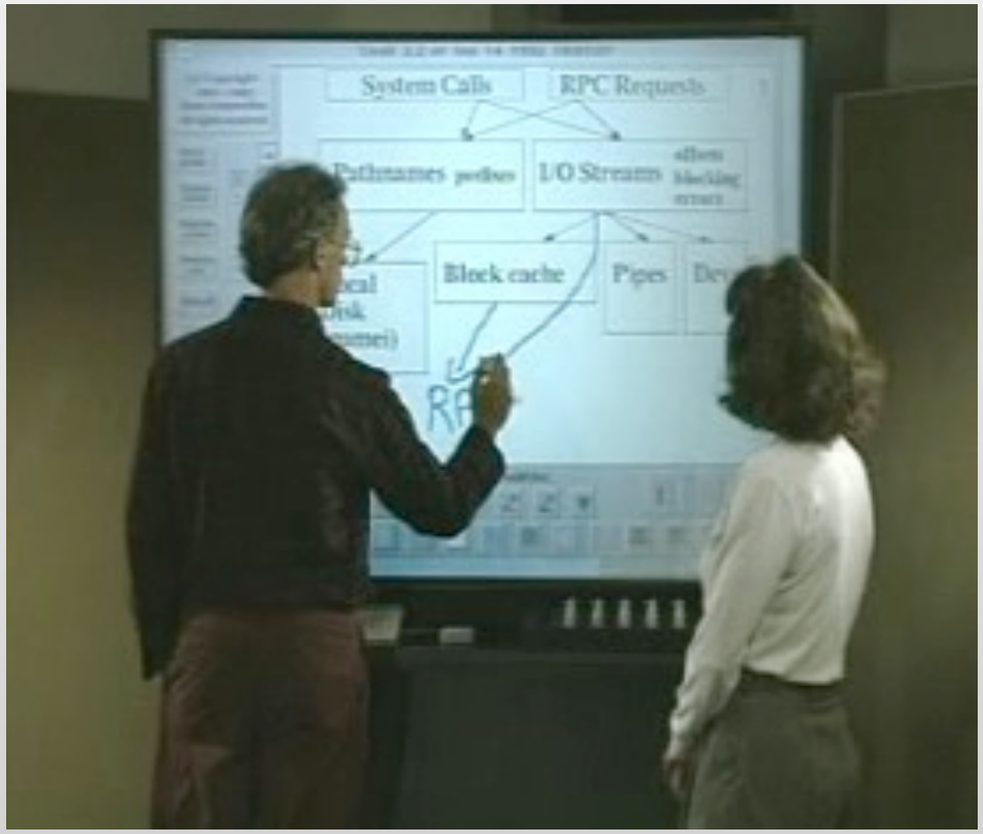
The PARC Pad



- Paper crossover with laptop
- Scrap computer (not personal to carry around with you)
- Antidote to windows: who wants 9x11” desk?
- Compare to modern Pads like the iPad: what’s still missing?

The PARC Board

- Used as video screen
- Bulletin board (attuning to reader!)
- Whiteboard
- Flip chart
- Need different UI:
  - Keyboard awkward
  - Menubar hard to reach
  - Shared across Atlantic



Ubicomp Predictions

- Small displays, faster CPUs: correct
- Battery prediction too optimistic (days of use at 1000x800)
- Memory underestimated
- High-resolution walls (80+dpi, 10s of Mpix) not there yet
- OSs today assume fixed hardware configuration,
  but in Ubicomp, devices come and go
- Window systems assume fixed base computer
- Ubicomp diversity of input devices not being dealt with well
- Network: Bluetooth, problem of multiple connections

Ubicomp Scenarios

- Neighborhood tracks (privacy vs. "coziness")
- Paper(!) newspaper, but with electronic pen.
- Finding lost garage door opener manual
- Foreview car mirror for traffic jams and parking spots and shops
- Fresh coffee indicator.
- Collaboration via replicated/miniaturized tabs/pads, awareness, move content to board for active collaboration
- Switch effortlessly between machines, displays, and devices. Meeting review example.

Ubicomp Scenarios

- Privacy: "minority report" ads jumping at passer-by. One approach: model physical world (hard but not impossible to break in, but leaves traces).
- Human-Centered: making people more aware of other people at end of computer links. Reverse bad effect of today's email-based workplace (isolation). Enables nothing fundamentally new but takes away mental strain, making things (such as locating information) much easier (like desktop publishing did) which makes an enormous difference.
- Decline of the computer addict?
- Overcome information overload

Ubicomp Today

- HUC'99 workshop
  → Ubicomp Conference

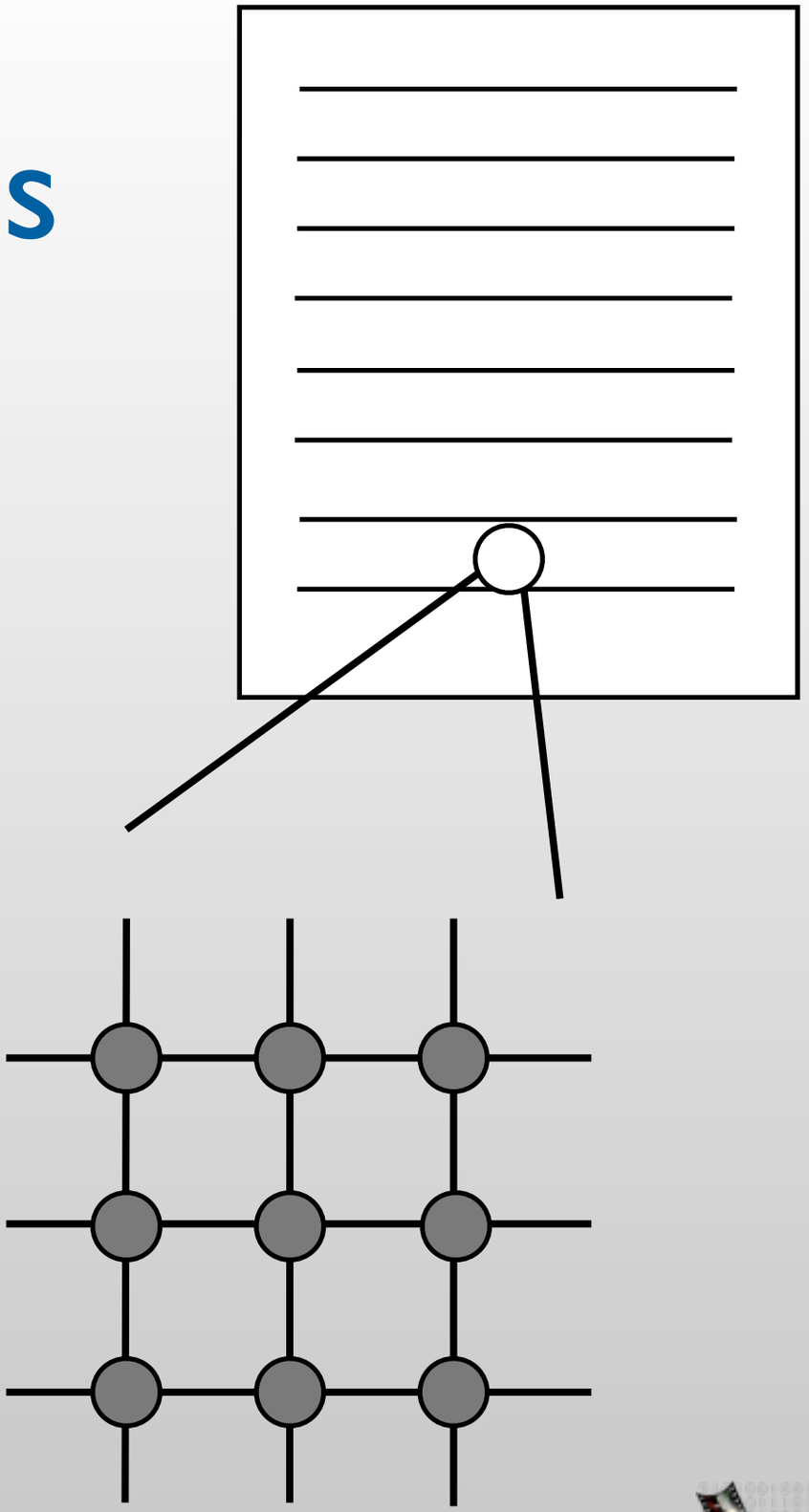
- Commercial Tabs, Pads and Boards
  - Hardware, but often still clinging to the desktop metaphor, and not "plentiful"

- One of the most intriguing current visions for the future of HCI and CS

- "As calm as a walk in the woods"

Digital Pens

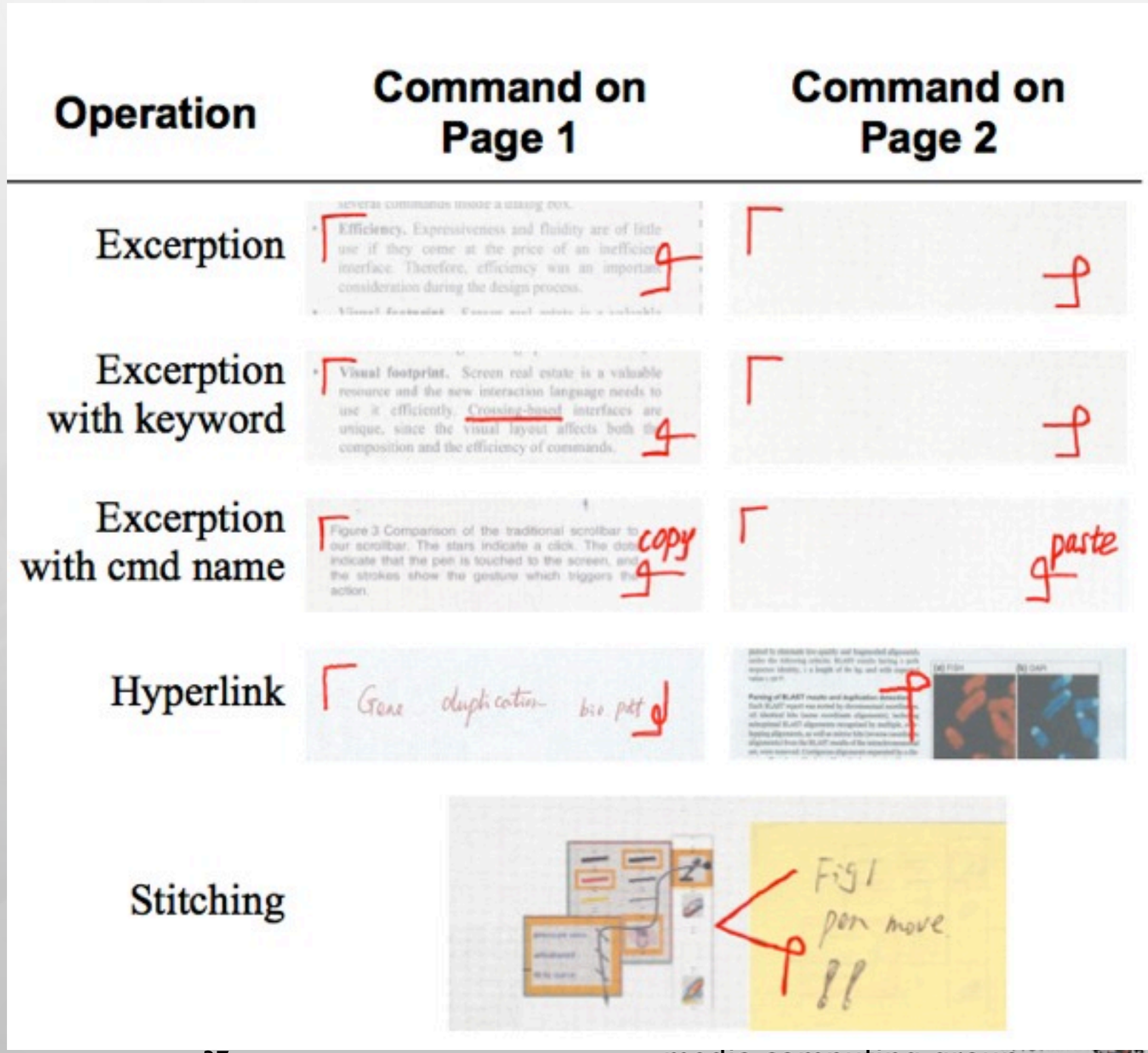
Anoto Digital Pen Technology



Papier Craft

(Liao et al., 2005)

- Work on paper (= the large desk) instead of small screens
- Ink gestures to execute commands
  - copy, paste, hyperlink start, hyperlink end

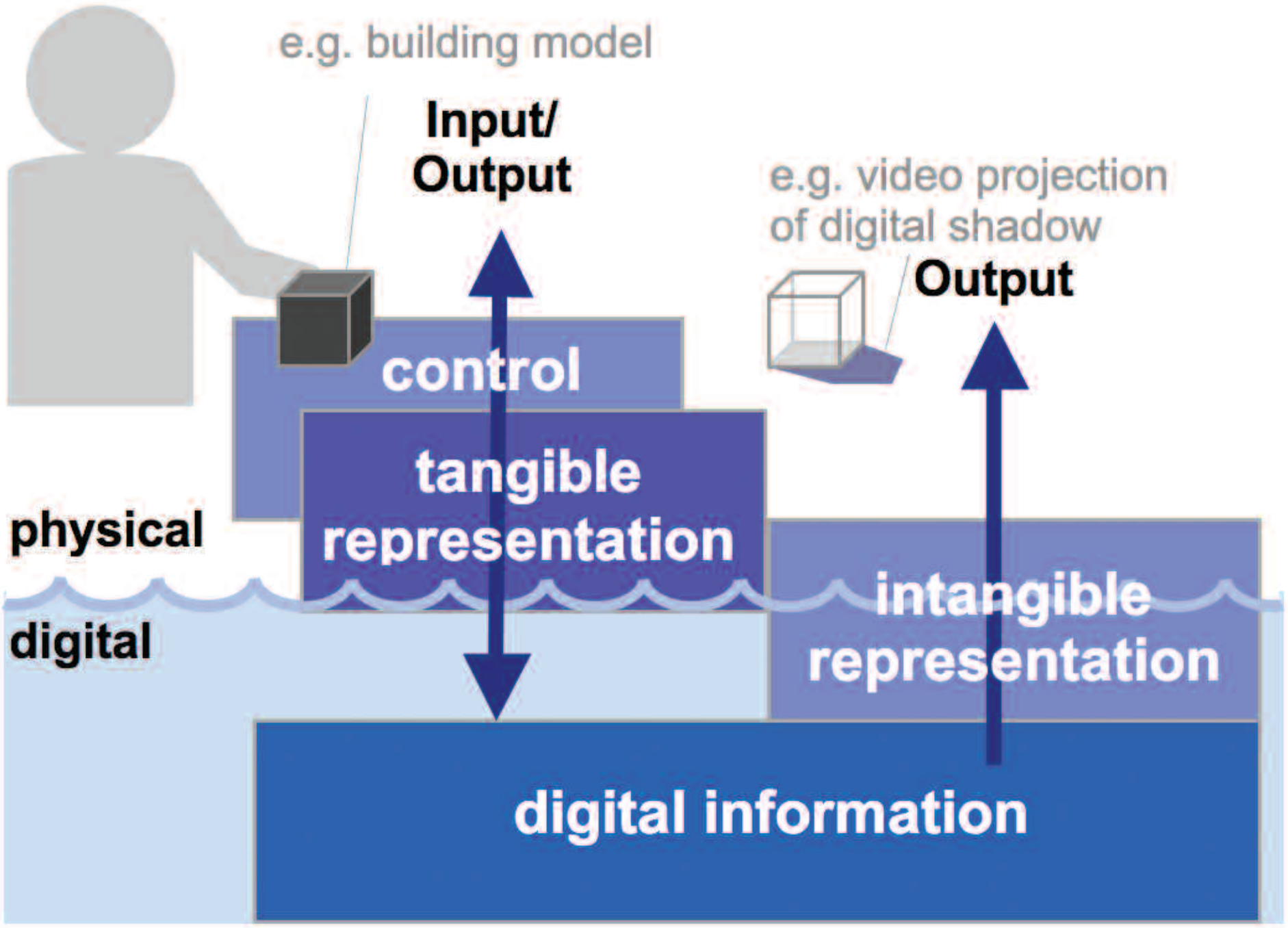


Pick-and-drop (Rekimoto, 1997)

Tangible User Interface

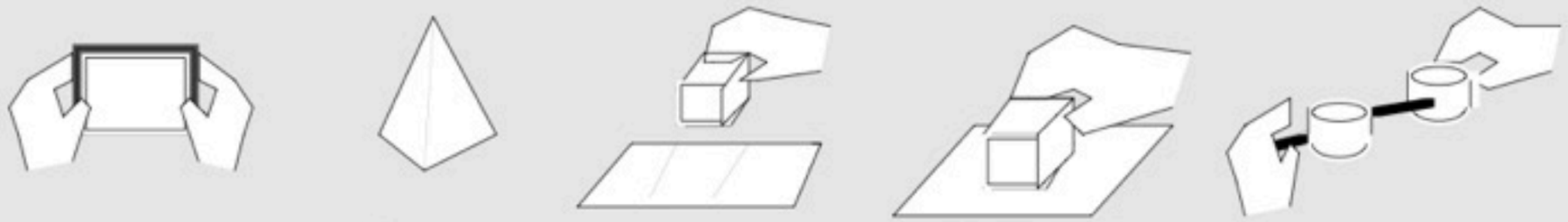
Hiroshi Ishii

- Coupling digital information with physical objects
  - Give immediate haptic feedback
  - Complement with intangible output



Ishii & Ulmer, CHI ’97

TUI: Tangible UI



GUI: Graphical UI

Ishii & Ulmer, CHI ’97

Phicon and activeLENS

Ishii & Ulmer, CHI ’97

Light Space (Wilson & Benko, UIST ’10)

Next Lecture: Statistics

- Bring your laptop and install programs for hands-on session
  - Install R and Deducer
  - More details on L²P