# Designing Interactive Systems I

## Phases of Technology and Visions of HCI

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# Review

- 0-D/1-D/2.5-D user interfaces?
- HCI innovations in
  - Sketchpad?
  - NLS?
  - Alto and Star?

# Phases of Technology



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# 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**

**Jan Borchers**

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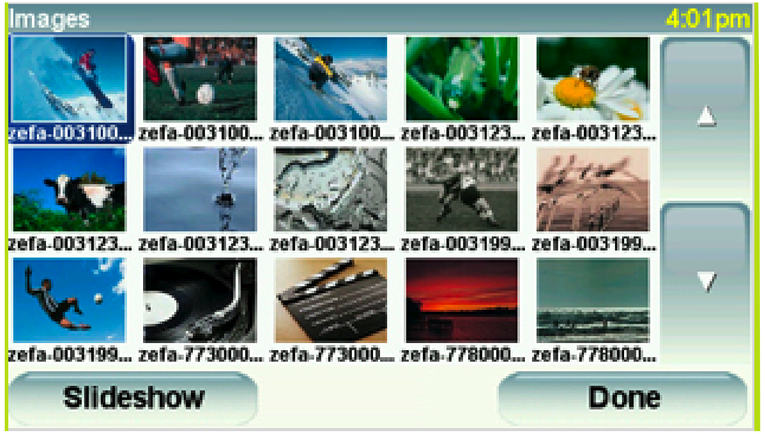


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*"Let me do it all!"*

# Sweet Spot

- Simplifies your life
- Rule-changing new functionality

# Baroque Phase

- Complicates your life
- Feature creep

# Visions of HCI

# How to Interpret (Past) Visions of HCI

- From today's point of view:
  - What aspects have become standard?
  - What aspects haven't? Why?
- From the audience's point of view back then:
  - What was the vision likely provoking in the audience? Positive / Negative?
- From the author's point of view:
  - What are the key new ideas?
  - How was the vision prototyped and communicated?

# Multimodal interfaces

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

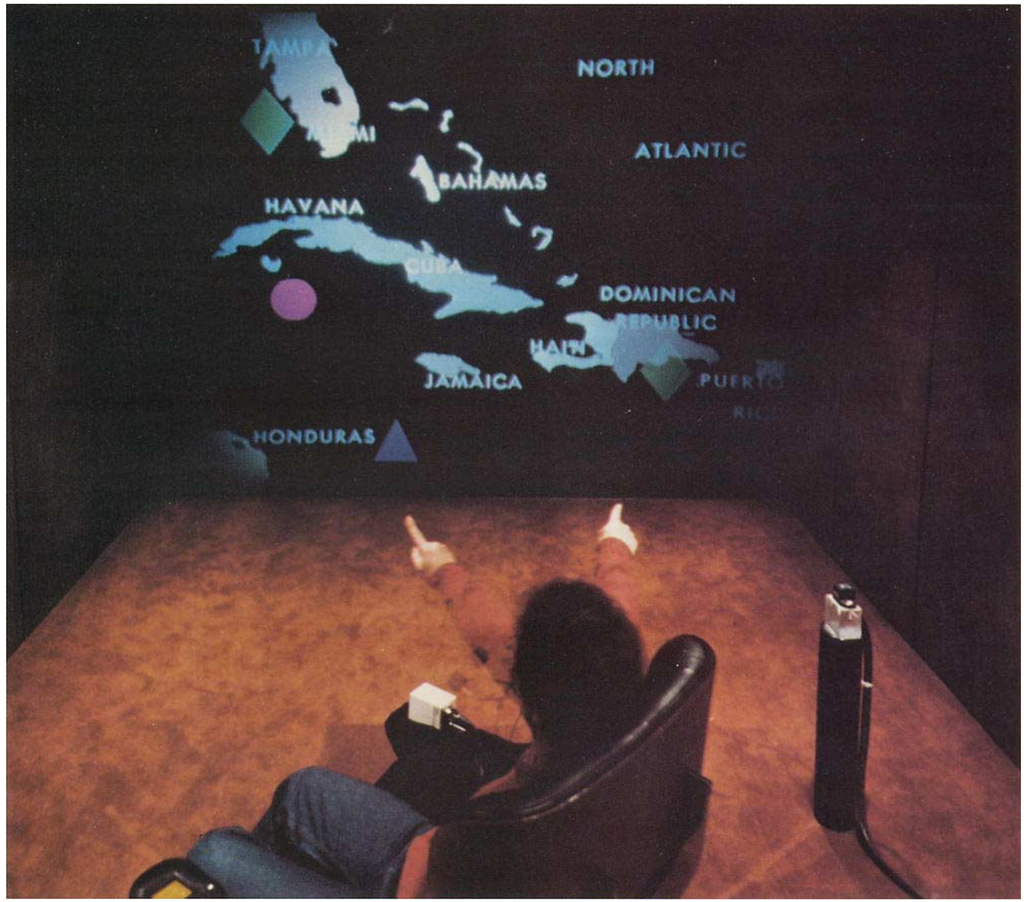


**Fig.: (Bolt, 1980)**


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# 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

# Knowledge Navigator

Link

# Sun Starfire (1992–1994)

- Video prototype of a future communication and computation system
- Bruce Tognazzini (TOG), Human Factors Engineering Group, SunSoft, Sun Microsystems
- Goal: Show a system that would be realistic in ten years
  - The story takes place on Nov 16, 2004…
  - Write down: What’s realistic now, what isn’t?

Link

# Starfire: Video Prototyping Guidelines

- Continually question if assumptions are realistic within 10-year timeframe
- Iterate video prototype like any other prototype
- Include things that go wrong in the story
- Avoid impossible hardware designs
- Design interface first, then decide film scenes based on budget
  - E.g., Mouse, Voice, Reverse Angle much cheaper than Gesture, Pen

Required Reading

# Starfire: Required Reading

- Bruce Tognazzini: The “Starfire” Video Prototype Project: A Case History. In Proceedings of CHI’94, ACM Press, pp. 99–105
- Paper documenting the video prototyping guidelines that evolved from the project
- Online in the ACM Digital Library, and at http://www.asktog.com/papers/videoPrototypePaper.html
- For more information, see Tognazzini’s book “Tog on Software Design” (which he had planned to call “Starfire” at first)

# Benddesk




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# Virtual Reality

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

# Ubiquitous Computing

- Mark Weiser, Xerox PARC †
- 1991: The Computer For The 21st Century
  - Most profound technologies disappear in fabric of everyday life

Required Reading

- 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 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)


Link

# Ubicomp: PARC Devices

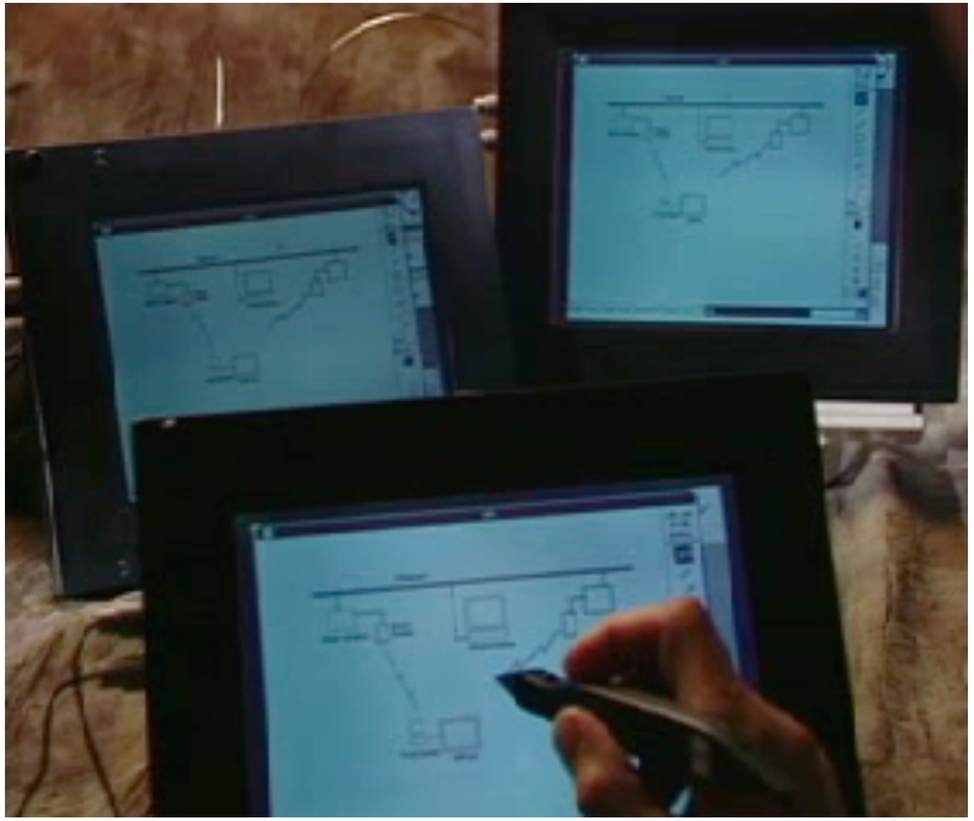
- Must know where they are (crucial to human perception)
  - Knowing room it's in can make computer adapt significantly, without any AI
- **Tabs/Pads/Boards**: inch/foot/yard scale, 100s/dozens/1 or 2 per room

# The PARC Tab

- 1993, ca. 50 deployed in PARC/EuroPARC
- A tab for each book spine
- 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?

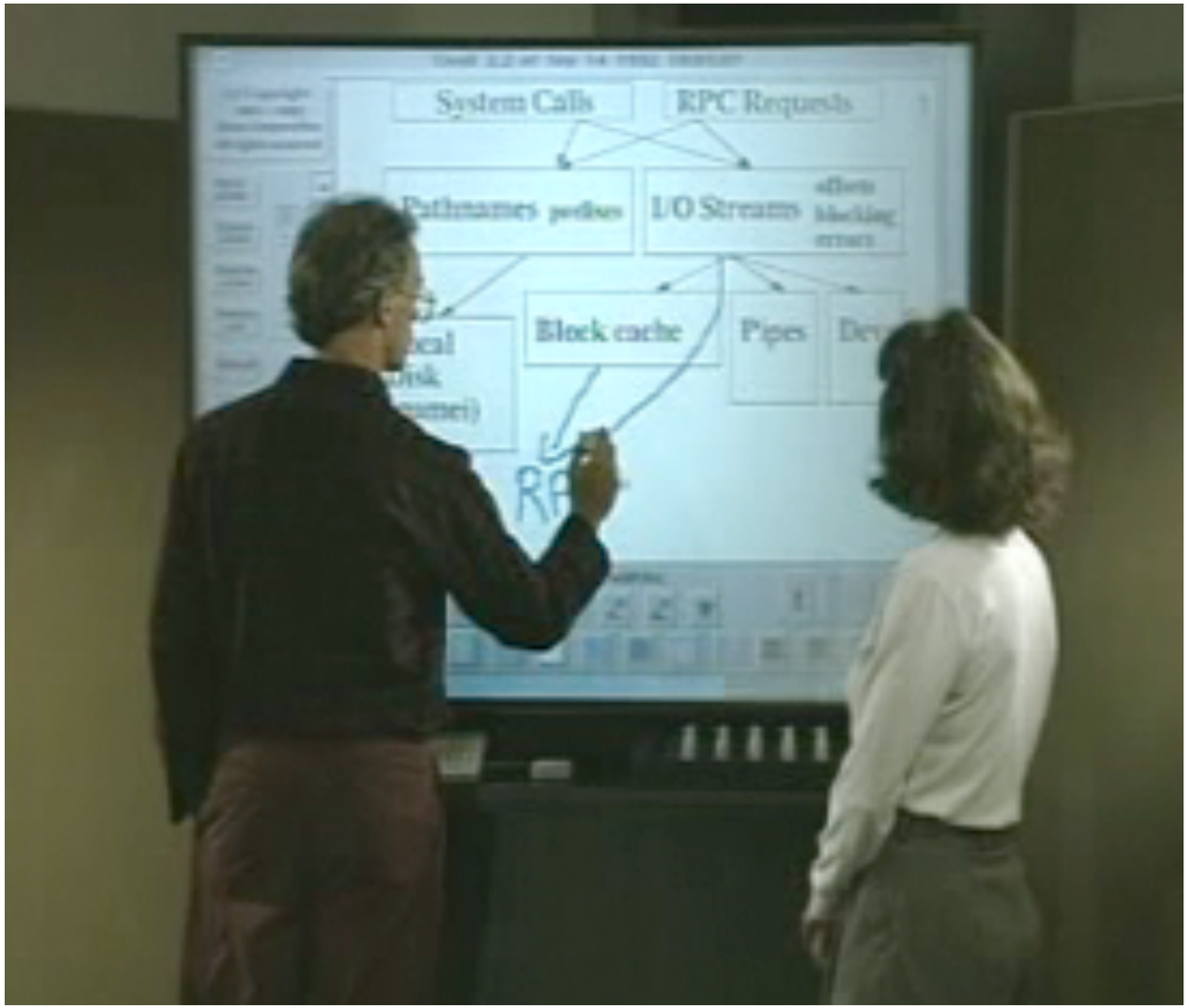
# The PARC Pad

- 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 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 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 LE, problem of multiple connections

# 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"

# Next Steps…

- Readings
  - Bill Moggridge: Designing Interactions
    - Enjoyable coffee table book
  - M. Weiser: **The Computer for the 21st Century**
  - B. Tognazzini: **The “Starfire” Video Prototype Project**
- Buxton Collection
  - Input devices
  - http://research.microsoft.com/en-us/um/people/bibuxton/buxtoncollection/