

Designing Interactive Systems I

History II – Technology Phases and HCI Visions

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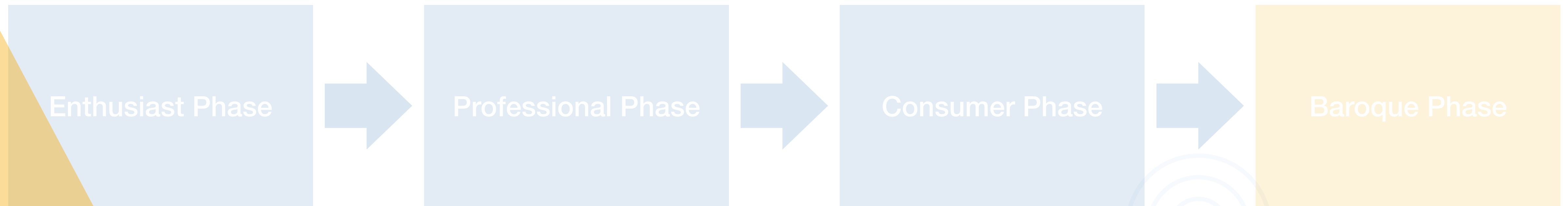
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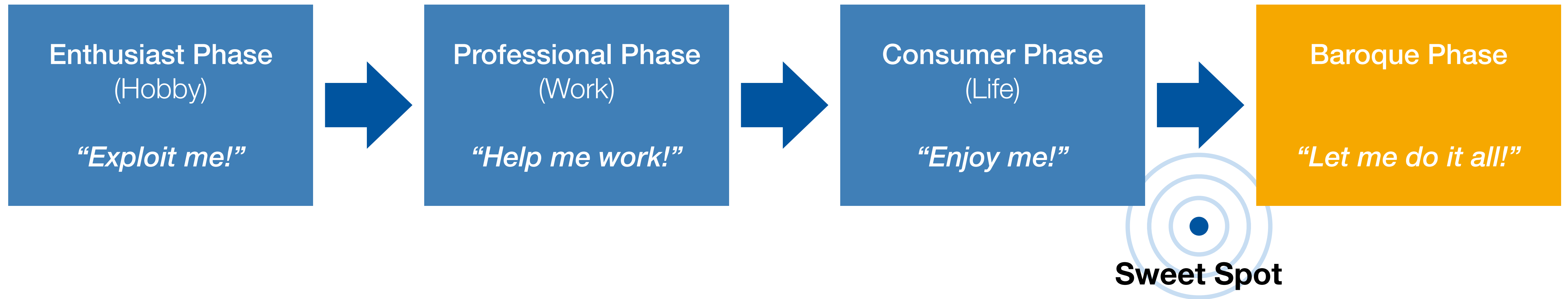
Review

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



Technology Phases

Force Shifts During Phases of the Technology Lifecycle



David Liddle



Jan Borchers



Enthusiast Phase
(Hobby)

“Exploit me!”



Professional Phase
(Work)

“Help me work!”



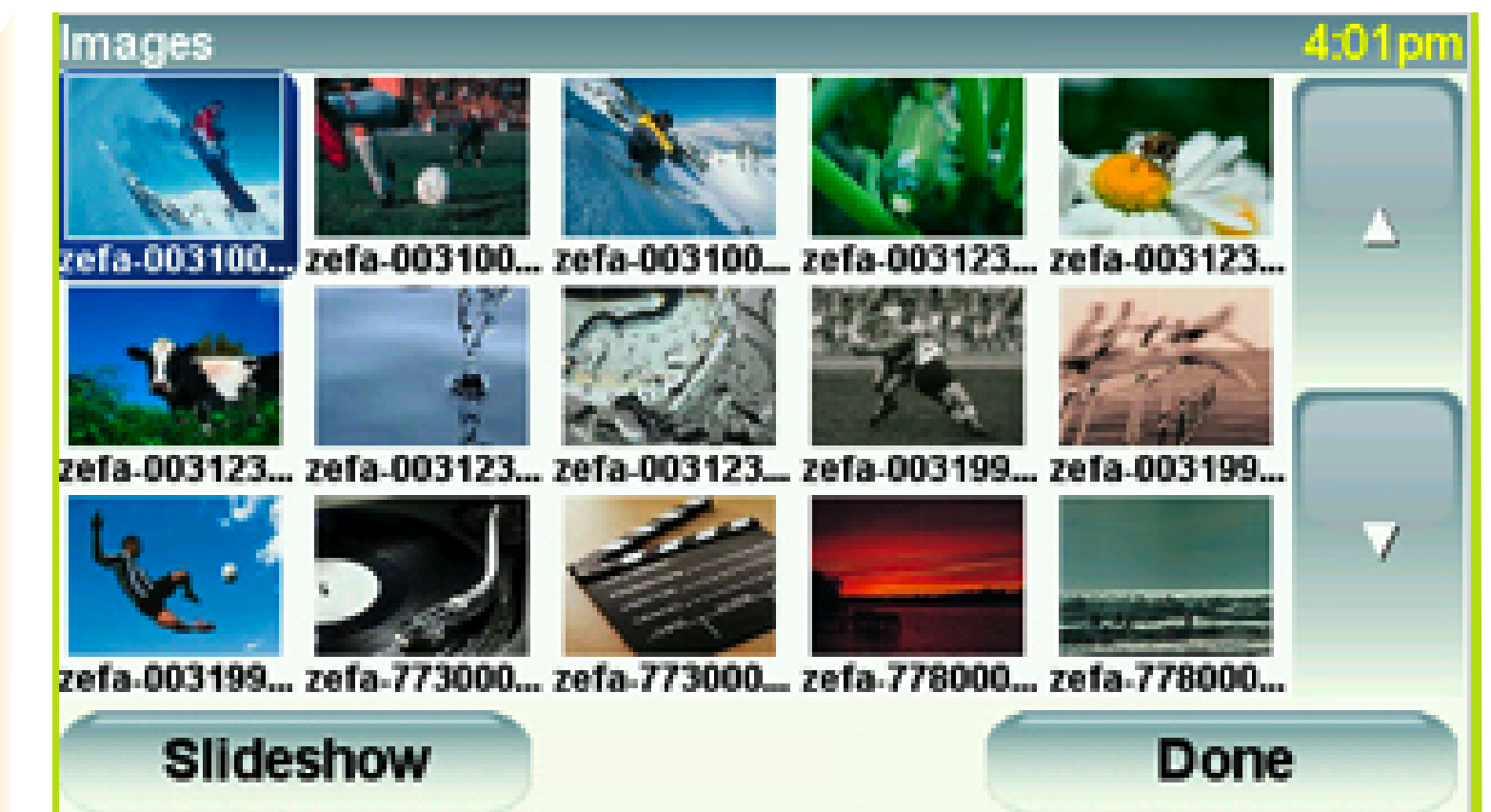
Consumer Phase
(Life)

“Enjoy me!”



Baroque Phase

“Let me do it all!”





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

- Simplifies your life
- Rule-changing new functionality

Baroque Phase

- Complicates your life
- Feature creep

HCI Visions

How to Interpret (Past) HCI Visions

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

Multimodal interfaces

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

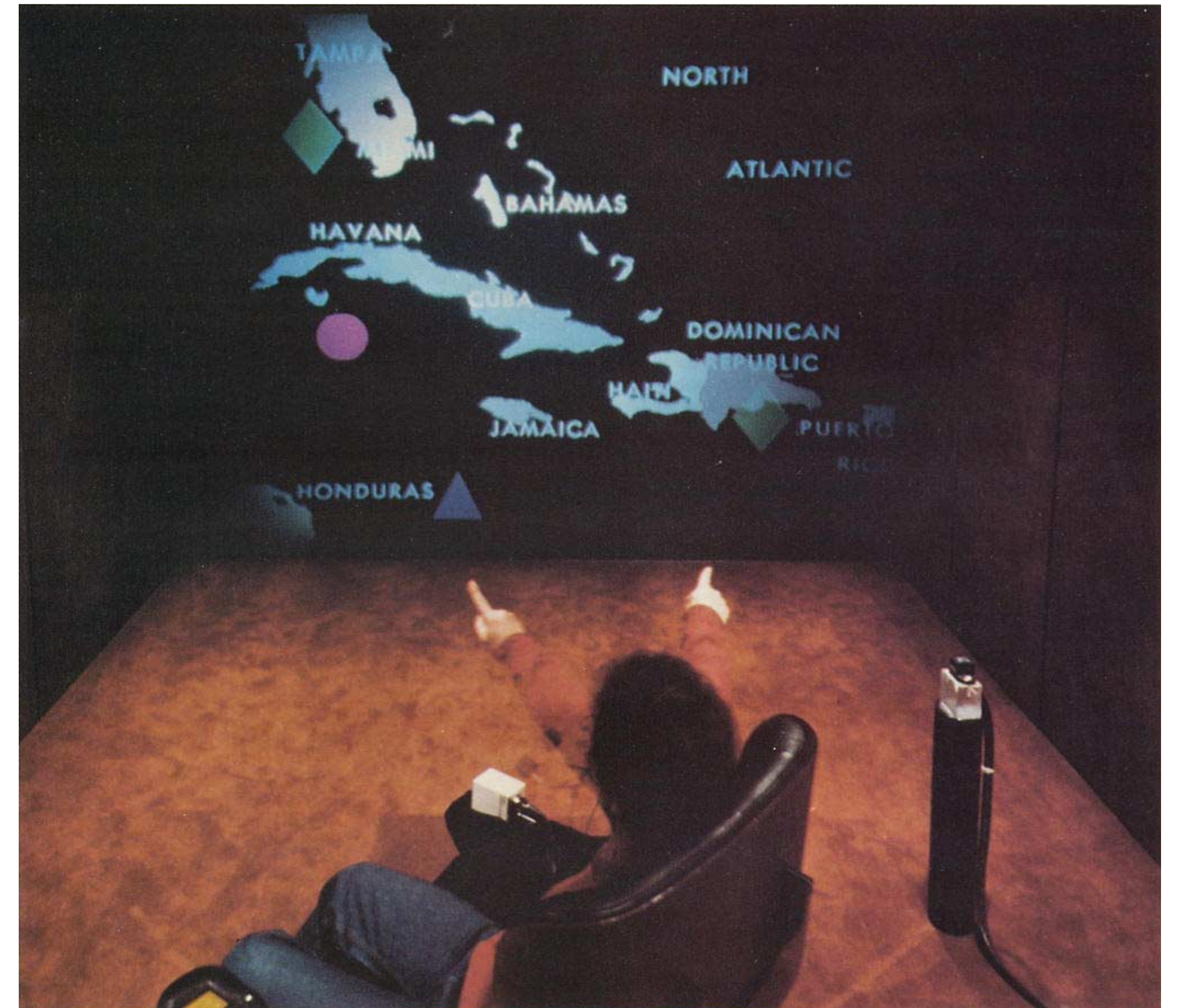


Fig.: (Bolt, 1980)



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



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?



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

Starfire: Required Reading

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)

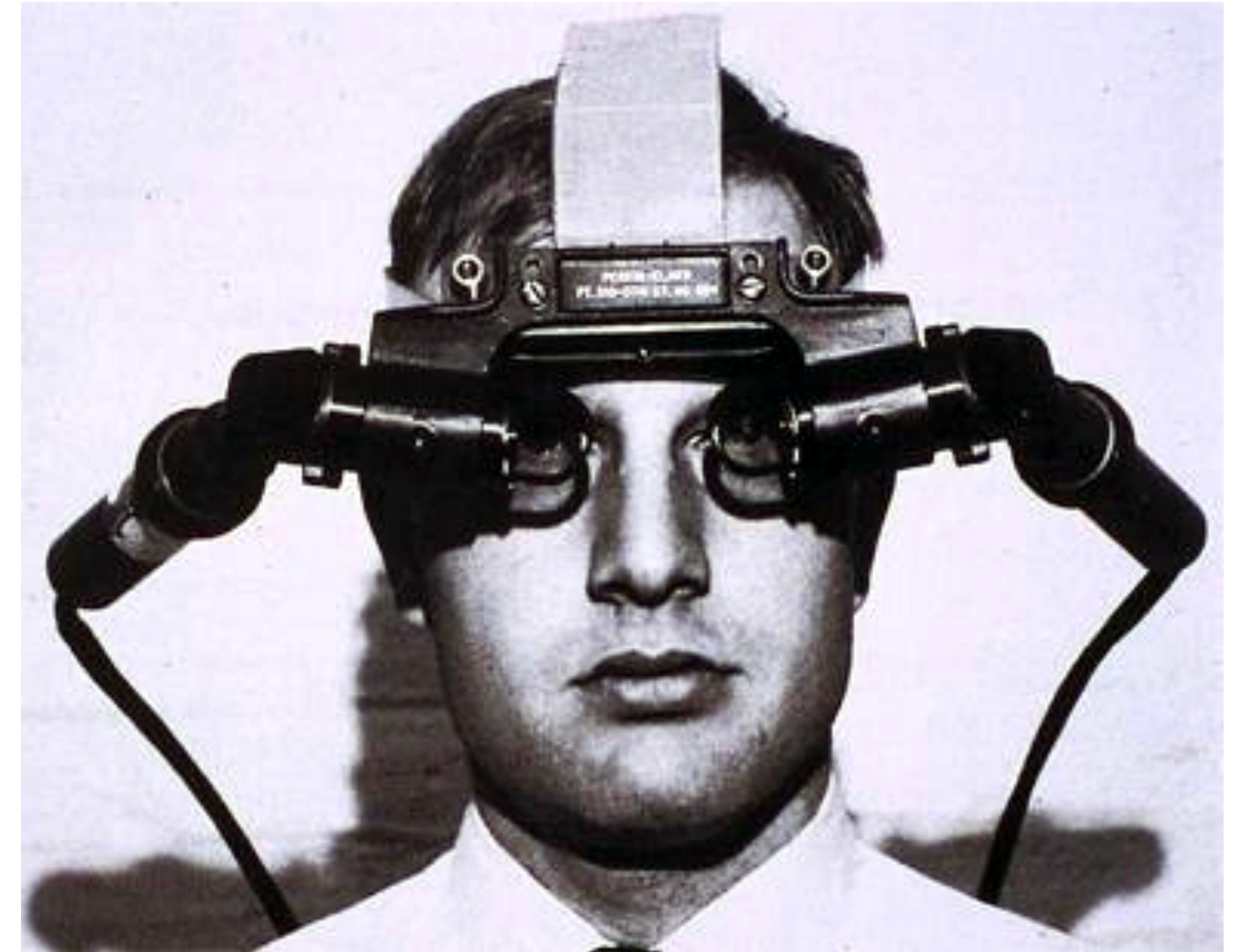


BendDesk (Our group, 2010)



Virtual Reality

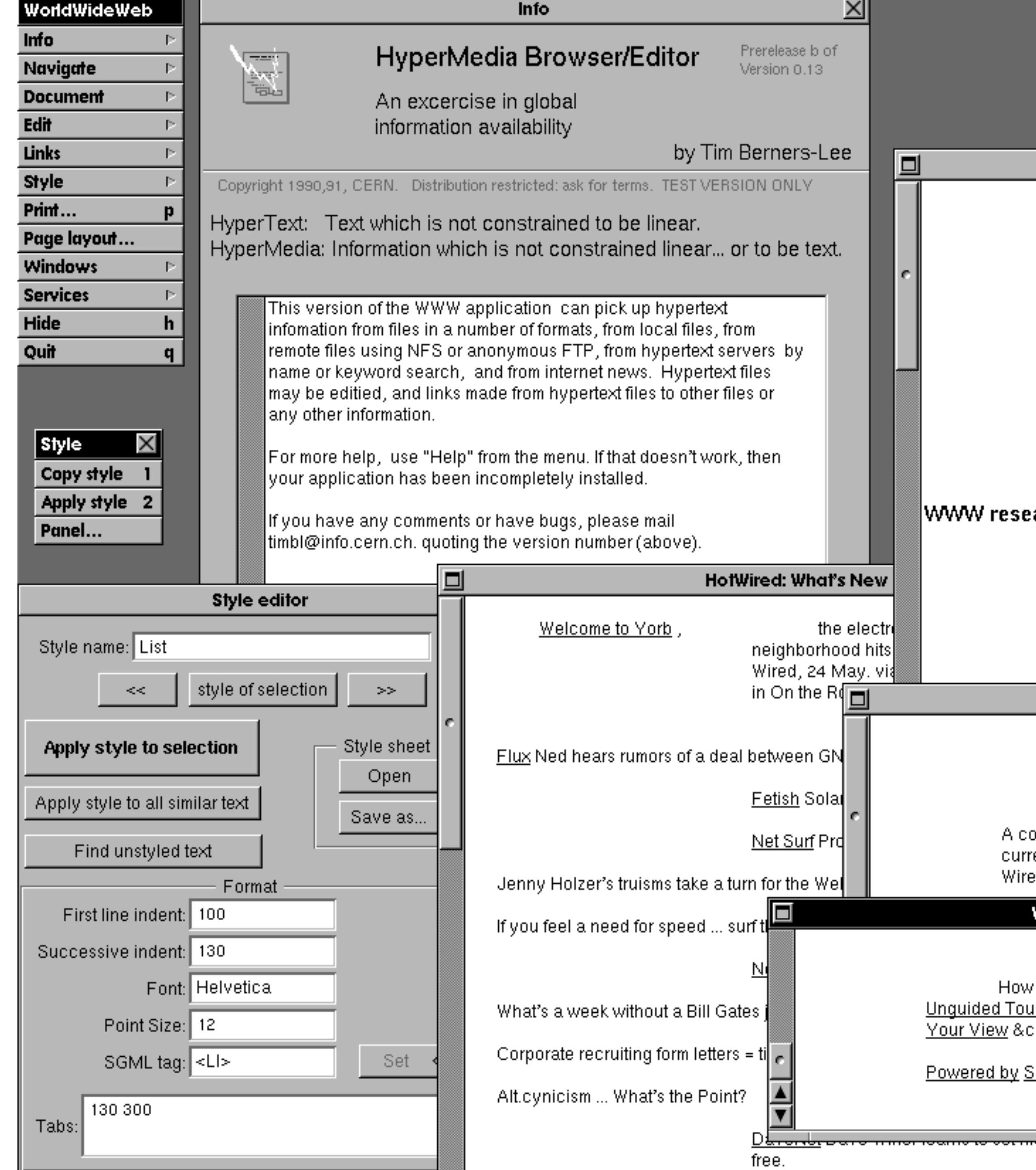
- Head-Mounted Display, Ivan Sutherland, University of Utah, 1968
- Key advance: Producing the illusion of being in a 3-dimensional world of computer-generated objects

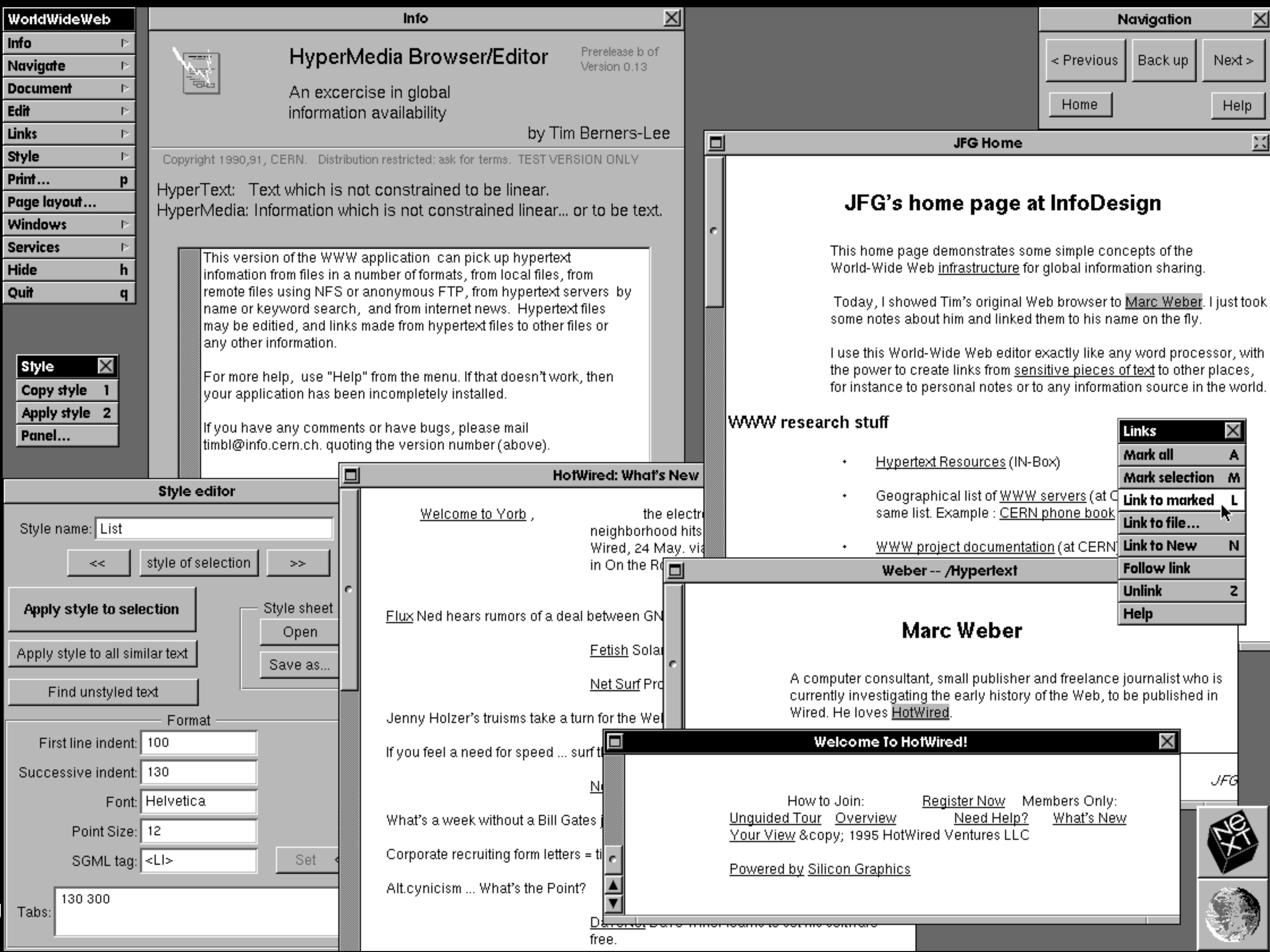


“Sword of Damocles”, I.E. Sutherland (1968)

World-Wide Web

- Tim Berners-Lee at CERN, 1989
- Key advances: Provide a GUI to quickly and easily view text and graphics files from remote networked sites





Ubiquitous Computing

Required Reading

- 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



Image: <https://alchetron.com/Mark-Weiser>

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)

UBIQUITOUS COMPUTING



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

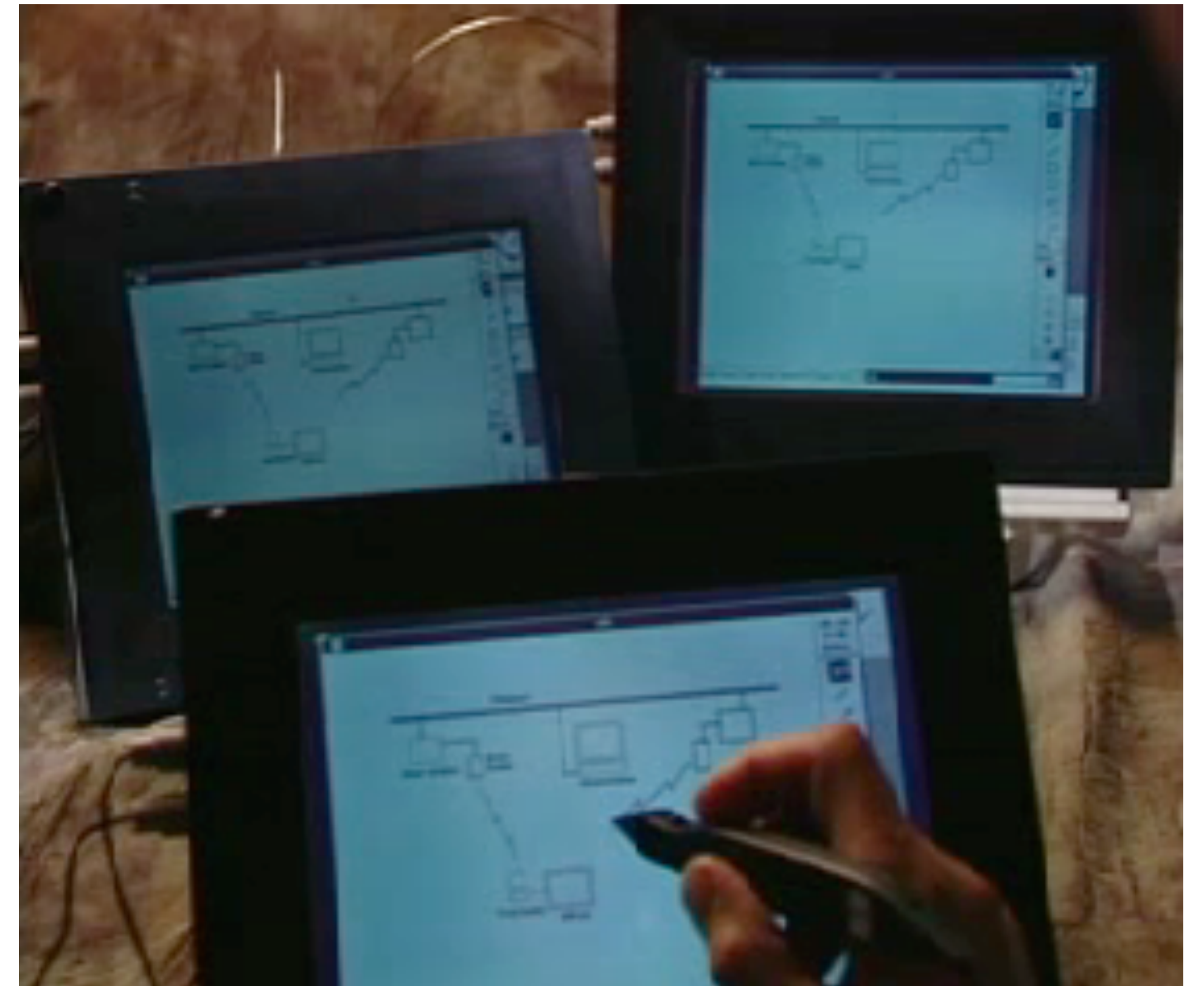
The PARC Tab

- 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?



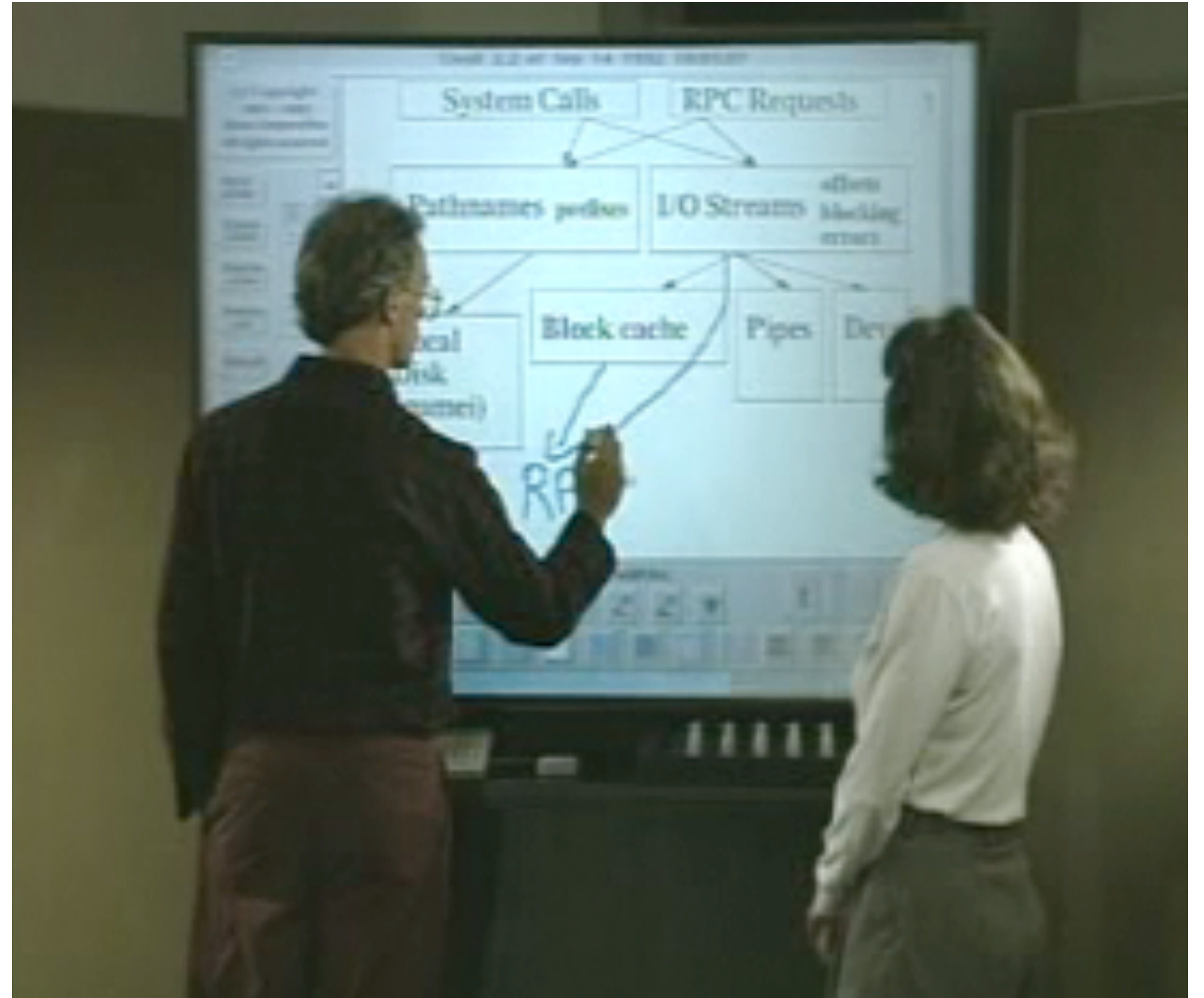
The PARC Pad

- 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) over several feet: Achieved recently with 8K screens
- 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

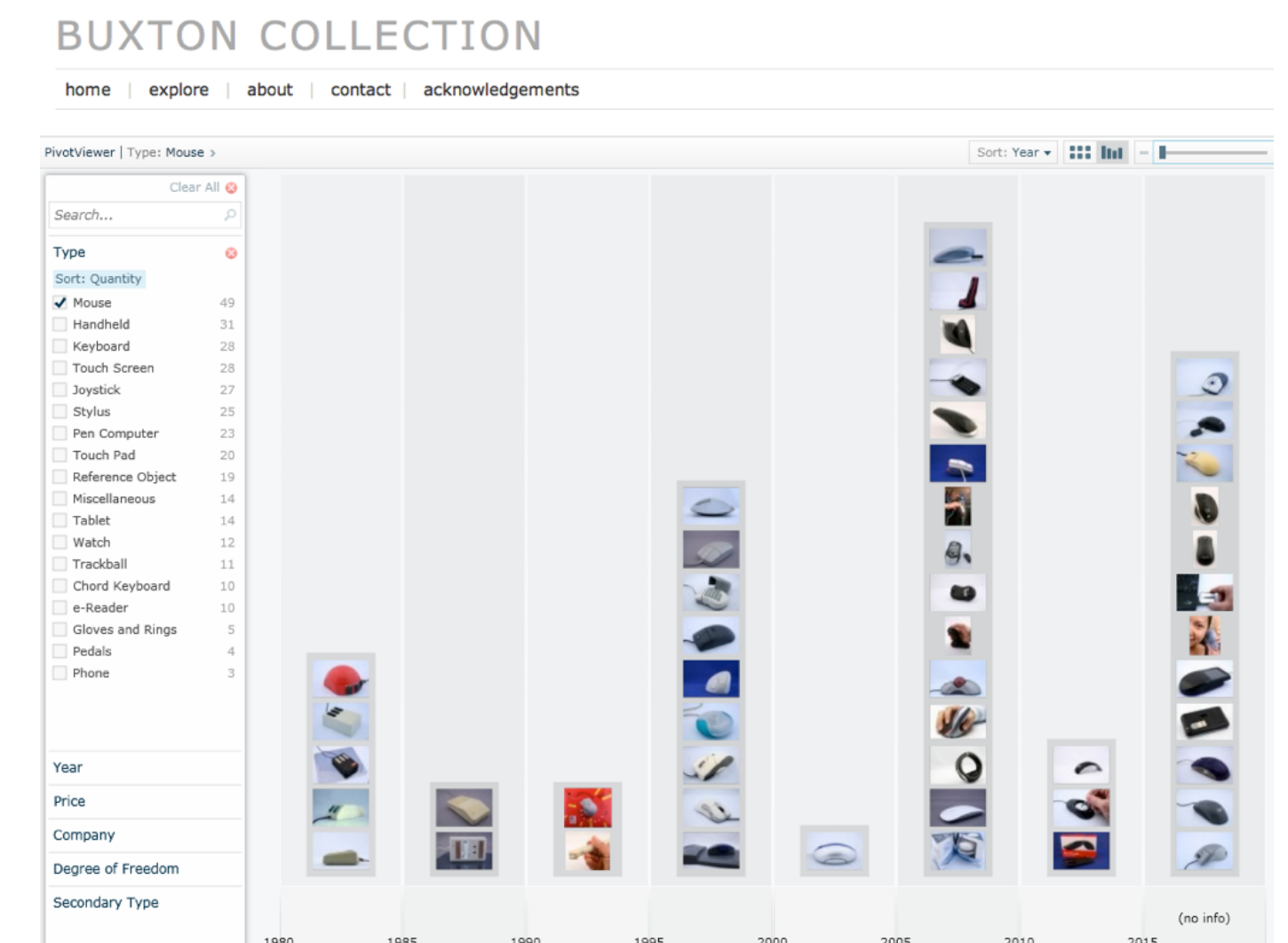
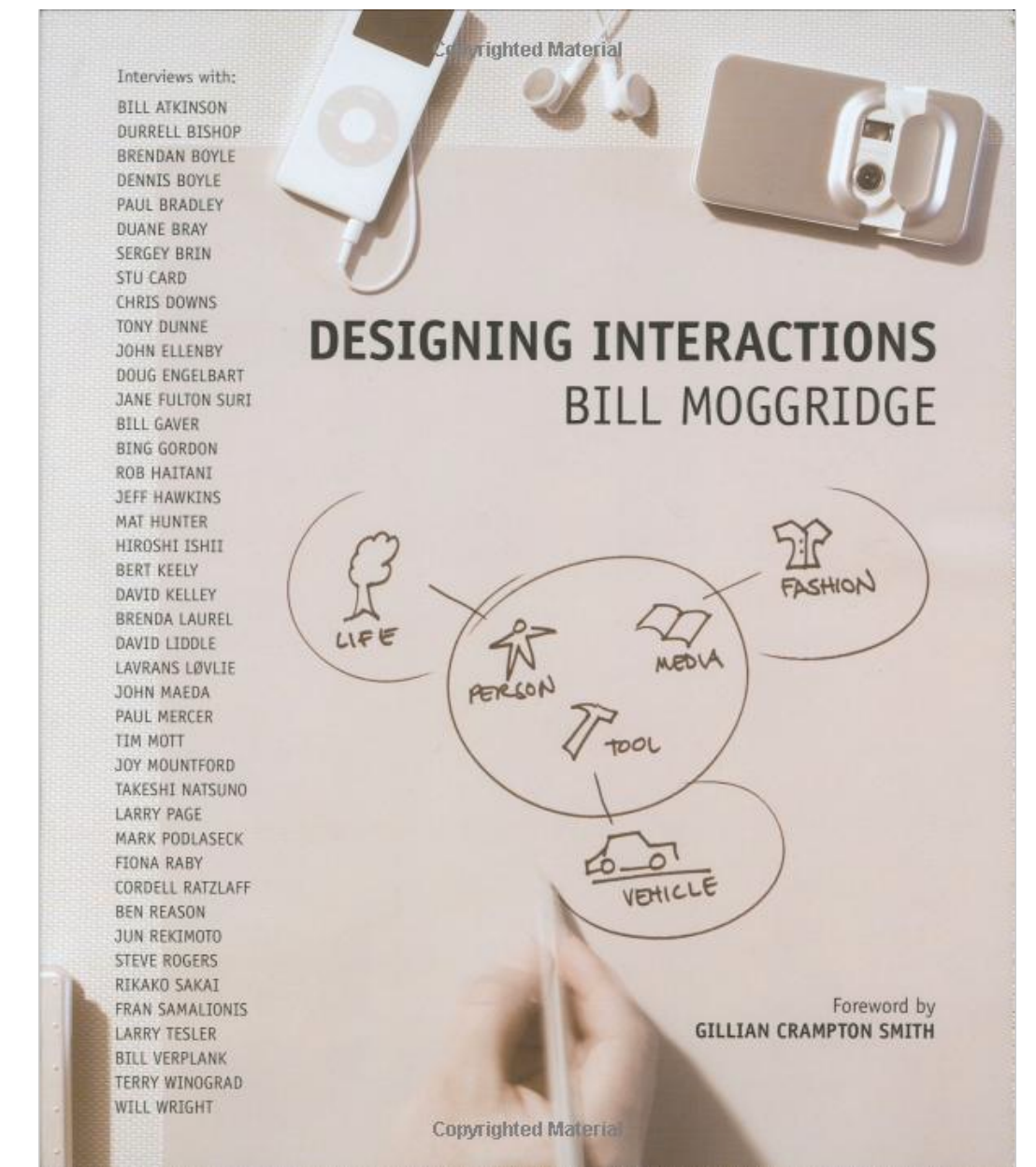
Ubicomp Today

- 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”



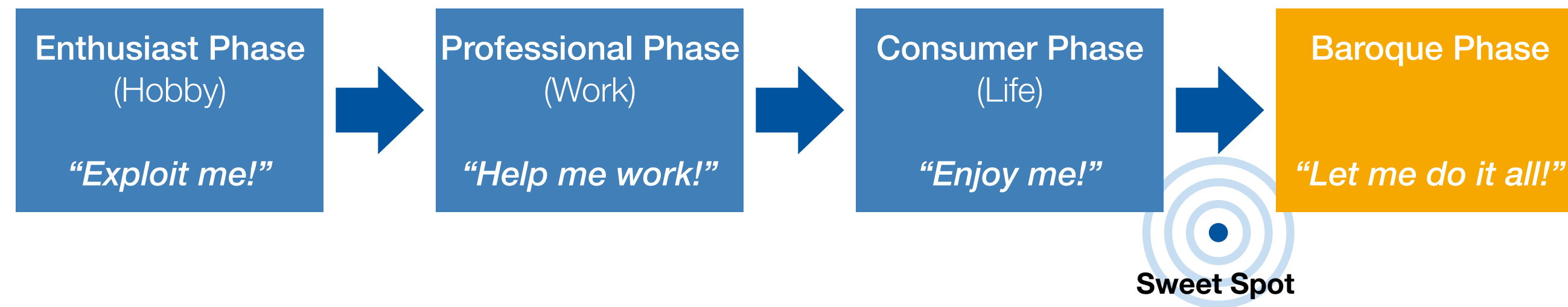
Next Steps...

- Readings
 - M. Weiser: **The Computer for the 21st Century (required)**
 - B. Tognazzini: **The “Starfire” Video Prototype Project (required)**
 - Bill Moggridge: Designing Interactions (great coffee table book)
- Bill Buxton's Collection of Input devices
 - <http://research.microsoft.com/en-us/um/people/bibuxton/buxtoncollection/>
- Curated collection of early HCI demo videos
 - <https://jackrusher.com/classic-ux/>



Summary

- Technology Lifecycle



- HCI Visions

- Put That There • Apple Knowledge Navigator • Sun Starfire
- VR, WWW
- Ubiquitous Computing