

UbiComp In The Clouds: Observations, Reflections and Experiences

Donald J. Patterson

Donald Bren School of Information and Computer Sciences
Department of Informatics
Laboratory for Ubiquitous Computing and Interaction

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<http://www.ics.uci.edu/~djp3>

: My Background


- B.S., Computer Science from Cornell (NY)
 - M.Eng, Electrical Engineering
- STRIKE Officer
 - USS CURTIS WILBUR, DDG-54, Japan
- Operations Officer
 - USS SIMON LAKE, AS-33, Italy
- Ph.D in Computer Science and Engineering at UW
- Director of the Laboratory for Ubiquitous Computing and Interaction
- Co-founder of quub, whisper.fm, swayr



: What is Ubiquitous Computing?



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ubiq·ui·tous  *adj* \yü-'bi-kwə-təs\

Definition of UBIQUITOUS



: existing or being everywhere at the same time : constantly encountered : WIDESPREAD <a *ubiquitous* fashion>

- ubiq·ui·tous·ly *adverb*
- ubiq·ui·tous·ness *noun*

 See [ubiquitous](#) defined for English-language learners »
See [ubiquitous](#) defined for kids »

Examples of UBIQUITOUS

- The company's advertisements are *ubiquitous*.
- <by that time cell phones had become *ubiquitous*, and people had long ceased to be impressed by the sight of one>
- Hot dogs are the ideal road trip food—inexpensive, portable, *ubiquitous*. —Paul Lucas, *Saveur*, June/July 2008

[+] more

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: The origins of Ubicomp as a academic discipline

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The Computer for the 21st Century

Specialized elements of hardware and software, connected by wires, radio waves and infrared, will be so ubiquitous that no one will notice their presence

by Mark Weiser

The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.

Consider writing, perhaps the first information technology. The ability to represent spoken language symbolically for long-term storage freed information from the limits of individual memory. Today this technology is ubiquitous in industrialized countries. Not only do books, magazines and newspapers convey written information, but so do street signs, billboards, shop signs and even graffiti. Candy wrappers are covered in writing. The constant background presence of these products of "literacy technology" does not require active attention, but the information to be transmitted is ready for use at a glance. It is difficult to imagine modern life otherwise.

Silicon-based information technology, in contrast, is far from having become part of the environment. More than 50 million personal computers have been sold, and the computer nonetheless remains largely in a world of its own. It

is approachable only through complex jargon that has nothing to do with the tasks for which people use computers. The state of the art is perhaps analogous to the period when scribes had to know as much about making ink or baking clay as they did about writing.

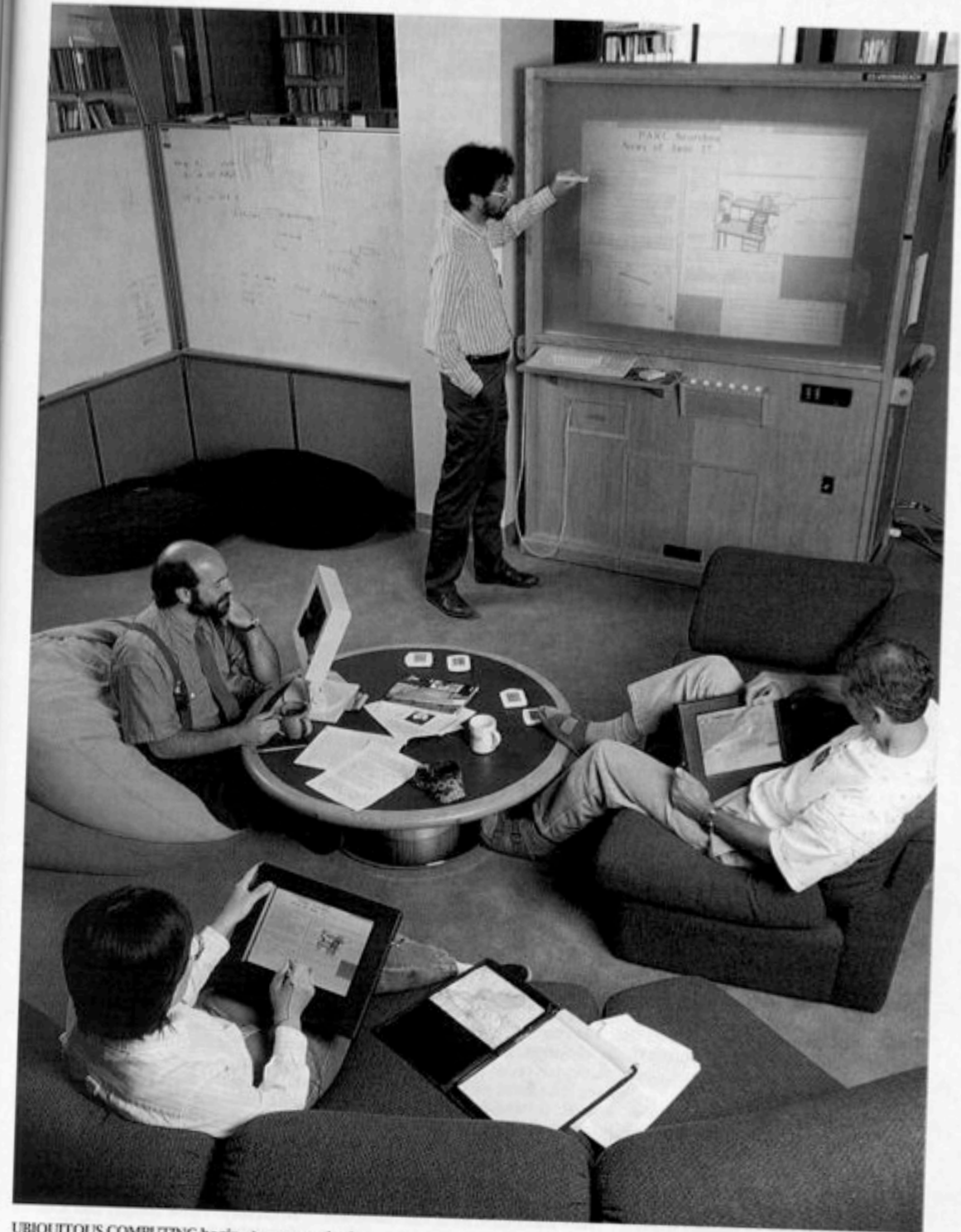
The arcane aura that surrounds personal computers is not just a "user interface" problem. My colleagues and I at the Xerox Palo Alto Research Center think that the idea of a "personal" computer itself is misplaced and that the vision of laptop machines, dynabooks and "knowledge navigators" is only a transitional step toward achieving the real potential of information technology. Such machines cannot truly make computing an integral, invisible part of people's lives. We are therefore trying to conceive a new way of thinking about computers, one that takes into account the human world and allows the computers themselves to vanish into the background.

Such a disappearance is a fundamental consequence not of technology but of human psychology. Whenever people learn something sufficiently well, they cease to be aware of it. When you look at a street sign, for example, you absorb its information without consciously performing the act of reading. Computer scientist, economist and Nobelist Herbert A. Simon calls this phenomenon "compiling"; philosopher Michael Polanyi calls it the "tacit dimension"; psychologist J. J. Gibson calls it "visual invariants"; philosophers Hans Georg Gadamer and Martin Heidegger call it the "horizon" and the "ready-to-hand"; John Seely Brown of PARC calls it the "periphery." All say, in essence, that only when things disappear in this way are we freed to use them without thinking and so to focus beyond them on new goals.

The idea of integrating computers seamlessly into the world at large runs counter to a number of present-day trends. "Ubiquitous computing" in this context does not mean just computers that can be carried to the beach, jungle or airport. Even the most powerful notebook computer, with access to a worldwide information network, still focuses attention on a single box. By analogy with writing, carrying a superlaptop is like owning just one very important book. Customizing this book, even writing millions of other books, does not begin to capture the real power of literacy.

Furthermore, although ubiquitous computers may use sound and video in addition to text and graphics, that does not make them "multimedia computers." Today's multimedia machine makes the computer screen into a demanding focus of attention rather than allowing it to fade into the background.

Perhaps most diametrically opposed to our vision is the notion of virtual reality, which attempts to make a world inside the computer. Users don special goggles that project an artificial scene onto their eyes; they wear gloves or even bodysuits that sense their motions and gestures so that they can move about and manipulate virtual objects. Although it may have its purpose in allowing people to explore realms otherwise inaccessible—the insides of cells, the surfaces of distant planets, the information web of data bases—virtual reality is only a map, not a territory. It excludes desks, offices, other people not wearing goggles and bodysuits, weather, trees, walks, chance encounters and, in general, the infinite richness of the universe. Virtual reality focuses an enormous apparatus on simulating the world rather than on invisibly enhancing the world that already exists. Indeed, the opposition between the



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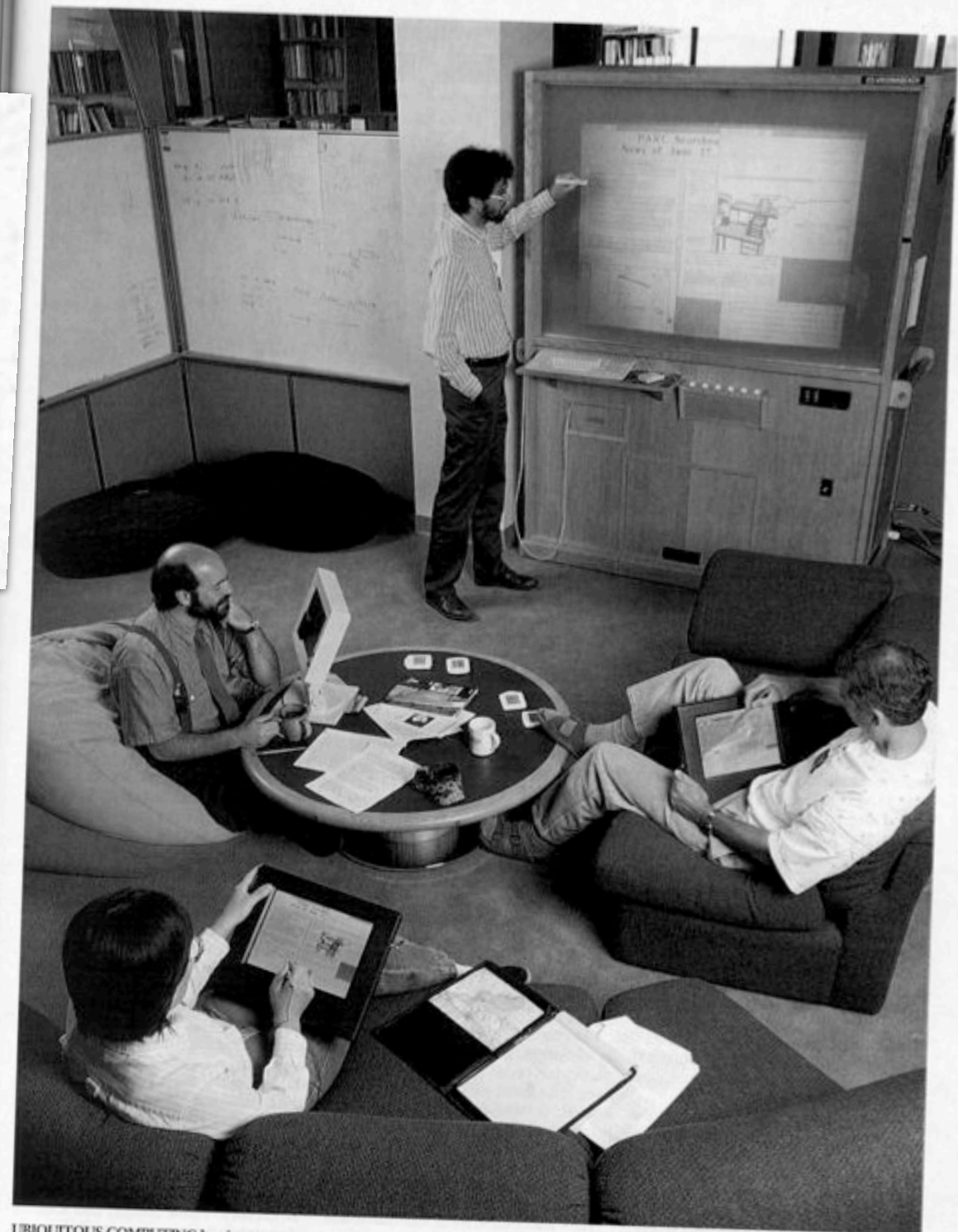
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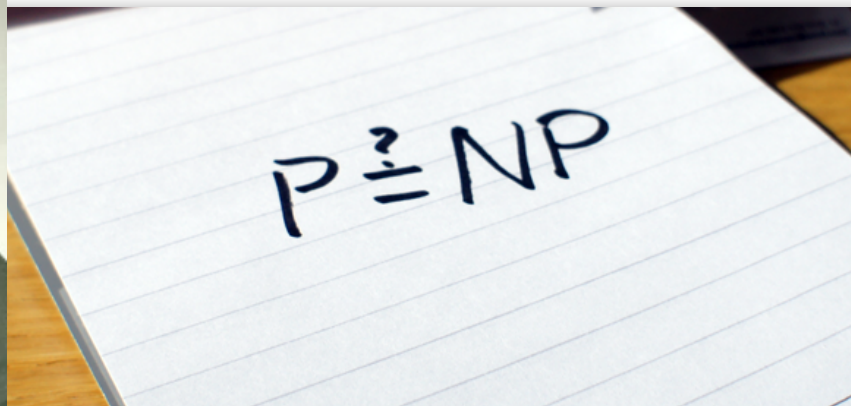
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Zero Wave

- Computerless Computing
 - 1930-1940
 - Computers are theoretical technology
 - Church and Turing establish fundamental limits on computability





First Wave

- Main Frame Computing
 - 1960-1970
 - Massive computers to do simple data processing
 - Few computers in the world





Second Wave

- Desktop Computing
 - 1980-1990
 - Business applications drive usage
 - One computer per desk
 - Computers connected in intranets to a massive global network
 - All wired





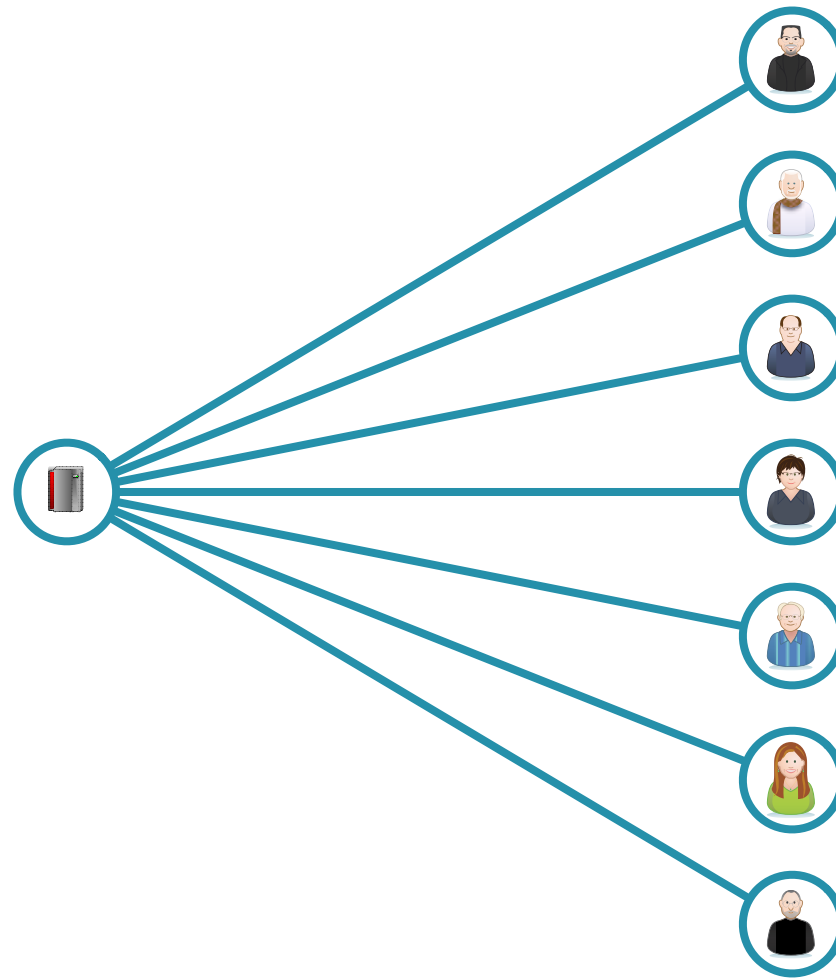
Third Wave

- Ubiquitous Computing
 - 2000 - present
 - Information creation, access, communication drive usage
 - Multiple computers per environment/person
 - WANs, LANs, PANs, ad-hoc networking, wireless
 - Computers disappearing



: Ubicomp is about people's relationship to computers

First Wave



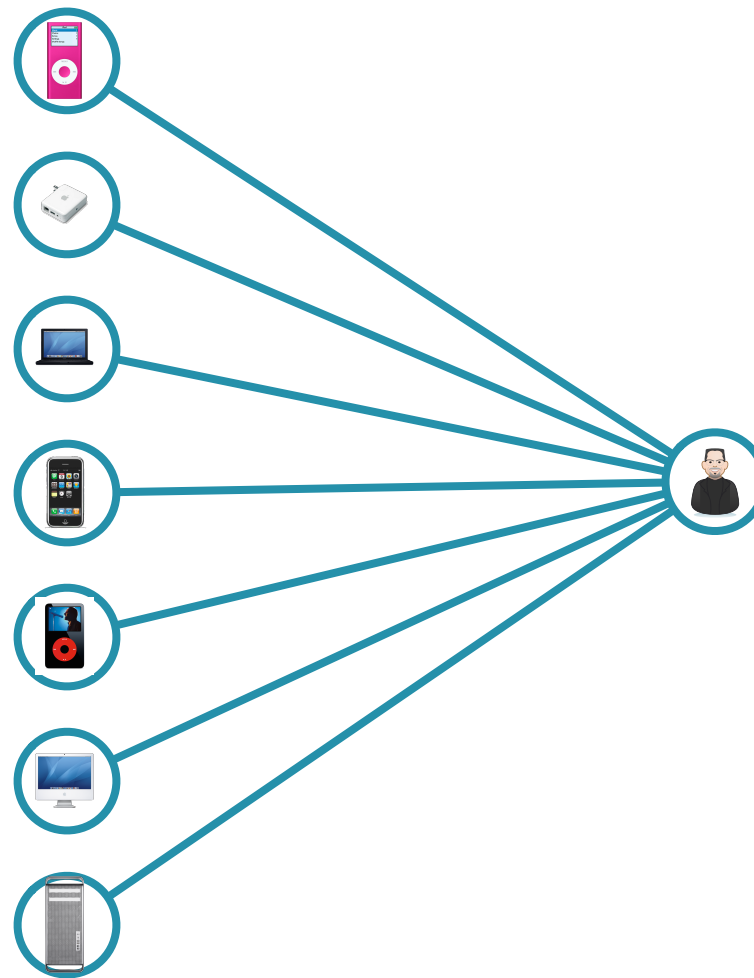
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Second Wave



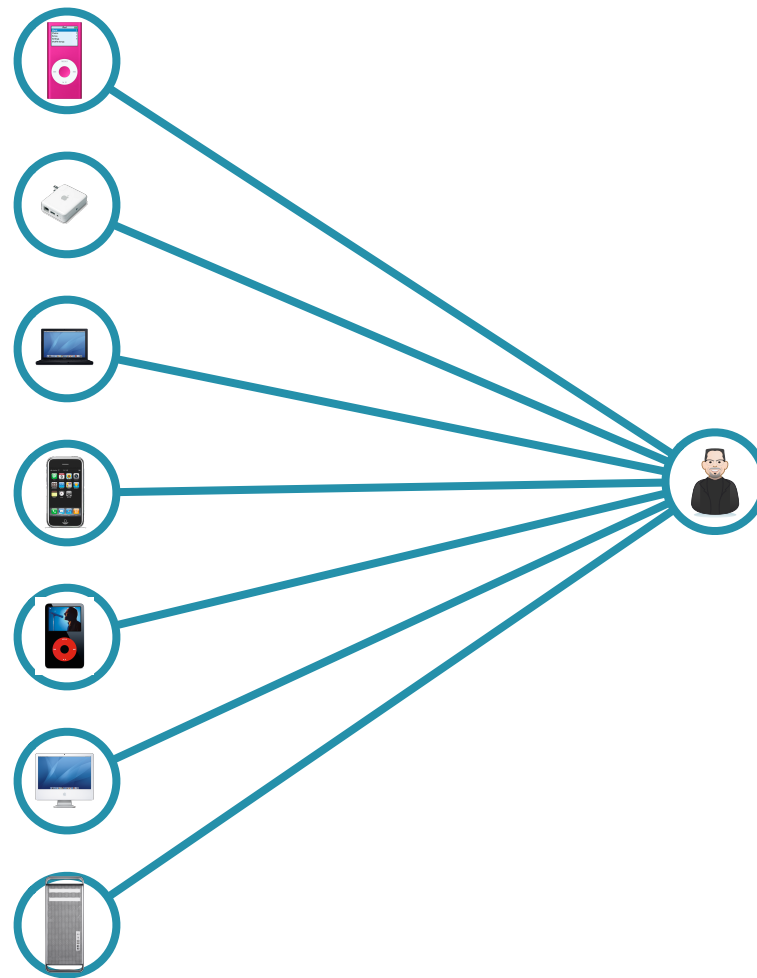
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Third Wave



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Third Wave



How are we going to manage all of these devices?

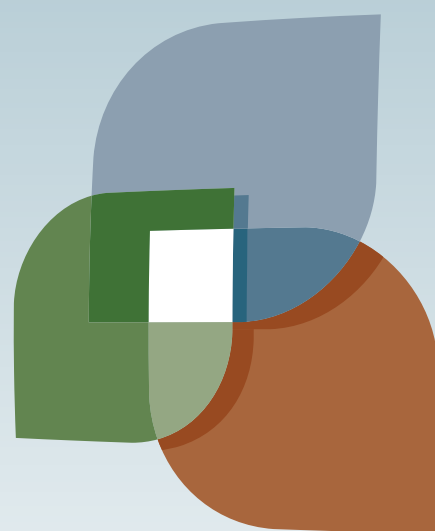
Ways of Thinking about UBICOMP

- Systems
- Experience
- Sensors



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L U C I

