

Ubiquitous Computing

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You'll be building
beautiful prototypes...



..and you'll have the
chance to get personal
with fascinating
research teams



develop, as an individual...



1980



1985



1991



1995



1998

It's all happening right here, in
Ubiquitous Computing



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Ubiquitous Computing



But wait!

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Ubiquitous Computing



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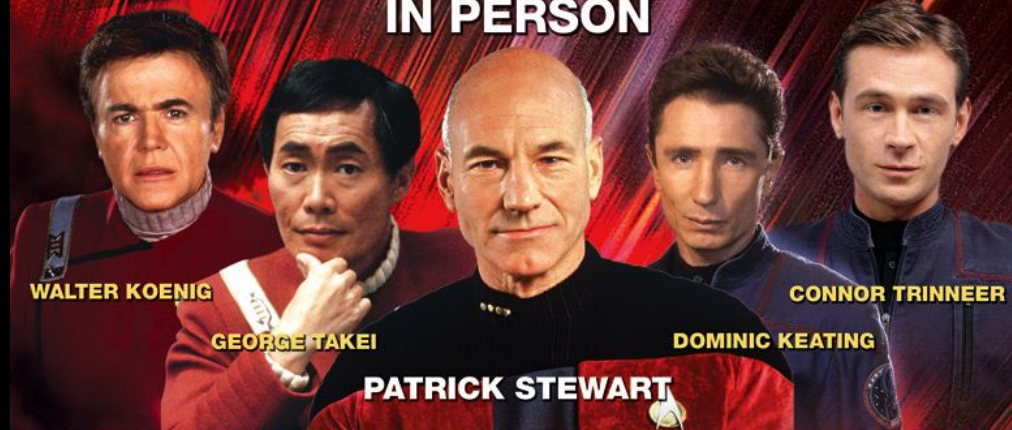
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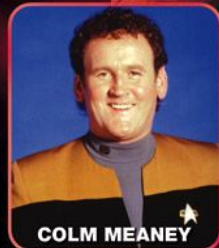
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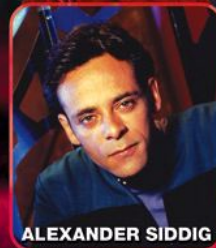
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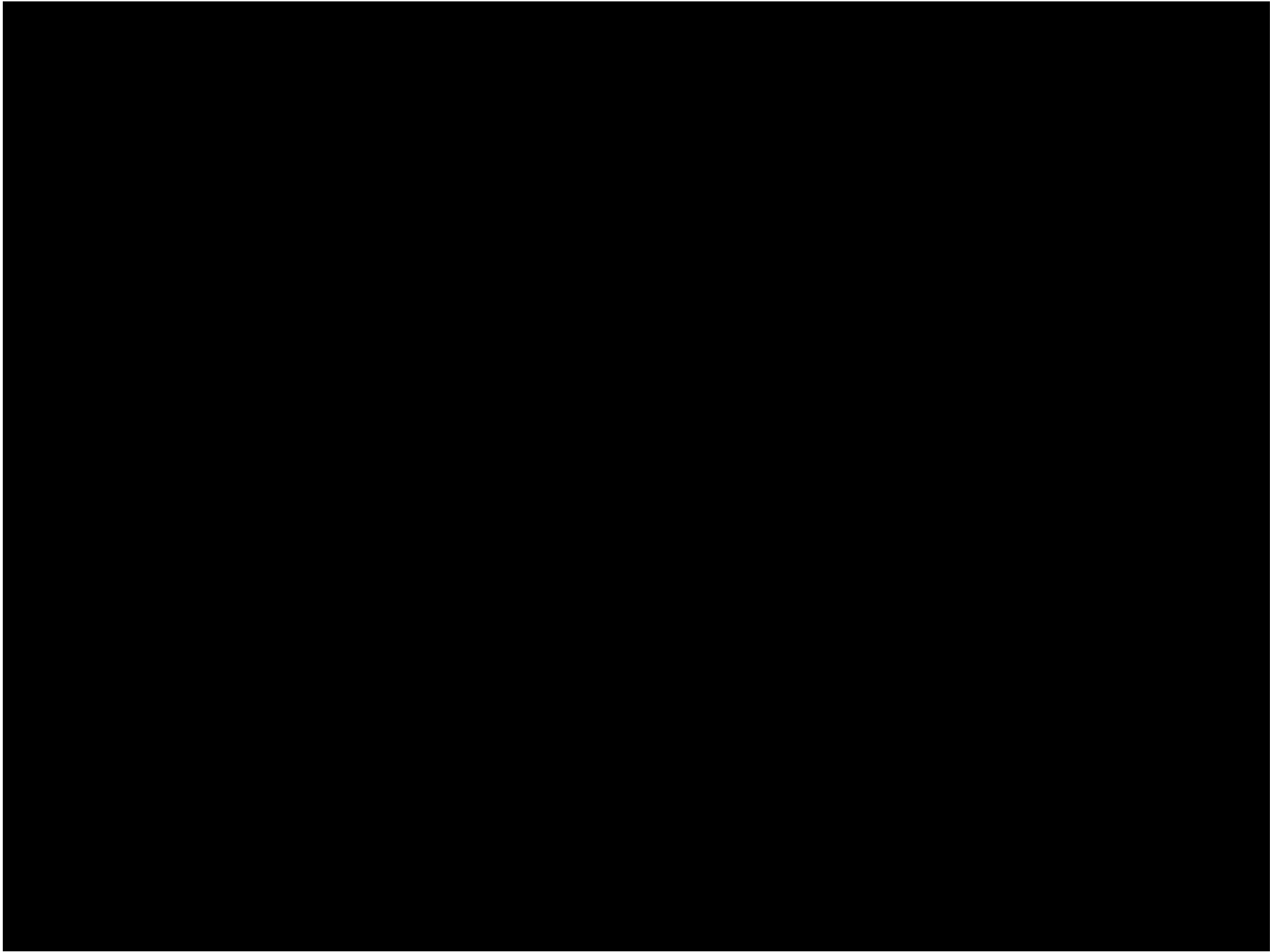
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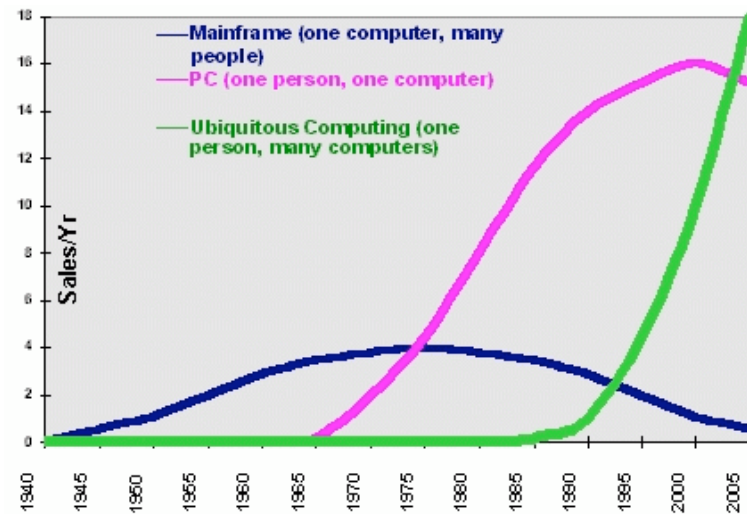
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Today's Topic:
The Vision of Ubiquitous Computing

The idea is that...

- In mainframe computing,
 - many people share one computer
- In desktop computing,
 - one person, one computer
- In ubiquitous computing,
 - many computers serve each person



'The major trends in computing', Weiser '96

The Disappearing Computer



- Mark Weiser
 - ‘Ubiquitous computing names the third wave in computing, just now beginning. First were mainframes, each shared by lots of people. Now we are in the personal computing era, person and machine staring uneasily at each other across the desktop. Next comes ubiquitous computing, or the age of calm technology, when technology recedes into the background of our lives’

Mark Weiser

http://www.ubiq.com/weiser/

g mps gml df uid lex wp dict wref news mac blogs umu trrnt tcim

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Click on parts of the picture above for more info, or read on. (The picture is by [Peter Menzel](#), and first appeared in a German magazine profile, without the words. I have adopted it for my web page with permission. Thanks Peter.)

[Pictures](#) from my vacation in Greece with my daughter Nicole.

[Pictures](#) from the vacation part of my recent trip to Brazil.

I ran the Computer Science Laboratory at Xerox PARC for seven years, stepped down in 1994 to found a startup, and I have now just started (August 1996) as [Chief Technologist of Xerox PARC](#). This will really be fun!

I am the drummer for [Severe Tire Damage](#) - first live band on the internet

Beyond the Desktop

- Finding ways of moving beyond desktop computing
 - No clear boundaries to other fields (except one thing, that we'll return to)
- Technology view
 - Computers are embedded everywhere in the environment, designed to sense users' presence and act accordingly
 - Mobile computers (mobile phones, PDAs, Tablets, etc.) are designed to interact both with the user and with this 'digital environment'
 - Blend of intelligent environments, context awareness, mobile computing, networking, information appliances, etc
- Human view
 - Invisible, computing blends into the background
 - Augmenting human abilities

Beyond the Desktop (II)

- Ubiquitous Computing poses a number of important issues
 - Social issues
 - Personal issues
 - Privacy issues
 - Environmental issues
- ...that we won't deal with today

History

- Ubiquitous Computing
 - Mark Weiser first mentions the term in '88
 - Builds on his earlier research on human-computer interaction
 - Influenced by Xerox PARC's work in networking and history of envisioning future environments
 - Influenced by late 80s critique of traditional HCI (see CSCW lecture)
 - Influenced by advances in graphical user interface research

History (II)

- A field with a strong vision, from the beginning:
 - ‘a new way of thinking about computers in the world, one that takes into account the natural human environment’
where computers would
 - ‘vanish into the background’
weaving
 - ‘themselves into the fabric of everyday life until they are indistinguishable from it’

Quotes from seminal papers by Mark Weiser
(late 80s/early 90s)

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An Unusual Field in Tech Research

- Most areas of computer science research are defined largely by technological problems
 - Driven by building, elaborating on a body of past results
- User-centered Design is typically driven by end user needs
 - Interviews, Field studies, Context Inquiries, etc.
- Ubiquitous Computing, by contrast is...
 - An arena for a wide range of very different kinds of technological areas and interests
 - Brought together by a common *vision*
 - Driven by the possibilities of the future, a concern for future computational worlds*, rather than problems of the past

(*) thus, a design discipline?

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A Strong, Common Vision

- Bell & Dourish, '07:
 - Around 25% of all papers published in the UbiComp conference between 2001 and 2005 cite one or more of Weiser's foundational papers

*'Yesterday's Tomorrows: Notes on Ubiquitous Computing's Dominant Vision',
Personal & Ubiquitous Computing, 11, Springer.*

But Is Weiser's Vision Up to Date?

- 'Proximate Future'
 - Motivations and frames tend to be 'just around the corner'
 - "Internet penetration will shortly reach..."
 - "We are entering a period when..."
 - "Mobile phones are becoming the dominant form of..."
 - A collective envisionment of a future saturated with technology, a collective 'looking forward'
 - Weiser's own "The Computer for the 21st Century"
 - Building defensible positions by alignment with existing paradigm; enrolling others as 'tacit supporters'
 - "Just as Weiser suggested in 1991, we are now entering an era of..."
- But our proximate future can't be the same as Weiser's from the late 80s! Or can it?
 - Intel's 486DX, 25MHz
 - 1.6 million US cellphone subscribers

Bell & Dourish, 2007

But Is Weiser's Vision Up to Date? (II)

- But then, if our proximate future can't be the same as Weiser's from the late 80s, how come it is in ubiquitous computing?
- Two alternatives:
 - The Ubiquitous Computing vision can *never* come to pass
 - The proximate future is a future indefinitely postponed
 - Ubiquitous Computing is never about the here and now
 - The Ubiquitous Computing vision has *already* come to pass
 - Ubiquitous Computing is already here, but took another form than that envisioned
 - Mobile computation and pervasive mobile phone use? Devices with wireless data communication and powerful computational capabilities are 'ubiquitous' in our society

Bell & Dourish, 2007

But Is Weiser's Vision Up to Date? (III)

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 - 'The future that ubicomp has been attempting to build is not our own future, but 1989s future—yesterday's tomorrows'

But Is Weiser's Vision Up to Date? (III)

- Bell & Dourish, '07:
 - 'The future that ubicomp has been attempting to build is not our own future, but 1989s future—yesterday's tomorrows'
- Weiser provided an imaginative vehicle for understanding the encounter between technology and the social world
 - where technology would play a liberating role
 - where technology would be clean, ordered, structured, invisible, thoughtful

We're Already Ubiquitous?

- The UbiComp world that was meant to be clean and orderly turns out instead to be very messy
 - The idea of seamless interoperation, homogeneity, grace, calmness has failed
- Rather than being invisible and unobtrusive, UbiComp devices are instead highly present, visible, branded
 - Characterized by improvisation and appropriation
 - Technologies lashed together, maintained in sync through considerable effort
 - Technologies appropriated in surprising ways, for purposes never imagined by the designers





Thanks!

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