

OP330: Human Factors 2

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- Guest lectures
- Book: Andy Clark: *Natural Born Cyborgs*
- Selected papers:
<http://www.ijsselsteijn.nl/hf2.html>

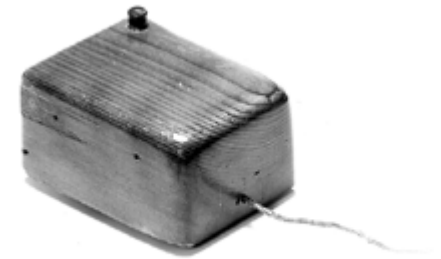
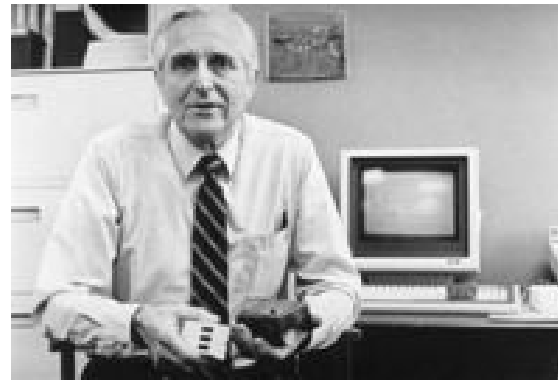
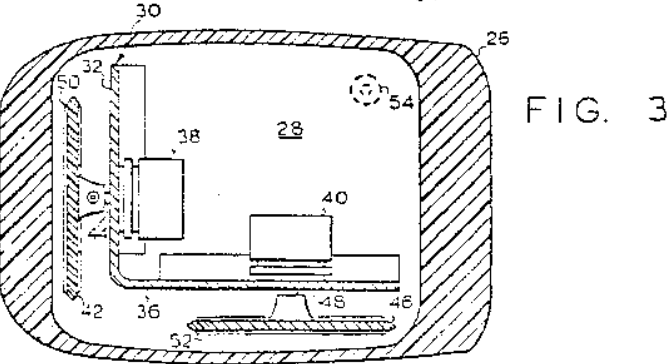
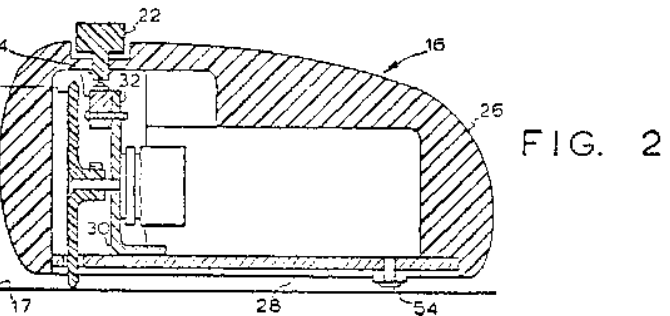
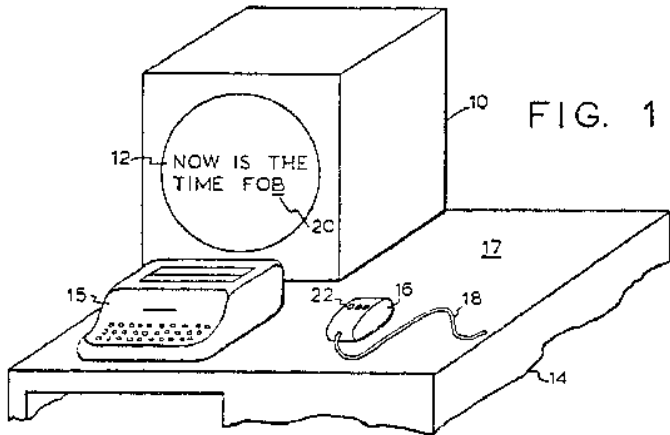
Goals

- To convey advanced knowledge and understanding of the complex relation between mind, body, and technology, in the context of current technology-dense environments: from laptops, mobile phones, and PDA's, to ambient intelligence, smart homes, and augmented reality.
- Introduction to advanced technological environments, and their related human factors challenges and potential solutions: transparent technologies, ambient intelligence, smart homes, ubiquitous computing, virtual and augmented reality, tangible interfaces, location based social digital media, affective computing

Themes

- History and development of human-machine interfaces that go 'beyond the desktop'. Natural interfaces such as graspable, tangible, or perceptual UIs
- Human-technology co-adaptation: How does human behavior and thinking change when confronted with technology; how does technology adapt to humans?
Context-sensitivity: who, what, where, when & why?
- Design & evaluation criteria for UbiComp and Smart Homes
- Social implications, e.g., control, privacy, information overload, alienation, etc.

Rewind 45 years...



Progress in computing...



Xerox Star (1982)

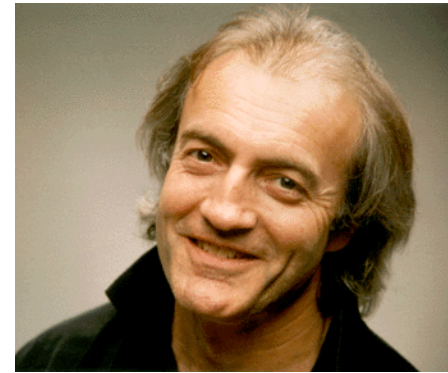


Apple iMac G5 (2005)

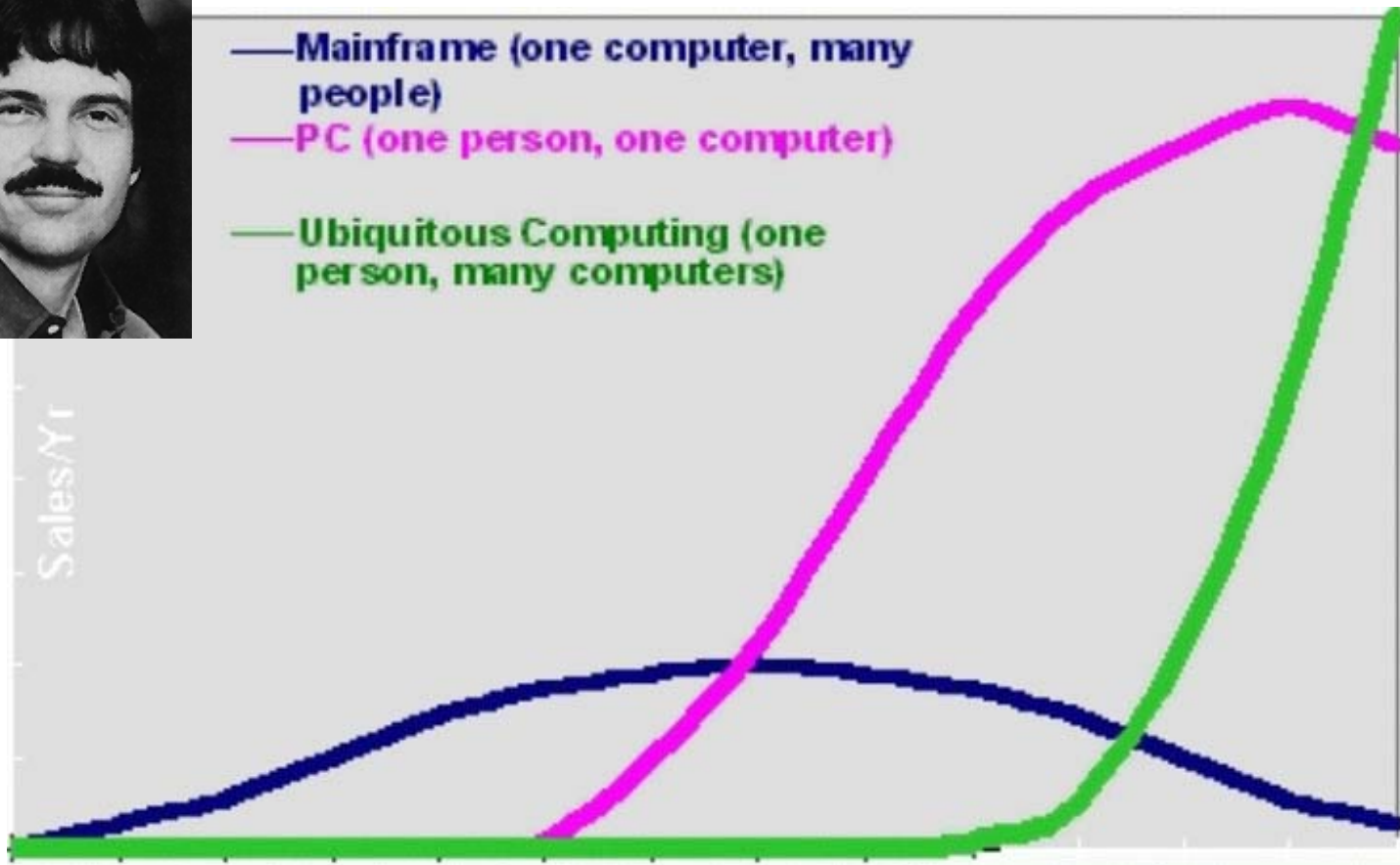
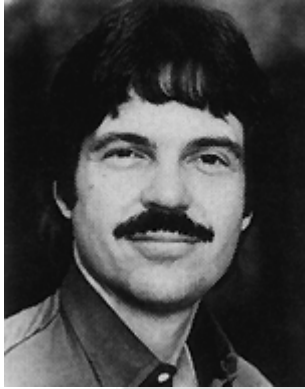
3 minute exercise

- Write down the most significant changes in computers over the past 15-20 years

- **Smaller**
- **Faster**
- **Cheaper**
- **More of them**
- **Networked**
- **Location/Motion Sensing:** our devices are starting to have the capacity to know where they are, both geographically (such as the GPS-equipped navigation computer in some cars, for example), and "socially".
 - Social awareness comes in two forms: technological and human. Devices are developing the capacity to have an awareness of what other devices are in (what Microsoft calls) the "Network Neighbourhood" , and in terms of the human social context.
- **Input/Output (I/O) Transducers:** the input output devices available are changing dramatically, offering a range of options from printers, scanners, etc. to the user, thereby opening the opportunity to redefine the nature of what constitutes a "computer terminal".



3 Waves in Computing (Alan Kay)



Kay envisioned a computer that can learn from the user and adapt to the user's needs through so-called *agent technology*.

Norman's Information Appliances

- An appliance is a machine or tool adapted for a special purpose (e.g., radio, camera, ...)
- A computer that provides specialised access to information (as opposed to a general control device)
- A distinguishing feature of information appliances is their ability to share information amongst themselves
- The appliance should fit the activity
- An information appliance should be:
 - simple - the task may be complex, but not the tool. The technology should be invisible
 - versatile: appliances should enable novel creative use
 - pleasurable: fun to use!



Mark Weiser's Vision

- “Disappearance is a consequence of human psychology afforded by the technology”
- Ubicomp is not just anywhere anytime
- Form factors: tabs, pads, boards
- Hundreds of computers embedded around us
- People will use them unconsciously
- Calm Technology:
 - moves easily between periphery and centre
 - enhances peripheral reach
 - puts us “at home”



Ubiquitous Computing

- “The most profound technologies are those that disappear” (Weiser, 1991) – e.g. electromotor
- “People and environments augmented with computational resources that provide information and services where and when desired” (Abowd & Mynatt, 2000)
- Integrated within our daily living and work environments



"Dangling String" : 8 foot piece of plastic spaghetti that hangs from a small electric motor mounted in the ceiling, connected to a nearby Ethernet cable...

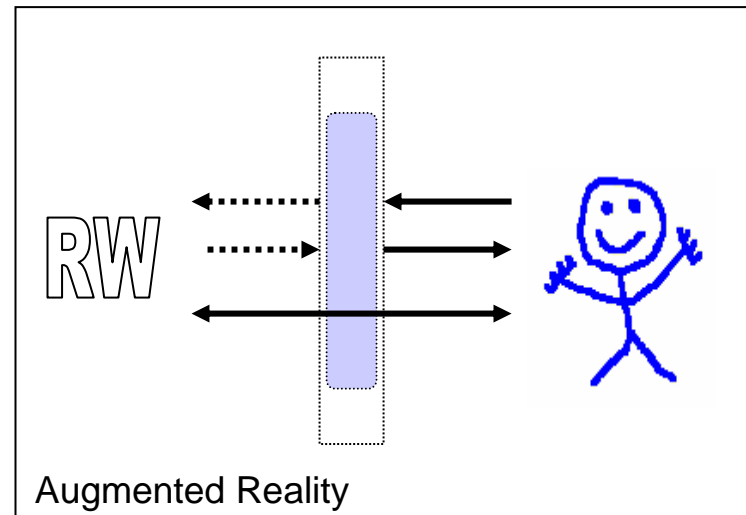
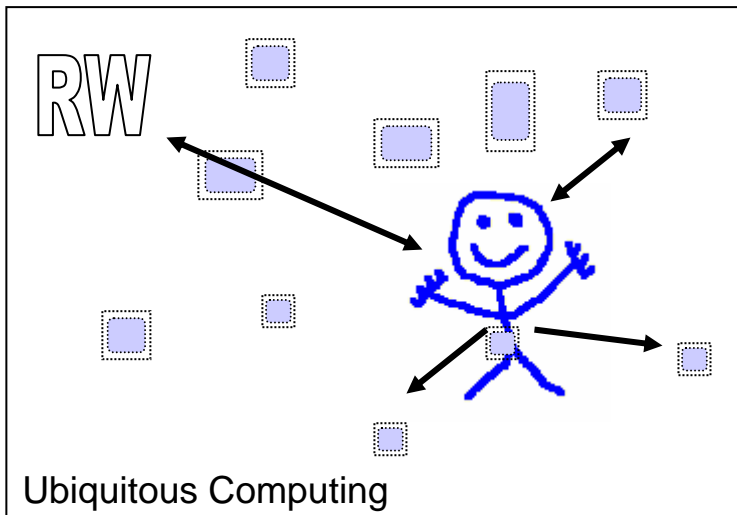
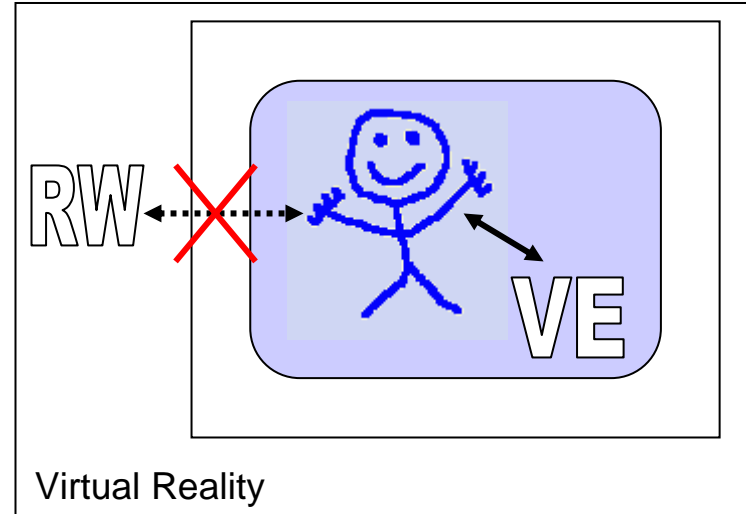
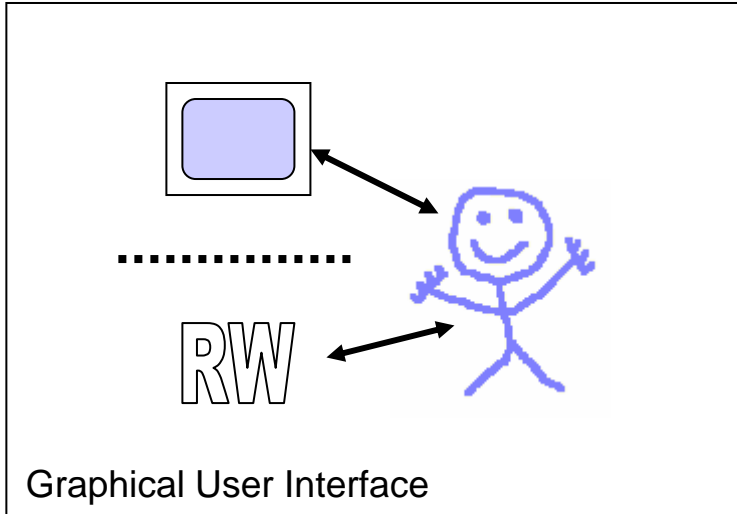
Very intuitive and non-intrusive information



This mirror not only reflects your image, but the weather, the news – and your vital signs.

The Philips vision of Ubiquitous Computing has been dubbed '*Ambient Intelligence*': ubiquity, awareness, intelligence, and natural interaction

User Interface Types



Andy Clark's *Natural Born Cyborgs*

- “It is our special character, as human beings, to be forever driven to create, co-opt, annex, and exploit non-biological props and scaffoldings”
- Blurs the boundary between user and technology – when do we ‘use’ tools and when do they become part of who we *are*?



Reading for today

- Abowd, G.D. & Mynatt, E.D. (2000). Charting Past, Present, and Future Research in Ubiquitous Computing. *ACM Trans. on Computer-Human Interaction*, 7(1), 29-58.
- Buxton, W. (2001). Less is More (More or Less). In: P. Denning (Ed.), *The Invisible Future: The seamless integration of technology in everyday life*. New York: McGraw Hill, 145 – 179.
- Thakara, J. (2000). The design challenge of pervasive computing, Invited talk at CHI 2000, reprinted in *Interactions*, May/June 2001, 46-52.
- Weiser, M. (1991). The computer for the 21st century. *Scientific American*, 265(3), 94-104.
- Weiser, M. & Seely Brown, J. (1995). Designing Calm Technology.