


BMMS: Mobile Media and Social IT

Ubiquitous / Pervasive / Context-Aware Computing



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Javaid et. al. (2008)

Ubiquitous computing paradigm as a byproduct of 4G technology

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01: The are many ubiquitous computings

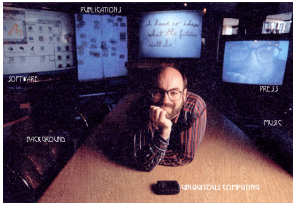
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Mark Weiser: 3rd era in the history of computers:

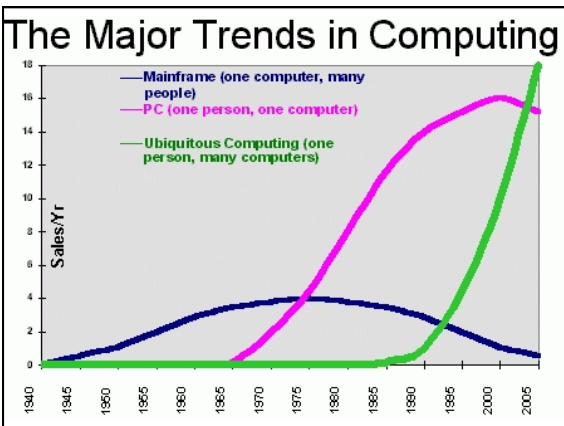
1950-1975: Mainframes (one computer → many people)

1975-1995: Personal Computers (one computer → one person)

1995-....: Ubiquitous computing (many computers → one person)



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“UbiComp”:

- “invisible” computing
- Computing without computers
- Desktop → physical environment
- “in every place” → “in every thing”
- 4G

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“UbiComp”:



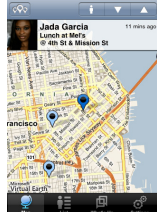
Vs.

- ubiquitous networking
- RFID tags
- Two-dimensional barcodes
- Voice/gesture recognition

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Terminology:

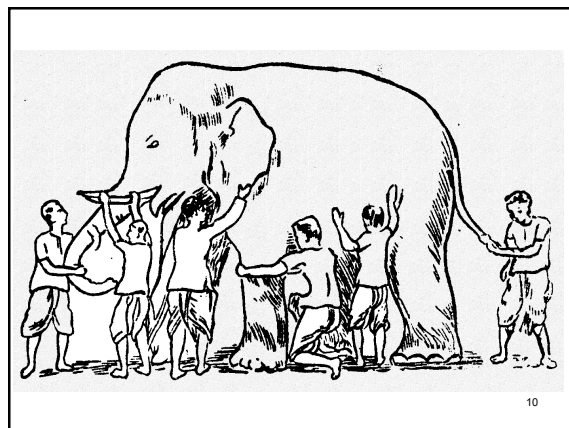
- Wearable computing
- Locative media
- Augmented reality
- Near-field communication
- “situated”, “connected” etc.

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02: The many forms of ubiquitous computing are indistinguishable from the user's perspective and will appear to a user as aspects of a single paradigm: everywhere

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Differences established by the research community are meaningless from the perspective of the user.

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Exceptions:

- Iroshi Ishii's Tangible Media Group

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"It involves a diverse ecology of devices and platforms, most of which have nothing to do with "computers" as we've understood them" (p. 16).

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03: *Everyware* is information processing embedded in the objects and surfaces of everyday life

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Microprocessors already exist in cars, cameras, watches, phones.

- Link to networks / exchange information
- Extend to connectivity to clothing, furniture, doorways

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Why was ubicomp first developed at work places?

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1. Active Badges (Olivetti, 1989)

2. Xerox Palo Alto Research Center (PARC, 1990s)

- [Parc Tab](#) (Identity, location, availability)
- [Parc Pad](#) (pen-based device)
- [Live Board](#) (wall-sized displays)




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Why it took so long for it to leave the domain of workplace and get into the mainstream?

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04: Everyware gives rise to a regime of ambient informatics

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- Multiplies the number of places in the world where information can be gathered
- Context-aware or location-aware services (Ex.)

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05: At its most refined, everyware can be understood as information processing dissolving in behavior

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Weiser: "The most profound technologies are those that disappear"
(transparency / calm technology)

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06: There are many rationales for the move away from the PC, any one of which would have been sufficient on its own

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- Q: Why embed computing in everyday objects?
- Q: Why reinvent thoroughly assimilated habits and behaviors around digital mediation?
- Q: Why give up the settled and familiar context of the PC for a wild and unruly user environment?

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The development of ubiquitous computing:

A Venn diagram consisting of four overlapping circles. The top circle is labeled 'technology', the bottom circle is labeled 'politics', the left circle is labeled 'society', and the right circle is labeled 'economy'. All four circles overlap in a central region.

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07: Everyware isn't so much a particular kind of hardware or software as it is a situation

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- environmental, enveloping field of information
- Embed new qualities in the things that surround us
- Ambient informatics
- Information processing dissolving in behavior
- Sensitivity to contexts

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08: The project of everyware is nothing less than the colonization of everyday life by information technology

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What is everyday life?

How can technology be embedded in it?

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09: Everyware has profoundly different implications for the user experience than previous paradigms

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PC experience vs. Everyware experience (p. 38)

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10: Everyware necessitates a new set of human interface modes.

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Interfaces		
PC	transition	Everyware
-keyboard -mouse -screen	-Phones / PDAs -Stylus-based input -Predictive text - Audio (voice recognition, auditory icons, speech output)	-Tangible media (MIT - Ishii) -Physical computing (NYU) (e.g. MultiTouchTable (Han) / Data Tiles / Sixth Sense (Maes) / Siftables (Merrill))

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11: Everyware appears not merely in more places than personal computing does, but in more different kinds of places, at a greater variety of scales.

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Places			
PC	LAPTOPS	PDAs / cell phones	Everyware
-Offices -Libraries -Dorm rooms -Dens -classrooms			

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Places			
PC	LAPTOPS	PDAs / cell phones	Everyware
-Offices -Libraries -Dorm rooms -Dens -classrooms	-Coffee shops -Transit lounges -Hotel rooms -airports		

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Places			
PC	LAPTOPS	PDAs / cell phones	Everyware
-Offices -Libraries -Dorm rooms -Dens -classrooms	-Coffee shops -Transit lounges -Hotel rooms -airports	-Sidewalks -Cars -Waiting rooms -Supermarkets -Bus stops -trains	

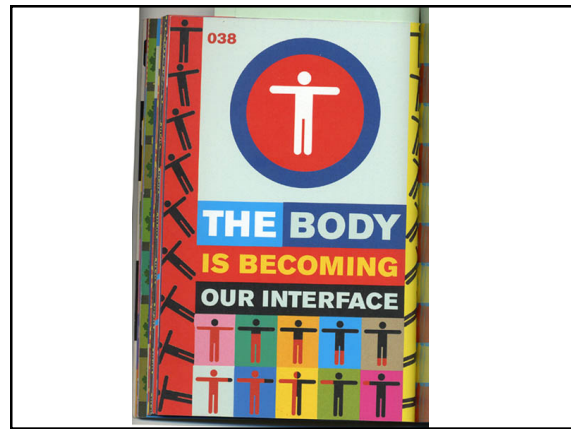
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Places			
PC	LAPTOPS	PDAs / cell phones	Everyware
-Offices -Libraries -Dorm rooms -Dens -classrooms	-Coffee shops -Transit lounges -Hotel rooms -airports	-Sidewalks -Cars -Waiting rooms -Supermarkets -Bus stops -trains	-Pens -Toilets -Refrigerator -Elevators -Closets -Pets -Etc.

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12: Everyware acts at the scale of the body

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Body Interfaces:

- BodyMedia's Sense Wear Patch prototype
- Matsushita's Electric prototype Kendo Toware
- Steve Mann's wearable computer



Steve Mann's "wearable computer" and "reality mediator" inventions of the 1970s have evolved into what looks like ordinary eyeglasses.



(a) 1980 (b) Mid 1980s (c) Early 1990s (d) Mid 1990s (e) Late 1990s

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13: Everyware acts at the scale of the room

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Room (sensor) interfaces:

- Smart Floor
 - Active Floor (1977, Olivetti / Oracle Research Lab)
 - NTT DoCoMo CarpetLAN
 - Leo Fernekas' [Sensacell](#) sensor grid system (Jef Han)
- Instrumented doorways
- Walls (ultra-flat screens)
- MIT Tangible Media Group AMBIENT ROOM

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14: Everyware acts at the scale of the building

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Extension of everyware into public spaces ("smart buildings"):

- Energy management control systems (EMCS)
- Schindler elevator's Miconic 10
- dECOi's Aegis [Hyposurface](#)

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15: Everyware acts at the scale of the street and of public space in general

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- Wayfinding (GPS)
- LBS
- "Immersive" maps (BING Maps)

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16: Everyware can be engaged inadvertently, unknowingly, or even unwillingly.

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17: The overwhelming majority of people experiencing everyware will not be knowledgeable about information technology.

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18: In many circumstances, we can't really conceive of the human being engaging everyware as a "user".

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19: Everyware is always situated in a particular context.

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20: Everyware unavoidable invokes the specter of multiplicity.

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21: Everyware recombines practices and technologies in ways that are greater than the sum of their parts.

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Q: Do the products and services we've been discussing truly constitute a system, a continuous fabric of computational awareness and response?

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22: Everyware is relational

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23: Everyware has profoundly different social implications than previous information-technology paradigms

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