Ubiquitous Computing Criticism

Seminar Ubiquitous Information

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Ubicomp as Seen by its Critics

- Agustin A. Araya, Dept. of Mathematics and Computer Science, San Jose State University: "… an attempt at a violent technological penetration of everyday life."

- Stephen Talbott, Author: "… the feverish dream of spooks and spies – to plant a 'bug' in every object – has been enlarged and re-shaped into the millennial dream of ubiquitous computing."

- Natascha Adamowsky, Humboldt-Universität zu Berlin: "Ubiquitous computing, so steht immer wieder zu lesen, sei die Vernetzung aller Dinge, bedeute die Allgegenwart von Computern. Es geht also um ein Projekt, das auf Totalität abzielt und natürlich auch nah am Totalitären steht …"

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Ubicomp Scenarios

Smart building materials:
- Sense vibrations, temperature, moisture
- Monitor premises for intruders
- Cancel street noise

Smart bridge deck:
- Senses / reports traffic, wind loads
- Monitors structural integrity

Smart sensor pills: Programmable delivery vehicles for pharmaceuticals: release substances based on bio-sensing, measure dose

Street light senses foot and motor traffic, polices area

Fire hydrant measures water flow, senses heat

Home networks: dishwashers, toasters, cable TV set-top boxes, toys, phones, thermostats, PCs

Collar on dog for **wireless location** via GPS. Clothes on man contain location sensors and wireless network capabilities

Smart concrete detects earthquake activity

Source:
Estrin, et al.: Embedding the Internet: introduction, Communications of the ACM, May 2000.

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"Pervasive" Includes Human Body

- Wearables → Shoes, Glasses, Clothes → Body Implants
  - Adamowsky: "Der Leib wird keine natürliche Oase bleiben inmitten der umfassenden Vernetzungsstrategien."

- Smart prostheses of every kind

- Body parts will contain chips
  and will be wirelessly connectable

- Border where human ends and machine begins
  becomes blurred

- By 2010 direct link
  to nervous system
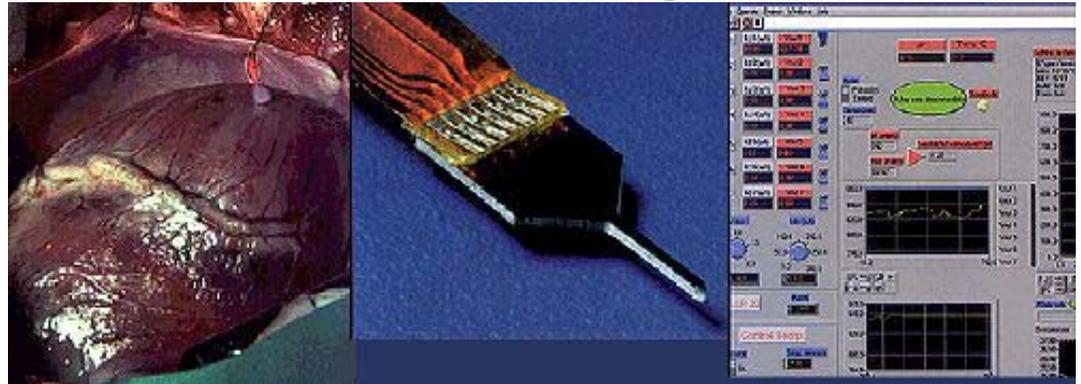
E.g. heart patient wirelessly connected to monitoring computer
Source: J. Thackara: "The design challenge of pervasive computing"

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Why is Ubicomp being Criticized?

- Explicit goal: Revolutionary transformation of everyday life
  - far reaching effects for each individual
  - Araya: "... ubicomp proposals should not remain unchallenged, but be subject to intense investigation."

- Guiding principle: Computers vanish into the background and are woven into the fabric of every day life
  - Seen as an attempt to let ubicomp go unnoticed in order to bypass resistance:

    Weiser: "the most profound revolutions are not the ones trumpeted by pundits, but those that sneak in when we are not looking"

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Criticism Categories

- Emotional reactions ←→ Philosophical analyses
- Criticism Categories
  - Surveillance
  - Marginal perceived value, irrelevance
  - Loss of control and loyalty
  - False promises
  - Primacy of technology over human needs: "technological absolutism" (Araya)
  - *Every*where and *every* thing: "nah am Totalitären" (Adamowsky)
  - Human world relationships change:
    Environment looses its "otherness"

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Useless Frills?

- Steven Levy: "Technology: What You'll Want Next", Newsweek, May 31, 1999

- Letters to the editor:
  - "... useless frills, trivial conveniences for the rich ..."
  - "Descriptions of the world of ubiquitous computing are dazzling, if only for their sheer silliness. If you rate humanity's needs for the coming century on a scale of 1 to 10, none of the products and services depicted in Levy's article rises much beyond a score of 1.5. ... one generation after another of superfluous techno-junk."
  - "Why are we getting excited about developing technology that allows us to check e-mail in the car when we have yet to figure out how to distribute food and resources in a way that helps 1.5 billion people living in poverty?"

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Surveillance

- H. Rheingold: "... Ubicomp might lead directly to a future of safe, efficient, soulless, and merciless universal surveillance"

- R. Lucky: "The old sayings that 'the walls have ears' and 'if these walls could talk' have become the disturbing reality. The world is filled with all-knowing, all-reporting things."

Marginal Perceived Value (Araya)

- Marginal character of needs presented in scenarios
  - Scenarios do not present anything fundamentally new
  - No justification for enormous research efforts and complexity of required infrastructure

- Things go faster and smoother
  - Weiser: "less strain, less mental gymnastics"

- Ubicomp appears to be driven by technology
  - Ubicomp has little to do with human needs, but with unfolding of technology per se: primacy of technology over needs

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Vagueness of Ubicomp Vision

- Scenarios appear to be pretty meager, compared to the dimensions of the envisioned goal
- Technological advancements (miniaturization, processing power, wireless connectivity) open up new possibilities
  - unclear how to use these possibilities constructively
  - unclear what things have to say to each other
    R. Lucky: "Everything will be connected to everything else. … no one has any idea what all those connections will mean …"
- Trapped in the "innovation dilemma"?
  - Know how to make things, but not what to make

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The Innovation Dilemma (J. Thackara)

- We know how to make amazing things (upper line)

- We don't know what to make (lower line)
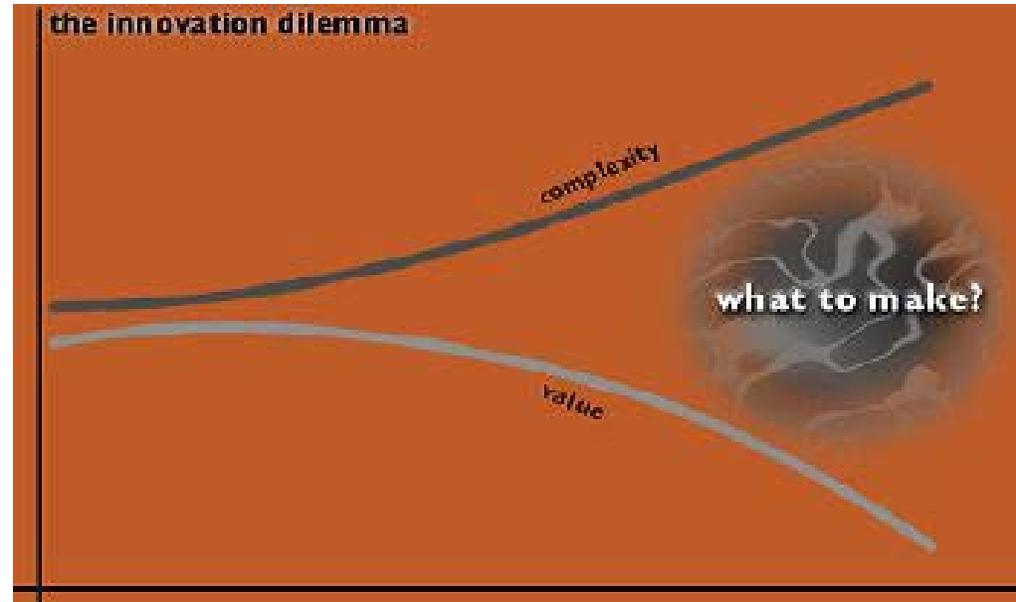
Source: J. Thackara: "The design challenge of pervasive computing"

- "Brilliant on means but pretty hopeless on ends"

- Divergence between technological intensification and perceived value

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Loss of Control and Loyalty

- R. Lucky: "Everything will be connected to everything else":
  - "My refrigerator ... would refuse to open at certain hours of the day, having talked to my bathroom scale."
  - "If I exceed the speed limit, [my car] reports me, and if I try to park illegally, it refuses to turn off or to let me open the door."
  - "I want to disengage these features, but the car comes with a shrink-wrap agreement whose legalese implies that the purchaser has only licensed its capabilities without any true ownership. The car now owes its primary allegiance to the new mega-company, Motorsoft.
  - "I feel surrounded by enemies and traitors."

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False Promises for Simplification

- L. Winner: "The Voluntary Complexity Movement":
  - "Simplify. Save time. Reduce effort. Liberate yourself from toil. This has been the continuing siren song of consumer technology throughout the twentieth century."
  - "According to anthropologists Silicon Valley employees have an endlessly busy, complicated, precariously balanced, strung-out existence in which traditional boundaries between work and leisure have evaporated. … Adding smart machines to every corner of the built environment does nothing to alleviate these patterns of hurry, stress and disconnection from people."
  - "… cramming more and more tasks into already harried days, adopting all kinds of digital technology as glue to hold things together."

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Change in Human—World Relationship (Araya)

- Environment is intimately tuned to us by engaging itself into our activities
  - ubicomp extends our "nervous system" through sensors as artificial nerves
  - physical surroundings become an extension of our bodies
  - environment becomes "us" rather than "other"
- Tagged things
  - things cannot get lost
  - things lose their "otherness"
  - "things" have been transformed into "surveillable things"
  - transformation disappears
  - surveillance is the default state
- Surrogates model aspects of the world
  - arbitrary, depending on interpretation of the world

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Do we care?

- Possibility for surveillance is a serious problem
- Ubicomp affects society as a whole, therefore its design should be an interdisciplinary effort
  - Adamowsky: "We have to examine very seriously what we intend and wish, because only then do we have a chance to design ubicomp in a meaningful way and actually arrive there."
- Marginal value?
  - "Civilization advances by extending the number of important operations which we can perform without thinking about them." – Alfred North Whitehead

References

- Natascha N. Adamowsky: Kulturelle Relevanz, Ladenburger Diskurs "Ubiquitous Computing", February 2000. Available at: http://www.inf.ethz.ch/vs/events/slides/adamowldbg.pdf

- Agustin A. A. Araya: Questioning ubiquitous computing, Proceedings of the 1995 ACM 23rd annual conference on Computer science, pp. 230-237, 1995. Available at: http://doi.acm.org/10.1145/259526.259560

- Hans Ulrich Buhl, Jürgen Schackmann, Matthias Knobloch, Cem Ulukut: Diskussion zu: Ubiquitous Computing - Oder was kommt nach der Informationsgesellschaft?, Wirtschaftsinformatik 42 (2000) 5, Meinung/Dialog, Mai 2000

- Stephen Doheny-Farina (1994). Default = Offline or Why Ubicomp Scares Me, Computer-Mediated Communication Magazine, 1 (6):8. Available at: http://www.december.com/cmc/mag/1994/oct/last.html

- Deborah Estrin, et al.: Embedding the Internet: introduction, Communications of the ACM, Volume 43, Issue 5 (May 2000)pp. 38-41, 2000. Available at: http://doi.acm.org/10.1145/332833.332836

- Martin Heidegger: The Question Concerning Technology and Other Essays, trans. William Lovitt. New York: Harper and Row. 1977. Available at:
    http://www.centenary.edu/~balexand/cyberculture/question1.html
    http://www.centenary.edu/~balexand/cyberculture/question2.html
    http://www.optdesign.com/Philosophy/Heidegger2.htm

- Thomas Leavitt: We'll Get What We Choose (and I'll Choose Convenience), NETFUTURE: Technology and Human Responsibility, Issue #98, November 1999. Available at: http://www.oreilly.com/~stevet/netfuture/1999/Nov2399_98.html#3e

- Robert Lucky: Connections – Everything will be connected to everything else. IEEE Spectrum, March 1999. Available at: http://www.argreenhouse.com/papers/rlucky/spectrum/connect.shtml

References

- Klaus Mainzer: Ubiquitous Computing - Perspektiven für Wirtschaft und Gesellschaft, Wirtschaftsinformatik 42 (2000) 5, Meinung/Dialog, Mai 2000

- Andrew Odlyzko: The visible problems of the invisible computer: A skeptical look at information appliances, AT&T Labs - Research, Revised version, September 7, 1999. Available at: http://www.research.att.com/~amo/doc/visible.problems.pdf

- David Porush: Ubiquitous Computing vs. Radical Privacy: A Reconsideration of the Future, Computer-Mediated Communication Magazine, Volume 2, Number 3, p. 46, 1995, Available at: http://www.december.com/cmc/mag/1995/mar/last.html

- Howard Rheingold: PARC is Back, Wired 2.02, February 1994. Available at: http://www.wired.com/wired/archive/2.02/parc_pr.html

- Steve S. Talbott: The Trouble With Ubiquitous Technology Pushers (Part 1), or: Why We'd Be Better Off without the MIT Media Lab, NETFUTURE: Technology and Human Responsibility, Issue #100, January 2000. Available at: http://www.oreilly.com/~stevet/netfuture/2000/Jan0600_100.html#3

- Steve S. Talbott: The Trouble With Ubiquitous Technology Pushers (Part 2), or: Why We'd Be Better Off without the MIT Media Lab, NETFUTURE: Technology and Human Responsibility, Issue #101, January 2000. Available at: http://www.oreilly.com/~stevet/netfuture/2000/Oct0500_112.html#1

- Steve S. Talbott: The Trouble With Ubiquitous Technology Pushers (Part 3), To Automate, or Re-enflesh?, NETFUTURE: Technology and Human Responsibility, Issue #112, October 2000. Available at: http://www.oreilly.com/~stevet/netfuture/2000/Oct0500_112.html#1

- John J. Thackara: The design challenge of pervasive computing, Doors of Perception, April 2000. Available at: http://www.doorsofperception.com/projects/chi/

- John J. Thackara: The design challenge of pervasive computing, interactions, Volume 8, Issue 3, pp. 46-52, May/June 2001. Available at: http://doi.acm.org/10.1145/369825.369832

References

- Phil Walsh, When Living Becomes an Inconvenience, NETFUTURE: Technology and Human Responsibility, Issue #96, October 1999. Available at: http://www.oreilly.com/~stevet/netfuture/1999/Oct1499_96.html#3b

- Mark Weiser: The Computer for the Twenty-First Century. Scientific American 265, no. 3 (1991): 94-104. Available at: http://www.ubiq.com/hypertext/weiser/SciAmDraft3.html

- Mark Weiser: Some Computer Science Problems in Ubiquitous Computing. Communications of the ACM, 36, no.7 (1993): 75-84. Available at: http://www.ubiq.com/hypertext/weiser/UbiCACM.html

- Mark Weiser and Seely Brown, John: Designing Calm Technology. Palo Alto: Xerox PARC, 1995. Available at: http://www.ubiq.com/hypertext/weiser/calmtech/calmtech.htm

- Peter Welzel: Ubiquitous Computing - Von der Vision zu ökonomischen Konsequenzen, Wirtschaftsinformatik 42 (2000) 5, Meinung/Dialog, Mai 2000

- Langdon Winner: The Voluntary Complexity Movement, NETFUTURE: Technology and Human Responsibility, Issue #94, September 1999. Available at: http://www.oreilly.com/~stevet/netfuture/1999/Sep1499_94.html#3