

# Ubiquitous Computing

Louise Barkhuus, guest lecture

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# Today

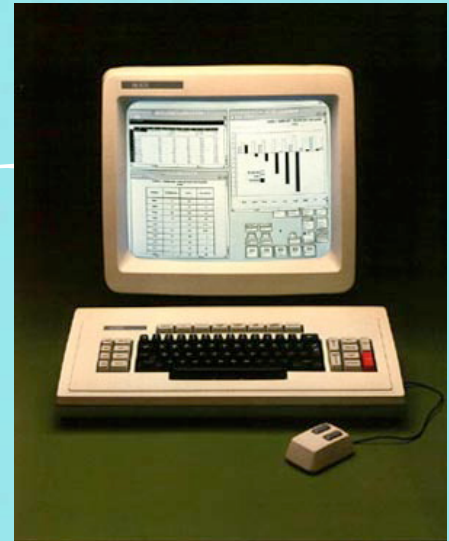
- \* Introduction to Ubiquitous Computing
- \* Discussion
- \* Envisioning Smart Homes
- \* Exercise

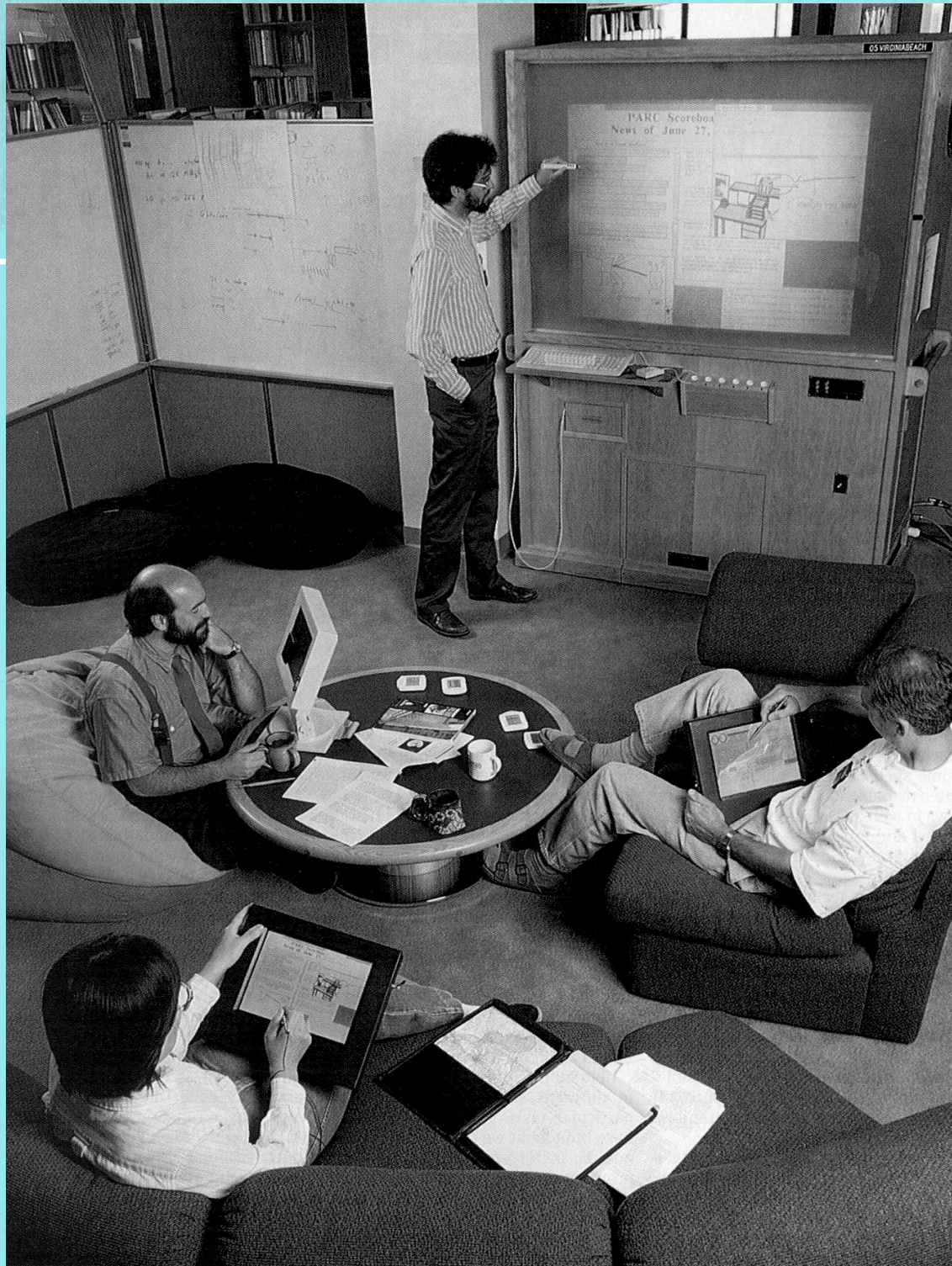
# Ubiquitous Computing

- \* A vision of the future of computing from the early 90s
- \* *Partially* playing out now in how we use computers
- \* Understanding the vision is an important part of understanding where the future of computing is going
- \* Important to think critically about computing and its pervasiveness

# Xerox Parc

- \* Xerox PARC - Californian research labs
- \* Where ethernet, laser printers, GUI, the mouse etc. was invented
- \* Mark Weiser, chief of the computing science lab - pushes his vision of the next revolution in computing
- \* Computing would become so cheap, so numerous that it would become embedded into everything from doorhandles to light switches





# The development of computing

- \* Computers have become

- \* faster

- \* cheaper

- \* smaller

- \* more numerous

- \* *more annoying*

As computers have become more embedded in our lives in many ways they have become disruptive

# Mark Weiser's challenge

- \* How can we build computers that integrate with our lives?
- \* People are most effective and authentic when they are fully engaged in the world with body and mind
- \* Computing should enhance this ability to engage with the world
- \* The notion of the disappearing computer

# The vision

- \* Technology embedded into the world in small and large forms
- \* A wireless network infrastructure that enables devices to work together
- \* Location sensitive technologies to guess and understand context
- \* *Invisible and calm computing*

# Interaction mode

- \* Handwriting recognition
- \* Speech recognition
- \* Small keyboards
- \* Sensorbased interaction
- \* The light turns out when there is no motion
- \* Windows automatically close after 5 pm in the office

# How to do this?

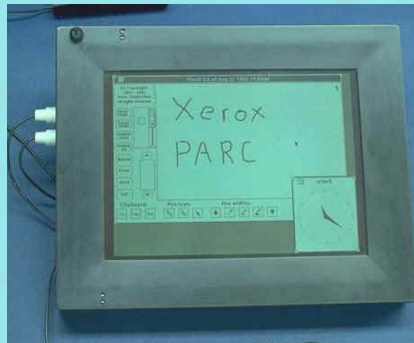


Phones

\* Tabs

\* Pads

\* Boards



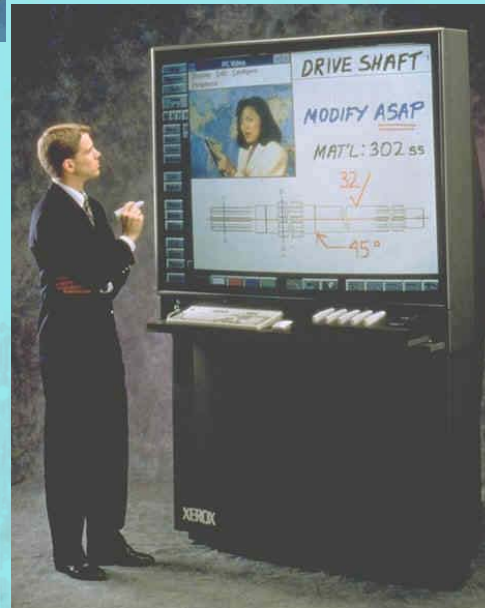
Laptops

Displays

Clocks

Portable games

Cards



# Three prerequisites

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- \* Hardware (cheap and fast computing)
- \* Software
- \* Networking (particularly wireless)

# Active badges re-route phone calls



# Ubicomp in Context

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- \* Xerox Parc was a company out of Xerox, the major copy machine company
- \* Wanted to go from being a paper company to a document company
- \* Really worried they would be obsolete soon

# Discussion

- \* Which things have come true?
- \* Which things have yet to come true?
- \* Which things will never come true



# Envisioning Scenarios

- \* Stuart Reeves: Envisioning Ubiquitous Computing
- \* Describes how envisioning is part of a research narrative for ubiquitous computing
- \* Envisioning has led to certain expectations and actual development
- \* But real development has often gone in different directions, for example in Virtual Reality

# Envisioning the future home

- \* Has been done since the 50s
- \* Rooted in home appliance development
- \* Ubiquitous electricity and cheaper motors
- \* Vacuums, washers, toasters, blenders
- \* Technologies that make it easier for the house wife (or do they?)

# Westinghouse

"Isn't my new Turnover Toaster a beauty? I just bought it. During February, you know, one thinks about adding to the home furnishings, and these handy electrical appliances make housekeeping so much easier!"

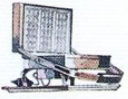
"My Westinghouse Iron and Percolator Set have really become indispensable, they're so useful and attractive. Next we're going to get the Waffle Iron."

Thousands of women are choosing Westinghouse appliances, both for their reliability and their good looks. Pictures don't half tell the story, but you can see them at any of the stores handling the Westinghouse line. Now is a good time to buy them.


WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY  
Offices in all Principal Cities. Representatives Everywhere




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Westinghouse  
Waffle Iron



Westinghouse  
Mazda Lamp



Westinghouse  
Table Stove




Westinghouse  
Iron



Westinghouse  
Warming Pad



Westinghouse  
Small Motor



Westinghouse  
Rectigon



Westinghouse Automatic  
Electric Range



Westinghouse Grecian  
Urn Percolator Set



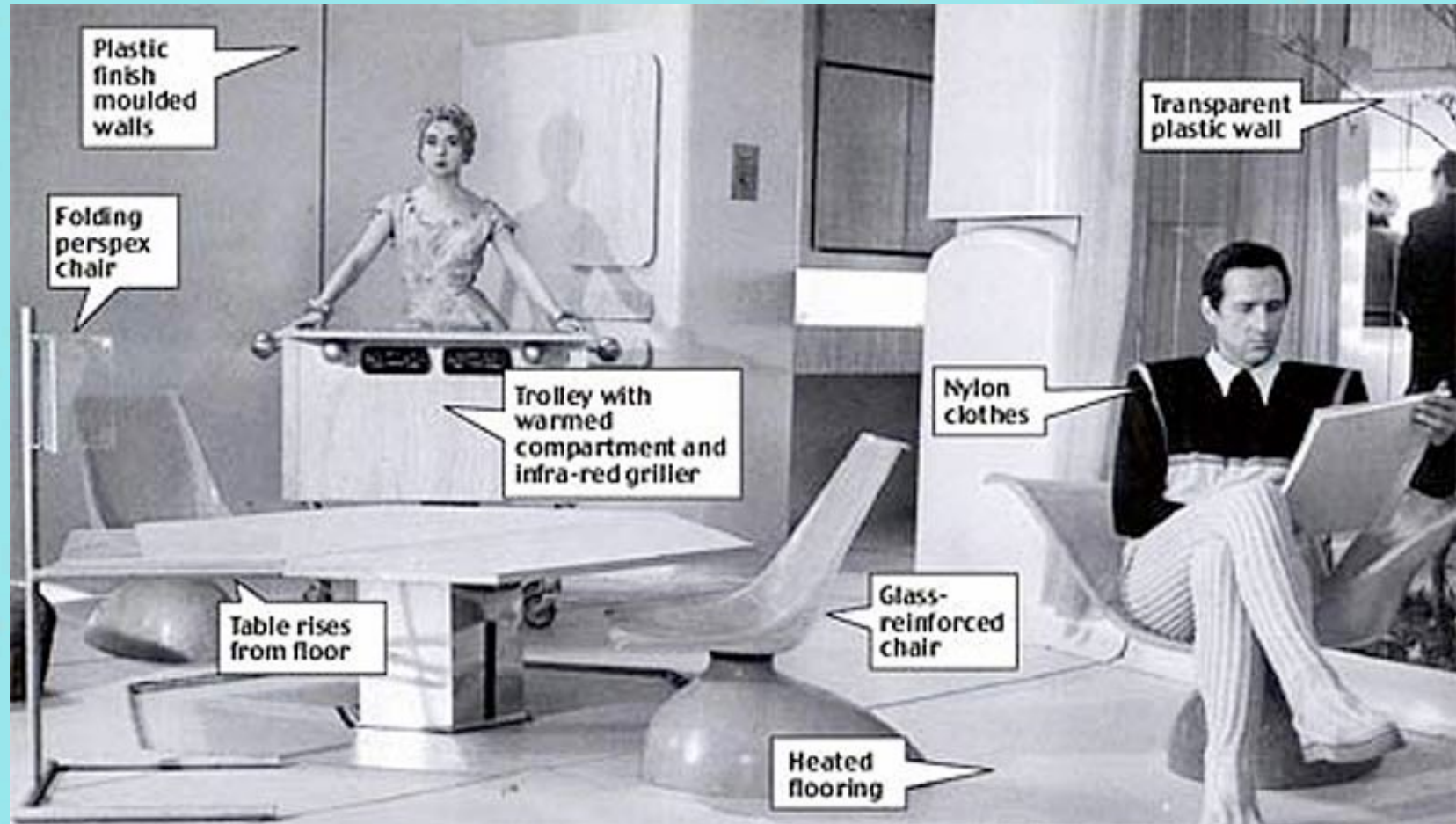
Westinghouse  
Bell Ringer

# Future house of 1956

- \* No Fridge - meat and fish was gamma-rayed for eliminating germs
- \* No stove - electrical pans and pots can cook on any surface
- \* Furniture would appear from the floor by a flick of a switch



# 1956: 2006



# 1956

This is your future

3D Color TV Wall Panel

Slide-back Roof

Personal Helicopter and  
Roof Landing Area

Moving Stairway

House-control Panel



Glass Walls

Dust-free Floors

Menu Selector  
and Microwave Stove

Giant-size Fruit

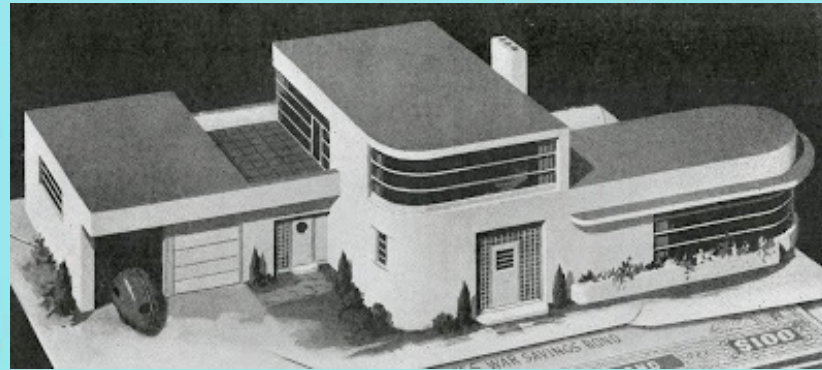
Ultrasonic Laundry

Electrical Heat Unit

Phono-vision Receiver

ILLUSTRATED BY FRED WINANS

# Actual Implementations



- \* Several companies started making prototypes in the 70-80s
- \* The Honeywell House, NAHB Smart House, Xanadu
- \* Focused on lighting, security and entertainment

# Computer Controlled House

- \* Smart house is a computer controlled house
  - \* Controlling electricity, music, security
- \* Integration
  - \* Energy (heating and lighting), safety (security alarms), communication (information and messaging), entertainment

- \* Honeywell invited people to test the house for dinner
- \* Light sensor went out when sitting still at dinner
- \* Consider voice activation
- \* Now solved with longer time-outs



**If she can only cook as well as Honeywell can compute.**

Her soufflés are supreme, her meal planning a challenge? She's what the Honeywell people had in mind when they devised our Kitchen Computer. She'll learn to program it with a cross-reference to her favorite recipes by N-M's own Helen Corbitt. Then by simply pushing a few buttons, she'll have a complete menu organized around the entrée. And if she pales at reckoning her lunch tabs, she can program it to balance the family checkbook. **\$44** 10,800.00 complete with two week programming course. **\$48** Fed with Corbitt data: the original Helen Corbitt cookbook with over 1,000 recipes \$5.00 (.75) **\$48** Her Potluck, 375 of our famed Zodiac restaurant's best kept secret recipes 3.95 (.75) **\$48** Her tabbed apron, one-size, ours alone by Garden House in multi-pastel provincial cotton 28.00 (.90) Trighy Room



- \* No help with house work
- \* They merely talk about integration of technologies
- \* Only examples are about communication
  - \* vacuum cleaner will stop automatically when there are someone at the door

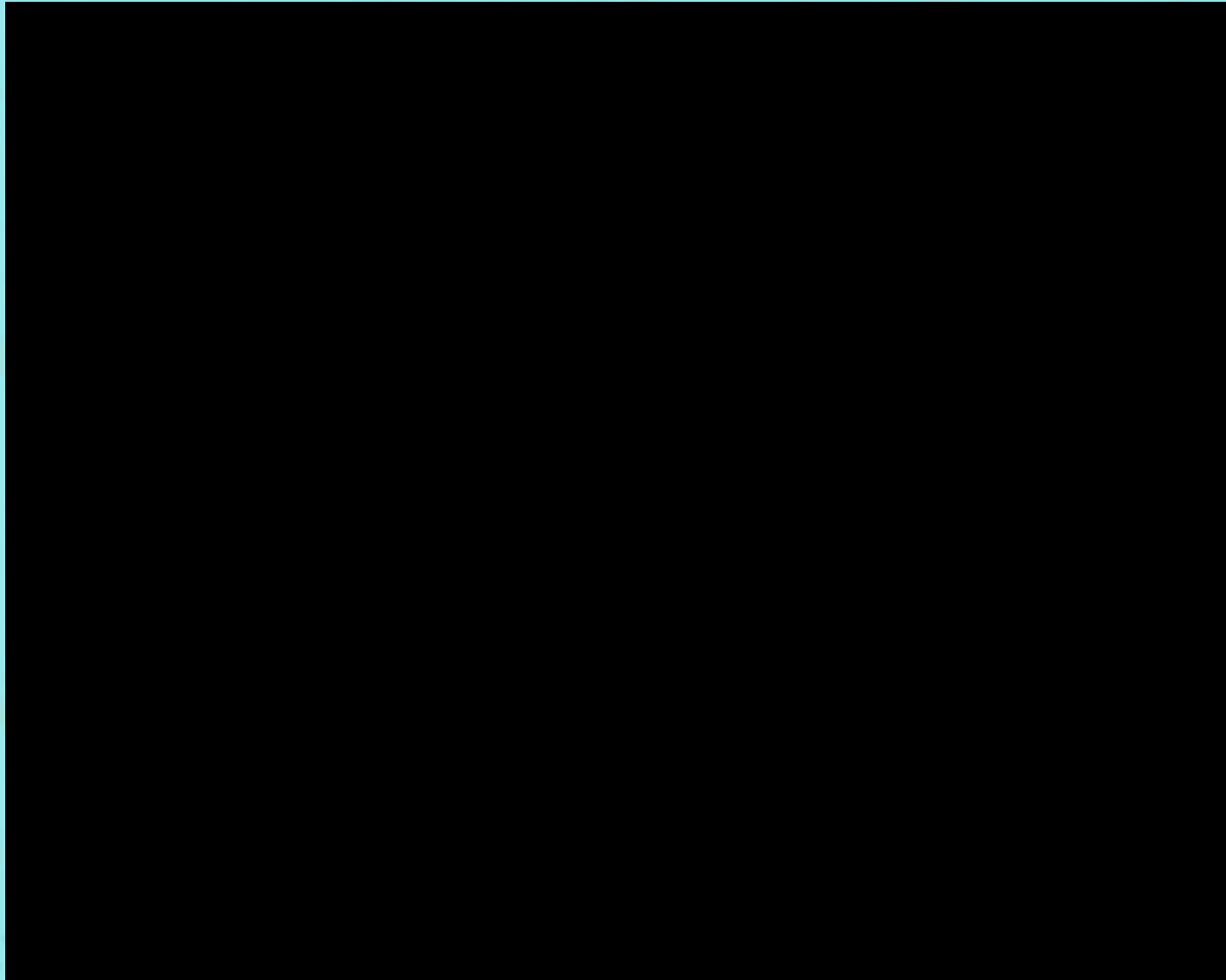


# Why not focus on housework?

- \* Smart homes essentially conceptualized by men (and engineers)
- \* Housework is invisible
- \* Housework is boring!



# Philips Vision of the Future



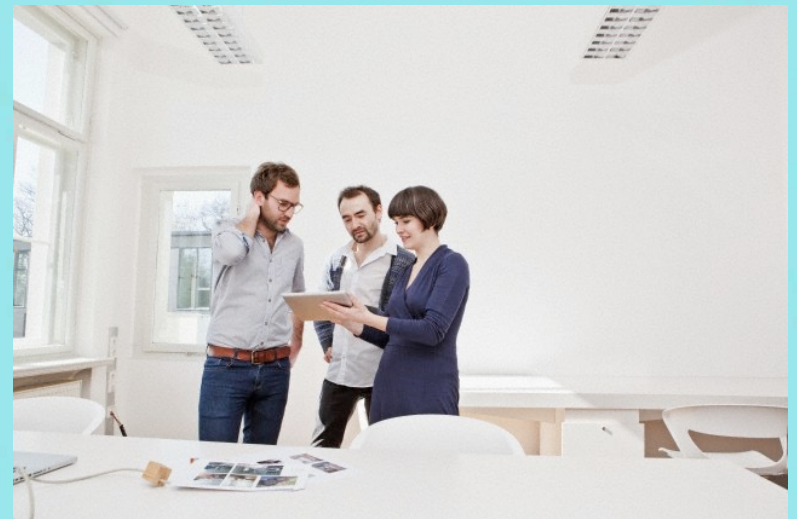
# Envisioning Discussion

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- \* What does Stuart Reeves say about Envisioning as a way of addressing technology development?
- \* How does envisioning affect our perception of computing?
- \* Think of examples of envisioning in the media

# Exercise

- \* Discuss with your neighbor an envision scenario of a mobile device in 30 years. Describe the user and the situation. How realistic is this scenario?



Thank you!