Lecture 11:
Handheld Devices and Information Appliances

- What is an Information Appliance?
- Norman & the “Invisible Computer”
- Survey of Devices
- Principles of design
  - Palm Pilot
  - Consistency

Information Appliances

- Defined (Mohageg & Wagner, 2000)
  - Computer enhanced consumer device
  - Dedicated to a restrictive cluster of tasks
    - An applicance (e.g. toaster) is a device which does only a few tasks
    - Contrast with a PC: general purpose machine, software enables it to be an unlimited number of 'virtual machines'
- Norman (1998) book "The Invisible Computer"
  - Computers (PC) are too complex for most users to be able to use well
  - Their complexity is partly the result of their function as multi-purpose general computing machines
  - The solution is information appliances dedicated to narrow uses
    - Reduces complexity

Information Appliance
(Norman, 1998)

- Coined by Raskin 1978 at Apple – Canon "writing appliance"

- Appliance – Device designed to perform a *specific* function
- Information Appliance – An appliance specializing in information.
  - "An information appliance is designed to perform a *specific* activity such as music, photography, or writing." (p. 53)
  - Information appliances exchange information with other information appliances

Reduction of Complexity
(Norman, 1998)

- Norman: PC outlived its usefulness to average user
  - Multi-purpose nature has made it too complex
  - How many hours do you spend maintaining your PC vs. “maintaining” your televison or refrigerator? (p. 71)
    - Note recent example: Microsoft critical windows updates – one a week in 2003!
  - Steep learning curve – huge manuals
  - GUIs are “wrong for today” (pp. 72-73)
    - GUIs made everything visible – great when you had simple system
    - Today – too many things to make ‘visible’
    - Example: huge hard disks with many, many files
- Analogy to motors
  - Started out expensive – one motor had attachments to drive multiple devices
  - Today, motor are :invisible”
  - Invisible motors in clocks, fans, vacuum cleaners, etc.
- Computers must become invisible

Norman's Three Axioms

- Simplicity
  - "The complexity of the appliance is that of the task. The technology is invisible"
- Versatility
  - "… encourage novel and creative interaction."
- Pleasurably
  - " … pleasurable, fun, enjoyable …"

Norman (1998) p. 67

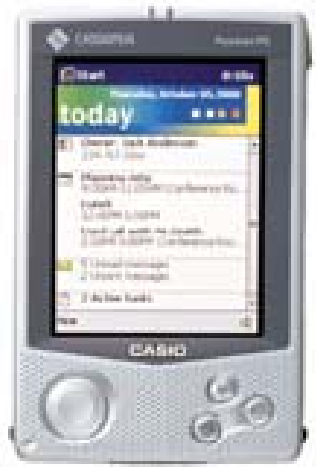
Technology- vs. User-centered Products

- Norman (1998) – Edison vs. Victor phonographs
- Edison phonograph (cylinder) was technically superior
  - Sounded better
  - Cylinders lasted longer
  - Edison was first
- Edison did not
  - Recognize what consumers wanted to use it for (recorded music)
  - Recognize the importance of convenience and compatibility
- Victor did (after a time)
- Edison switched to discs – too late
- Moral of Norman's story:
  - *Being first and being best does not matter, knowing your consumer does.*

Information Appliances Today

Handheld PDAs (Personal Digital Assistants)

Palm Pilot



Windows CE Device

Typical large, high function PDA:
HP Jornada 720 (Windows CE)

Enhanced PDAs

Handheld with wireless modem

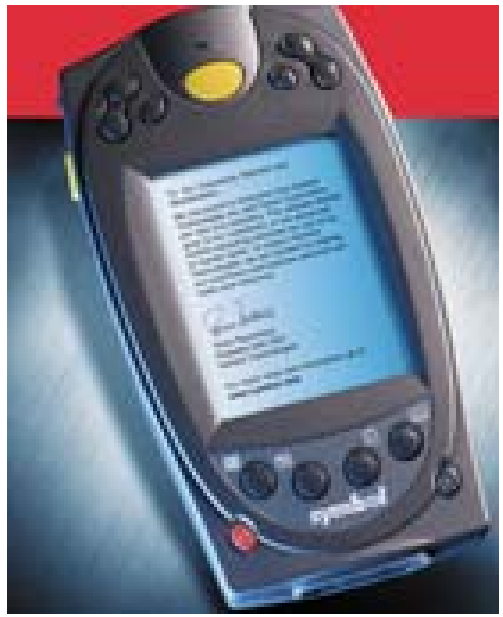
Visor with plug-in module (camera)

Portable Email Retrieval Device: The Blackberry

Wireless Phones Enhanced by PDA Function

Wireless Phones Enhanced Internet Connectivity (PocketNet)

Single purpose device (Barcode reader) acquires PDA functions (Palm Pilot and Windows CE versions)



Samsung Uproar: Combination Cellular Phone and MP3 Player

Revenge on Don Norman?

Mobile Tablet Device

Is there a future for natural handwriting recognition after the Newton?

Design Rules

- Mohageg & Wagner (2000) -- class reading
- Five design considerations:
  - Account for the target domain
    - take into account environment, user tasks, how device is to be used
  - Dedicated devices mean dedicated user interfaces
    - User interfaces may vary on demands on product use
  - Allocate functions appropriately
    - Not limited to PC input devices, design freedom (e.g. dedicated buttons)
  - Simplify
  - Design for responsiveness
    - Unlike PCs, users expect immediate and reliable response from a device

Design of the Palm Pilot (1)

- Bergman interview with Rob Haitani (2000) -- class reading
- Counter trends in PDA (Personal Digital Assistants)
  - Counter industry trend: products need to have more functionality
  - More functionality caused succeeding generations of PDAs to be larger, slower, more expensive
  - Less functionality, match what users want
  - Smaller size: Jeff Hawkins walks around with wood block in his pocket
    - Pocket size
    - Built from assumption of size users wanted, not from need for functionality
  - Less functionality: easier to use
- Counter trend to make handheld device a “little PC”
  - Directly counter to Microsoft Windows CE, Pocket Windows
  - Doing the “right thing” might be different on handheld than with desktop PC
    - Example: Pilot date book goes to current day when selected, counters PC default to return to where you last were in an application: inappropriate for use a PDA is likely to see (check calendar at different times in different contexts)

Design of the Palm Pilot (2)

- Solve the complexity of synchronization with desktop
  - "Hotsync" cradle concept
  - User results found from focus groups
- Design for efficiency for tasks that are done frequently
  - "one more tap does not matter for features you use infrequently"
- User testing and prototyping with Hypercard
  - Maximized design for user expectations -- Haitani refers to it as "predictability"
  - Analyzed people usage of laptops versus handhelds
    - Rejected the sort of Windows CE consistency philosophy

Device-Desktop Consistency

- Consistency and Windows desktop
  - Philosophy of Windows CE: bring familiar desktop concepts and widgets to handheld device
    - This was not a success, to many people's surprise, not just Microsoft
  - Palm applications are inconsistent with MS Windows
    - But are easy to use
  - Palm applications are suited to use handhelds are put to
    - Proper fit to users' tasks are more important than consistency
    - Transfer of training apparently not as important as usefulness