HP Cooltown • (ubiquitous comp.)

• What inferences does the system make?
• What connections are necessary?
• What are possible pitfalls?
• What’s your (emotional) reaction?
Interaction styles (traditional)

• Command entry
• Menus
• Direct manipulation
• Form fill-in
• Natural language
Interaction styles (new)

• Immersive/virtual reality
• Ubiquitous computing
• Robotics
Conceptual models for activities

- Giving instructions
- Conversing
- Manipulating, navigating
- Exploring, browsing
Direct manipulation

- GUI objects representing task objects/funcs
- Pointing device
- Based on consistent metaphor
- Congruent operations, always available
- Immediate feedback
- Form of icon, cursor on rollover indicates possible operations
Interface hardware (I/O devices)

- Appropriate for users’ tasks
- Suitable for intended work environment
- Match user’s physical characteristics
  - age, dexterity, impairments, injury avoidance
- Match user’s psychological characteristics
  - computer skills, capacity for learning
Survey of output devices

• Displays (CRT, LCD, …)
  – Wearable • • • or room-scale • •
• Audio (speech or non-speech)
• Tactile •
• Olfactory •
• Specialized for disabilities (e.g., Braille •)
Survey of input devices

• Keyboards
  – QWERTY, Dvorak •, chording ••, thumb •, numeric, arrows

• Pointers
  – Mouse, trackball ••, trackpad, joystick, pen •

• Touchscreen

• Speech input

• Handwriting, gestures, “Graffiti” •

• Data gloves ••, data suits, 3D trackers

• Specialized for disabilities
Hand-held devices

• Often used without watching ("eye-less"), so highly tactile keypads necessary

• Highly targeted info (personalization)

• New interaction paradigms:
  – Motion-invariant displays •
  – Touchscreen dragging (page-flipping) •
  – Hand mirror metaphor •
  – Keyhole/flashlight metaphor
Design principles (indep. of style)

- Consistency (internal, external)
- Advance information •
- Immediate feedback •
- Easy reversal (undo •)
- Error prevention, help •
- Minimal short-term memory
- User control
- User diversity, personalization •
- Shortcuts for experts
- Online help •
- Learning aids •
HCI design

- Many roles (HCI designers, graphic designers/artists, tech writers, user reps, management reps, programmers)
- Determining users’ needs, requirements
- Must precede coding
- Guidelines to follow
- Evaluation throughout process
ID process (Preece)

- Identify needs, establish requirements
- Develop alternative designs (unlike software design)
- Build interactive versions of designs (prototypes)
- Evaluate designs
- Iteration is inevitable
The star life cycle (adapted from Hix and Hartson, 1993).
ID process model (Preece)

- (Re)Design
- Identify needs/establish requirements
- Build an interactive version
- Evaluate

Final product
Identify all the stakeholders

• Primary (directly interacting) users, but also:
  • Managers
  • Recipients of product’s results
  • Purchasing decision makers
  • Competitors’ users
Human users are diverse

- Physically (hand size, height, strength, coordination, disabilities)
- Cognitively
- Culturally
- Experientially
Needs and requirements

• Want to understand users, task, context
• Kinds of requirements
  – Functional: what it does
  – Non-functional: e.g., memory reqts, delivery time
  – Data: what info is stored, in what form
  – Environmental: physical, social, org’l context
  – User: what users will be like
  – Usability: what balance of factors
Gathering requirements data

- Questionnaires
- Interviews
- Workshops and focus groups
- Naturalistic observation
- Studying documentation
- Choose based on kind of task, on data provided, cost, time required, what analyst needs to know
Problems gathering data

- Identifying, involving stakeholders
- Availability of key stakeholders
- Ownership of reports, versions
- Communication (with users, within team)
- Domain info hard to get or articulate
- Political problems in organization
- Changes in economic or business situation
Data gathering guidelines

• Focus on identifying stakeholder needs
• Involve all stakeholder groups, more than one person from each
• Combine techniques; use props, prototypes
• Run a pilot session (user testing!)
• Decide how to record data (audio, video, notes)