

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 •)

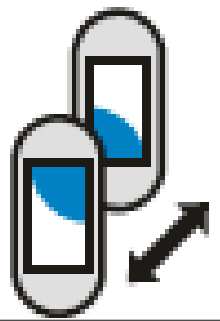
Survey of input devices

- 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)

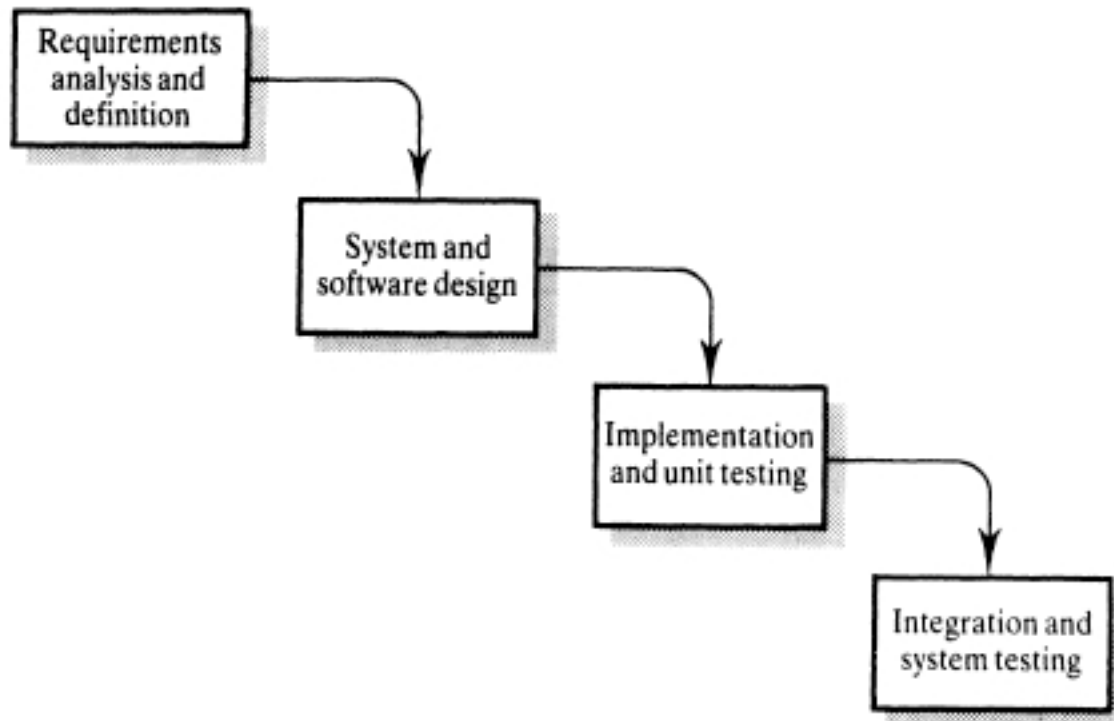
- Consistency (internal, external)
- Advance information •
- Immediate feedback •
- Easy reversal (undo •)
- Error prevention, help •
- Minimal short-term memory
- User control
- User diversity, personalization •
- Shortcuts for experts
- Online help •
- Learning aids •

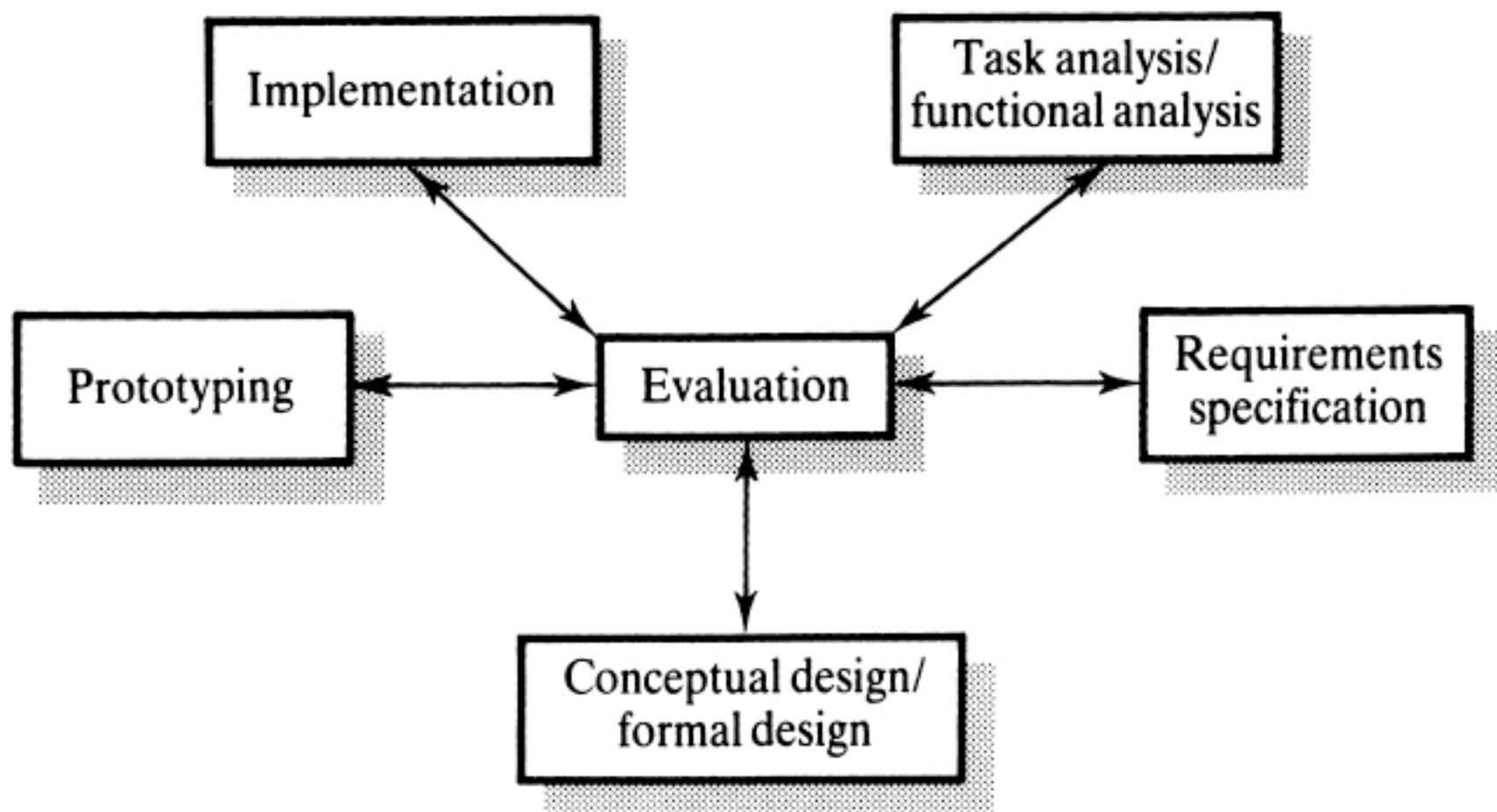
HCI design

- 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)

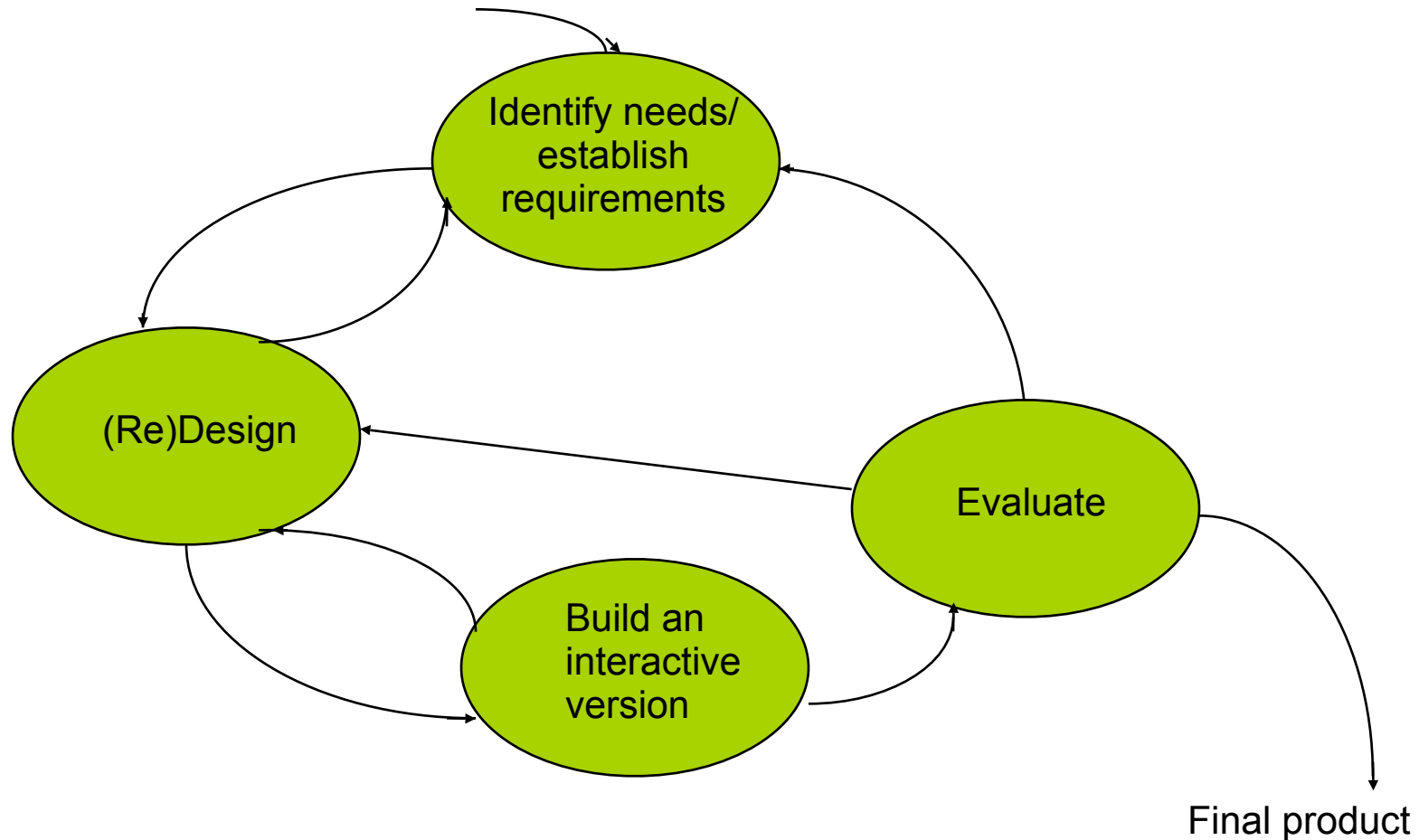
- Identify needs, establish requirements
- Develop alternative designs (unlike software design)
- Build interactive versions of designs (prototypes)
- Evaluate designs
- Iteration is inevitable





The star life cycle (adapted from Hix and Hartson, 1993).

ID process model (Preece)



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)