Interaction Design (ID)
Overview

• At the end of the day, it’s all about the picture below

A system’s designer/developer must effectively communicate his or her perception (mental model) of the system to the system’s users through the “image” presented by that system

• Once you know how to bridge that gap, then you know interaction design
How the Course is Structured

- **Theory**: Concepts, principles, history, methods, techniques, models

- **Practice**: Focus on specific technologies as a sandbox of sorts for testing and applying the theory
  - Java Swing — knowing the libraries, designing software, implementing specific functions
  - Others, depending on time: OpenGL/GLUT, HTML/CSS/JavaScript, Cocoa Framework — different technologies, similar application to HCI

How to Use the Materials

- *Designing the User Interface* by Shneiderman & Plaisant — This is the core textbook; the theory part of the course will follow the chapters in this book

- *The Design [Psychology] of Everyday Things* by Norman — Basis for many core design principles; not the only one, but widely acknowledged as seminal

- *Usability Engineering* by Nielsen — Basis for design methodologies; again, not the only one, but viewed as pioneering work in the area
The State of the Field

- ID is a “young” field, when compared to other computer science topics
- Naming: “user interface design,” “human-computer interaction (HCI),” “interaction architecture”
- Today, ID is distinct from HCI, and is viewed as a synthesis of:
  - Traditional disciplines (e.g., computer science, psychology, sociology)
  - Interdisciplinary fields (e.g., HCI, cognitive psychology, human factors engineering, computer-supported cooperative work [CSCW])
  - Design practices (e.g., graphic and industrial design, Web authoring, studio arts)

- Characteristics of a “young” field
  - Few fully established universal concepts
  - “Guru-oriented” — field depends on key individuals that establish their own schools of thought; results in unstable vocabulary, jargon
  - Commercial products sometimes ahead of research

- Characteristics of a “mature” or “established” field
  - Established, universally accepted conceptual framework
  - Standardized vocabulary; individualized schools of thought shift to the cutting edge of the field
  - Research leads commerce
Usability Requirements

• What do we ask of a usable system?

• An early take: the *US Military Standard for Human Engineering Design Criteria* (paraphrased, my italics)

  1. Achieve required *performance*
  2. *Minimize* skill and personnel requirements, *training time*
  3. Achieve required *reliability* for personnel, equipment, software
  4. Foster design *standardization*

Requirements are Requirements

• One view is that usability requirements are pretty much the same as software requirements in general:

  1. Ascertain users’ needs
  2. Ensure proper reliability
  3. Promote appropriate *standardization, integration, consistency*, and *portability*
  4. Complete projects on schedule and within budget

• Nielsen’s term is “system acceptability”
Usability Measures

• To imperatively determine that a requirement has been fulfilled, metrics are required — how do we quantify requirement goals (1) and (3)?
  ◆ Requirement (2): unit tests, fault tolerance, program correctness
  ◆ Requirement (4): deadlines met, products shipped, money remaining in the bank!

• International Standards Organization (ISO) standard 9241: effectiveness, efficiency, satisfaction

• Current consensus (terms in parentheses indicate Nielsen’s vocabulary):
  1. Time to learn (learnability)
  2. Speed of performance (efficiency)
  3. Rate of errors by users (errors)
  4. Retention over time (memorability)
  5. Subjective satisfaction (satisfaction)

• Nielsen lists memorability as the metric #3, errors as metric #4
Usability Motivations: Not Just a Pretty Face

- *Life-critical systems*: need we say more?
- *Industry and commerce*: usability is frequently the “oil” in a well-oiled business
- *Office, home, entertainment*: Web browsers, e-mail, cell phones, and digital music players as usability successes — or are they?
- *Exploration, creation, collaboration*: traditionally very “human” activities; so far, technology gets in the way more often than not
- *Technology and society*: hanging chads, anyone?

Universal Usability: ID as Democratizer

- *Workplace/environment diversity*: Anthropometry, sometimes referred to as “human factors”
- *Human diversity*: Cognitive and perceptual abilities; personality; cultural and international differences; disabilities and handicaps; age groups (older adults, children)
- *Technological diversity*: Today, this deals with bandwidth (network, display) and internationalization, or “i18n” for short (languages, formatting conventions)
ID as a Profession, Science, and Field of Study

• “Addressing the needs of all users”
• Not a “religion” — early perception of HCI as nitpickers and aesthetes, even elitist; in fact it is a full-fledged subdiscipline of computer science, with ID now serving as an interdisciplinary umbrella that includes HCI

1. Growth/maturity as a field of study: Seek and establish universal concepts, theory, techniques
2. Apply the theory: Develop tools to make “good ID” easier to do — analogous to increasingly more sophisticated programming languages/compilers
3. Raise public consciousness: Unique to ID, because it involves exactly the system/user border

Good ID Leads to Tangible, Significant Financial Impact

• Improved software development process: Time to deployment/market, cost savings, overall system performance
• Lower overhead: Fewer systems/designs (ideally just one!) for a broader user base
• Enhanced competitiveness: Sony Walkman, Nokia cell phones, Apple iPod
• Expansion of markets: Call centers, markets with different native languages