Interaction Design (IxD) 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

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*based on Don Norman’s model, with some UML, software engineering, use case modeling, and MVC tweaks*
How the Course is Structured

- **Theory**: Concepts, principles, history, methods, techniques, models
- **(undergrad) Practice**: Focus on specific technologies for testing and applying the theory
  - Java Swing — knowing the library, implementing specific functions
  - Others, depending on time: OpenGL/GLUT, XHTML/CSS/JavaScript, Cocoa — different technologies, similar application to HCI/IxD
- **(grad) Research**: Review, analysis, and discussion of the latest HCI/IxD literature — as with most research, may be years ahead, or eventual dead ends

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

• IxD is a “young” field, when compared to other computer science topics
  (so young, in fact, that even its acronym varies…we’ll use “IxD” in this course)

• Naming: “user interface design,” “human-computer interaction (HCI),” “interaction architecture”

• Today, IxD 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: IxD 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)
IxD 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 IxD 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 IxD” easier to do — analogous to increasingly more sophisticated programming languages/compilers
3. Raise public consciousness: Unique to IxD, because it involves exactly the system/user border

Good IxD 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