Introduction to Human Computer Interaction

- Know Thy User
Introduction to Human Computer Interaction

- UX is not UI
  - http://www.uxisnotui.com/

**UX IS NOT UI**

What does UX actually mean? The various UX roles that a person can fulfill are plentiful. Some are whole jobs, some whole careers; others are tactical roles we all move in and out of.

What so many UX designers would like you to remember is that UX is not just UI design.

<table>
<thead>
<tr>
<th>HOW UX WANTS TO BE SEEN</th>
<th>HOW UX IS TYPICALLY SEEN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field research</td>
<td>Field research</td>
</tr>
<tr>
<td>Face to face interviewing</td>
<td>Face to face interviewing</td>
</tr>
<tr>
<td>Creation of user tests</td>
<td>Creation of user tests</td>
</tr>
<tr>
<td>Gathering and organizing statistics</td>
<td>Gathering and organizing statistics</td>
</tr>
<tr>
<td>Creating personas</td>
<td>Creating personas</td>
</tr>
<tr>
<td>Product design</td>
<td>Product design</td>
</tr>
<tr>
<td>Feature writing</td>
<td>Feature writing</td>
</tr>
<tr>
<td>Requirement writing</td>
<td>Requirement writing</td>
</tr>
<tr>
<td>Graphic arts</td>
<td>Graphic arts</td>
</tr>
<tr>
<td>Interaction design</td>
<td>Interaction design</td>
</tr>
<tr>
<td>Information architecture</td>
<td>Information architecture</td>
</tr>
<tr>
<td>Usability</td>
<td>Usability</td>
</tr>
<tr>
<td>Prototyping</td>
<td>Prototyping</td>
</tr>
<tr>
<td>Interface layout</td>
<td>Interface layout</td>
</tr>
<tr>
<td>Interface design</td>
<td>Interface design</td>
</tr>
<tr>
<td>Visual design</td>
<td>Visual design</td>
</tr>
</tbody>
</table>
Introduction to Human Computer Interaction

- Human Computer Interaction Overview
  1) The means the user interacts with applications
  2) User requirements
  3) The user interface design process
  4) High level goals of a UI Designer
  5) Usability measurements
  6) Life Critical Applications
  7) Business Factors related to types of applications
  8) Creative and Collaborative applications
  9) Physical Abilities and Physical Workspaces impact on Design
  10) The role of Cognitive and Perceptual Abilities in user interface design
  11) Designing for Personality Differences and International Diversity
  12) Technical challenges in user interface design
  13) The Scientific Method versus User Interface Research
  14) Future research directions
Introduction to Human Computer Interaction

- **Interacting with Technology**
  - Direct Manipulation
  - Telepresence
  - Virtual Reality

  Lawnmower Man: [http://www.youtube.com/watch?v=YCxFGxgLsHE](http://www.youtube.com/watch?v=YCxFGxgLsHE)
  Hershey Park: [http://www.youtube.com/watch?v=BKsOJQjouDU&NR=1](http://www.youtube.com/watch?v=BKsOJQjouDU&NR=1)

  - Communicating with Family and Friends

- **The Display of Information**
  - Small, Wall and Mall Sized Displays
  - Cell Phones & Pocket Computers
  - Large Plasma Panels
  - Projected Displays

- **Will the desktop computer disappear?**
  - Will computers become embedded in the surrounding environment?
Introduction to Human Computer Interaction

- **Prophecy vs. Reality**
  - “The inspirational pronouncements from technology prophets can be thrilling, but rapid progress is more likely to come from those who do the hard work of tuning designs to genuine human needs.” Ben Shneiderman, *Designing the User Interface*, page 8.

- **Glitz vs. Usability**
  - “I found the user interface to be aesthetically pleasing.”
  - “Doing my taxes with this PC application was really easy.”

- **Coolness vs. Usefulness**
  - “That game was really cool.”
  - “This system allows me to reduce ER patient registration time by 2 minutes.”
Introduction to Human Computer Interaction

- Usability Requirements
  - Determine the user's goals that are achieved via the user interface
  - Know the tasks that the user must accomplish
  - Take into consideration the skills required to perform the task
  - Take into consideration training time
  - Develop design alternatives and test those designs
  - Prototype the top designs via wire frames or simulations
  - Consider standardization, integration, consistency and portability
  - Always be aware of the schedule and budget
  - The UI should be transparent to the user, and allow the user to focus on their work, exploration or pleasure
Introduction to Human Computer Interaction

- Preview of User Interface Design Process
  - Research
    - Inputs: Market Research Specifications
    - Activities: Contextual Inquiry, Competitive Analysis, Legacy Systems, Customer Work Sessions
    - Deliverables: User Profiles, Metrics
Introduction to Human Computer Interaction

- **Preview of User Interface Design Process**
  - **Research**
    - **Inputs**: Market Research Specifications
    - **Activities**: Contextual Inquiry, Competitive Analysis, Legacy Systems, Customer Work Sessions
    - **Deliverables**: User Profiles, Metrics
  - **Model**
    - **Inputs**: High Level System Design
    - **Activities**: Determine Use Patterns, Determine User Role Interaction
    - **Deliverables**: Task Flows (within and across individuals), Rough Wire Frames, Scenarios, Perspectives, Usability Test Plans
  - **UI Design**
    - **Inputs**: Use Cases
    - **Activities**: Validate Technical Feasibility, Customer Validation, User Validation
    - **Deliverables**: Proof of Concept Wire Frames, Storyboards, Prototypes
Introduction to Human Computer Interaction

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Introduction to Human Computer Interaction

- **Preview of UI Analysis/Design Process (cont.)**
  - **Document**
    - **Inputs**: Data Requirements, Business Rules, Use Case
    - **Activities**: Write UI Specifications, Conduct Review Meetings
    - **Deliverables**: UI Specification (Navigation Flow, Screen Captures, Controls w/ Behaviors, Error Messages), Detailed Usability Test Plans
  
- **Refinement**
  - **Inputs**: UI Specification, Prior Research, Code
  - **Activities**: Formal Usability Testing
  - **Deliverables**: Test Results Report
Introduction to Human Computer Interaction

- Preview of UI Analysis/Design Process (cont.)
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Introduction to Human Computer Interaction

- **High Level Goals of a UI Designer**
  - **Know the user’s tasks and subtasks**
    - Task Analysis
    - Beware of providing excessive functionality
  - **Ensure reliability**
    - The system must function as specified
    - Consistency between the display of data and the database contents
    - Privacy
    - Security
  - **Consider the context of use**
    - Standardization (across applications, Apple, Windows, Unix, Linux)
    - Integration (across application packages)
    - Consistency (common action sequences, terms, units, layouts, colors, typography)
    - Portability (across platforms)
  - **Delivery within budget and on time**

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**Online Activities US Mobile Internet Users Would Perform More Often via Mobile Internet if the Display Were Tailored to Mobile Phones, Jan 2011**

<table>
<thead>
<tr>
<th>Activity</th>
<th>% of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Email</td>
<td>46%</td>
</tr>
<tr>
<td>Looking at maps</td>
<td>38%</td>
</tr>
<tr>
<td>Checking information online</td>
<td>38%</td>
</tr>
<tr>
<td>Checking the news</td>
<td>37%</td>
</tr>
<tr>
<td>General browsing</td>
<td>35%</td>
</tr>
<tr>
<td>Shopping</td>
<td>28%</td>
</tr>
<tr>
<td>Social networking</td>
<td>27%</td>
</tr>
<tr>
<td>Instant messaging</td>
<td>21%</td>
</tr>
<tr>
<td>Gaming</td>
<td>18%</td>
</tr>
<tr>
<td>Other</td>
<td>4%</td>
</tr>
<tr>
<td>Don't know</td>
<td>9%</td>
</tr>
<tr>
<td>I don't have problems with the display on my mobile phone</td>
<td>6%</td>
</tr>
<tr>
<td>Not applicable</td>
<td>22%</td>
</tr>
</tbody>
</table>

*Note: n=1,420 ages 18+; excludes internet access via app.*

Introduction to Human Computer Interaction

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Deliver within budget and on time
Introduction to Human Computer Interaction

- **Usability Measures**
  - Time to Learn
  - Speed of Performance
  - Ratings of Errors by Users
  - Retention over Time
  - Subjective Satisfaction

- **Usability Measures and how they influence design**
  - Goal: Speed of Performance
    - Provide short-cuts, abbreviations, command line
    - Training time may be increased
  - Goal: Low Error Rates
    - May need to trade-off for speed

- Learn the goals of your lead requirements experts
- Learn what is being marketed
- Early high fidelity prototypes help all team members to focus on the product
  - Make the abstract system a concrete system
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Introduction to Human Computer Interaction

- **Industrial and Commercial Applications**
  - Banking
  - Insurance
  - Order Entry
  - Inventory Management
  - Reservations
  - Utility Billing

- **Business Factors related to Usability Goals of Commercial Applications**
  - As training costs increase, the ease of learning must increase.
  - As the number of transactions increases, the number of errors must decrease.
Introduction to Human Computer Interaction

- Office, Home, and Entertainment Applications
  - E-mail
  - On-line Shopping
  - On-line Banking
  - Games
  - IM
  - Education
  - Search Engines
  - Cell Phones

- Business Factors related to Usability Goals of Office, Home and Entertainment Applications
  - As discretionary usage, ease of learning must
  - As discretionary usage, subjective satisfaction must
Introduction to Human Computer Interaction

- **Creative Interfaces**
  - Writing Workbenches
  - Artist Workstations
  - Programmer Workstations
  - Music-Composition Systems (e.g., Sibelius)

- **Collaborative Interfaces**
  - Two or more people interacting across time and space
  - Electronic Meeting Systems (e.g., NetMeeting)

- **Sociotechnical Systems**
  - Town Meetings
  - Computer Based Voting
Introduction to Human Computer Interaction

- Universal Usability
  - Addressing the needs of all users

- Physical Dimensions
  - Anthropometry
  - Physical measures of human dimensions
Introduction to Human Computer Interaction

- Physical Workspaces
  - Workspace Issues
    - Illumination
    - Glare
    - Room Layout and Human Interaction
    - Audio Cues

- Measures of Dynamic Actions
  - Time to dark adapt
  - Response time to visual stimuli
  - Determine the velocity and direction of a moving point
Introduction to Human Computer Interaction

- Human Computer Interaction Overview
  1) The role of Cognitive and Perceptual Abilities in user interface design
  2) Designing for Personality Differences and International Diversity
  3) Technical challenges in user interface design
  4) The Scientific Method versus User Interface Research
  5) Future research directions
Introduction to Human Computer Interaction

- **Cognitive and Perceptual Abilities**
  - Short-term and working memory
  - Long-term and semantic memory
  - Problem solving and reasoning
  - Decision making and risk assessment
  - Language communication and comprehension
  - Search, imagery, and sensory memory
  - Learning, skill development, knowledge acquisition, and concept attainment
Introduction to Human Computer Interaction

- Cognitive and Perceptual Abilities
  - Short-term and working memory
    - Header information

**Schedule Appointment**

<table>
<thead>
<tr>
<th>PATIENT</th>
<th>Nar Ridge IP Hosp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mike Smith</td>
<td>Nar Ridge IP Hosp</td>
</tr>
<tr>
<td>DOB 04/02/1935 (70 yrs) Male</td>
<td>Status: Scheduled</td>
</tr>
<tr>
<td>Social Security #:</td>
<td></td>
</tr>
</tbody>
</table>

**Encounter date/time:** 11/17/2005

**Schedule Appointment**

<table>
<thead>
<tr>
<th>Name (1 on record)</th>
<th>View/Add Names</th>
<th>Encounter date/time: 11/17/2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>First name:</td>
<td>Mike</td>
<td>Name type: Unidentified</td>
</tr>
<tr>
<td>Middle name:</td>
<td></td>
<td>Maiden name:</td>
</tr>
<tr>
<td>Last name:</td>
<td>Smith</td>
<td></td>
</tr>
</tbody>
</table>
Introduction to Human Computer Interaction

- Cognitive and Perceptual Abilities
  - Assists in solving limitations of: Long-term and semantic memory
    - Auto-Completion of Codes

![Encounter Reason](image)
Introduction to Human Computer Interaction

- Cognitive and Perceptual Abilities
  - Problem solving and reasoning
    - Example: Projection of if a certain dosage is applied, then what should the physiological response be?
Introduction to Human Computer Interaction

- **Cognitive and Perceptual Abilities**
  - Assists in solving limitations of: Decision making and risk assessment
    - Example: retirement planning

---

**Retirement calculator**

**About you:**
- Your age today: 40
- Your age at retirement: 65
- Your life expectancy: 85

**About your money:**
- Your annual income today: 50,000
- Percentage of income you save for retirement each year: 10.0%
- Your retirement savings today: 5,000
- Average return on your investments before retirement: 9.0%
- Anticipated return on your investments after retirement: 6.0%

**About your retirement income:**
- How much you'll need annually: 40,000
- Other retirement income: 0
- Include an estimated Social Security benefit in calculations? $-12,996
- Your annual withdrawal from savings: $27,004

**Your results**
- Your savings today: $5,000
- Your savings at retirement: $311,072
- Age when your savings runs out: 79
- Debt you'll leave behind: $-172,402
Introduction to Human Computer Interaction

- Cognitive and Perceptual Abilities
  - Language communication and comprehension
    - The application and user are always in a state of dialog
    - The communication between the two should always be clear and efficient
    - This is often not the case with error and warning messages
Introduction to Human Computer Interaction

- Cognitive and Perceptual Abilities
  - Search, imagery, and sensory memory
  - Example Mobile/Location based tasks
Introduction to Human Computer Interaction

- Cognitive and Perceptual Abilities
  - Learning
  - Skill development
  - Knowledge acquisition
  - Concept attainment
Introduction to Human Computer Interaction

- Personality Differences
  - Computer-philes versus Computer-phobes
  - Styles of interaction
    - Pace
    - Graphics vs. tables
    - Dense vs. sparse displays
  - Meyers-Briggs (interesting but the relationship to UI design is weak)
Introduction to Human Computer Interaction

- **International Diversity**
  - Characters, numerals, special characters
  - Left-to-right vs. right-to-left vs. vertical input and reading
  - Date/Time formats
  - Numeric and currency formats
  - Weights and measures
  - Phone numbers and addresses
Introduction to Human Computer Interaction

- Users with Disabilities - Section 508 of the Rehabilitation Act
  - Vision impaired (fonts, contrast settings, graphics, ALT tags)
  - Mobility impaired (Mouse and keyboard input)
  - Hearing impaired

- Older Adults
  - Reduction in sensory motor abilities (double-click speed or fine motor control)
  - Reduction in cognitive abilities (reduce the complexity of navigation)

- Children
  - Pre-readers
  - Limits to Dexterity

http://www.youtube.com/watch?v=LPkgFljFtVI
Introduction to Human Computer Interaction

- **Hardware Diversity**
  - Large Screens, PCs, Mobile Devices, and CAT Scan Machines

- **Software Diversity**
  - Mobile Device Operating System
  - Windows Operating System
  - Apple Operating System

- **Technical Challenges**
  - Internet connection speeds
    - Browser Based vs. Client Based Applications
  - Display Size
    - PCs (1200 x 1600)
    - Mobile Devices (640 x 480)
Introduction to Human Computer Interaction

- **Research Directions**
  - Reduced anxiety and fear of computer usage
  - Transition from novice to intermediate to expert user
  - Tools for interactive system designers
  - Direct manipulation
    - Visual Languages
    - Information Visualization
    - Telepresence
    - Virtual Reality
Introduction to Human Computer Interaction

- **Research Directions**
  - Input Devices
    - Biometric
  - Online Help
  - Information Exploration
    - Filter, select, restructure

- **Tools, Techniques and Knowledge for Commercial Development**
  - Software Tools (rapid prototyping)
  - Testing methods
Introduction to Human Computer Interaction

- Research Directions
  - What Devices?
  - What apps?
Introduction to Human Computer Interaction

- Research Directions
  - What apps?

Figure 26: Average Application Volume Shares in Mobile Broadband Networks for Different Device Types
Introduction to Human Computer Interaction

- Research Directions
  - What apps/platforms?