

Module-2

Development Processes

Topic Covered

Development Processes

Managing Design Processes: Introduction, Organizational Design to support Usability, The Four Pillars of Design, Development methodologies: Ethnographic Observation, Participatory Design, Scenario Development, Social Impact statement for Early Design Review, Legal Issues.

Evaluating Interface Design

Introduction, Expert Reviews, Usability Testing and Laboratories, Survey Instruments, Acceptance tests, Evaluation during Active Use, Controlled Psychologically Oriented Experiments.

Evaluating Interface Design

Introduction

- Designers can become so entranced with their creations that they may fail to evaluate them adequately.
- Experienced designers have attained the wisdom and humility to know that extensive testing is a necessity.
- The determinants of the evaluation plan include:
 - Stage of design (early, middle, late)
 - Novelty of project (well defined vs. exploratory)
 - Number of expected users
 - Criticality of the interface (life-critical medical system vs. museum exhibit support)
 - Costs of product and finances allocated for testing
 - Time available
 - Experience of the design and evaluation team
- The range of evaluation plans might be from an ambitious two-year test to a few days test.
- The range of costs might be from 20% of a project down to 5%.

Expert Reviews

- While informal demos to colleagues or customers can provide some useful feedback, more formal expert reviews have proven to be effective.
- Expert reviews entail one-half day to one week effort, although a lengthy training period may sometimes be required to explain the task domain or operational procedures.

- There are a variety of expert review methods to choose from:
 - **Heuristic evaluation**- Review UI to determine compliance with a short list of design heuristics (e.g “The 8 golden rules of UI design”)
 - **Guidelines review** - Review UI for conformance with the guidelines document. Because guidelines documents may contain a thousand items or more, it may take expert reviewers some time to absorb them and days or weeks to review large interface.
 - **Consistency inspection** - Verify consistency across several UIs, within a UI, or within a tutorial
 - **Cognitive walkthrough** – Experts verify simulate users walking through the interface to carry out typical tasks. An expert may try the walkthrough privately and explore the system, but there also should be group meeting with designers, users, or managers to conduct a walkthrough and provoke discussion.
 - **Metaphors of human thinking**- Experts conduct an inspection that focuses on how user thinks when interacting with an interface. They consider five aspects of human thinking : a habit, the stream of thought, awareness and associations, the relation between utterances and thought, and knowing.
 - **Formal usability inspection** - Experts participate in a meeting/discussion with a moderator who presents the interface and asks specific questions
- Experts reviews can be scheduled at several points in the development process, when experts are available and when the design team is ready for feedback.
- The number of experts reviews will depends on the magnitude of the project and on the amount of resources allocated.
- After choosing a review method you need to select the right approach/means and/or reporting style to implement it. Some examples:
 - Ranked Recommendation (assign priorities)
 - Birds-Eye View (study printed screens from distance)
 - Use of Software Tools (speed up the review process)
 - General challenge: Experts may lack an understanding of the task domain and/or user community, or may be biased. Hence it is crucial to choose knowledgeable experts that are familiar with the project and organization.

Usability Testing and Laboratories

- Actual potential users test the UI, commonly in a lab-environment. The emergence of usability testing and laboratories since the early 1980s is an indicator of the profound shift in attention to user needs.

- The remarkable surprise was that usability testing not only sped up many projects but that it produced dramatic cost savings.
- The movement towards usability testing stimulated the construction of usability laboratories.
- Participants should be chosen to represent the intended user communities, with attention to background in computing, experience with the task, motivation, education, and ability with the natural language used in the interface.
- Participation should always be voluntary, and informed consent should be obtained. Professional practice is to ask all subjects to read and sign a statement like this one:
 - I have freely volunteered to participate in this experiment.
 - I have been informed in advance what my task(s) will be and what procedures will be followed.
 - I have been given the opportunity to ask questions, and have had my questions answered to my satisfaction.
 - I am aware that I have the right to withdraw consent and to discontinue participation at any time, without prejudice to my future treatment.
 - My signature below may be taken as affirmation of all the above statements; it was given prior to my participation in this study.
- **Videotaping participants performing tasks** is often valuable for later review and for showing designers or managers the problems that users encounter.
- **Field tests** attempt to put new interfaces to work in realistic environments for a fixed trial period. Field tests can be made more fruitful if logging software is used to capture error, command, and help frequencies plus productivity measures.
- Game designers pioneered the **can-you-break-this** approach to usability testing by providing energetic teenagers with the challenge of trying to beat new games. This destructive testing approach, in which the users try to find fatal flaws in the system, or otherwise to destroy it, has been used in other projects and should be considered seriously.
- For all its success, usability testing does have at least two serious limitations: it emphasizes first-time usage and has limited coverage of the interface features.
- These and other concerns have led design teams to supplement usability testing with the varied forms of expert reviews.

Usability labs

- A typical modest usability lab would have two 10 by 10 foot areas, one for the participants to do their work and another, separated by a half-silvered mirror, for the testers and observers (designers, managers, and customers).
- The number of types and sources of participants are identified.
- **Develop a test plan**
 - Test Plan contains a list of tasks, subjective satisfaction and debriefing questions, identifies number, types and sources of participants
 - Developed in collaboration with the design team, also consider deadlines and budgets

- **Conduct pilot test**
 - Usually a couple of weeks before the actual test
 - Very limited number of participants
 - Purpose: Validate procedure, tasks, questions, adjust if problems occur
- **Choose participants**
 - Selection Criteria: background, experiences with the tasks, motivation, education, natural language ability, physical abilities
 - Also consider issues such as time, date, noise, etc.
- Recording participants performing tasks is often valuable for later review and for showing designers or managers the problem that users encounter.
- Another relatively new technique available to the usability-evaluation professional is eye-tracking software. The eye-tracking data can show where participants gazed at the screen and for how long.

Handling participants and the Institutional Review Board(IRB)

- Participants should always be treated with respect and should be informed that it is not they who are being tested; rather it is software and user interface that are under study.
- They should be told about what they will be doing and how long they will be expected to stay.
- An Institutional Review Board governs any research performed with human subjects. There are different levels of review and precise procedures that must be followed.


Think aloud and related techniques

- An effective during usability testing is to invite users to think aloud about what they are doing as they are performing the task.
- The designer or tester should be supportive of the participants, not taking over or giving instructions, but prompting and listening for clues about how they are using the interface
- For example, they may hear comments such as “This web page text is too small... so I’m looking for something on the menus to make the text bigger...”

The spectrum of usability testing

- Usability testing comes in many different flavors and formats.
- The purpose of the test and the type of the data that is needed are important considerations
- The following is a list of the various types of usability testing. Testing can be performed using combinations of these methods as well.
 - **Paper mockups.** Early usability studies can be conducted using paper mock-ups of screen displays to assess user reactions to wording, layout, and sequencing. A test administrator plays the role of the computer by flipping the pages while asking a participant user to carry out typical tasks. This informal testing is inexpensive, rapid,

and usually productive.

- **Discount usability testing.**  This quick-and-dirty approach to task analysis, prototype development, and testing has been widely influential because it lowered the barriers to newcomers. A controversial aspect is the recommendation to use only three to six test participants. Advocates point out that most serious problems are found with a few participants, enabling prompt revision and repeated testing, while critics hold that a broader subject pool is required to thoroughly test more complex systems. The formative evaluation identifies problems that guide redesign, while the summative evaluation provides evidence for product announcements ("94% of our 120 testers completed their shopping tasks without assistance") and clarifies training needs ("with 4 minutes of instruction, every participant successfully programmed the videorecorder").
- **Competitive usability testing.** Competitive testing compares a new interface to previous versions or to similar products from competitors. This approach is close to a controlled experimental study, and staff must be careful to construct parallel sets of tasks and to counterbalance the order of presentation of the interfaces. Within-subjects designs seem the most powerful, because participants can make comparisons between the competing interfaces-fewer participants are needed, although each is needed for a longer time period.
- **Universal usability testing.** This approach tests interfaces with highly diverse users, hardware, software platforms, and networks. When a wide range of international users is anticipated, such as for consumer electronics products, web-based information services, or e-government services, ambitious testing is necessary to clean up problems and thereby help ensure success. Trials with small and large displays, slow and fast networks, and a range of operating systems or Internet browsers will do much to raise the rate of customer success.
- **Field tests and portable labs.** This testing method puts new interfaces to work in realistic environments for a fixed trial period. Field tests can be made more fruitful if logging software is used to capture error, command, and help frequencies, as well as productivity measures. Portable usability laboratories with videotaping and logging facilities have been developed to support more thorough field testing.
- **Remote usability testing.** Since web-based applications are available internationally, it is tempting to conduct usability tests online, without incurring the complexity and cost of bringing participants to a lab. This makes it possible to have larger numbers of participants with more diverse backgrounds, and may add to the realism since participants do their tests in their own environments, using their own equipment.
- **Can-you-break-this tests.** Game designers pioneered the *can-you-break-this* approach to usability testing by providing energetic teenagers with the challenge of trying to beat new games. This destructive testing approach, in which the users try to find fatal flaws in the system or otherwise destroy it, has been used in other projects and should be considered seriously.