CHAPTER 4: Design

Designing the User Interface: Strategies for Effective Human-Computer Interaction

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Design

Topics

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- 2. Organizational Support for Design
- 3. The Design Process
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Organizational Support for Design

- Design is inherently creative and unpredictable.
 Interactive system designers must blend knowledge of technical feasibility with a mystical esthetic sense of what attracts users.
- Some companies are beginning to employ chief design officers (CDOs), which may help to promote usability and design thinking at every level
- Return on Investment (ROI) business case for focusing on usability has been made powerfully and repeatedly

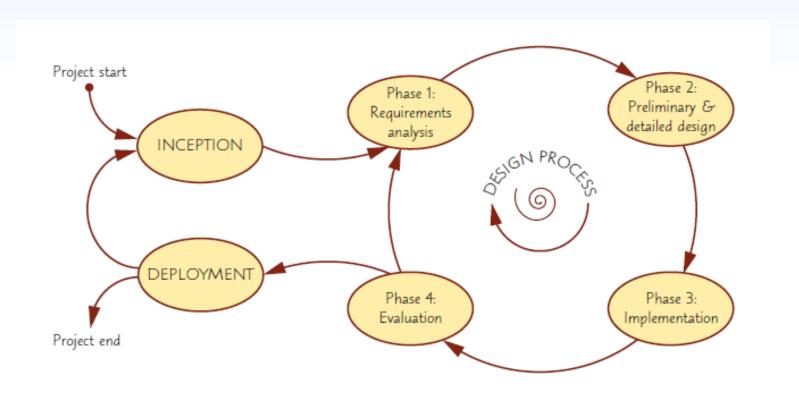
Organizational Support for Design (concluded)

- Usability engineering has evolved into a recognized discipline with maturing practices and a growing set of standards
- Usability engineers and user-interface architects, sometimes called the user experience (UX) team are gaining experience in organizational change
- The Usability Experience Professionals Association (UXPA) holds annual meetings called the "World Usability Day"

Design Process

- Rosson and Carroll (scenario-based) design characterization:
 - Design is a process, not a state
 - The design process is nonhierarchical
 - The process is radically transformational
 - Design intrinsically involves the discovery of new goals

Design Process (continued)



An iterative design process would consist of four distinct phases

Design Process: Phase 1 - Requirements Analysis

 Examples of requirements regarding system behavior for three distinct types of interactive systems: an e-commerce website, an ATM, and a mobile messaging app

Functional requirements:

- Website: The website shall allow users to purchase items and shall provide other, related merchandise based on past visits and purchases.
- ATM: The system shall let users enter a PIN code as identification and shall ensure that the code matches the one on file.
- Mobile app: The app shall be able to send messages at all times, even when
 out of the service area (in which case they are saved for later sending).

Non-functional requirements:

- Website: The website shall give users the ability to access their user account at all times, allowing them to view and modify name, mail address, e-mail address, phone, etc.
- ATM: The system shall permit the ATM customer 15 seconds to make a selection. The customer shall be warned that the session will be ended if no selection is made.
- Mobile app: Messages should send within 2 seconds, returning the user to the new message window (continuing in the background if necessary).

User experience requirements:

- Website: The website shall always have a visible navigation menu in the same position on the screen.
- ATM: On-screen prompts and instructions shall be clear and accessible.
 The ATM should return the user's commands within half a second.
- Mobile app: The mobile app shall support customization such as color schemes, skins, and sounds.

Design Process: Phase 2 – Preliminary and Detailed Design

- The design phase in turn consists of two stages:
 - 1. a preliminary stage, where the high-level design or architecture of the interactive system is derived
 - 2. a detailed stage, where the specifics of each interaction is planned out
- The preliminary stage is also called architectural or conceptual design
- Examples of suitable design methods include sketching, paper mockups, and high-fidelity prototypes
 - Can be clarified via tools, patterns, best practices

Design Process: Phase 3 – Build and Implementation

- Where all the planning gets turned into actual, running code
 - The actual software and hardware engineering needed to achieve this are outside the scope of this book
 - Included in this text is software development platforms for interactive applications for mobile apps, the web and PC's
 - Make sure to evaluate tool capabilities, ease of use, ease to learn, cost, and performance
 - Tailor tool choices for the size of the job

Design Process: Phase 4 – Evaluation

- Developers test and validate the system implementation to ensure that it conforms to the requirements and design set out earlier in the process
- Chapter 5 covers a range of suitable evaluation methods for this phase in depth

Design Frameworks

User-centered design (UCD)

 Takes the needs, wants, and limitations of the actual end users into account during each phase of the design process

Participatory design (PD)

 Direct involvement of people in the collaborative design of the things and technologies they use

Agile interaction design

 Development methods for self-organizing, dynamic teams and that facilitate flexible, adaptive, and rapid development that is robust to changing requirements and needs

Participatory Design

 Intergenerational and interdisciplinary design team from the University of Maryland's KidsTeam working on new human-computer interaction technologies using paper prototypes



Agile Interaction Design

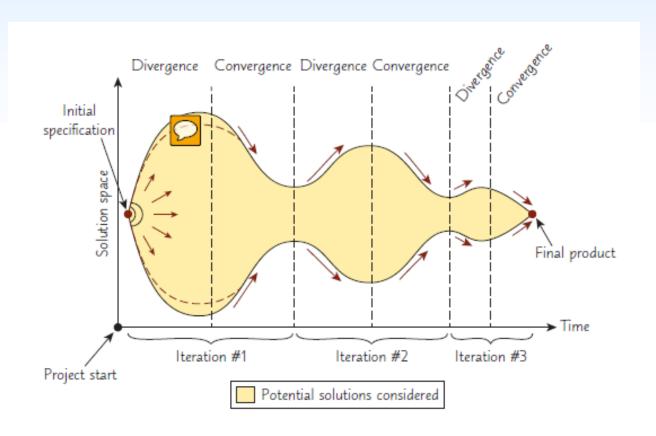
 Professor Jon Froehlich and his students working in the HCIL Hackerspace at University of Maryland, College Park



Design Methods

- Practical building blocks that form the actual day-to-day activities in the design process
 - Ideation and creativity
 - Surveys, interviews and focus groups
 - Ethnographic observation
 - Scenario development and storyboarding
 - Prototyping

Design Methods (concluded)



- Illustration of how the solutions considered during a design process will grow (diverge) and shrink (converge) iteratively until it eventually fixates on a single point, the finished product
- This particular design process involves three iterations, but real processes may have more or fewer iterations.

Ethnographic Observation

Preparation

- Understand organization policies and work culture
- Familiarize yourself with the system and its history
- Set initial goals and prepare questions
- Gain access and permission to observe/interview

Field Study

- Establish rapport with managers and users
- Observe/interview users in their workplace and collect subjective/objective quantitative/qualitative data
- Follow any leads that emerge from the visits

Ethnographic Observation (concluded)

Analysis

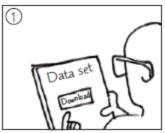
- Compile the collected data in numerical, textual, and multimedia databases
- Quantify data and compile statistics
- Reduce and interpret the data
- Refine the goals and the process used

Reporting

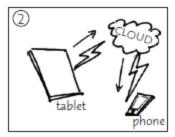
- Consider multiple audiences and goals
- Prepare a report and present the findings

Storyboarding

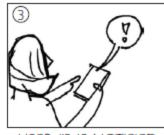
 Hand-drawn storyboard for a collaborative software that allows multiple people to view a common dataset using their personal smartphones and tablets



USER #1 FINDS DATA



DATA IS SYNCHRONIZED

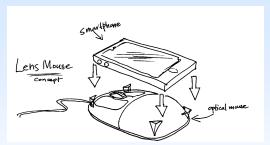


USER #2 IS NOTIFIED



USERS CAN ANALYZE TOGETHER

Prototyping





- Low-fidelity prototypes are generally created by sketching, using post-it notes, or cutting and gluing pieces of paper together (paper mockups)
- Medium-fidelity prototypes are often called wireframes, and provide some standardized elements (such as buttons, menus, and text fields), even if potentially drawn in a sketchy fashion, and has some basic navigation functionality
- High-fidelity prototypes look almost like the final product and may have some rudimentary computational capabilities; however, the prototype is typically not complete and may not be fully functional

Design Tools, Practices, and Patterns

Design Tools

 Dedicated prototyping design tools are specifically designed for the purpose of creating interface mockups rapidly and effortlessly

Design Guidelines and Standards

- Guideline documents are a powerful tool for interaction design
- Four E's: Education, Enforcement, Exemption, Enhancement

Interaction Design Patterns

- Best-practice solutions to commonly occurring problems specified in such a way that they can be reused and applied to slightly different variations of a problem over and over again
- Model-View-Controller (MVC), document interface, Web app page architecture

Social Impact Analysis

Describe the new system and its benefits

- Convey the high level goals of the new system
- Identify the stakeholders
- Identify specific benefits

Social Impact Analysis (continued)

Address concerns and potential barriers

- Anticipate changes in job functions and potential layoffs
- Address security and privacy issues
- Discuss accountability and responsibility for system misuse and failure
- Avoid potential biases
- Weigh individual rights vs. societal benefits
- Assess trade-offs between centralization and decentralization
- Preserve democratic principles
- Ensure diverse access
- Promote simplicity and preserve what works

Social Impact Analysis (concluded)

Outline the development process

- Present and estimated project schedule
- Propose process for making decisions
- Discuss expectations of how stakeholders will be involved
- Recognize needs for more staff, training, and hardware
- Propose plan for backups of data and equipment
- Outline plan for migrating to the new system

Legal Issues

Potential Controversies

- What material is eligible for copyright?
- Are copyrights or patents more appropriate for user interfaces?
- What constitutes copyright infringement?
- Should user interfaces be copyrighted?
- Evolving public policies related to:
 - Privacy
 - Liability related to system safety/reliability
 - Freedom of speech