

Chapter 11: User Interface Design (Part 2 – Design, Evaluation & WebApps)

Subject: Software Engineering | Program: BTech Computer Science and Engineering | Duration: 1 Hour

Interface Design & Evaluation

From Analysis to Action

Creating and Validating the User Experience

Context: Lecture Introduction & Objectives

Rolling Up Our Sleeves

The Journey So Far

We have analyzed our Users (Who), their Tasks (What), and their Environment (Where).

The Challenge Today

- How do we translate that analysis into a concrete, usable design?
- How do we know if our design is any good before we build it?

The Focus

Design Steps, Patterns, WebApp Specifics, and Design Evaluation.

Learning Objectives

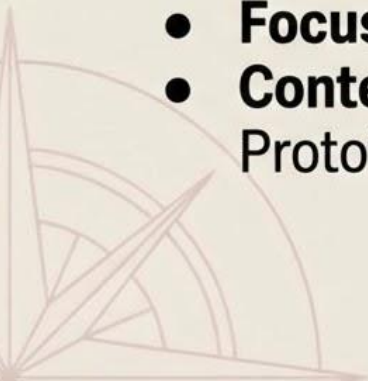
By the end of this lecture, you will be able to:

- **Systematic Design:** Apply a systematic set of steps to transform interface analysis into an initial design.
- **Design Patterns:** Identify and apply common UI design patterns (e.g., Breadcrumbs, Wizards).
- **Key Issues:** Address critical design issues like System Response Time and Error Handling.
- **WebApp Adaptation:** Adapt interface principles specifically for Web Applications.
- **Evaluation:** Conduct a basic design evaluation using Heuristic and Usability Testing methods.

Part 1: Systematic Interface Design Steps

Section 11.4

- **Focus:** A Structured, Iterative Process
- **Context:** Moving from Analysis to Prototype



The Six Design Steps

From Concept to Concrete

- **Define Interface Objects & Actions:** Create the vocabulary.
- **Define Events (User Actions):** Map tasks to interactions.
- **Depict Each Screen:** Create wireframes.
- **Show Screen Sequence:** Define the flow.
- **Indicate Navigation:** How do we move?
- **Add "Look and Feel":** Visual design.

Steps 1 & 2: Objects, Actions, and Events

Building the Foundation

- **Define Objects & Actions:**

From Task Analysis, identify objects the user manipulates (e.g., File, Message, Report).

Identify actions performed on them (e.g., Open, Send, Print).

- **Define Events:**

Determine how the user initiates actions (e.g., Click Button, Select Menu, Shortcut).

Map every task step to a specific user event.

Steps 3 & 4: Screens and Sequence

Visualizing the Interface

- **Depict Each Screen (Wireframing):**
Create layouts for each state.
Show placement of objects, data, and controls.
Tools: Paper sketches, Figma, Balsamiq.
- **Show Screen Sequence:**
Create a Storyboard or State Transition Diagram.
Answer: "What appears after the user clicks 'Submit'?"

Steps 5 & 6: Navigation and Look & Feel

Polishing the Experience

- **Indicate Navigation:**
Specify mechanisms: Menus, Tabs, Buttons, Links.
Ensure consistency with the User's Mental Model.
- **Add "Look and Feel":**
Apply visual design: Color schemes, Typography, Icons.
Create the High-Fidelity Prototype.

User Interface Design Patterns

Section 11.4.2: Reusable Solutions

- Why use them? They represent collective wisdom and speed up design.
- Common Patterns:
- **Dashboard:** Aggregates key info on one screen.
- **Wizard:** Guides novices through complex steps.
- **Master-Detail:** List (Master) → Details Pane.
- **Breadcrumbs:** Shows path from home.

Design Issue: System Response Time

Section 11.4.3: The Need for Speed

- **Key Rule:** Keep it short and predictable.
- **Thresholds:**
 - **> 1 Second:** User's flow of thought is interrupted.
 - **> 10 Seconds:** User will switch tasks.
- **Feedback:** For long operations, ALWAYS use progress bars or spinners. Never leave the screen "frozen."

Design Issue: Errors & Help

Handling Friction Gracefully

- **User Help:**
 - Integrated: Tooltips, "What's This?"
 - Online: Searchable manuals.
- **Error Handling:**
 - Rule: Never blame the user. Be polite and constructive.
 - **BAD:** "Error #405: Invalid Input."
 - **GOOD:** "The 'Date of Birth' must be in the past. Please enter a valid date."

Part 2: WebApp Interface Design

Section 11.5

Focus: Browser, Network, and Hypermedia

Context: Applying universal principles to the specific constraints of the constraints of the Web.



Web-Specific Golden Rules

(1/2)

Section 11.5.1: Tailoring the Experience

Anticipate User Needs: Proactively provide likely links or information. Example: 'Customers who bought this also bought...'

Facilitate Navigation: The user should always know: Where am I? Where can I go? How do I get back? Tools: Consistent Navigation Bars, Site Maps, Breadcrumbs.

Design for Different Users: Cater to everyone from the First-Time Visitor (needs guidance) to the Registered Power User (needs speed).

Web-Specific Golden Rules

(2/2)

Conventions & Cognitive Load

Establish Conventions: Follow standard web behaviors (e.g., Logo always links to Home, Links are distinct). Rule: Don't reinvent basic interactions; familiarity breeds comfort.

Minimize Cognitive Load: Don't overwhelm the user with too many choices (Hick's Law).

Use Progressive Disclosure to reveal information only when needed.

Interface Design Workflow for WebApps

Section 11.5.2: The Iterative Cycle

A continuous process of refinement:

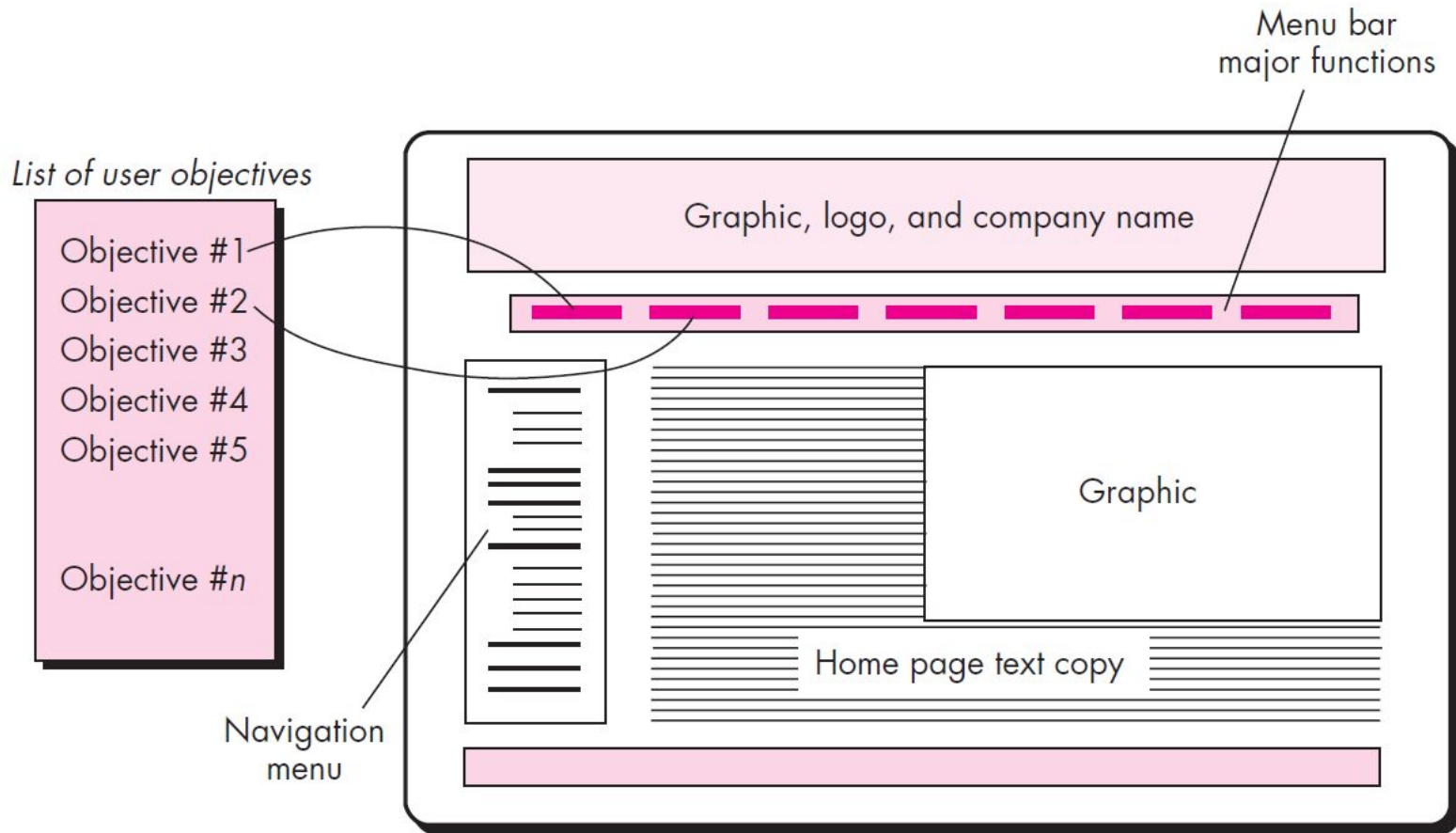
Review Information/Content Model: Know exactly what needs to be displayed before drawing.

Storyboarding: Sketch the flow of pages for key usage scenarios (e.g., 'User buys a shirt').

Wireframing Layout: Create low-fidelity layouts for each page type (Homepage, Product Page, Form).

FIGURE 11.4

Mapping user objectives into interface actions



Navigation & Prototyping

Building the Skeleton

Design Navigation Mechanism:

Design Menus, Links, Buttons, and Sitemaps. Ensure the 'roadmap' is clear.

Prototype: Build a Clickable Prototype (using tools like Figma, Adobe XD). Goal: Simulate navigation and interaction without writing backend code.

Slide 6: Refinement

The Final Polish



Refine and Elaborate:

- Add visual design (Look and Feel).
- Apply color schemes, typography, and high-resolution imagery.
- Create the Final Mockup ready for development.

Part 3: Design Evaluation

Section 11.6

“Is It Any Good?”

Focus: Validating the Design Before Coding

Context: The crucial final step before implementation.

The Golden Rule of Evaluation

Measure Twice, Cut Once

Philosophy: Never release a design without evaluating it.

The Cost: Fixing problems in a Prototype costs 10x less than fixing them in Code.

Goal: To identify usability issues early when they are cheap to change.

Method 1: Heuristic Evaluation (Expert Review)

The “Gold Standard” Checklist

What: 3-5 usability experts inspect the interface against recognized principles (heuristics).

Nielsen’s 10 Usability Heuristics:

- Visibility of System Status.
- Match between System and Real World.
- User Control and Freedom.
- Consistency and Standards.
- Error Prevention.

Process: Experts work independently → Identify violations → Aggregate findings.

Pros: Fast, Cheap, Finds major issues.

Cons: Experts are not real users; may miss specific task problems.

Method 2: Usability Testing (User-Centered)

The Most Valuable Method

Process:

- **Recruit:** Participants matching user profiles.
- **Define Tasks:** Realistic scenarios (e.g., "Find support contact").
- **Think-Aloud Protocol:** Ask users to verbalize thoughts.
- **Observe:** Record errors and confusion. DO NOT HELP THEM.

What: Observe real, representative users attempting real tasks.

Metrics: Success Rate, Time-on-Task, Error Count, Satisfaction.

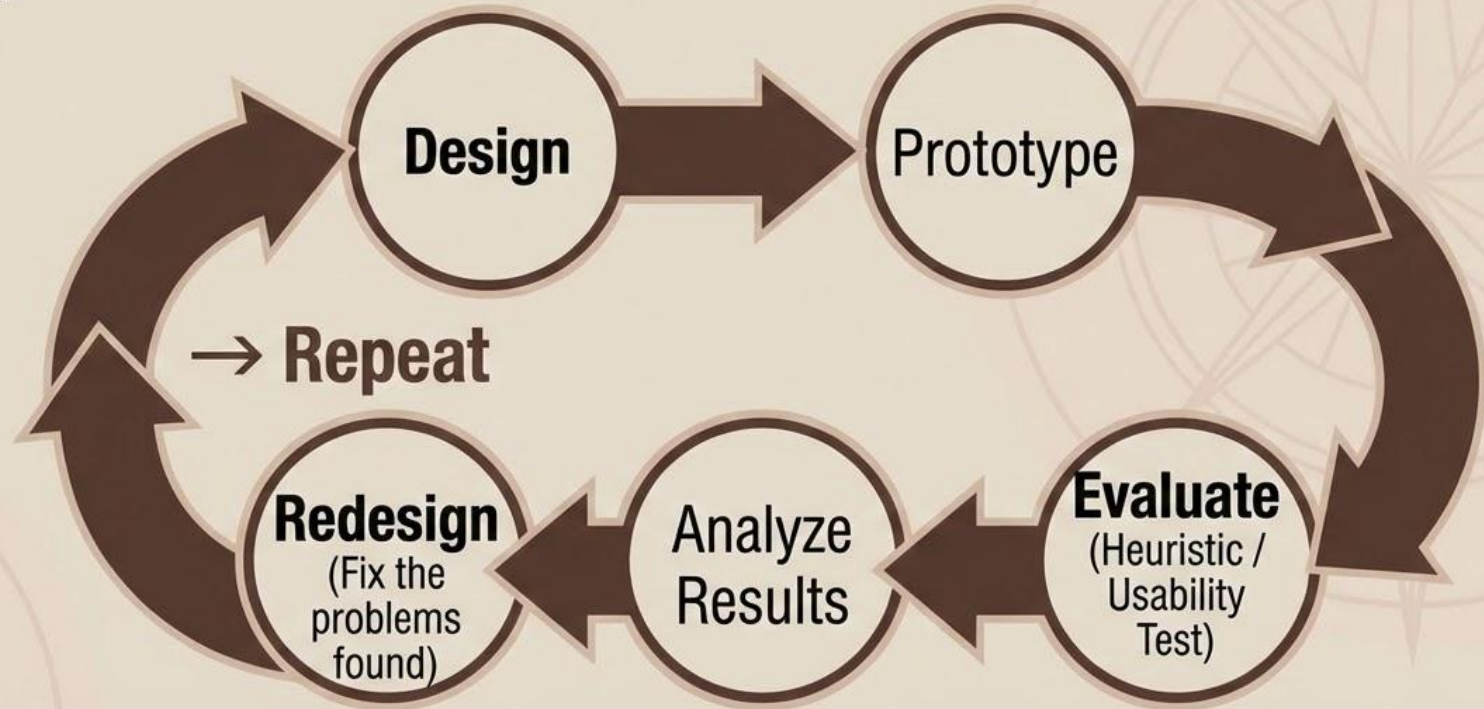
Pros: Reveals real, unexpected problems.

Cons: Time-consuming and costly.

The Iterative Loop

Design is Never Done

The process is circular, not linear:



In-Class Activity: Heuristic Evaluation Mini-Lab

Put on Your Expert Hat (7 Minutes)

Task: Look at the provided screenshot of a Cluttered, Poorly Designed Dialog Box.

Activity: In groups, apply two of Nielsen's heuristics to identify at least two specific UI problems.

Heuristic A: Aesthetic and minimalist design.

Heuristic B: Help users recognize, diagnose, and recover from errors.

Output: "Problem 1: The error message is vague." / "Problem 2: Too many buttons."

Conclusion & Key Takeaways

The Art & Science of Interface Design

Process, Patterns, and Evaluation

Final synthesis of the lecture series.

The Systematic Process

From Logic to Visuals

Interface Design is not random; it is a stepwise journey:



Patterns & Critical Issues

Reusable Wisdom & Proactive Design

UI Design Patterns

Use proven templates like Dashboards and Wizards to solve common interaction problems efficiently.

Critical Issues

You must proactively address:



Response Time:
Keep it fast.



Help Facilities:
Make it supportive.



Error Handling:
Make it forgiving.

WebApp Specifics

Context Matters



Navigation is King:

Users must always know where they are.



Anticipation:

Proactively provide what the user likely needs next (e.g., 'Related Products').



Conventions:

Stick to standard web behaviors to reduce cognitive load.

Design Evaluation

The Mandatory Step



Heuristic Evaluation:

Fast, expert-led reviews to catch obvious flaws.



Usability Testing:

Irreplaceable testing with real users to uncover deep, task-specific issues.



Rule:

Never release a design without validating it first.

Final Thought

The Generous Interface



“A great UI designer is part psychologist, part communicator, and part artist. They use a structured process and hard evaluation data to build bridges of understanding between complex systems and human minds. Your goal is not just a functional interface, but a generous one—one that anticipates needs, forgives mistakes, and empowers the user.