Usability Pattern-Oriented Design:

Maximizing Reusability of Pattern Languages over the Web

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Outline

- General Overview
  - Patterns as a Design Solution
  - Usability Pattern Examples
  - Pattern Languages
- Research at Concordia University
  - MOUDIL
  - UPADE Environment
Tools for Gathering and Disseminating Design Knowledge

- Aim to capture best practices about the design of usable systems
- Most used tools: guidelines and patterns
- Guideline Example: Dialog boxes from the Macintosh Human Interface Guidelines
  - 4 types
  - Eg. Alert boxes
Disadvantages of Guidelines

- Numerous and difficult to select appropriate guideline for particular design problem
- Difficult to apply, especially for novice designers
- Guidelines contradict each other at times
Patterns as Alternative Design Tool

- A pattern is a *proven solution* to a *common problem* in a *specified context*
- Good alternative to guidelines -- concrete, easier to use
- Focus on context
- Tells the designer when, how & why
Software Engineering Patterns Mania

- **Organization**
  - Organizational Patterns (Coplien, 1998, Cockburn, 1997)
  - Business Reengineering Patterns (Beedle, 1997)

- **Process**
  - Steps and Task Patterns (Ambler, 1998; Coplien, 1995)
  - Process Improvement Patterns (Appleton, 1997)

- **People**
  - Pedagogical Patterns (Manns, 1996)
  - Human-to-Human Communication Patterns (Cockburn, 1997)

- **Product**
  - HCI Patterns (Tidwell, 1998)
  - Software Design Patterns (Gamma, 1995)
Example 1: Go Back to a Safe Place

Problem

- Users often get lost when exploring
- Users often want to go back to previous state they were happy with
- Users more likely to explore if they feel safe
- Backtracking out of a long navigation path can be tedious

Solution

- Provide a way to go back to a checkpoint of the user’s choice
Example 1: Pattern Definition

Pattern Name: Go back to a safe place

Pattern Description:
- Specific example → Home button
- Context → move through steps **
- Problem → how to make navigation easy
- Forces → users get lost, etc.
- Solution → go back to checkpoint
Usability Pattern – A Definition

- Distilled lessons learned and best design practices from real world experiences about how to develop usable systems
- Patterns expose knowledge that has been gained from different projects by many experts over many years
Example 2: Web Convenient Toolbar

- Provides a direct access to frequently used pages or services.
- Includes navigation controls for What’s New, Search, Contact Us, Home Page, Site Map, and so on.
- Groups these actions together in a toolbar, labels them with terms or pictures whose meanings are self-explanatory, puts them in a fixed place so that they are easily accessible to a user visiting any page of the site.
Example 2: Web Convenient Toolbar
Advantages

- Reduce the cost of usability evaluation and testing
- Improve the reusability and standardization of applications
- Their assimilation, convey expert insight and knowledge to inexpert developers
- Help forge the foundation of a shared vision, and a collective of styles for developing usable products
Pattern Languages

- A collection of interrelated patterns
- Objective: to capture the collective wisdom of designers in a way that can be immediately used, especially by novice designers
- 2 criterion
  1. Standard Pattern Description
  2. Relationship between patterns
- If both criterion not fulfilled, it is not a language but a *catalogue* of patterns
Examples of Pattern Languages

- Experiences -- A Pattern Language for UI Design (Coram & Lee, 1996)
- The Brighton Usability Pattern Collection (University of Brighton, 2001)
- Common Ground (Tidwell, 1999)
- The Amsterdam Collection of Patterns in UI Design (van Welie, 2000)
Experiences

- Emphasis on the user’s experience within software systems
- Patterns grouped by focus areas
- Pattern Description: narrative form using natural language
- Pattern Relationships: clear mapping of pattern interrelationships
Experiences -- Pattern Relationships
Problems with Pattern Languages

- Patterns...
  - There are NO standards for documenting patterns
  - We need tools to formally validate patterns

- Pattern Languages...
  - Need for formal language with syntax and semantics; not just narrative description
  - Need for context of use-oriented relationships
Projects in Development

- By the Human-Centered Software Engineering Group at Concordia University
- http://hci.cs.concordia.ca
  - MOUDIL -- Montreal Online Usability Digital Library
  - UPADE -- Usability Patterns-Assisted Design Environment
    - UPADE Web Language
    - UPADE editor
UPADE Environment

MOUDIL Digital Library

Usability Patterns Database

UPADE Environment

feedback
MOUDIL

- Montreal Online Usability Digital Library
- Online digital library for sharing usability and user interface pattern information
- Target: software and usability engineers, developers
- Objective: provide pattern information and receive feedback
- Functionality: Browse, Search, MySpace
MOUDIL Objectives

- Use feedback to answer certain questions about patterns and their uses
- How do developers create and document patterns?
- How are patterns used?
- Use this information to develop UPADE
UPADE Web Language Characteristics

- UPADE Web language is a usability pattern language for Web applications
- A set of usability patterns
- Patterns are interrelated
- Patterns are documented in formal notations
- Patterns are related to Web design process
Overview of UPADE Web Language

Product-Oriented Patterns

- Architectural Patterns
  - Information
    - Sequential
    - Hierarchical
    - Grid
    - Composite
  - Page Managers
    - Focus Page
    - Utility Page
    - Navigation Page
    - Tiled Page
    - Stack Page
  - Information Containers
    - Executive Summary
    - On Fly Description
  - Navigation Support Patterns
    - Shortcut
    - Convenient Toolbar
    - Path
    - Map
    - Browsing Index
Pattern Categories

This language define 3 categories of product patterns:

- **Architectural Patterns:**
  - Describe different schemes for organizing the content of a Web application

- **Structural Patterns:**
  - Define physical and logical layout of commonly used web pages. Suggests how to group info in cognitively respectable structure and how to display them

- **Navigation Support Patterns:**
  - Provide navigation between a set of pages and segments of information
Hierarchical Pattern

- Architectural Pattern
- Pages are organized in a hierarchical model. The user can easily go from the most general overview of the website, such as the home page, down to more specific topics.
Composite Pattern

- Architectural Pattern
- A complex and large web application is generally organized using a combination of several architectural patterns
Focus Page Pattern

- Page Manager Pattern – subcategory of Structural Pattern
- Helps to build a Web page that is the fountainhead and center of the Web site. Balances aesthetics and practicality to attract users from their first glances
Executive Summary Pattern

- Information Container Pattern – subcategory of Structural Pattern

- This pattern gives users a preview of underlying information before spending time in downloading and reading large amounts of information.
Pattern_Name: Convenient Toolbar Pattern
- type of Navigation Support Pattern

Context_Use
- User: Expert
- Task: Assist the user to reach the most useful and frequently visited pages at any time throughout the Web site.
- Workplace: Web applications

Usability_Problem:
- The user can easily find the most commonly used pages regardless of the current state of the artifact.
- The user can reach these convenient pages promptly.
Example - Convenient Toolbar Pattern

- **Usability Factor**
  - **Factor:** Efficiency, Safety
  - **Criteria:** Consistency, Minimal Action, Minimal Memory, User Guidance, Helpfulness

- **Example**
Example - Convenient Toolbar Pattern

- **Design Solution**
  - Group the most convenient action links, such as home, site map, help and etc.
  - Use meaningful metaphors and accurate phrases as labels
  - Place it consistently throughout the Web site
Example - Convenient Toolbar Pattern

Other Language Attributes:

- Design_Principle
- Related Usability_Patterns
- Reading
Final Remarks

- Patterns at different levels of the organization
- Usability Patterns as an alternative design solution
- Pattern Language
  - Pattern Definition
  - Pattern Interrelationships
- UPADE Web Language
- MOUDIL Digital Library – receive feedback
- Our website: http://hci.cs.concordia.ca
Questions...