DEPTH:
A Method for Usability Evaluation of Web-based Systems Based on Design Patterns and Heuristics Criteria

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Overview

- What is a design pattern (DP)
  - Definition
  - What they offer
  - History of patterns
- Designing a web-based system using DPs
  - Examples of Design patterns
- Evaluating a web-based system using DPs
  - DEPTH method
- Criticism of DEPTH
Bus stops
The problem
Bus stops must be easy to recognize, and pleasant, with enough activity around them to make people comfortable and safe.

The solution
Build bus stop so that they form tiny centers of public life. Build them as part of the gateways into neighborhoods, work communities, parts of town. Locate them so that they work together with several other activities, at least a newsstand, maps, outdoor shelter, seats, and in various combinations, corner groceries, smoke shops, coffee bar, tree places, special road crossings, public bathrooms, squares, …

Related patterns
Main gateway(53), public outdoor room(69), path shape(121), place to wait (150, food stand(93), seat spots(241)
What is a design pattern?

Alexander defines a pattern as follows:

".... Each pattern describes a problem which occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice"

History of Design Pattern

- 1987: OOPSLA (Object Oriented Programming System), Orlando, presentation of design pattern to the community OO by Ward Cunningham and Kent Beck
- 1995: Group of Four alias E. Gamma, R. Helm, R. Johnson and J. Vlissides: “Design Pattern: Elements of Reusable OO software”
- CSCL 2003 Workshop on e-learning design patterns
- ECSCW Workshop: From Good Practices to Patterns: Mining socio-technical patterns from experience with groupware, September 15, 2003
UI Design Pattern Languages

- 30 – Design patterns - Hypermedia Design Patterns Repository http://www.designpattern.lu.unisi.ch/PatternsRepository.htm
- The Interaction Design Patterns Page - pattern languages for interaction design (of which user interface design is a subset), and a few links to more general papers that may be of use to interaction designers.
- http://www.pliant.org/personal/Tom_Erickson/InteractionPatterns.html
- 30 UI Patterns Jenifer Tidwell http://www.time-tripper.com/uipatterns/
# Web Design patterns

## Site Types
- My Site
- Portal
- Commerce Site
- Community Site
- Branded Promo Site
- Corporate Site
- News Site
- Museum Site
- Automotive Site
- Web-based Application
- Travel/booking Site
- Multinational Site
- Artist Site

## User Experiences
- Shopping
- Community
- Learning

## Ecommerce
- Shopping cart
- Login
- Registering
- Product Comparison
- Product Configurator
- Product Advisor
- Premium Content
- Lock
- Newsletter
- Case study
- Booking process
- Store Locator
- Virtual Product Display

## Related sites:
- These patterns in russian!!!
- Jenifer's new UI patterns
- Jan Borcher's patterns
- Sari Laakso's patterns

## Navigation
- Main Navigation
- Bread crumbs
- Double tab
- Meta Navigation
- Split Navigation
- Repeated Menu
- Faceted Navigation
- Teaser Menu
- Header-less Menu
- Fly-out Menu
- Directory
- Trail Menu
- Scrolling Menu
- Shortcut Box
- Image Menu

## Searching
- Simple Search
- Advanced Search
- Search Results
- Search Area
- Sitemap
- Topic Pages
- Search Tips
- Site Index
- Help Wizard
- FAQ

## Basic Page Types
- Homepage
- Contact Page
- Processing Page
- Printer-friendly Page
- Article Page
- Blog Page
- Product Page
- Forms
- Input Error Message

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**NEW!** View a random pattern

**ATTENTION:** This section contains many incomplete patterns, I know. That is because it is work-in-progress.

If you have any comments, suggestions or if you know of better examples, let me...
The Product Configurator Design Pattern

[From Welie]

- **Problem**: Users want to configure the product they may intend to buy.
- **Use When**: You want users to get more enthusiastic about a product by letting them 'control' the product and kind of 'personalize' it.

Source: www.nickie.com
The Product Configurator Design Pattern

Solution: Allow users to configure a product using a direct and visual version of the configured product

- Configuring is usually done in several steps because there may be several aspects of the product that can be configured, e.g. the colour, material, writings etc.
- The product configurator is therefore a Wizard where every configurable aspect of the product is handled in a single step.
- Additionally there may be a 'buy' or 'order' step that leads to some additional steps for the wizard.
- Since the steps of the process are usually not dependent on each other, Tabs can also be used to set each aspect instead of using a Wizard.
The product configurator is a highly interactive concept where users can visually configure the product. Every time users make a change they should immediately see the results. Usually the users start with a base-configuration that can be changed.

Why: The product configurator allows people to 'play' with a product and literally 'see' the different options. This way they can see the product as-is, a preview of the product they may want to order.
The Product Configurator Design Pattern

[From Welie]

- **Example**: At the Porsche US site potential customers can configure their 'ideal' Porsche. The model, exterior color, cabriolet tops, interior color, and equipment can be changed while the two images show the currently selected configuration.

- **Relationships**: Shopping Cart, Wizard

Source: http://www3.us.porsche.com/
Patterns Can …

- Capture expert practice in specific context
- Provide common nomenclature for designers
- Provide “shorthand” for effectively communicating complex principles
- Help documentation and justification of the rationale
- Capture the most important aspects of a problem solution in a standard format with a formalism
- Show multiple examples of solutions
- Become a tool for collaboration among peers who are interested in designing activities
Motivation in using Design Patterns for Usability Evaluation Purposes

- We try to **minimize the time** spent for the preparatory phase of a usability study
  - To create the scenarios and tasks to be checked and the things we would like to check each time
- To help **novices** in usability evaluation
  - not always try to look for usability experts
  - Patterns contain the distilled knowledge of an expert as well as their tacit knowledge
  - HCI design patterns are the means for expressing the “ideal” functionality of a web site in a justified and not prescriptive way.

So we have to correlate the “expert view” of a web site (in terms with HCI patterns) and the actual implementation
DEPTH method at a glance

DEPTH-Evaluator

- Select Genre
- Check functionality
- Select functions for Usability Evaluation
- View/Modify Scenario
- Execute Scenario
- See/Compare with Related Patterns
- Produce Final Report

DEPTH-Repository

- Systems Genres
- Functionality Tables
- Related Scenario
- Modified Related Scenario
- Related Patterns
- Draft Results

DEPTH-Deliverables

- Functionality Report
- Usability Report
Specifying the functionality of the system

Personalisable Web based System

- Personalized content
  - Customizable Window
- Drag and Drop
  - Drag and Drop Objects
  - Drag and Drop Modules
Trimming the functionality of the system for evaluation

Personalisable Web based System

- Personalized content
  - Customizable Window

- Drag and Drop
  - Drag and Drop Objects
  - Drag and Drop Modules
Relations among selected functionalities, scenarios and Design Patterns

- Personalisable Web based System
  - Personalized content
  - Scenario for Personalized Content
    - Design Pattern for Personalized Content
  - Customizable Window
    - Scenario for Customizable Window
      - Design Pattern for Customizable Window
Personalized 'My' Site

Find patterns that are related to the tasks

Problem
User have a need to define their own page elements

Use when
Typically used in a Portal Site. Or in e-commerce sites where users have their own portions of the site.

Solution
Create a part of the site that belongs to a user and that is controlled by that user.

First log in and then present a customized personal section. Usually the pages are built up using modules that the users has selected. Each module is a Customizable Window. Users can change the which modules they want and in which layout and graphical presentation.
Customizable Window

Problem Users ideally want to have fully personalized content.

Use when Websites that offer categorized content where users may be only interested in a handful of categories or items. This pattern is used when there is some form of customization available to the users. Often this is when it is a personal site such as a Personalized My Site. Typically users will need to do some form of Login.

Solution Use "windows" with select items that users can adapt or click away.

Why The window metaphor suggests functionality many users are familiar with. By making them customizable users can dynamically create the web page as they want.

More Examples The site www.startpagina.nl is almost completely built up using customization windows:

<table>
<thead>
<tr>
<th>Tip/Recept van de dag</th>
<th>x</th>
</tr>
</thead>
<tbody>
<tr>
<td>tv van de dag (tip)</td>
<td></td>
</tr>
<tr>
<td>recept van de dag</td>
<td></td>
</tr>
<tr>
<td>versies mij</td>
<td></td>
</tr>
</tbody>
</table>
### Personalized Content

**Customizable Window**

You are visiting a site that offers categorized content. Let say you are interested in several categories of items not as many as the intro page is providing and not exactly what provided. Let us try to dynamically create a webpage according to your interests. Try to close or minimize those windows not wanted. Try to edit or customize those that interest you. Try to bring in your page some that are not listed. Try to change the colours of each window or of the layout of your page. Try to change the graphical presentation of some modules as the reading pane settings of the listings you prefer.

- **Question 1**
  
  Were you able to “minimize” or even “close” selected modules?

- **Question 2**
  
  Were you able to “edit” or “customize” selected modules, like changing colours, or the reading pane settings?
... theory and practice?

- We evaluated a personalized web-based system (naftemporiki.gr) using DEPTH

- Usability findings were not our prime focus since
  - we used a rather small set of functionalities.
    - Generally the specific system supports configurability in a user friendly manner.
  - We were interested in fine tuning the method for this specific genre of systems (personalisable systems). We found that:
    - Need of user oriented scenarios specific for each functionality
    - Lack of patterns associated with users’ characteristics
    - Reuse of scenarios provided by experts for every user type
A tool to support DEPTH

- We have implemented a prototype Web-based tool for designing and implementing evaluations based on DEPTH methodology (http://softlab.teipir.gr/depth.htm). The tool supports both preparatory and execution phase.
- More specifically, the tool supports the following tasks:
  - Selecting genre of web application
  - Specifying the checkpoints/functionalities that will be examined
  - Create scenarios and relate them with specific functionalities
  - Associating functionalities with patterns and creating network of patterns
  - managing evaluation sessions and recording the results
  - authorized and personalized access for the “Designers”, “Session managers” and “Evaluators”.
The DEPTH Evaluation Toolkit

- **Patterns’ repository:**
  - Patterns are arranged by genre & functionality
  - There are genre independent patterns

- **Scenarios’ repository**
  - Scenarios are related to functionality and patterns

- **Reporting system**
Method’s Advantages

- Provides source of tasks & requirements to be evaluated
- Do we really need usability experts? The “expert” section could probably be performed by a “power end user”?
- Isolated areas of interest can only be evaluated (e.g., checkout process)
Method’s Disadvantages

- Design patterns are not that many but the field is still evolving
- Will there always be a design pattern to validate all areas of interest in a web-site?
  - Application dependent scenarios created by experts
Future plans

- To use it in more evaluation studies
  - We have started with the evaluation of Learning Management Systems (WebCT, Blackboard) and Collaborative Tools & e-tourism sites
  - e-learning brokerage platforms, like Universal, MERLOT, WorldLectureHall, COREO, etc.
  - Wiki-systems, like TikiWiki
  - Synchronous Web Conferencing Systems like netmeeting, Centra

- To answer to questions about
  - The granularity of the scenario
    - a scenario can be highly scripted or loosely defined. One of the main difficulties is how to create such scenarios.
    - Why not create scenarios per design pattern…
  - The use of patterns that are “genre independent”
  - The time that the novice usability engineer will read the pattern (prior or after his/her evaluation)

- To check if we can use DEPTH for supporting scenario-based user inspection/enquiry sessions.
The most important part of a successful design is the underlying conceptual model.

The hard part of design: formulating an appropriate conceptual model and then assuring that everything else be consistent with it.

*Donald Norman*
Questions?
Identify an idea

- Forces lead to needs
- Context of the problem
- Solution proposed
- Known solutions

Authoring a draft version of the Pattern (either by an individual or a small group)

- Experts experience
- Observation of user tasks
- In depth analysis of the functionality of systems
- User log files analysis of user activities
- Study of other patterns already published

Forming a design pattern language
Eliciting a pattern
## Usability Evaluation Methods

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Synopsis</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expert Review</td>
<td>People having sufficient experience or an advanced degree in a related discipline (HCI experts) critique a product separately or in groups to determine areas in need of improvement.</td>
<td>• No guidelines</td>
<td>• Uses experts</td>
<td>• May be difficult to standardize or categorize rationale for design changes</td>
</tr>
<tr>
<td>Heuristic Evaluation</td>
<td>HCI experts separately review an interface and categorize and justify problems based on a short set of heuristics (rules of thumb).</td>
<td>• Uses short guidelines</td>
<td>• Uses experts</td>
<td>• The validity of Nielsen's guidelines have been questioned and alternative guidelines exist</td>
</tr>
<tr>
<td>Cognitive Walkthrough</td>
<td>A method which fully utilizes task scenarios to stress the user's cognitive process and model, which guides the analysis.</td>
<td>• Uses &quot;information processing perspective&quot; which puts the focus on the user's cognitive process and perception</td>
<td>• Puts the focus on the user</td>
<td>• May be tedious</td>
</tr>
</tbody>
</table>
<pre><code>                                                             |                                                                                                                                                                                                             | • Uses scenarios and tasks                     | • May focus on known problem areas                                                                  | • Tries to make the designer the user                                                               |
                                                             |                                                                                                                                                                                                             |                                               | • Recognition of user goals                                                                          | • Inherent bias because of task selection                                                          |
                                                             |                                                                                                                                                                                                             |                                               |                                                                                                      | • Does not cover entire problem space                                                              |
</code></pre>
DEPTH Process - Preparatory Phase

- Decide upon the focus of the evaluation
- Gather all the design patterns related to domain application under evaluation.
  - The design patterns are actually related to features of the web application under evaluation.
- Select the patterns that will be applied in the evaluation process
- Create the set of interrelated patterns that will be used during the evaluation.
  - When selecting a pattern, a network of related patterns is constructed. The evaluator has to decide which related patterns to keep thus concluding to the final set of patterns.
The evaluator uses the system based on the scenarios given. The evaluator then checks whether the design of the web application matches to the solution of the design pattern. In case deviations from the design pattern occur, the evaluator reports them. The evaluator states how design problems could be resolved according to the solution proposed by the design patterns. Some deviations from design patterns might be necessary due to the difference of the context of the web application under evaluation. Evaluator will make comments about the basic usability criteria such as aesthetics, satisfaction, etc.
What Is the Relation Between Design Patterns and Usability?

- HCI design patterns are “user centered design patterns” which by nature are focused on usability.
- HCI design patterns have been created with some underlying values in the same lines with Alexander (The Quality without a Name).
- Implementation of a design pattern varies.
  - So let’s check the implementation based on a design pattern!
For this paper we evaluate My Yahoo
It's easy to find content to add to your page. Use the find box, browse by topic, see what's popular, or explore editors' picks and sources in the spotlight. Learn More.
### Change Layout

**Layout and Organization**

You can move your modules up and down using the arrows, or delete one by selecting it and clicking the "X" button. You can move columns to the left or right using the bottom arrows. Click “Finished” when you’re done.

<table>
<thead>
<tr>
<th>Narrow Column</th>
<th>Wide Column</th>
</tr>
</thead>
<tbody>
<tr>
<td>Message Center</td>
<td>Most Viewed News Stories</td>
</tr>
<tr>
<td>Weather</td>
<td>AP Top Stories</td>
</tr>
<tr>
<td>Scoreboard</td>
<td>Horoscopes</td>
</tr>
<tr>
<td>Music Video of the Day</td>
<td>TV Listings</td>
</tr>
<tr>
<td>Stock Portfolios</td>
<td>Movie Showtimes</td>
</tr>
<tr>
<td>Calendar</td>
<td>Comics</td>
</tr>
<tr>
<td>News Photos</td>
<td></td>
</tr>
<tr>
<td>Slideshow</td>
<td></td>
</tr>
</tbody>
</table>

#### Layout

Select how many columns you want on your page.

- ○ Two columns
- ○ Three columns

#### Search Box

- ○ Put search box at the top of the page
- ○ Put search box at the bottom of the page

#### When adding content to your pages

- ○ Always add to top
- ○ Always add to bottom

#### When deleting content from a page

- ○ Always ask for confirmation before deleting
- ○ Just delete

#### Reading filters (What’s this?)

- ○ Turn reading filter on
- ○ Turn reading filter off
Change Colors

Current Theme
My Yahoo! Classic

Feature Themes
Here are a few of the best My Yahoo! themes available. For more colors and styles, browse the Theme Directory to the left.

- Carbon Fiber (More Industrial themes ...)
  Add speed to your page with this fast and lightweight theme.
  Use this theme

- Classic Camouflage (More Patterns themes ...)
  Protect your page in the wild.
  Use this theme

- FIFAworldcup.com (More FIFA World Cup themes ...)
  Celebrate the 2005 World Cup with this FIFA theme
  Use this theme

- Plum (More Colors Only themes ...)
  Purple lovers rejoice! Different shades of purple grace your pages.
  Use this theme

- Stars & Stripes (More Patriotic themes ...)
  Decorate your pages with red, white, and blue.
  Use this theme

- Titanium (More Industrial themes ...)
  Wrap your page in brushed titanium.
  Use this theme

- Tulips (More Flowers themes ...)
  Spring colors and blooming tulips for your pages.
  Use this theme

Theme Directory
Select a category to see more themes:
- Featured (7)
- Yahoo! (7)
- Animals (19)
- Flowers (31)
- Holidays (4)
- Industrial (8)
- Patriotic (7)
- FIFA World Cup (36)
- Sky & Space (4)
- Sports (1)
- Patterns (16)
- Colors Only (20)
Add Another Page

Add a new page for more content, or delete a page. Set your default My Yahoo! page and choose how often your content refreshes. Click “Finished” when you’re done.

Your Current Pages

| My Front Page | Rename | Add New | Remove |

Options

Default Page: My Front Page

Refresh Rate: never