Heuristic evaluation

Heuristics = Rules of thumb

*providing aid or direction in the solution of a problem but otherwise unjustified or incapable of justification*

- Webster’s 3rd
Inspection methods

“Experts,” not users
    Expert in evaluation (and/or design)

“Inspection” not use
Uses of heuristics and guidelines

Competitive testing
Design guidance
Evaluation criteria
Summarize lessons learned for future design guidance

The process of developing and applying heuristics can help design/evaluation group(s) to define and agree on goals, priorities, evaluation criteria.
Detailed method

1) Develop/identify short list of 10-15 heuristics [weighted by importance]

2) Assign multiple evaluators
   Design and domain experts (who are not the designers)
   Representative users if possible
   How many? 3 to 5 (Nielsen) – assuming homogeneous user population

3) Step through the use of the system/site
   Using a set of heuristics as evaluation criteria
   May simulate users’ activities (ie, using scenarios and personas)

4) Apply heuristics
   Individually at first
   Collective debriefing

5) Determine severity of violations

6) Make recommendations for improvement
One example: Nielsen’s heuristics

Visibility of system status
Match between system and the real world
User control and freedom
Consistency and standards
Error prevention
Recognition rather than recall
Flexibility and efficiency of use
Aesthetic and minimalist design
Help and documentation

more in Appendix A
1) Identify heuristics

Nielsen’s basis - # of evaluators
Three types of heuristics

General (e.g., Nielsen’s)
Adapted/defined for this kind of app e.g.
http://www.stcsig.org/usability/resources/toolkit/he_cklst.doc

For specific applications (web, homepages, e-commerce)
From similar efforts
From research, guidelines (see Appendices)

For this specific application
Developed through consensus of design/evaluation team(s)
Company-wide guidelines
1) **Assign multiple evaluators**

2) **Step through use**

### Multiple evaluators

When relevant, evaluate for **each major kind of use and/or user**

Keep going until you don’t find much that’s new and critical

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#### 1. Visibility of System Status

The system should always keep user informed about what is going on, through appropriate feedback within reasonable time.

<table>
<thead>
<tr>
<th>#</th>
<th>Description</th>
<th>Yes</th>
<th>No</th>
<th>MIA</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Does every display begin with a title or header that describes current status?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Is there consistent design scheme and sufficient contrast across the system?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Is a single, related message clearly visible when surrounded by unrelated ones?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Are status messages, progress, and error messages (e.g., system is being updated) on each screen?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Is each page given a screen number, or each page labeled so number relates to order?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Are pop-up windows used to display error messages, do they allow the user to see the field in error?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Is there some form of system feedback for every error message?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>If the user completes an action (e.g., group of actions), does the feedback indicate that the entire group of actions is complete?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Is there visual feedback in menus or dialog boxes about the choices that are selectable?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Is there visual feedback in menus or dialog boxes about the choices that are available?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Is there visual feedback in menus or dialog boxes about actions that are already selected?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>If multiple options have been selected in a menu or dialog box, is there visual feedback about which options are already selected?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Is there visual feedback when choices are returned in control?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Is the current status of users clearly indicated?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Severity ratings**

**Goal:** prioritize recommendations

Nielsen’s metrics

- Frequency: how often does this happen?
- Impact: how hard is it to overcome?
- Persistence: how long will this be a problem?

Possible severity rating scale:

- 0: not a problem
- Cosmetic: need not be fixed unless time available
- Minor: low priority
- Major: high priority
- Catastrophe: fix before release
Reporting Heuristic Evaluation Results

Tell a story

Put problems and recommendations at the center, not the heuristics.

“Follow the user” – by task or operation, report problems and identify heuristics violated

Thematic
Priorities – group violations by urgency
By heuristic – least useful?

Need to be concise!
### Reporting example: By task/activity

<table>
<thead>
<tr>
<th>Task</th>
<th>Problem</th>
<th>Heuristics violated</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search for plant by name</td>
<td>Requires Latin name, with genus capitalized</td>
<td>H2: match with real world; H15, use users’ language</td>
<td>4 (catastrophe) 90% of searches will fail</td>
</tr>
</tbody>
</table>
## Reporting example: themes x heuristic

### Sidebar #6: Thematic Problems Identified

<table>
<thead>
<tr>
<th>Heuristic</th>
<th>UI Experts</th>
<th>Developers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Speak users’ language</td>
<td>Use of jargon</td>
<td>Not enough information</td>
</tr>
<tr>
<td></td>
<td>Uninformative ordering of lists</td>
<td>Misleading titles</td>
</tr>
<tr>
<td>2: Consistency</td>
<td>Terminology</td>
<td>Formatting (typeface, header, graphics, layout)</td>
</tr>
<tr>
<td></td>
<td>Link term vs. Page header</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formatting (typeface, header, graphics, layout)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Button labels (‘go’, ’run’, etc.)</td>
<td></td>
</tr>
<tr>
<td>3: Memory load</td>
<td>No theme</td>
<td>No theme</td>
</tr>
<tr>
<td>4: Flexibility and efficiency</td>
<td>Need instructions</td>
<td>Need instructions</td>
</tr>
<tr>
<td></td>
<td>Difficulties finding desired material</td>
<td>Optimize ‘applications’</td>
</tr>
<tr>
<td></td>
<td>Insufficient short cuts</td>
<td></td>
</tr>
<tr>
<td>5: Aesthetic and minimalist design</td>
<td>Visual appeal</td>
<td>Visual appeal</td>
</tr>
<tr>
<td></td>
<td>Redundant objects on screen</td>
<td>Position elements for visibility</td>
</tr>
<tr>
<td></td>
<td>Missing information</td>
<td></td>
</tr>
<tr>
<td>6: Chunking</td>
<td>Separate topics merged</td>
<td>Separate topics merged</td>
</tr>
<tr>
<td></td>
<td>Same topic split</td>
<td></td>
</tr>
<tr>
<td>7: Progressive levels of detail</td>
<td>No theme</td>
<td>Insufficient detail</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inconsistent granularity</td>
</tr>
<tr>
<td>8: Navigation</td>
<td>Insufficient navigation aids (titles, headers, etc.)</td>
<td>Missing links</td>
</tr>
<tr>
<td></td>
<td>Inaccurate or unclear links</td>
<td></td>
</tr>
</tbody>
</table>
Reporting example: by heuristic, with mean severity ratings

<table>
<thead>
<tr>
<th></th>
<th>UI Experts</th>
<th>Developers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speak users’ language</td>
<td>Avg. Severity 3.17</td>
<td>2.91</td>
</tr>
<tr>
<td></td>
<td>Std Deviation 1.16</td>
<td>.68</td>
</tr>
<tr>
<td></td>
<td>% Total Violations 19</td>
<td>17</td>
</tr>
<tr>
<td>Consistency</td>
<td>Avg. Severity 3.08</td>
<td>2.89</td>
</tr>
<tr>
<td></td>
<td>Std Deviation  .99</td>
<td>.79</td>
</tr>
<tr>
<td></td>
<td>% Total Violations 21</td>
<td>11</td>
</tr>
<tr>
<td>Memory load</td>
<td>Avg. Severity 2.92</td>
<td>3.00</td>
</tr>
<tr>
<td></td>
<td>Std Deviation  .90</td>
<td>.74</td>
</tr>
<tr>
<td></td>
<td>% Total Violations 3</td>
<td>5</td>
</tr>
<tr>
<td>Flexibility and efficiency</td>
<td>Avg. Severity 3.18</td>
<td>3.01</td>
</tr>
<tr>
<td></td>
<td>Std Deviation  .77</td>
<td>.92</td>
</tr>
<tr>
<td></td>
<td>% Total Violations 15</td>
<td>20</td>
</tr>
<tr>
<td>Aesthetic and minimalist design</td>
<td>Avg. Severity 2.25</td>
<td>1.92</td>
</tr>
<tr>
<td></td>
<td>Std Deviation 1.52</td>
<td>1.12</td>
</tr>
<tr>
<td></td>
<td>% Total Violations 17</td>
<td>19</td>
</tr>
<tr>
<td>Chunking</td>
<td>Avg. Severity 3.40</td>
<td>3.50</td>
</tr>
<tr>
<td></td>
<td>Std Deviation  .68</td>
<td>.58</td>
</tr>
<tr>
<td></td>
<td>% Total Violations 5</td>
<td>1</td>
</tr>
<tr>
<td>Progressive levels of detail</td>
<td>Avg. Severity 3.71</td>
<td>3.08</td>
</tr>
<tr>
<td></td>
<td>Std Deviation  .55</td>
<td>.56</td>
</tr>
<tr>
<td></td>
<td>% Total Violations 6</td>
<td>13</td>
</tr>
<tr>
<td>Navigation</td>
<td>Avg. Severity 3.32</td>
<td>3.22</td>
</tr>
<tr>
<td></td>
<td>Std Deviation  .84</td>
<td>.67</td>
</tr>
<tr>
<td></td>
<td>% Total Violations 15</td>
<td>14</td>
</tr>
</tbody>
</table>

What’s the scale?

http://www.bls.gov/ore/htm_papers/st960160.htm#Sidebar%201
**Reporting example: by heuristic**

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**User Control and Freedom**
- Add site map to HTC home page.
- To offer the user more control, make navigational links of each word in the unordered list that repeats in the link button frame.
- Add navigational options so the user does not rely on the back button.
- Add more internal links to the course description page to take users back to the top.
- If a user goes to the HTC home page and bypasses the SPSU links, the user does not know that this department is part of Southern Polytechnic nor can the user go to SPSU’s home page, other department pages, or other information such as fees and registration.

**Consistency and Standards**
- Site identification is really important, as is the repetition of frames (and how the frames look), colors, and fonts. Why aren't frames used on the HTC home page?
- Make Peers and Professionals consistent with the others. The faculty bios do not have a link back to HTC.

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Problem: this shows fixes, not violations

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Heuristic evaluation: benefits

Low resource requirements

Usually find many problems fairly quickly, and get them in front of developers fast

Easy to repeat in iterative design

Easy to communicate

Usually easy to get agreement on a basic set of heuristics

*Face validity*
Heuristic evaluation: Limits

Can be superficial

Tends toward a short list of heuristics

Focuses on easily-seen problems; may miss problems associated with in-depth/repeated use

Can be deceptive – evaluation may appear been more complete and thorough than it was

How similar to users are experts? How expert are users?

How appropriate are the heuristics to THIS site?

Trade-offs among heuristics, the fixes needed?
Some key points

We need to **differentiate** among official standards, how people generally do things, and expert opinion.

Usability in a changing environment: what people are used to, their technology and expectations, are **continually evolving**

Heuristics need to be **customized** to goals, context.

Most guidelines are solutions to problems; have to ask what is the **underlying rationale**, goal.

**Trade-offs** among different goals, heuristics often have to be made **[deliberate sic]**.
Heuristics - observations

Heuristics shape what we see

What we think the problems may be help shape decisions about heuristics

As a practical matter, heuristics tend to focus on problems, not what a site/system does well

CONTENT is not addressed by most heuristics and guidelines
Appendix A
other heuristics
What others do: design patterns

“What best practices” for interaction design can also furnish material

Examples
- Yahoo! Design Pattern Library
- Designing Interfaces (Tidwell)
- The Design of Sites (Van Duyne, Landay, Hong)

What’s a Pattern?
A pattern describes an optimal solution to a common problem within a specific context.

Recent Patterns
- Alphabetic Filter Links
  - The user needs the ability to look up information alphabetically within a large data set.
- Animate Transition
  - Designer needs to communicate that an object is changing its spatial relationship within the page.
- Calendar Picker
  - User wants to find or submit a particular piece of information based on a date or between a date range.
- Change Screen Width
  - The designer needs to communicate that an object is no longer of primary importance.
- Drop Invitation
  - Designer needs to indicate valid candidate crop sites during a drag and drop operation.
- Expand Transition
  - Designer needs to show the detail of an object in its context or reveal a previously collapsed object.

http://developer.yahoo.com/ypatterns/
What others do:
Nielsen’s 113 Design Guidelines for *Homepages (2002)*

Determining Homepage Content
Vertical Industry Segments
Communicating the Site's Purpose
Communicating Information About Your Company
Content Writing
Revealing Content Through Examples
Archives and Accessing Past Content
Links
Navigation
Search
Tools and Task Shortcuts
Graphics and Animation
Graphic Design
UI Widgets

Window Titles
URLs
News and Press Releases
Popup Windows and Staging Pages
Advertising
Welcomes
Communicating Technical Problems and Handling Emergencies
Credits
Page Reload and Refresh
Customization
Gathering Customer Data
Fostering Community
Dates and Times
Stock Quotes and Displaying Numbers
Bruce Tognazzini’s principles

Anticipation
Autonomy
Color Blindness
Consistency
Defaults
Efficiency of the User
Explorable Interfaces
Fitts's Law – size and distance
Human-Interface Objects

Latency Reduction
Learnability
Limit Tradeoffs
Metaphors
Protect the User’s Work
Readability
Track State
Visible Interfaces
Specialized Heuristics:
e-Commerce and Order Forms

From http://www.weinschenk.com/tools/online_checklist.asp

Shows total cost
Shows itemized costs
  Shows product names and/or descriptions
Allows the user to change the quantity easily
Provides an option to save an order and complete it later
Provides details on any other charges on the order
Provides details on shipping options and charges
Provides shortcuts for repeat visitors to make transactions faster
Allows users to easily move from the order form to shopping
  and back again
Provides security information
Provides users with an alternate offline way of ordering
Allows users to view and/or change previous orders
Does not require users to register before a purchase
Customer support: Supporting users before, during, and after a purchase.
Trust: Establishing trustworthiness.
Product Navigation: Enabling users to browse products easily.
Product Information: Providing the product information that users want, need, and expect.
Purchase transaction: Providing easy means for users to purchase products.
Other Heuristics

heuristics OCLC’s Heuristics – slight variations on Nielsen’s

Heuristics operationalized:
http://www.stcsig.org/usability/resources/toolkit/he_cklst.doc
Gerhardt-Powals (1996) proposed a set of research-based heuristics:

Automate unwanted workload:
- Free cognitive resources for high-level tasks.
- Eliminate mental calculations, estimations, comparisons, and unnecessary thinking.

Reduce uncertainty; display data in a manner that is clear and obvious.

Fuse data; reduce cognitive load by bringing together lower level data into a higher-level summation.

Present new information with meaningful aids to interpretation:
- Use a familiar framework, making it easier to absorb.
- Use everyday terms, metaphors, etc.
- Use names that are conceptually related to function.
- Context-dependent.
- Attempt to improve recall and recognition.

Group data in consistently meaningful ways to decrease search time.

Limit data-driven tasks:
- Reduce the time spent assimilating raw data.
- Make appropriate use of color and graphics.

Include in the displays only that information needed by the user at a given time.

Provide multiple coding of data when appropriate.

Practice judicious redundancy.

Appendix B
guidelines and recommendations
Guidelines and checklists

Research-based web guidelines from

http://www.usability.gov/pdfs/

See specifically:

http://www.usability.gov/pdfs/chapter4.pdf:

user connection speeds and screen resolutions
What others do (cont):

Nielsen’s Homepage Design Statistics
(what people are used to; what others have found useful)

Download Time
Basic Page Layout
  Page Width
  Liquid Versus Frozen Layout
  Page Length
  Frames
Fundamental Page Design Elements
  Logo
  Search
Navigation
  Footer Navigation
  Site Map
Routing Pages
Splash Pages

Frequent Features
  Sign In, About Us, Contact Info, Privacy
  Policy, Job Openings, Help

Graphics and Multimedia
  Pictures, ALT Text, Music, Animation

Advertising

Typography
  Body Text and Background Colors
  Link Formatting