Human Computer Interaction

Fundamentals and Practice [SWE - 431]

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Chapter: 2
Specific HCI Guidelines

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- Principles are general, where guidelines are specific.
- International Organization for Standardization (ISO) provide guidelines covering visual display, physical input devices, workplace ergonomics, tactile/heptic interactions.
- Guidelines can be divided into two categories:
    - Domain specific (Specific to user, platform etc)
    - General HCI Design
- Guidelines can be relevant and common across the different categories.
    - Eg. guidelines for e-commerce application might also address different general HCI design issues such as display layout, how to solicit input, how to promote vendor-specific styles, and how to target for a particular user group.

Examples of Criteria/Categories for HCI Guidelines

Criteria	**Main Categories**	**Examples**
User Type	Age/generation Disability/accessibility Gender Consumer group Occupation Culture/country	Kids, elders, visually challenged, baby boomers, students, parents, East asians, atheletes etc
Platform/system setup	Mobile/handheld Desktop Large display/virtual reality Embedded Public installation Operating system/network	Smartphone, padlike device, desktop, kiosk, embedded OS, cloud based, navigation systems, personal game players, MP3 players, e-book, etc.

Examples of Criteria/Categories for HCI Guidelines

Criteria	**Main Categories**	**Examples**
Vendors/organizations	Private Public	NASA, Korea University, Android™, iOS, Windows® XP, etc.
Interface style/ modality/technology	WIMP (*windows, icon, mouse, pointer*) Non-WIMP 3-D Multimodal	Voice/aural, gesture, single/ multitouch, tactile/haptic, multimodal, menu driven, GUI/ widgets, visual perception, etc.
Task/operational context	Location/place Time Noise/lighting Bodily constraints	Office, outdoor, road/street, home, automobile, subway, classroom, eyes free, hands free, handedness, etc.

Examples of Criteria/Categories for HCI Guidelines

Criteria	**Main Categories**	**Examples**
Applications	Game Media/information Electronic commerce Design/editing Social network service	
General HCI design	Display layout Information structure/navigation Soliciting input Information/output visualization Design process and practices User experience General aesthetics	

- Still hard to apply guidelines into the HCI design.
    - Even though guidelines are much more specific than the principles, it is still not very clear how to reflect them into the HCI design in a concrete and consistent manner

- Tidwell's guidelines address many category of the HCI issues illustrating specific UI examples with description what it does, why and when it should be used. Here we will discuss few examples.

Visual Display Layout (General HCI Design)

- Organizing and allotting relevant information in one visible screen is concerning.
- Generally one should try to:
    - Organize the display layout based on information content. (importance, sequence, functionality)
    - Divided into proper sections
    - Attention grabbing
    - Visually pleasing (align and with restricted use of colors)

On the next page, we will see the summarized gui for web-page layout put-forth by the US Department of Health and Human Services.

Guidelines	Explanation
Avoid cluttered displays	Create pages that are not considered cluttered by users
Place important items consistently	Put important, clickable items in the same locations and closer to the top of the page, where their location can be better estimated
Place important items at top center	Put the most important items at the top center of the web page to facilitate users finding the information
Structure for easy comparison	Structure pages so that items can be easily compared when users must analyze those items to discern similarities, differences, trends, and relationships
Establish level of importance	Establish a high-to-low level of importance for information and apply this approach throughout each page on the website

Guidelines	Explanation
Optimize display density	To facilitate finding target information on a page, create pages that are not too crowded with items of information
Align items on a page	Visually align page elements, either vertically or horizontally
Set appropriate page lengths	Make page-length decisions that support the primary use of the web page
Choose appropriate line lengths	If reading speed is most important, use longer line lengths (75–100 characters per line); if acceptance of the website is most important, use shorter line lengths (50 characters per line)
Use frames when functions must remain accessible	Use frames when certain functions must remain visible on the screen as the user accesses other information on the site

Information Structuring and Navigation (General HCI Design)

- Single display is insufficient to encompass all the required information or to control UI of the application.
- Structuring the information and making easy to move among items is must for high usability.
- This is closely related to the principle of Understanding the Task.
    - Understanding the task involves identifying subtask sequences and actions, each linked to input or output information. The task structure, action sequence, and content organization guide interaction flow, ensuring optimal information and control timing.

An example of site map for a website

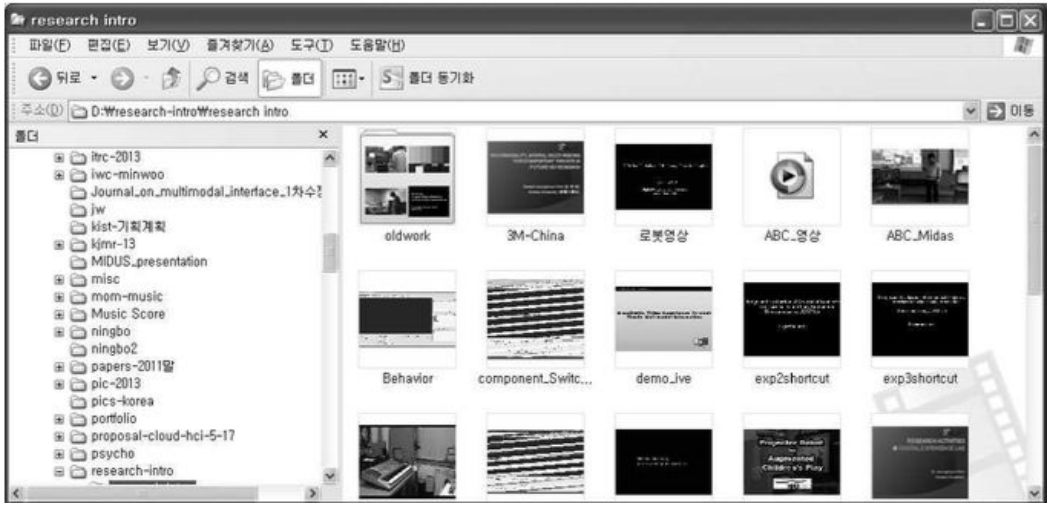
- Fast and easy navigation is also important to enable users to find the needed action and information quickly.
- Designers should include site maps, and provide effective feedback on the user's location within the site.
- To facilitate navigation designers should
    - Differentiate and group navigation elements
    - Use appropriate menu types
    - Use descriptive tab labels
    - Provide clickable list of page contents on long pages
    - Add "glosses" on links when needed
    - Must not trap users on dead-end pages

Example of two design patterns from Tidwell.

What: Put two side-by-side panels on the interface. In the first, show a set of items that the user can select at will; in the other, show the content of the selected item.

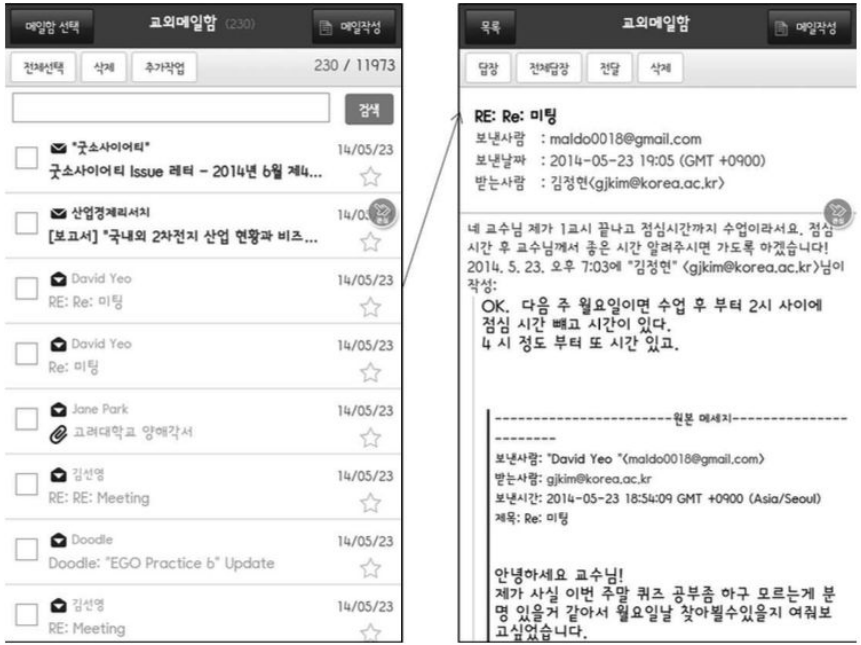
When:

- Display is large enough to show two separate panels at once
- Presenting list of objects, categories or even actions.
- Allow users to see the overall structure of list



The use of a two-panel selector, a design pattern for information structuring and facilitated navigation

Example of two design patterns from Tidwell.



The use of one-window drilldown as a designer pattern for content organization and fast navigation

What: Show each of the application's pages within a single window. As a user drills down through a menu of options, or into an object's details, replace the window contents completely with the new page.

When:

- Device with tight space restrictions
- Application consists of many pages of content
- Many application windows open - confuse average computer users.

Taking User Input (General HCI Design)

Modern interfaces use GUI elements (window, text box, button, menu, forms, dialog box, icon), support techniques (autocompletion, deactivating irrelevant options, voice recognition), and devices (mouse, touch screen) for varied user input. UI designers must compose these methods considering design constraints (user type, task characteristics, operating environment).

Some guidelines for use in applying these input methods to facilitate data entry are:

- *Consistency of data-entry transactions:* Similar sequences of actions should be used under all conditions (similar delimiters, abbreviations, etc.) Eg. Same date format across all the applications [MM/DD/YYYY]

- *Minimal input actions by user:* Fewer input actions means greater operator productivity.
  - Proper use of single-key commands
  - Mouse selection
  - Auto-completion features
  - Selecting from list
  - Use default values
  - Avoid switching between keyboard and mouse

- *Minimal memory load on users:* Use menus and button choices so that users do not have to remember a lengthy list of codes and complex syntactic command strings.
- *Compatibility of data entry with data display:* The format of data-entry information should be linked closely to the format of displayed information (i.e., what you see is what you get).
- *Clear and effective labeling of buttons and data-entry fields:* Use consistent labeling. Distinguish between required and optional data entry. Place labels close to the data-entry field.
- Match and place the sequence of data-entry and selection fields in a natural scanning and hand-movement direction (e.g., top to bottom, left to right).
- *Do not place semantically opposing entry/selection options close together:* For example, do not place “save” and “undo” buttons close together. Such a placement is likely to produce frequent erroneous input.

Situations become more complicated when other forms of input are also used such as touch, gesture, 3-D selection and voice. There are separate guidelines for them.

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