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Pertemuan Ke 12

Oleh : MALABAY

Prodi : Teknik Informatika/Sistem Informasi

USER INTERFACE DESIGN

Disusun oleh : Malabay

Sumber dari :
https://www2.southeastern.edu/Academics/Faculty/galkadi/285/notes/Chapter 12.doc

User Interface Design

CHAPTER OVERVIEW AND COMMENTS

Virtually all modern computer-based systems (and many legacy systems that are reengineered) have some type of interactive user interface, and most require reasonably sophisticated interface designs. It is easy for programmers to focus on splashy new technologies and ignore the fact that functionality and usability (not innovation) is what users are most concerned about.

This chapter outlines the design processes for software user interfaces.

Typical Design Errors

- Lack of consistency
- Too much memorization
- No guidance / help
- No context sensitivity
- Poor response
- Arcane/unfriendly

12.1 The Golden Rules

This section discusses three principles of user interface design. The first is to place the user in control (which means have the computer interface support the user's understanding of a task and do not force the user to follow the computer's way of doing things). The second (reduce the user's memory load) means place all necessary information on the screen at the same time. The third is consistency of form and behavior.

The three "golden rules" are:

1. Place the user in control
2. Reduce the user's memory load
3. Make the interface consistent

These golden rules actually form the basis for a set of user interface design principles that guide this important software design action.

12.1.1 Place the User in Control

Mandel defines a number of design principles that allow the user to maintain control:

- **Define interaction modes in a way that does not force a user into unnecessary or undesired actions**. The user should always be able to enter and exit the mode with little or no effort.

- **Provide for flexible interaction**. Because different users have different interaction preferences, choices should be provided by using keyboard commands, mouse movements, digitizer pen or voice recognition commands.
- **Allow user interaction to be interruptible and undoable**. A user should be able to interrupt a sequence of actions to do something else without losing the work that has been done. The user should always be able to "undo" any action.
- **Streamline interaction as skill levels advance and allow the interaction to be customized**. Allow to design a macro if the user is to perform the same sequence of actions repeatedly.
- **Hide technical internals from the casual user**. The user interface should move the user into the virtual world of the application. A user should never be required to type O/S commands from within application software.
- **Design for direct interaction with objects that appear on the screen**. The user feels a sense of control when able to manipulate the objects that are necessary to perform a task in a manner similar to what would occur if the object were a physical thing.

12.1.2 Reduce the User's Memory Load

Whenever possible, the system should "remember" pertinent information and assist the user with an interaction scenario that assists recall.

- **Reduce demand on short-term memory**. Provide visual cues that enable a user to recognize past actions, rather than having to recall them.
- **Establish meaningful defaults**. A user should be able to specify individual preferences; however, a reset option should be available to enable the redefinition of original default values.
- **Define shortcuts that are intuitive**. "Example: Alt-P to print. Using easy to remember mnemonics."
- **The visual layout of the interface should be based on a real world metaphor**. Enable the user to rely on well-understood visual cues, rather than remembering an arcane interaction sequence. For a bill payment system use a check book and check register metaphor to guide the user through the process.
- **Disclose information in a progressive fashion**. The interface should be organized hierarchically. The information should be presented at a high level of abstraction.

12.1.3 Make the Interface Consistent

The interface should present and acquire information in a consistent manner:

1. All visual information is organized according to a design standard that is maintained throughout all screen displays,
2. Input mechanisms are constrained to a limited set that is used consistently throughout the application,
3. Mechanisms for navigating from task to task are consistently defined and implemented.

A set of design principles that help make the interface consistent:

Allow the user to put the current task into a meaningful context. The user should be able to determine where he has come from and what alternatives exist for a transition to a new task.
Maintain consistency across a family of applications. "MS Office Suite"
If past interactive models have created user expectations, do not make changes unless there is a compelling reason to do so. Once a particular interactive sequence has become a de facto standard (Alt-S ➔ save file), the user expects this in every application she encounters.

12.2 User Interface Analysis and Design

The overall process for analyzing and designing a UI begins with the creation of models of system.

12.2.1 User Interface Design Models

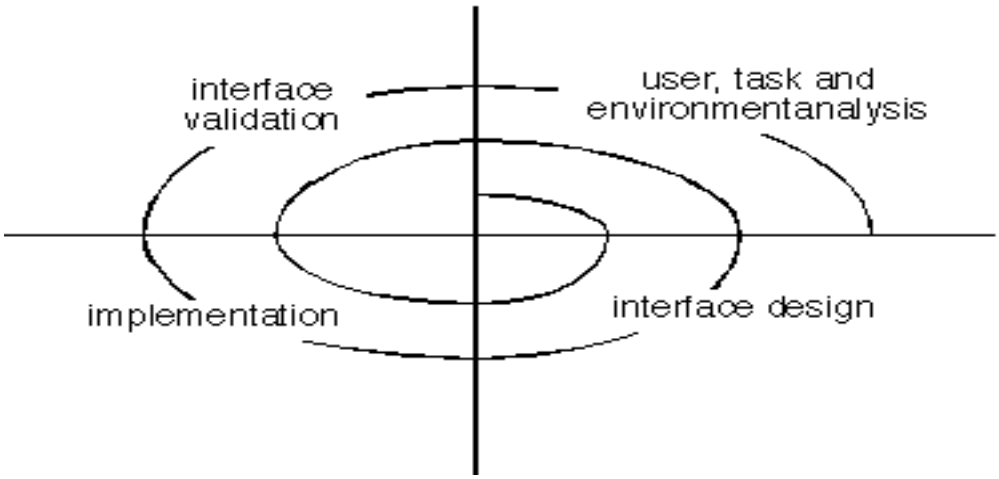
Four different models come into play when a user interface is to be analyzed and designed. "Prototyping"

1. User model: a profile of all end users of the system
   Users can be categorized as:
   - *Novices*: No syntactic and little semantic knowledge of the system.
   - *Knowledgeable, intermittent users*: reasonable knowledge of the system.
   - *Knowledgeable, frequent users*: good syntactic and semantic knowledge of the system.
2. Design model: a design realization of the user model that incorporates data, architectural, interface, and procedural representations of the software.
3. Mental model (system perception): the user's mental image of what the interface is. The user's mental model shapes how the user perceives the interface and whether the UI meets the user's needs.
4. Implementation model: the interface "look and feel of the interface" coupled with all supporting information (documentation) that describes interface syntax and semantics.

12.2.1 The Process

The analysis and design process for UIs is iterative and can be represented using a spiral model.
The user interface analysis and design process encompasses four distinct framework activities:

1. User, task and environment analysis and modeling.
2. Interface design
3. Interface construction (implementation)
4. Interface validation



The figure implies that each of these tasks will occur more than once, with each pass around the spiral representing additional elaboration of requirements and the resultant design. The construction involves prototyping which is the only practical way to validate what has been designed.

The analysis of the user environment focuses on the physical work environment. Among the questions to be asked:

- Where will the interface be located physically?
- Will the user be sitting, standing, or performing other tasks unrelated to the interface?
- Does the interface hardware accommodate space, light, or noise constraints?
- Are there special human factors considerations driven by environment factors?

The information gathered as part of the analysis activity is used to create an analysis model for the interface. Using this model as a basis, the design activity commences.

The construction activity normally begins with the creation of a prototype that enables usage scenarios to be evaluated.

12.3 Interface Analysis

A key tenet of all software engineering process models is this: *you better understand the problem before you attempt to design a* solution. Interface design analysis means understanding:

(1) The people (end-users) who will interact with the system through the interface;
(2) The tasks that end-users must perform to do their work,
(3) The content that is presented as part of the interface,
(4) The environment in which these tasks will be conducted**.**

12.3.1 User Analysis

The only way that a designer can get the mental image and the design model to converge is to work to understand the users themselves as well as how these people will use the system. This can be accomplished by:

User Interviews: The software team meets with the end-users to better understand their needs, motivations, work culture, and a myriad of other issues.
Sales Input: Sales people meet with customers and users to help developers categorize users and better understand their requirements.
Marketing Input: Market analysis can be invaluable in the definition of market segments while providing an understanding of how each segment might use the software in different ways.
Support Input: Support staff talks with users on a daily basis, making them the most likely source of information on what works and what doesn't, and what they like and what they don't.

The following set of questions help the interface designer better understand the users of a system:

- Are users trained professionals, technician, clerical, or manufacturing workers?
- What level of formal education does the average user have?
- Are the users capable of learning from written materials or have they expressed a desire for classroom training?
- Are users' expert typists or keyboard phobic?
- What is the age range of the user community?
- Will the users be represented predominately by one gender?

- How are users compensated for the work they perform?
- Do users work normal office hours or do they work until the job is done?
- Is the software to be an integral part of the work users do or will it be used only occasionally?
- What is the primary spoken language among users?
- What are the consequences if a user makes a mistake using the system?
- Are users' experts in the subject matter that is addressed by the system?
- Do users want to know about the technology the sits behind the interface?

The answers to these and similar questions will allow the designer to understand who the end-users are, what is likely to motivate and please them, how they can be grouped into different user classes or profiles, what their mental models of the system are and how the user interface must be characterized to meet their needs.

12.3.2 Task Analysis and Modeling

The goal of task analysis is to answer the following questions:

- What work will the user perform in specific circumstances?
- What tasks and subtasks will be performed as the user does the work?
- What specific problem domain objects will the user manipulate as work is performed?
- What is the sequence of work tasks—the workflow?
- What is the hierarchy of tasks?

The techniques below are applied to the user interface:

- Use-cases define basic interaction
- Task elaboration refines interactive tasks
- Object elaboration identifies interface objects (classes)
- Workflow analysis defines how a work process is completed when several people (and roles) are involved

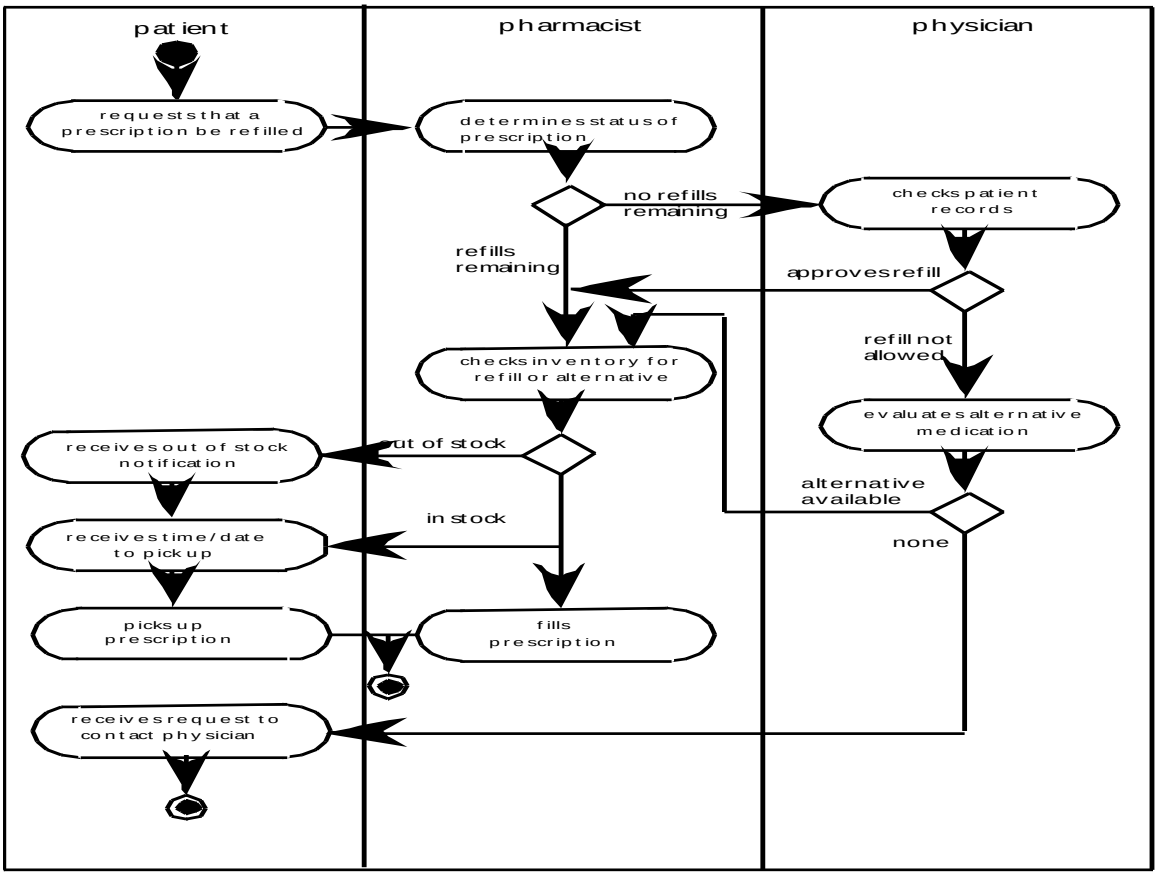


Figure 12.2 Swimlane diagram for prescription refill function

12.4 Interface Design Steps

Once interface analysis has been completed, all tasks required by the end-user have been identified in detail.

1. Using information developed during interface analysis (Section 12.3), define interface objects and actions (operations).
2. Define events (user actions) that will cause the state of the user interface to change. Model this behavior.
3. Depict each interface state as it will actually look to the end-user.
4. Indicate how the user interprets the state of the system from information provided through the interface.

A number of UI design patterns are discussed in Section 12.4.2. Visit www.hcipatterns.org to explore the design patterns available for user interfaces.

12.4.2 Interface Design Patterns

Patterns are available for

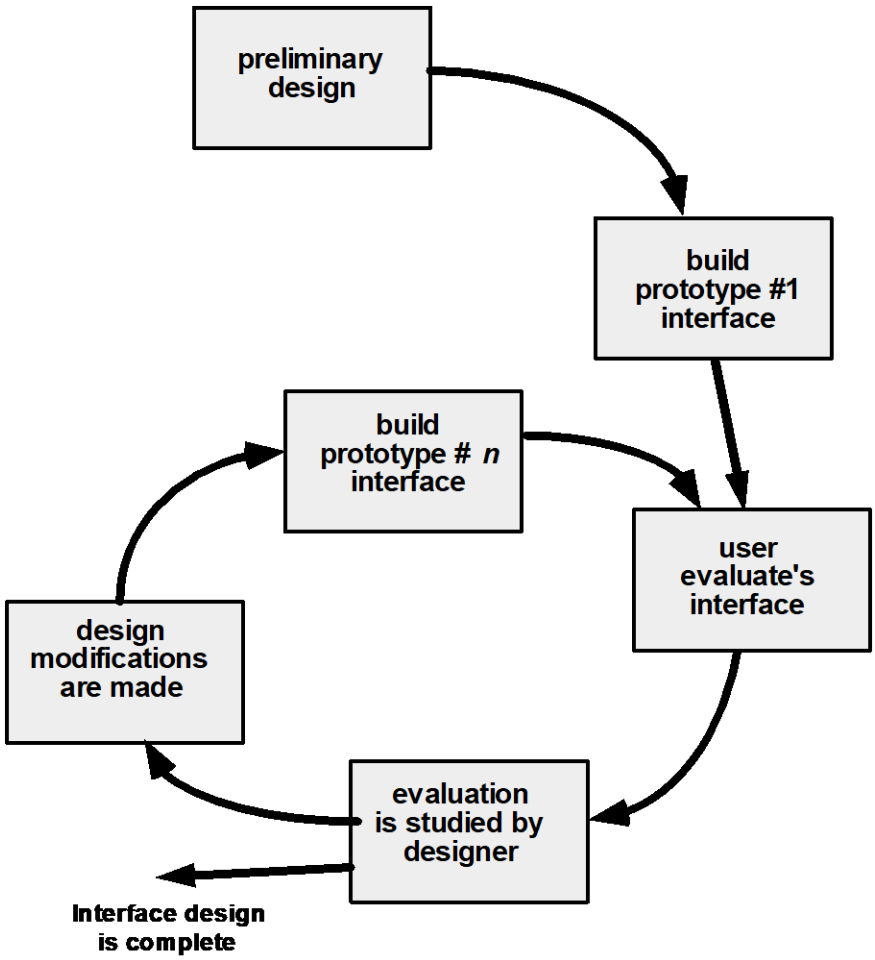
- The complete UI
- Page layout
- Forms and input
- Tables
- Direct data manipulation
- Navigation
- Searching
- Page elements
- e-Commerce

12.4.3 Design Issues

- **Response time**: System response time has 2 important characteristics: length and variability. Variability refers to the deviation from average response time.
- **Help facilities**: Help must be available for all system functions. Include help menus, print documents.
- **Error handling**: describe the problem in a language the user can understand. Never blame the user for the error that occurred.
- **Menu and command labeling**: menu options should have corresponding commands. Use control sequences for commands.
- **Application accessibility**: especially for the physically challenged.
- **Internationalization**: The Unicode standard has been developed to address the daunting challenge of managing dozens of natural languages with hundred of characters and symbols.

12.5 Design Evaluation

Two interface design evaluation techniques are mentioned in this section, usability questionnaires and usability testing. The process of learning how to design good user interfaces often begins with learning to identify the weaknesses in existing products.



Once the first prototype is built, the designer can collect a variety of qualitative and quantitative data that will assess in evaluating the interface. Questions can be a simple Y/N response, numeric response, scaled response, Likert scale (strongly agree, etc.), percentage response, and open-ended ones.

Likert scale example:

http://www.gifted.uconn.edu/Siegle/research/Instrument%20Reliability%20and%20Validity/Likert.html

Sumber dari : http://people.cs.ksu.edu/~dag/541sp06/materials/UserInterfaceDesign.doc.

User Interface Design - Suggested sites

1) Matthew C Smith –

First, I wanted to list a link that is nice for website UI design.

http://jeffglover.com/ss/ssmain.php

Then, for a good website I would say the Google mail application. The design is clean, easy on the eyes. Not cluttered at all. It is scalable for different resolutions. It implements Ajax technology so that the user does not have to click and reload pages constantly, instead it loads data asynchronously so the interface is smooth. It's not quite a minimalist in design, but it is to the point where it is clean. No animated gifs, no ad banners. Good choice of colors in terms of contrast. http://mail.google.com
Although an account is required to log in. But they have a tour deal set up at http://www.google.com/mail/help/tour/GetStarted2.html
and there you can see the interface. Similarly the Google Maps interface is good for the same reasons. http://maps.google.com

2) Josh King –

I think www.google.com is a excellent user interface. It meets the specs for easy to read with the visual impaired and user friendly. No advertising or excess material that causes congestion. Loads up fast for both T1 lines and 28.8 modems. Run able on all browsers. The page is nice, quick and to the point demonstrating the sites main function, the search utility.

3) Tom Zagorski -

I may be biased, but I think the College of Engineering webpage (http://www.engg.ksu.edu/) is well designed. The splash page gives an opportunity to show some of the college as well as clearly identify areas where different people will want to visit. The secondary pages are simple, but not plain and there is consistency throughout all of them. They catch the user's attention just enough to make them notice it but not be overwhelming. The information is also split up logically in each subsection.

4) Brandi Kendrick

Website: http://en.wikipedia.org/wiki/Main_Page

This webpage is a little full with information but the text is big and clean and clear. There are no advertisements to speak of. The color dependency is nonexistent. It is an international site, listing articles in many, many different languages. The help menu is accessible and extensive. The site loads fast and works well on any browser. It does not use sounds for any of it's information. I have never seen wikipedia give an error message because I have never seen a problem with it but I am sure they handle all kinds. It also has a nice point and click interface that allows easy navigation through the articles.

5) Eric Lamb

http://www.pearlizumi.com

This site is very consistent. The top and bottom navigation bars are on all the pages allowing for easy navigation to any section of the site. Also, when inside a section of the site an additional top or side navigation bar is added, and this bar stays consistent through this section. This allows users to learn the site easily. Further, its fixed width allows it to display well at any resolution. Furthermore, they have added color and photos to this site, but they always have good contrast for text to make it readable for most people.

6) Tony Trujillo

I find www.newegg.com to be a visually pleasing site. You have a search at the top to find a specific item and on the left a breakdown of categories to find an item. In the center of the screen you have the items on sale for the day. At the bottom you have other functions that a buyer may need such as contacting customer service. The yellow / dark blue color layout it has is a visually appealing color combination.

7) Jared Sutherland

There are few websites that come into mine when looking at a good user interface. I figured I would list a couple so they wouldn't overlap with others. The first would be Google Personalized, which the url is http://www.google.com/ig?hl=en. The user has flexible interaction. Users can pick what they want on their homepage and the number or RSS feeds within a selected category. The second url with a good interface would be espn.com. Espn.com the interface is organized in a progressive fashion by being able to click on sport and being able to select the area you wish to look at. All of the sports are located at the top and you have a menu come down,

which results in a deduction of the user remember to look for information.

8) Yahui Jin

There are two websites that I really like. One is www.animepaper.net. This one basically shows off user made wallpapers that is anime themed. The use of white space and the basic layout of the site are well suited for the purpose of presenting artistic wallpapers. The navigation to various wallpapers is extremely well made as well. You can quickly get to different anime series within seconds. The other website is www.animenfo.com. The transparent banner really stands out and not many websites does that. The layout of the site is pretty good and the usability of the website is again very good.

9) Ben Goreham

The URL I want to use is www.ebay.com

When navigating the site, the header is always at the top of the page allowing quick access to new searches, a users account, and the primary activities a buyer/seller may use. When searching for items, the user can customize the way search results are displayed. This is useful for users with slower modems so that fewer items are retrieved (like skipping the pictures). Many of the most important actions have a second confirmation page to prevent accidental actions from being executed (like bidding $9999 instead of $99.99...). Item listings always give the same type of information at the very top and when in the users account page, a summary report at the top allows the user to quickly navigate to items of importance. While this somewhat violates the second golden rule (Reduce the User's Memory Load) it does meet the first (Place the user in control) and the third (make the interface consistent) golden rules.

10) Phil Pickett

http://www.writely.com/

Writley has a very nice user interface. The site is not loaded down with useless graphics, but still looks nice in my opinion. Data is presented in a very structured and consistent manner to new users. The site is easy to navigate and does not confuse the new user. The main attraction to the site is the online word processing software. Anyone that is used to using MS word should have no trouble using this site and will find the functions familiar. This site provides a very useful service and the easy to user interface is an attractive feature.

11) Kenton Born

http://www.k-state.edu/chessclub/

This website is not good because it is fancy or outstanding. It is good because it is easily navigable and suited to the type of people who would visit the site. While the tournaments link and pictures still need updated (in the process of doing so), the rest of the website overall works well. The initial purpose of the website is for people in the area looking to play chess, and it immediately shows the meeting times and that we are an active club. The left-hand side is strongly emphasized, and has a navigation tab for each primary item a chess player may be interested in dealing with our club. Also, the left and top are constant with each page, with only the text updating, making the website computationally efficient and easy to understand. With the links being properly updated, this is an example of a basic website good for its intended use.

12) Dusty Burwell

I believe that www.digg.com has a great user interface.

First, I find it visually appealing with somewhat of a minimalist approach. Although there is a lot of information on the main page, it is well organized and easy to read. Navigation is easy with the options laid out very simply on the right. The text would be easy to read for the visually impaired as it is high contrast with black on an off-white. One interesting feature of this site is that it uses on ajax for it's rating system. This allows asynchronous communication with the server so the user doesn't have to leave the page when 'digging' a news story. Although this causes the user to have to download a fairly big javascript file to use the site for the first time, after the file is cached in the browser it takes little time to load the page for viewing on either broadband or dial-up. Also, from what I've heard, the creators are working on shrinking the size of that javascript file so that load times will decrease for those who don't use a caching system on their browsers.

13) Tyson Yager

I would like to submit the URL of http://www.gizmodo.com.

I picked this website for a number of reasons. The most important reason is that it is updated very frequently. One thing I hate is a good website that does

not update its content. Second, it has a language translation function, allowing users from all over the world to view the contents. And lastly, it doesn't throw lots of pop ups at you(at least not on my machine).

14) Kyle Becker

http://cabelas.com

Cabelas Web has links that take the customer directly to areas of interest. Links are broken down into specific products available by brand name. The site also informs the customer of current sales. Check out has easy to follow steps for the customer to update orders prior to final payment. The site is tested daily by Hacker Safe to ensure the site has not been compromised. And VeriSign confirms the Website to be owned/operated by Cabelas

15) Joseph Lutz

Websight: http://www.nws.noaa.gov/
I believe this website has a good user interface. I came to this conclusion by using Pressman's guidelines. The following comments are what I thought of the website using his categories.
1. Place the user in control.
* Provide for flexible interaction: This website is accessible by many different formats. It can be accessed in a very graphical rich way or it can even be accessed with a pure text format. It also has the ability to receive RSS feeds from it if the user wants the content in that form.
* Allow for user interaction to be interrupted and undone: This is not much of an issue for the webpage. Mainly it allows the user to use the back button and not have any problems while using it to get to a previous page.
* Hide technical internals from the casual user: The technical internals are not available to any user. The website takes care of all the formatting and retrieval of the information in a nice easy to use way.
* Design for direct interaction with screen objects: It has many maps that people can click on to zoom in and also to move the map around.
2. Reduce the user's memory load.
The only problem here is that people need to know what information is collected by what parts of the agency to get to it easily.
* Reduce short-term memory use: The page displays what actions it took to get to your current location.
* Meaningful defaults: It defaults to a starting place that every one who would be using the page would expect to start at. (ie the entire US in the

latest time information)

* Define shortcuts that are intuitive: The shortcuts are located on the left side of the page. They could be a little easer to read but in general they get you to where you want to go. You may need to know some background information about the government agency to use the links in a more efficient manner.

* Disclose information in a progressive manner: It allows you to drill down into more detail about particular areas and get more detailed information.

3. Make the interface consistent.

The only inconsistency is between the National Oceanic and Atmospheric Administration and the National Weather Service do not use the same layout for their website. But this is just to help in keeping the separation between these two parts of the government agency separate.

* Maintain consistency across applications: The consistency of the website design is maintained within the information retrieval part of the website. The terminology is maintained throughout all of the National Oceanic and Atmospheric Administration websites.

16) Adam Jundt

http://www.thunderheadeng.com

Thunderhead Engineering's webpage meets all of the requirements specified by Mandel. The interface is consistent with its navigation and allows for easy access to all parts of the site. The layout is also very intuitive and requires little knowledge from the user. Lastly, because the links to the left allow the user to select the desired product and the links to the right allow more detailed information about the selected product, the user is in full control of what he/she sees.

17) Steven Chu
Website: http://www.k-state.edu/

From the previous design, the current interface offers a much more clean structured layout without the menu pop-ups. The information has been categorized efficiently after much usability testing throughout the design phase. There are 4 persistent to common areas that target audiences frequent allowing easier navigation as well as a universal top bar allowing search capability reducing the amount of clicks if unsure how to navigate to a page. There is consistency between the second level page layout and homepage (and more will follow once the new templates are offered). The layout was controlled by CSS which allows uniformity to all pages as well as conforms to users whose browser does not support such features to still see the material in a top-bottom fashion in a column.

18) Curtis Rempe

The site I think has a very nice design is www.espn.com. I feel that this site shows you everything you want on the first page. You don't need to go down deep into it to get what you want. It lists all the current news on the front so that you can get to them easy. Also, it allows you to watch videos from the day or week in sports. You can watch all the current highlights of games and also watch special segments that were on SportsCenter.

19) Marcellus Seamster Jr.

www.xbox.com

This site is easy to navigate (high usability), and it gives the user lots of information and it shows them exactly where they need to go to find certain information.

20) Roland Craddolph

http://www.newegg.com/

I am a fan of newegg, but by the UI standards discussed in the book, there are some good points but more bad points.

Good: Eye catching and pleasing Links on the side of the page make it easy to navigate Quick to load Listing pictures with the item name giving someone the ability to find something they are looking for if they forgot the name of that particular item

Bad points: Main page has way to much information for the viewer to see. If someone new to the website is not use to this will be overloaded with all of the information.

www.nsbe.org

For a professional website it is flashier than most, but with some professionalism. However, if a user has dial up, or a really slow internet connection will wait a long time for the page to load. The website also uses a lot of macromedia based tools, causing the user to download macromedia drivers/software to view the website. Finally, the website is easy to navigate, but it is really hard to find any specific information for example scholarship available for students.

21) Tyson Moore

http://www.apple.com/

Apple has done an absolutely outstanding job keeping their website simple and easy to use, while still offering its clients more and more services. Their website meets each of the three "Golden Rules" by:
1) Place the user in control. Apple Computer's website allows the user to easily select which section he or she would like to view via graphics *and* text (graphics in the middle of the page, text on the side in the form of a nav bar).
2) Reduce the user's memory load. Each section of the website includes the main navbar at the top, with a simple breadcrumbs type interface at the top to easily see what section you are viewing and how to change sections. Also, there are multiple ways to get to where you want. As I mentioned above, you can either click on a graphic of the product you'd like more information on, or you can click on the text at the side of the screen.
3) Make the interface consistent. As I mentioned before, Apple has kept this similar design for quite a long time, even after adding a multitude of products to their line. This consistency has allowed old Apple fans to continue to feel "at home," while still attracting new clients with the sexy design.

22) Tom Kugler

Here is a website I found with a wonderful user interface. www.thesuperficial.com

One of Mandel's three golden rules is placing the user in control. When I want my stories about Tom Cruise I want them now. Thankfully the Superficial has a conveniently located search bar on the right side. I just type in Tom Cruise and almost instantly I get links to such stories as "Tom Cruise is still nuts." Also its very easy to go the "Archives" and read past articles.

Another of Mandel's three golden rules is about consistency. All the pages on the Superficial have the same layout/format so I never have to hunt for information because I'll always find it in the same place. This makes the page really easy to use.

23) Philip Galloway

First off I would like to give a website that I felt had some great information regarding new standards for UI design that provides not only for direct visual design but also for underlying application design that can lead to errors for the end user. This accounted for things such as CSS hacks, java script errors, accessible tables and things of this nature. The site is [http://www.maxdesign.com.au/presentation/checklist.htm]

The site however that I decided to judge UI design on is General Electric's vast website starting at www.ge.com. As in intern for GE this previous summer, one of my projects was to add a meeting minutes uploading system to one of the divisions of GE Insurance Solutions. I right away recognized the three rules of Mandel in Pressman's book simply because they resembled GE's guidelines for web site additions so closely. GE has spent a great effort in forming all their web sites to one consistent design to display company unity. With the same navigation bar always proportionate to the size of the page combined with a consistent location of the search tool, we see how GE gives the user great control. Although the site does not utilize a lot of interaction which would require the user to "remember" anything, GE does provide sub links on the left hand side of the page that allows users to move back to the home page or previous pages should the user get lost. Overall, even though the size GE is so enormous, GE.com provides a very clean, straight forward, interface that doesn't require any knowledge to get information about the company and what it provides.

24) Nickolas Zimmerman

I'd like to submit www.re-aim.org for examination as a well-designed website. Built by Orion Online, the web design division of the School of Journalism at K-State, this site exemplifies the three "golden rules" mentioned in Pressman's text. It places the user in control by offering multiple ways to access a page, via the colored "tabs" at the top, by links in pages, or by the site map. It reduces the user's memory load by color-coding each of the main sections of the site and by disclosing information in a progressive form in order to prevent "information overload." The design is also a consistent interface, with the main colored tabs appearing on all pages and a consistent layout among content pages (with a different color scheme based on what section of the site you are in).

25) Travis Rail

Site: K-State Online
URL: http://online.ksu.edu

This site has come along way in the past 5 years, especially over this summer. The site is now trying to adopt the Web 2.0 manifesto, using crisp style sheets, and emphasizing features such as message boards and user profiles that others can view. However, once I peel back two or three of the new layers I find the same boring HTML layout and ugly generic site templates that professors have to choose from. Once I get past the Course Listing page it's like the same ugly and cumbersome KSOL we have grown

accustom too. The changes made over the summer were a good start, but should have been implemented years ago, and to now label this Frankenstein of website as some glories new web technology named Axio is laughable by any decent web developer.