

Mobility Program Socrates/Erasmus

Thomas Bata University in Zlin
(<http://web.utb.cz>)

Dates: 20 – 24 April 2009

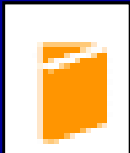
**Course: “Methods and guidelines to develop
User Centred Web Interfaces ”**

Course: Analysis and Design phase

Lecturer : Luís Carlos Bruno (lbruno@estig.ipbeja.pt)

ESTIG – Technology and Management School (www.estig.ipbeja.pt)

IPB - Polytechnic Institute of Beja (www.ipbeja.pt)



HCI Foundations

- HCI (Human Computer Interaction)
 - Subject that handle the
 - Project (design),
 - Development
 - Evaluationof Interactive Computer Systems to be used by human beings
 - Subject that study the information exchange between persons and computers

HCI Foundations

- Person/Computer Interaction
 - Person
 - Program End user (For users the interface is the system)
 - Computer
 - The machine where the program is working
 - Interaction
 - The user send commands to computer and this send back the results (actions -> effects)

HCI Foundations

- User Interfaces
 - Visible part of one application/system
 - Program part that permits user to
 - Interact with application
 - Develop their tasks
- Software Interfaces Types
 - GUI (Graphical User Interfaces)
 - WIMP (Windows Icons Mouse Pointing)
 - Voice Interfaces
 - Speech recognition (command and control)
 - Text to Speech (to blind people)
 - Gestures Interfaces
 - Using the expressivity of the hand and face
 - Multimodal Interfaces
 - Speech, gestures, physical devices (PDA)
 - Intelligent Interfaces
 - Attentive, Suggestive, Predictive, Incidental

HCI Foundations

- Why to study HCI
 - 50%-60% of the total price of software
 - The programs are used for many people with different knowledges
 - Bad interfaces has costs
 - Money/Profits and Satisfaction
 - Lifes (Nuclear and Medical applications)
 - Isn't easy to get the best user interface
 - People is imprevisible
- System Results of HCI Thecniques
 - Easy to use
 - Effectives
 - Increase the user satisfaction
 - Minimize the user errors
 - Decrease the user frustration
 - The user tasks became more productives
 - Hide the technology from the user

Usability

- Usability is described on **ISO/IEC 9126** and on **ISO/IEC 9241 Norms**
- Relates to ease-of-use some software or hardware interface
 - Simple concept, but not always easy or intuitive to implement
- To get usability, interactive systems must be developed based on **User-Centered Design Process**

Interfaces Usability Parameters

- Low Memory Load
 - The site should reduce user memory load
- Avoid Errors
 - An error is an incorrect action by the user such as clicking the wrong link (decrease performance)
- Provide Satisfaction
 - The site should be pleasant to use and look at. Users perception of 'pleasantness' influences their tasks

Interfaces Usability Parameters

- Easy to learning
 - Quickly perception of ease-of-use
 - comfortable learning curve
 - Motivation for learning how to use
- Efficiency
 - The system permits user to perform their tasks with suited performance (as quickly as possible and with minimums resources)

User-Centered Design

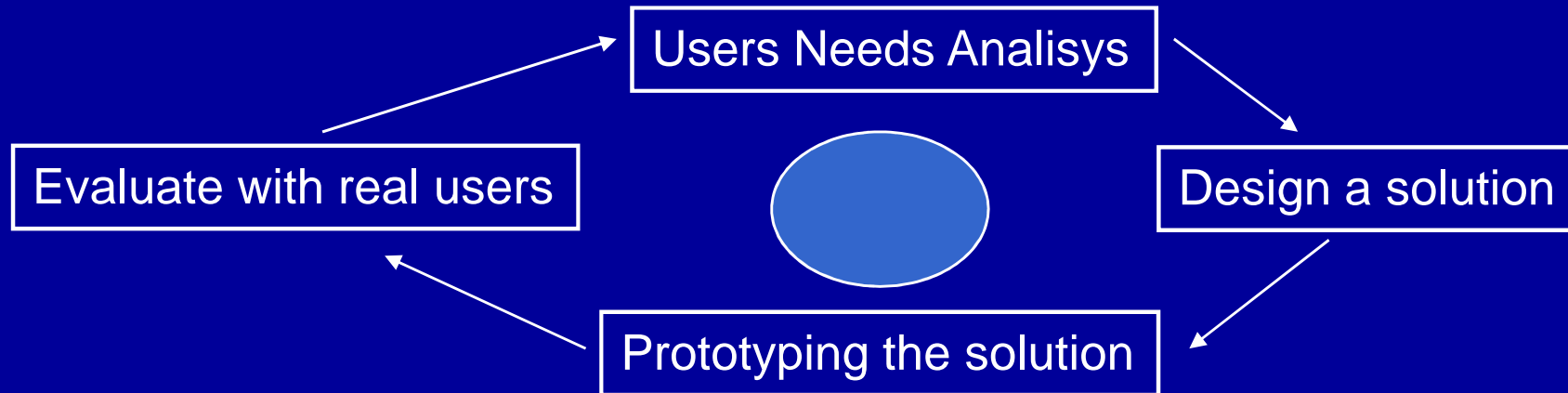
- User Centered-Design (UCD) is a philosophy and a process:
 - Philosophy that places the person (as opposed to the system) at the center;
 - Process that focuses on cognitive factors (such as perception, memory, learning, problem-solving, etc.) as they come into play during peoples interactions with systems.

User-Centered Design

- UCD seeks to answer questions about users and their tasks and goals, then use the findings to drive development and design.
- UCD seeks to answer questions such as:
 - Who are the users of system?
 - What are the users' tasks and goals?
 - What are the users' experience levels with this kind of systems?
 - What functions do the users need from this system?
 - What information might the users need, and in what form do they need it?
 - How do users think this system should work?
 - How can the design of this system facilitate users' cognitive processes?

User-Centered Design

- Iterative Design



- Needs Analysis (to know users, tasks and context)
 - Tasks Analysis
 - Relevant tasks
 - Problem Scenario
- Design solution (principles of design)
 - Interaction scenarios
 - Storyboards
 - Prototypes

11 Task Analysis Questions

1. Who are the users?

- Identify who are and their features: preferences, work habits, computer background, physical and motors skills, usage frequency and others

2. What tasks do they perform?

- Identify the tasks that are currently doing on other type of systems (ex: not automatically). It's good to identify functionalities to the system.

3. What tasks are desired?

- Identify other tasks which are not currently implemented and could be important to the success of the system

4. How are tasks learned?

- What knowledge users have to have. They need training?

5. Where are tasks performed?

- Place, place conditions, security questions,...

11 Task Analysis Questions

6. Relationship between user and data?

- User Personal safety data is provided to system? User Common data is provided? The access to system is remote?

7. What other tools user has?

- Other software, devices, and objects that user could use to complement their tasks

8. How do users communicate with other?

- Who communicate?, about what?, with other persons? What are the relationships between users

9. How often tasks performed?

- The frequency users use the system, what the tasks more used (to optimize) and who do it.

10. Time constraints on tasks?

- Define time to execute the tasks (main or more used tasks)

11. What happens when things go wrong?

- Contingency plans to crash the system, communications. How to help users in difficult situation

See this example: <http://bmrc.berkeley.edu/160/projects/t2/taskanalysis.html>

Data Gathering Methods

- Documentation
 - Often contains description of how the tasks should be done (rather than how they are currently being done)
 - Standards
 - Manuals
 - Histories
 - Best Practices
- Domain Expert Description
 - Expert describes how process should work, how tasks should be done
 - “Knowledge-based” discovery

Data Gathering Methods

- Interviews:
 - Structured
 - Efficient
 - Require training
 - Unstructured
 - Inefficient
 - No training
 - Semi-structured
 - Good balance
 - Often appropriate

Plan for effective question types:

How do you perform task x?

Why do you perform task x?

Under what conditions do you perform task x?

What do you do before you perform...?

What information do you need to...?

Who do you need to communicate with to...?

What do you use to...?

What happens after you...?

What is the result or consequence of...?

What is the result or consequence of NOT...?

Source:

Gordon & Gill, 1992; Graesser, Lang, & Elofson, 1987

Data Gathering Methods

- Observation
 - In situ, watch users do what they do
 - Record with videotape to watch later, or again
 - Take lots of notes, sketches
 - Focus on specific task-relevant behaviors in notes, but later convert to abstract subtasks
- Questionnaires
 - Exploratory vs. confirmatory
 - Qualitative / Quantitative
 - Type of Replies : Yes/No, Multiple Choice (odd number of questions), Sorting, Open-ended, Comments

Tasks Classification

- After the 11 questions performed the tasks should be organized into 3 categories:
 - Easy
 - Moderate
 - Difficult
- The main tasks of each category should be described by a problem scenario.

Problem Scenario

- Problem Scenario is a small story with:
 - One context
 - One or more characters
 - One final goal
 - Mental activity, plans and behavior evaluation
 - With one intrigue with actions/reactions and events
 - Focused on the user activity / Not focused on controls and technology

Problem Scenario

Example of one problem scenario based on the task: User Registration

John is a customer of supermarket "Big One". One day he decided to buy some products of that supermarket by internet. To do this John should register their personal data (name, address) and their payment way on the system and should receive a confirmation of this action.

General Principles of Design

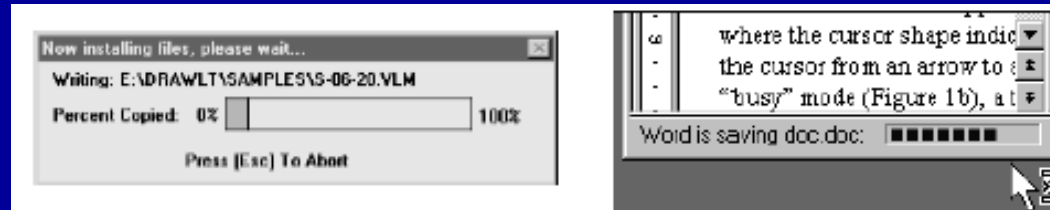
- Principles of Design

- Visibility

- All the main functions should be visible -> The user knows what to do after

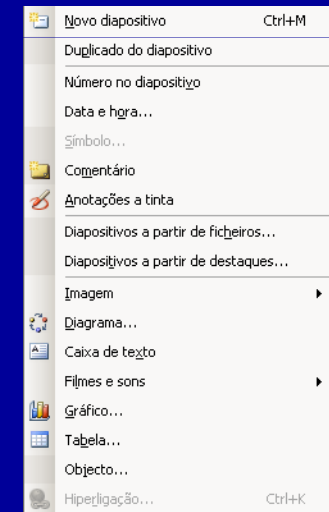
- Feedback

- System should return information about an user action



- Restrictions

- Reduce options to user ->
 - reduce the n° of errors



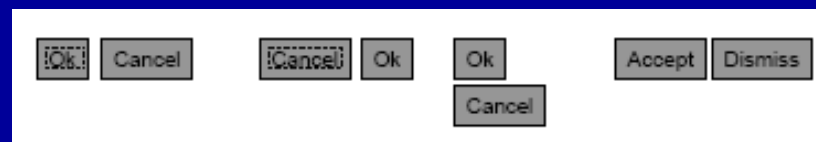
General Principles of Design

- Mapping the real world and the interface elements
 - Relationship between the User Interfaces Controls and elements of the real world



- Consistency
 - Similar elements to similar tasks (easier to learn)

Bad example:



General Principles of Design

– Affordance

- Attribute that permits user to know how to perform the task (similar to use the handle mug)
- Use Universal Patterns (example: links web pages underlined and blue)



Interaction scenarios

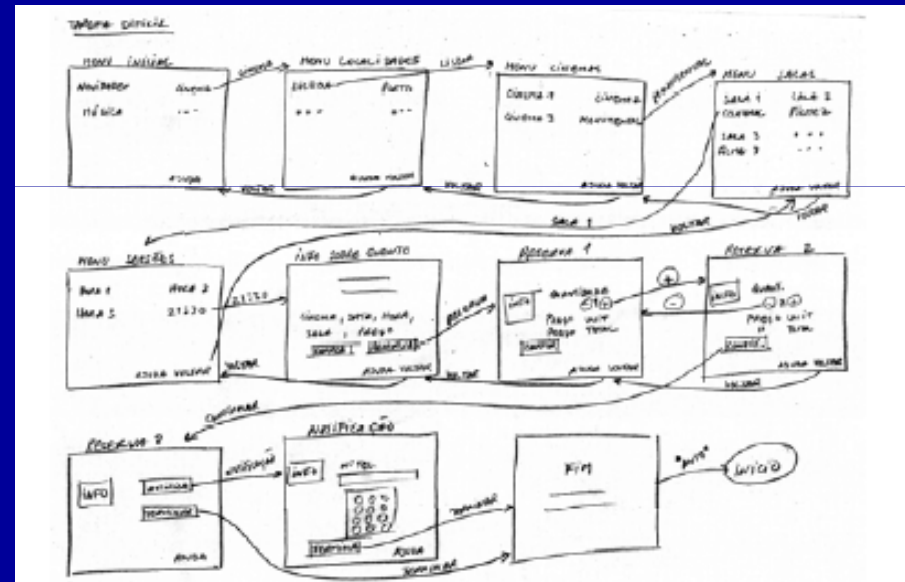
- Similar to the Problem Scenario, but is focused on technology and user interface controls
- Should be used to better design an interface

Example:

- John has to do the customer registration on the “Big One” supermarket webpage. On the Homepage he chose the option “Registration” and then is open a web form. He fill the textbox’s Name, Address, Email, Phone that are mandatory. After he fill the checkboxes with their products preferences, he chose visa option from the dropdownbox (with the usual ways to do the payment (visa, money...)) and he fill a textbox with the username that he prefer and two textboxes to type and retype the password. Finally, he submit the information clicking on the button “Register”. One page of confirmation is opened. He check it and then click the button “Confirm Registration”. The system inform John that after he will receive an email with the status registration.

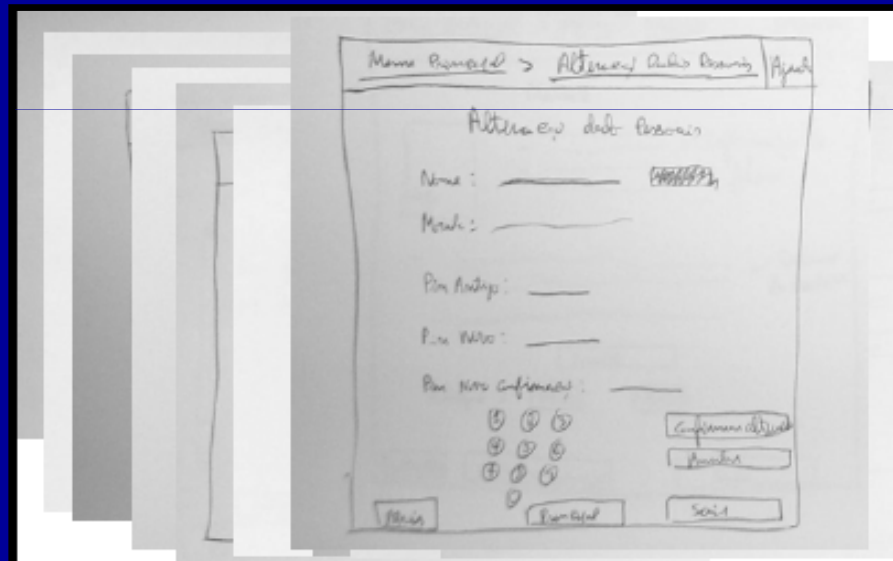
Storyboards

- Used first on Movies and Animation
- Used on interactive systems to complement the scenarios
- A set of sketches that describe important interactions
- The arrows help designer to understand the actions (show navigation)
- Text annotations complement the visual information



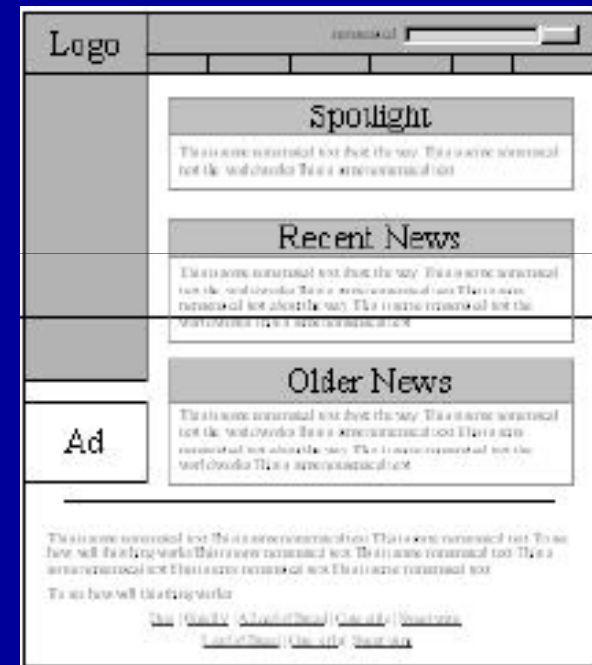
Interface Prototypes

- Low fidelity prototype (not functional)
 - Pencil and paper
 - Could be tested with real users
 - Show on early stage the interface behavior
 - Obey users to think more on the content and functionality than on the look
 - Could be noted



Interface Prototypes

- High fidelity prototype (not functional)
 - Developed with computer tool
 - Show more details
 - Could be tested with real users
 - Focused on interface look



Interface Prototypes

- Functional Prototype
 - Used on the end of cycle design life
 - Tested by users
 - Define scenarios tasks
 - Goals to evaluate
 - Methods and metrics to evaluate



Usability Guidelines for Websites

(<http://usability.gov/pdfs/>)

1. Analysis and Design Process
2. Design for commonly-used hardware and software
3. The Homepage
4. Page Design
5. Navigation
6. Scrolling and Paging
7. Links
8. Text Appearance
9. Lists
10. Data entry and forms
11. Graphics, Images, and Multimedia
12. Writing Web Content
13. Content Organisation
14. Search
15. Accessibility for people with special needs

1. Analysis and Design Process

- ** **Set and state goals**: Obtain consensus on the main purposes of the site before starting development.
- ** **Use an iterative design approach**: create and evaluate paper (low fidelity prototypes) and software prototypes to obtain design feedback.
- ** **Evaluate websites before and after** making changes to determine if changes improved the usability of the site.
- ** **Provide useful content** that is engaging, relevant, and appropriate to the audience.
- * **Understand and meet users' expectations** by using familiar formatting and navigation schemes.

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• *very important for the success of the web site*

Source: <http://www.usabilitynet.org/guidelines/academic.html#design>

1. Analysis and Design Process

- * **Establish user requirements:** through surveys (questionnaires), interviews, observation, task analysis, focus groups, user groups, etc.
- * Consider many user interface issues, e.g. the **users' experience and reason for visiting the site**; usability results (errors, time, satisfaction).
- * **Focus on performance before preference:** Make decisions about content, format, interaction & navigation before deciding colours and graphics.
- * **Provide feedback** when users must wait.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#design>

2. Design for commonly-used hardware and software

- ** **Design for common browsers**: design for all browsers that have a significant number of users.
- * **Design for popular operating systems**: design for all operating systems that have a significant number of users.
- * **Design for the user's typical connection speed**. Restrict page size for dial-up users.
- * **Design for commonly used screen resolutions** (currently 800x600 upwards): eliminate horizontal scrolling for expected window sizes.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Hardware>

3. The Homepage

** Show all major options on the homepage (such as topic areas and categories).

* Enable access to the homepage by providing a link to home on all other pages (eg: on upper/left logo).

* Communicate the website's purpose: **What is this?**
What does it have? What can I do?

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Homepage>

4. Page Design

** **Set appropriate page lengths**: Use shorter pages for navigation and pages that need to be quickly browsed. Use longer pages to facilitate uninterrupted reading and to make pages easier to print.

** **Use frames when functions must remain visible** to enable immediate changes to be made to information displayed in another frame.

** **Establish level of importance** by putting important information at the top of the page and less important at the bottom.

* **Provide printing options**: Format the page for easy printing by allowing it to adjust to the width of the window, or use CSS to provide a printable version.

* **Provide descriptive page titles** that are unique, concise and meaningful when used by bookmarks and search engines.

* **Avoid PDF for on-screen reading**. Only use pdf format if the text is intended to be printed and read offline

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Page>

5. Navigation

- ** **Provide feedback on the users's location** to let users know where they are: e.g. highlight the menu location and show navigation path as a breadcrumb.
- * **Use a clickable 'List of Contents'** on long pages: to provide a quick overview and enables users to easily reach specific items.
- * **Do not create pages with no navigational options.** Newly opened windows should have a prominent control to close the window.
- * **Differentiate and group navigation elements.** Break up pages into clearly defined areas.
- * **Use descriptive tab labels:** When using tabs for navigation, make sure the labels are self-explanatory.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Navigation>

5. Navigation

- * **Use site maps** for websites that have many pages.
- * **Provide a list of the contents of each part of the site** as a list of links to the final information, in meaningful groups
- * **Customise the 'page not found' error** message to offer suggested solutions.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Navigation>

6. Scrolling and Paging

- * Use longer, scrolling pages when users are reading for comprehension.
- * Scroll fewer screenfuls: If users are looking for specific information, break up the information into shorter pages.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Scrolling>

7. Links

- * **Provide consistent clickability cues**: Make it obvious what is clickable: preferably use the browser default.
- * **Avoid misleading cues to click**: Ensure that items that are not clickable do not look clickable (e.g. avoid underlining or blue items).
- * **Use text for links**: images alone may not look clickable and can be difficult to understand.
- * **Use meaningful link labels** so that users can find the right link first time. Do not use 'click here'.
- * **Match the link names with the destination page headings**, so that users know they have reached the right page.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Links>

7. Links

- * **Ensure that embedded links are descriptive:** The wording should help users scan the contents of a page.
- * **Repeat important links:** Ensure that important content can be accessed in different ways.
- * **Designate used links:** Use colour changes to indicate to users when a link has been visited.
- * **Link to related content:** Use links to cross-reference other pages in the site with related content.
- **Indicate internal v. external links:** differentiate internal page links and external links from links to other pages in the site.
- **Clarify clickable regions of images:** Ensure that the entire image is clickable or that the clickable areas are obvious.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Links>

8. Text Appearance

- ** Use black text on plain, high-contrast backgrounds
- ** Ensure visual consistency of website elements within and between web pages.
- * Format common items consistently across pages (such as date or time).
- * Use at least 12-point font. Preferably use the browser default size.
- Use attention-attracting features such as animation with caution and only when they are highly relevant.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Text>

9. Lists

- * **Order elements** to maximise user performance (e.g. lists should read down columns, not across).
- * **Display related items in lists vertically**, rather than as text in a paragraph.
- * **Introduce each list**: Provide an introductory heading (i.e. word or phrase) at the top of each list.
- * **Format lists to ease scanning** by use of meaningful labels, effective background colours, borders and white spaces.
- * **Start numbered items** at one rather than zero.
- **Place any important items at the top of a selection list**, and the remainder alphabetically or numerically.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Lists>

10. Data entry and forms

- ** Distinguish **required** and **optional** data entry fields.
- ** **Detect** data entry **errors automatically** (when possible).
- ** **Minimize user data entry**. Do not require users to enter the same information more than once.
- ** **Label data** entry fields **clearly**.
- ** Put labels **close** to data **entry fields**.
- * **Label pushbuttons** clearly.
- * **Label data entry fields consistently** across pages.

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Source:<http://www.usabilitynet.org/guidelines/academic.html#Data>

10. Data entry and forms

- * **Allow users to see their entered data** - Create data entry fields that are large enough to show typical entries without scrolling.
- * **Display default values** whenever a likely default choice can be defined
- * **Use a minimum of two radio buttons**: if necessary provide a separate choice labeled 'none'
 - **Use radio buttons** for mutually exclusive selections
 - **Use check boxes** to enable multiple selections
 - **Do not make** user-entered codes **case sensitive**
 - **Place the cursor** in the first data entry field

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Source:<http://www.usabilitynet.org/guidelines/academic.html#Data>

10. Data entry and forms

- **Ensure that double-clicking** will not cause problems (many users double-click when only one click is needed).
- **Do not limit viewable** list box options: When using a lists box, show as many items as possible.
- **Prioritise pushbuttons**: Put the button that is used most frequently in the 1st position & make it the default when users press Enter.
- **Minimise use of the Shift key** for data entry .

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Source:<http://www.usabilitynet.org/guidelines/academic.html#Data>

11. Graphics, Images, and Multimedia

* Use video, animation, and audio only when they help to convey the website's message or other content.

* Include the logo of the organisation in a consistent place on every page.

*Limit large images above the fold: Do not fill the entire first screenful with one if there are screenful of text information below the fold.

-Limit the use of images to when they are critical for the success of a website.

-Label clickable images (unless they are readily understood by typical users).

-Ensure that images do not significantly slow page download time, particularly for users with slow connections. Using the same graphic repeatedly saves time as browsers only download them once.

-Use simple background images: Use background images sparingly, and avoid using images behind text

- Include actual data values with graphical displays of data when precise reading of the data is required.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Graphics>

12. Writing Web Content

* Define acronyms and abbreviations: Do not use unfamiliar or undefined acronyms or abbreviations on websites.

* Use abbreviations sparingly: Show complete words rather than abbreviations (except for well-known abbreviations).

* Use familiar words: Avoid jargon.

-Make first sentence descriptive: Include the primary theme of each paragraph in the first sentence.

- Use active rather than passive sentences for instructions

- Limit the number of words in sentences, and the number of sentences in paragraphs.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Writing>

13. Content Organisation

** Organize information clearly: Structure the site to be meaningful to the user (not the information providers)

** Put critical information near the top of the hierarchy of a website to make it easy to find.

** Use clear labels for categories of information that summarise the items within the category.

** Use unique headings that clearly describe and differentiate the different categories of material.

** Display information in a format and in units that are immediately useful and understandable.

* Standardise task sequences : Allow users to perform tasks in the same sequence and manner across similar conditions.

* Facilitate scanning: Design navigation pages for scanning, not reading.

* Group related elements: Group all related information and functions in order to decrease time spent searching or scanning.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Content>

13. Content Organisation

- * Display only necessary information: Remove extraneous information to allow users to remain focused on the desired task .
- * Ensure that all necessary information is available and displayed on the page where and when it is needed.
- * Format information for multiple audiences: Use multiple formats if the website has distinct audiences with different needs.
- * Provide assistance to users through links to additional help, for example for first time users.
- Design quantitative content for quick understanding by use of tables and graphics .

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Source:<http://www.usabilitynet.org/guidelines/academic.html#Content>

14. Search

- ** Provide a search box in the same place on each page of content-rich web sites
- ** Ensure usable search results that give the information needed in a format that matches users' expectations.
- ** Allow simple searches: Structure the search engine to provide appropriate results for users who enter one or two words.
- * Make upper- and lowercase search terms equivalent
- * Design search engines to search the entire site, or clearly communicate which part of the site will be searched.

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Source: <http://www.usabilitynet.org/guidelines/academic.html#Search>

14. Search

- * Design search around users terms: Refine the search engine to respond to the words most frequently entered by users.
- Default search should work like Google (look for the phrase then individual words), or be labeled (e.g.'phrase')
- State how many results have been found
- Display the search criteria on the results page, either as a separate page heading or display it in the search box
- Ensure a search box is provided for repeat searches, both at the top and especially at the bottom of the page

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Source:<http://www.usabilitynet.org/guidelines/academic.html#Search>

Accessibility

- Web accessibility means that people with disabilities can use the Web.
- More specifically, Web accessibility means that people with disabilities can perceive, understand, navigate, and interact with the Web, and that they can contribute to the Web.
- Desabilities:
 - Visual disabilities
 - Hearing Impairments
 - Speech disabilities
 - Cognitive and neurological disabilities
 - Physical disabilities
 - Others
- Web Accessibility Initiative (WAI) Home Page (<http://www.w3.org/WAI>) has information about
 - Strategies, guidelines, resources to make the Web accessible to people with disabilities

Accessibility

- Web Accessibility Initiative (WAI) - <http://www.w3.org/WAI>
- Web Content Accessibility Guidelines (WCAG) – version 2.0 (new release)
- Evaluating Accessibility (tools)
 - <http://www.w3.org/WAI/ER/tools/complete>

Bibliography

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(ISBN: 0-13-046109-1)
- **Jenny Preece et al**, “Interaction Design – beyond Computer Interaction”, John Wiley
2002, 519 pp.(ISBN: 0-471-49278-7)
- Web Accessibility Initiative (WAI) Home - <http://www.w3.org/WAI>

- Thank You For Your Attention

- Questions ?

(lbruno@estig.ipbeja.pt)

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