Usability Engineering

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What is Usability?

- **Utility:**
  - Does the system provide the required functionality?

- **Usability:**
  - How easy is it to use the system functionality?

- **Usefulness:**
  - Usefulness = Utility + Usability

- Related to **ergonomics:**
  - Ergonomics = scientific discipline concerned with understanding interactions among humans and systems
  - Theory, principles, data and methods to design systems to optimize
    - human well-being
    - overall system performance.
Why is Usability Important?

- Employee productivity.
- System adoption.
- Reputation of development house/team.
  - Quality UI’s build credibility (Stanford study, 2002)
Simplicity

- Remove non-essentials/irrelevant info
  - minimalist design
- Use white spaces
- Get user focus on most common tasks.
- **Self-evidency**: Design such that target user does not require instructions.
Consistency

- **External consistency**
  - Follow adopted standards for
    - platform
    - application type
  - Align to real world
    - Terminology, concepts and conventions
    - Logical ordering
    - Presentation of information, . . .

- **Internal consistency**
  - Terms, flows, positioning, styling, navigation, . . .
Communication

- **Feedback**
  - Provide timely feedback.
  - User should always get feedback on
    - what is happening,
    - required actions/input,
    - available results

- **Structure**
  - Organize UI elements to reinforce meaning
  - Group related objects

- **Sequencing**
  - Organize work flows with a start, middle, and end
  - Users should see
    - what has been done
    - potentially what is still to do

- **Help and documentation**
  - Provide intuitive access to help/documentation.
  - Interactively provide as need is evident.
  - Don’t provide if no need.
User Control and Freedom

- Allow for
  - Change of minds/aborts
  - Back-track, undo, redo, retrospective corrects.
  - Check up something and come back.
Error Prevention and Handling

- **Prevention**
  - Allow reasonable variations in input.
  - Prevent the user from making serious errors whenever possible
    - ask for user confirmation for actions with serious consequences.

- **Error recovery**
  - Provide clear, plain-language messages to describe the problem
  - Suggest a solution to help users recover from any errors.

- **Undo and redo**
  - Provide ”emergency exits” to allow users to abandon an unwanted action.
  - The ability to reverse actions relieves anxiety
    - and encourages user exploration of unfamiliar options.
Manage User Focus

- That focus zooms into
  - most common actions
  - next step
Accessibility

Allow for access across

- Devices/browsers
  - including text browser
- User groups
  - Languages/cultures
  - Skills levels
  - Physical disabilities
    - Without sound, colour
    - Magnified screen, high contracts mode
    - Voice control
    - . . .
Workload Reduction

- **Supportive automation**
  - Make the users work easier, simpler, faster, or more fun.
  - Automate unwanted workload.

- **Reduce memory load**
  - Brief, simple views
  - Consolidate and summarize data
  - Provide assistance for interpretation of new information
  - Do not require the user to remember information
    - Allow recognition rather than recall.

- **Free cognitive resources for high-level tasks**
  - Eliminate mental calculations, estimations, comparisons, and unnecessary thinking.
  - Reduce uncertainty.
Support Efficiency

- Important for frequent use.
  - Accommodate a user's continuous advancement in knowledge and skill.

- Techniques
  - Keyboard-only support
  - Support short-cuts
    - abbreviations
    - macros/templates
    - customization of frequent actions.
Place Labels Above Boxes

Study: Matteo Penzo, 2006

- Label better associated with field
  - left alignment increases cognitive workload
  - Do not use bold for labels
- Only use drop-down list boxes for important things (eye-catching)
Users Focus on Faces

James Breeze, 2009

- Faces draw eyes
  - Users look where faces look
- Use it to pull attention to important parts of page.
Users Don’t Scroll

- Jakob Nielsen, 2006
  - Only 23% of user’s scroll down pages on first visit.
  - Even less users scroll down on subsequent visits
White-Spaces Improve Comprehension

Weiss, Knowlton, and Morrison, 2002

- White spaces make content more readable
  - improve comprehension by 20%

- Between
  - headers and items
  - paragraphs, images, ... 
  - Around related groups
    - can be used to build hierarchy of elements
Don’t Make Paragraphs Too Narrow

Lin, 2004

- Paragraphs with line lengths of 95 characters are easier to read than narrower paragraphs.
Users are Blind to Adverts

Jakob Nielsen, 2006

- User’s avoid anything which looks like an advert
  - even if it isn’t
- Don’t make things look like adverts
  - content, or
  - adverts
Findings from Eye-Tracking Studies

- Dominant headlines draw eyes
  - but get less than 1 sec attention
- Small fonts encourage focused viewing/reading
  - larger fonts encourage light scanning
- Top left corner receives most eye-contact.
- Navigation on top of page best.
- The bigger the image, the more people look at it.
Process for Improved Usability

- Agile methods
  - on-site customer
  - Frequent delivery
  - Short feedback cycles
Jakob Nielson’s Usability measures:

- **Efficiency**
  - How quickly can users perform user tasks
  - once they have learned how to accomplish them.

- **Learnability**
  - How easy is it to learn to accomplish different tasks?
  - Learnability is related to *intuitiveness*.

- **Memorability**
  - How easy is it to remember to do different tasks?
  - If system not used for some time, how easy is it for users to use the system efficiently?

- **Errors**
  - How many errors do users make when using the system?
  - How serious are the errors?
  - How easy can users recover from those errors?

- **Satisfaction**
  - How pleasant is it for users to use the system.
Usability Testing

• Not a lot is needed
Data gathered

- Success in completing task
- Time taken
- Number of Link navigations, eye/mouse movements
  - whether user got lost
- User perception of ease of use
- User perception of application usefulness
- Overall satisfaction