YOUR USER REQUIREMENTS INCLUDE FOUR HUNDRED FEATURES.

DO YOU REALIZE THAT NO HUMAN WOULD BE ABLE TO USE A PRODUCT WITH THAT LEVEL OF COMPLEXITY?

GOOD POINT. I'LL BETTER ADD "EASY TO USE" TO THE LIST.
USABILITY, ACCESSIBILITY, ACCEPTABILITY
Objectives

• Forms of guidelines in IxD
• Evaluate of an interactive product in terms of goals and principles of interaction design
USABILITY
Definition of usability

• ISO 9241-11
• The extent to which a product can be used
  – by specified users
  – to achieve specified goals
  – with effectiveness, efficiency and satisfaction
  – in a specified context of use.
Usability for desktop applications

ISO 9241 outlines 3 measurable attributes

• Effectiveness:
  – Accuracy and completeness with which users achieve specified goals;

• Efficiency:
  – Resources expended in relation to the accuracy and completeness with which users achieve goals;

• Satisfaction:
  – Freedom from discomfort, and positive attitudes towards the use of the product.
Usability attributes

Easy to learn
Easy to remember
Efficient to use
Few errors
Subjectively pleasing

(Nielsen, 2010)
# Nielsen’s principles vs. ISO 9241

<table>
<thead>
<tr>
<th>Nielsen's principles</th>
<th>ISO 9241</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Learnability</td>
<td>A. Effectiveness</td>
</tr>
<tr>
<td>2. Efficiency of use</td>
<td>B. Efficiency</td>
</tr>
<tr>
<td>3. Memorability</td>
<td>C. Subjective satisfaction</td>
</tr>
<tr>
<td>4. Few and noncatastrophic errors</td>
<td></td>
</tr>
<tr>
<td>5. Satisfaction</td>
<td></td>
</tr>
</tbody>
</table>
Norman’s usability principles

• Visibility
• Constraints
• Mapping
• Consistency
• Feedback
• Affordance

Visibility

• This is a control panel for an elevator

• How does it work?

• Push a button for the floor you want?

• Nothing happens. Push any other button? Still nothing. What do you need to do?

It is not visible as to what to do!

From:
www.baddesigns.com
Visibility

...you need to insert your room card in the slot by the buttons to get the elevator to work!

How would you make this action more visible?

- make the card reader more obvious
- provide an auditory message, that says what to do (which language?)
- provide a big label next to the card reader that flashes when someone enters

- make relevant parts visible
- make what has to be done obvious
Constraints

• Restricting the possible actions that can be performed

• Helps prevent user from selecting incorrect options

• Physical objects can be designed to constrain things
  – e.g. only one way you can insert a key into a lock
Feedback

• Sending information back to the user about what has been done
• Includes sound, highlighting, animation and combinations of these

  – e.g. when screen button clicked on provides sound or red highlight feedback:

![Previous] ➔ “ccclichhhk”

www.id-book.com
Mapping
Logical or ambiguous design?

- Where do you plug the mouse?
- Where do you plug the keyboard?
- Top or bottom connector?
- Do the color coded icons help?

From: www.baddesigns.com
How to design them more logically

(i) A provides direct adjacent mapping between icon and connector

(ii) B provides color coding to associate the connectors with the labels

From: www.baddesigns.com
Consistency

• Design interfaces to have similar operations and use similar elements for similar tasks

• For example:
  – always use `ctrl` key + first initial of the command for an operation – `ctrl+C`, `ctrl+S`, `ctrl+O`

• Main benefit is consistent interfaces are easier to learn and use
When consistency breaks down

• What happens if there is more than one command starting with the same letter?
  – e.g. save, spelling, select, style

• Have to find other initials or combinations of keys, thereby breaking the consistency rule
  – e.g. ctrl+S, ctrl+Sp, ctrl+shift+L

• Increases learning burden on user, making them more prone to errors
Internal and external consistency

• Internal consistency refers to designing operations to behave the same within an application
  – Difficult to achieve with complex interfaces

• External consistency refers to designing operations, interfaces, etc., to be the same across applications and devices
  – Very rarely the case, based on different designer’s preference
Keypad numbers layout

- A case of external inconsistency

(a) phones, remote controls

(b) calculators, computer keypads
Affordances: to give a clue

• Refers to an attribute of an object that allows people to know how to use it
  – e.g. a mouse button invites pushing, a door handle affords pulling

• Norman (1988) used the term to discuss the design of everyday objects

• Since has been much popularised in interaction design to discuss how to design interface objects
  – e.g. scrollbars to afford moving up and down, icons to afford clicking on
Affordance and interaction design

• ‘Perceived’ affordances
  – Learned conventions of arbitrary mappings between action and effect at the interface
  – Some mappings are better than others
Examples

– Physical affordances:
  How do the following physical objects afford? Are they obvious?
Virtual affordances

How do the following screen objects afford?
What if you were a novice user?
Would you know what to do with them?
Accessibility

• Legislation
  – UK Disability Discrimination Act
  – W3C declarations and guidelines
  – Usability.gov guidelines
Acessibility

• Concerns removing the barriers that would otherwise exclude some people from using the system at all.

• Excluding reasons:
  – Physically
    • Inappropriate siting of equipment
  – Conceptually
    • Cannot understand complicated instructions
  – Economically
    • Cannot afford essential technology
  – Culturally
    • Inappropriate metaphors
  – Socially
    • Equipment is unavailable at an appropriate time and place
    • If people are not members of a particular social group and cannot understand particular messages
Web Content Accessibility Principles

Principle 1: Perceivable

Information and user interface components must be presentable to users in ways they can perceive.

Principle 2: Operable

User interface components and navigation must be operable.

Principle 3: Understandable

Information and the operation of user interface must be understandable.

Principle 4: Robust –

Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.
Web Content Accessibility Guidelines (WCAG) 2.0

• Principle 1: Perceivable
  – Information and user interface components must be presentable to users in ways they can perceive.
  – Guideline example:
    Guideline 1.1 Text Alternatives: Provide text alternatives for any non-text content so that it can be changed into other forms people need, such as large print, braille, speech, symbols or simpler language.
Assistive technologies

Make your computer easier to use

Quick access to common tools
You can use the tools in this section to help you get started.
Windows can read and scan this list automatically. Press the SPACEBAR to select the highlighted tool.

- [ ] Always read this section aloud
- [ ] Always scan this section

- ![Start Magnifier](image)
- ![Start Narrator](image)
- ![Start On-Screen Keyboard](image)
- ![Set up High Contrast](image)

Not sure where to start? Get recommendations to make your computer easier to use

Explore all settings
When you select these settings, they will automatically start each time you log on.

- ![Use the computer without a display](image)
  - Optimize for blindness

- ![Make the computer easier to see](image)
  - Optimize visual display

- ![Use the computer without a mouse or keyboard](image)
  - Set up alternative input devices

- ![Make the mouse easier to use](image)
  - Adjust settings for the mouse or other pointing devices

- ![Make the keyboard easier to use](image)
  - Adjust settings for the keyboard
Product acceptance by Nielsen

Figure 1 A model of the attributes of system acceptability.

Usability of Interactive systems
Acceptability

• Social acceptability
  – Do product goals correspond to values of various groups of stakeholders?

• Practical acceptability
  – Cost: Does price meet performance quality?
  – Reliability: Is the level of privacy and security appropriate to user needs?
  – Compatibility: Is an application compatible with required hardware and platforms?
Practical acceptability (cont.)

- Usefulness: Can system be used achieving desired goal?
- Utility: Does system provide appropriate for desired goals set of features?
- Usability: how the tasks are performed?
The User Experience

• How a product behaves and is used by people in the real world
  – “every product that is used by someone has a user experience: newspapers, ketchup bottles, reclining armchairs, cardigan sweaters.” (Garrett, 2003)

• Cannot design a user experience, only design for a user experience
Panaudojamumo ir potyrių tikslai
# User experience goals

**Desirable aspects**

<table>
<thead>
<tr>
<th>Satisfying</th>
<th>Helpful</th>
<th>Fun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enjoyable</td>
<td>Motivating</td>
<td>Provocative</td>
</tr>
<tr>
<td>Engaging</td>
<td>Challenging</td>
<td>Surprising</td>
</tr>
</tbody>
</table>

| Pleasurable | Enhancing sociability | Rewarding |
| Exciting    | Supporting creativity | Emotionally fulfilling |
| Entertaining| Cognitively stimulating | |

**Undesirable aspects**

<table>
<thead>
<tr>
<th>Boring</th>
<th>Unpleasant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frustrating</td>
<td>Patronizing</td>
</tr>
<tr>
<td>Making one feel guilty</td>
<td>Making one feel stupid</td>
</tr>
<tr>
<td>Annoying</td>
<td>Cutesy</td>
</tr>
<tr>
<td>Childish</td>
<td>Gimmicky</td>
</tr>
</tbody>
</table>
Cultural differences

• 5/21/2012 versus 21/5/2012?
  – Which should be used for international services and online forms?

• Why is it that certain products, like the iPod, are universally accepted by people from all parts of the world whereas websites are reacted to differently by people from different cultures?
Anna, IKEA online sales agent

- Designed to be different for UK and US customers
- What are the differences and which is which?
- What should Anna’s appearance be like for other countries, like India, South Africa, or China?
Usability goals

• Effective to use
• Efficient to use
• Safe to use
• Have good utility
• Easy to learn
• Easy to remember how to use
User needs analysis

1. Define your users: Who are the users?
2. Identify user goals:
   – What do your users want and need?
   – How do they solve their problems now?
3. Define business goals:
   – What do the users need to do for this Web site or application to be a viable investment?
User needs analysis

4. Set the usability objectives:
   – To what extent does the site need to satisfy both the user and the business goals?
   – How do we measure success?

5. Identify the design constraints:
   – Define the budget, the timeline, the project team.

6. Define functional specifications
Usability objectives

Users
Tasks
Measures from business goals

ISO 9241

Mayhew, 1999
## Examples of usability objectives

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples of Specific Objectives</th>
</tr>
</thead>
</table>
| Learning time/task time   | Users will be able to use this site the first time without any training  
First-time users will be able to find their topic of interest within two minutes of visiting the site; expert users (five or more visits) will be able to find a topic within 30 seconds |
| Number of errors          | Users will not visit more than three incorrect pages (on average) in completing a task  
Users will make no fatal errors at least 99 percent of the time (such as entering an incorrect credit card or shipping address) |
| Subjective impressions    | On a scale of 1 (really appealing) to 7 (really unappealing), users will rate the site at least a 2.5                                                                                                                                  |
| Accomplished tasks        | At least 75 percent of users who add an item to a shopping cart will complete a purchase  
At least 95 percent of users who complete their credit card information will complete a purchase                                                                                                                                     |
<p>| Revisits                  | At least 50 percent of registered users will return to the site at least once per month                                                                                                                                              |</p>
<table>
<thead>
<tr>
<th>Business Goal</th>
<th>User Experience Goal</th>
<th>Functions to Support Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grow the business by getting more new users to adopt our service</td>
<td>Improve the learnability</td>
<td>Progressive tooltips</td>
</tr>
<tr>
<td>Reduce support costs</td>
<td>Reduce/prevent errors</td>
<td>Formatting information for text fields</td>
</tr>
<tr>
<td>Inspire loyalty among existing users</td>
<td>Reduce navigational requirements</td>
<td>± Error message enhancements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± Diagnostic features</td>
</tr>
<tr>
<td></td>
<td></td>
<td>± Shortcuts to frequently used content or features</td>
</tr>
</tbody>
</table>

MTV Networks‘ Mobile Apps Life Cycle

1. Discovery
2. Adoption
3. Trial
4. Abandonment or Long-Term Usage

MTV Networks' Mobile Apps Study Reveals the Life Cycle of an App: From Discovered to Discarded
Usability and user experience goals

• Selecting terms to convey a person’s feelings, emotions, etc., can help designers understand the multifaceted nature of the user experience

• How do usability goals differ from user experience goals?

• Are there trade-offs between the two kinds of goals?
  – e.g. can a product be both fun and safe?

• How easy is it to measure usability versus user experience goals?
Bibliography


• David Benyon, Phil Turner, Susan Turner Designing Interactive Systems: People, Activities, Contexts, Technologies Addison Wesley, Chapter 4. Usability.


• *Usability of Interactive systems*