



### 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



#### (Nielsen, 2010)

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# Nielsen's principles vs. ISO 9241

#### **Nielsens principles**

- 1. Learnability
- 2. Efficiency of use
- 3. Memorability
- 4. Few and noncatastrophic errors
- 5. Satisfaction

#### ISO 9241

- A. Effectiveness
- B. Efficiency
- C. Subjective satisfaction

# 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!

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# Visibility



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 
$$\rightarrow$$
 "ccclichhk"  
Previous  $\rightarrow$  Previous

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# 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?

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# 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

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# 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

7	8	9
4	5	6
1	2	3
0		

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# 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?





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# 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 uinderstand particulat 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				
<ul><li>Start Magnifier</li><li>Start On-Screen Keyboard</li></ul>	Start Narrator			
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 Optimize for blindness



Make the computer easier to see Optimize visual display



Use the computer without a mouse or keyboard Set up alternative input devices



Make the mouse easier to use

Adjust settings for the mouse or other pointing devices



Make the keyboard easier to use

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





The iPod Nano Touch

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### Panaudojamumo ir potyrių tikslai



### User experience goals

#### **Desirable aspects**

	satisfying enjoyable engaging	helpful motivating challenging	fun provocative surprising	
	pleasurable exciting entertaining		enhancing sociability rewarding supporting creativity emotionally fulfillir cognitively stimulating	וg
	Undesirable aspects			
boring			unpleasant	
frustrating			patronizing	
making one feel guilty		/	making one feel stupid	
	annoying		cutesy	
childish			gimmicky	

# 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?



IKEA ChatBot

#### **IKEA Help Center**



close

Go

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# 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

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# Examples of usability objectives

Category	Examples of Specifi c Objectives
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
Revisits	At least 50 percent of registered users will return to the site at least once per month

Business Goal	User Experience Goal	Functions to Support Goals
Grow the business by	Improve the learnability	Progressive tooltips
getting more new users to adopt our service		Wizards to get people started
Reduce support costs	Reduce/prevent errors	Formatting information for text fields
		Error message enhancements
		Diagnostic features
Inspire loyalty among existing users	Reduce navigational requirements	<ul> <li>Shortcuts to frequently used content or features</li> </ul>

Tom Brinck, Darren Gergle, and Scott D. Wood. User needs analysis. In *User Experience Re-Mastered*. Morgan Kaufman, 2010, Chapter 2.

# 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?

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