



SOEN 357: User Interface Design

Interaction Design Principles

Based on Chapter 1 of the textbook



A good interface should be ...

- Easy to learn and use
 - Supports both the initial orientation and continued learning throughout the complete lifetime of use
- Engaging
 - Draws the user into the interaction and is pleasant and satisfying to use
- Effective
 - The task or experience is completed or goals reached completely and accurately
- Efficient
 - Helps complete the task quickly
- Error Tolerant
 - Prevents errors and helps the user recover from mistakes



Design Principles

- Generalizable abstractions for thinking about different aspects of design
- The do's and don'ts of interaction design
- What to provide and what not to provide at the interface
- Derived from a mix of theory-based knowledge, experience and common-sense



Design Principles

- **Simplicity**
 - Keep the UI as simple as possible.
- **Structure**
 - Organize in a meaningful and useful way.
- **Consistency**
 - Uniformity in appearance, placement, and behavior.
- **Tolerance**
 - Prevent the user from making errors.
- **Visibility, Affordance and Feedback**
 - What controls are for, how to use them and indication that they are used.

Visibility



From:
www.baddesigns.com

- 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!

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



Affordance: 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



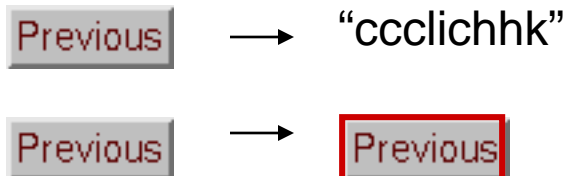
What does 'affordance' have to offer interaction design?

- Interfaces are virtual and do not have affordances like physical objects
- Norman argues it does not make sense to talk about interfaces in terms of 'real' affordances
- Instead interfaces are better conceptualized as 'perceived' affordances
 - Learned conventions of arbitrary mappings between action and effect at the interface
 - Some mappings are better than others



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:





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

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 plus 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

1	2	3
4	5	6
7	8	9
	0	

(b) calculators, computer keypads

7	8	9
4	5	6
1	2	3
0		



Usability principles

- Similar to design principles, except more prescriptive
- Used mainly as the basis for evaluating systems
- Provide a framework for heuristic evaluation

Usability principles (Nielsen 2001)



- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Help users recognize, diagnose and recover from errors
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help and documentation



The User Experience

- How a product behaves and is used by people in the real world
 - the way people feel about it and their pleasure and satisfaction when using it, looking at it, holding it, and opening or closing it
 - “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

Why was the iPod user experience such a success?



- Quality user experience from the start
- Simple, elegant, distinct brand, pleasurable, must have fashion item, catchy names, cool, etc.



User experience goals

- satisfying
- enjoyable
- engaging
- pleasurable
- exciting
- entertaining
- helpful
- motivating
- emotionally fulfilling
- boring
- frustrating
- aesthetically pleasing
- supportive of creativity
- supportive of creativity
- rewarding
- fun
- provocative
- surprising
- enhancing sociability
- challenging
- annoying
- cutsey

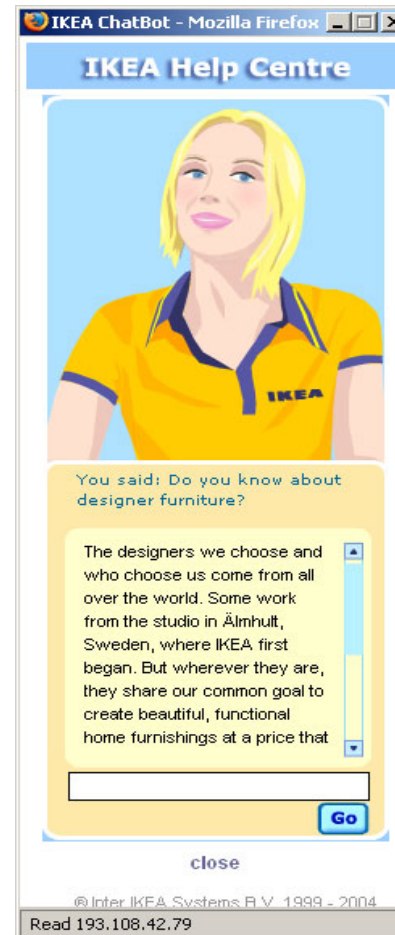


Usability and user experience goals

- 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?

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?





What is a “Good” User Interface

- Ideally, the UI should represent the capabilities of the entire system, not one part.
- The UI should help the user build a “Mental Model” easily, or intuitive to use.
- When the UI feels natural to its user, it is easy to learn and retain. No surprises occur.
- A good UI helps tailoring it to the end user
- A good UI helps to perform the task efficiently.
- A good UI meets the principal design goals (e.g: usability, catering to the first time user, infrequent user, expert user, etc.)

What a “Good” User Interface can do?



- Enhances human productivity
- Reduces training/learning time and costs
- Increases end-users' satisfaction
- Improves work quality
- Help minimizing errors in task performance

An Experience with American Express Customer Service [Fisher-97]

- Making an existing system more usable (by distributing information and learning resources on how to do their common tasks more efficiently) improved:
 - Training period (12h reduced to 2h)
 - Productivity (increased from 17 minutes/request-handling to 4)
 - Errors rate (reduced from an average 20% to 2%)



Key points

- Interaction design is concerned with designing interactive products to support the way people communicate and interact in their everyday and working lives
- It is concerned with how to create quality user experiences
- It requires taking into account a number of interdependent factors, including context of use, type of activities, cultural differences, and user groups
- It is multidisciplinary, involving many inputs from wide-reaching disciplines and fields