Lecture 9
Design Principles #1

Design principles
- **Comprehensibility**
- **Learnability**
- **Effectiveness/usefulness**
- **Efficiency/usability**

Heim, Chapters 6.1-6.5

Principles of Interaction Design

- *How do we create elegant solutions to complex interaction problems?*
- *How do interaction designers succeed at creating great designs that are powerful and aesthetically appealing?*

Principles of Interaction Design

Principles of Interaction Design

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Design principles can be used to guide design decisions

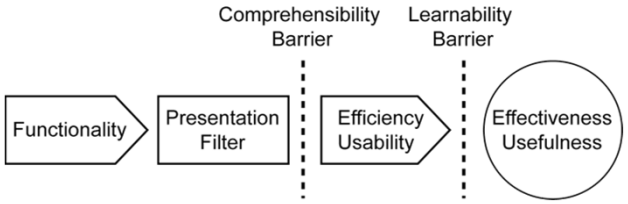
•Design principles do not prescribe specific outcomes; they function within the context of a particular design project.

•Design principles guide interaction designers and help them make decisions that are based on established criteria

Gulfs and Principles

- Design principle can be used to determine if there are gulfs of execution or evaluation
- Gulfs of execution relate to the effectiveness principles
- Gulfs of evaluation relate to the efficiency principles

Framework for Design Principles

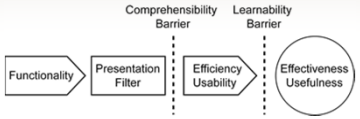


Framework for Design Principles

The framework has the following components:

- **Usability Goals**
  - There are two main usability goals in the framework; comprehensibility and learnability.
- **Design Principle Categories**
  - The framework also divides the design principles into two main groups; efficiency principles and effectiveness principles.
- **Format to Describe Design Principles**
  - The framework uses the format "serves the principle of … which promotes …" to describe the different principles.
  - *Familiarity* serves the principle of *memorability*, which promotes *usability*.

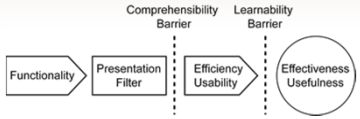
Framework for Design Principles



Functionality - The system must have adequate functionality for a particular task.

Presentation Filter - The functionality must be made accessible through the presentation filter (interface).

Framework for Design Principles



Comprehensibility Barrier - If the presentation is comprehensible, the comprehensibility barrier will be superseded. This depends on the degree of efficiency/usability in the interface design.

Learnability Barrier – If the interface is comprehensible it will be learnable, there is a direct relationship.

Effectiveness/Usefulness - If the user can learn the interface s/he can take advantage of the functionality and the interface will, therefore, be useful.

Comprehensibilty

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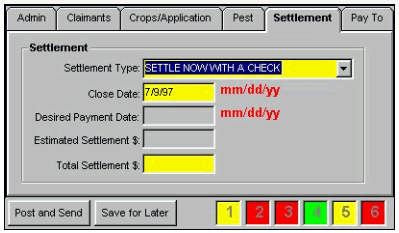
An interface design that is easy to comprehend will be efficient and effective

- If a user does not understand the interface it will be useless
- A design's comprehensibility is highly dependent on the way in which the interface communicates its functionality to the user

Interface Hall of Shame

Tally printer dialog

Interface Hall of Shame



Stoplight metaphor

Learnabilty

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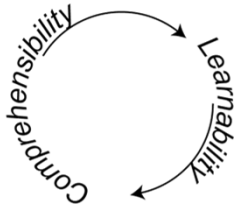
An interface with high usability will be easier to learn

- The learnability of a design is based on comprehensibility: if you can't understand it, you can't learn it

Comprehensibility Learnabilty

- Learnability and comprehensibility are recursive: we start with comprehensibility which affects learnability, which will in turn increase comprehensibility.



Comprehensibility/Learnability Feedback Loop

Principles of Interaction Design

- Effectiveness/Usefulness
  - Utility
  - Safety
  - Flexibility
  - Stability
- Efficiency/Usability
  - Simplicity
  - Memorability
  - Predictability
  - Visibility

Design Principle Categories

- **Effectiveness/Usefulness**

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Effectiveness describes the usefulness of a design

- The effectiveness goal stipulates that a design must fulfill the user's needs by affording the required functionality

Effectiveness/Usefulness

- **Utility** - The principle of utility relates to what the user can do with the system.
- **Safety** - If a design has a high degree of safety, it will prove more useful than a design that involves a high degree of risk.
  - **Recovery** - can be implemented in interaction designs by incorporating appropriate undo functionality and robust error recovery routines.

A computer shall not harm your work or, through inaction, allow your work to come to harm.

(Raskin, 2000)

Effectiveness/Usefulness

- **Flexibility** - A tool that is flexible can be used in multiple environments and may address diverse needs
  - **Customization** - A tool would have greater flexibility if people were able to customize the interface according to their personal preferences
- **Stability** - A stable system is a robust system.
  - A system that functions consistently well will be more useful than a system that crashes frequently

Efficiency/Usability

MAXIM

Efficiency describes the usability of a design

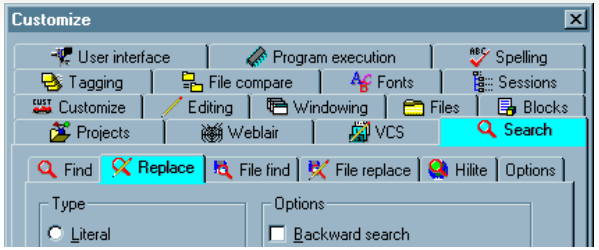
- The efficiency goal stipulates that a design should enable a user to accomplish tasks in the easiest and quickest way possible without having to do overly complex or extraneous procedures.

A computer shall not waste your time or require you to do more work than is strictly necessary. *(Raskin, 2000)*

Efficiency/Usability

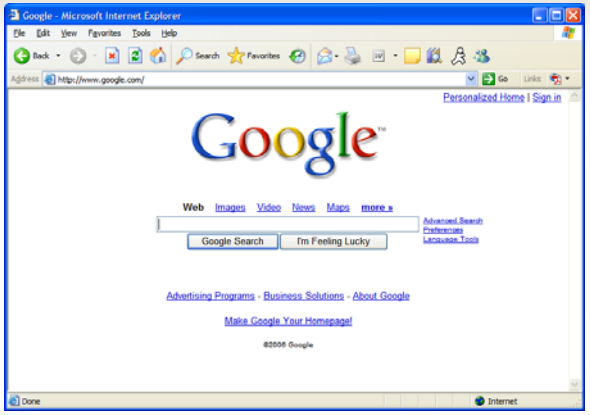
- **Simplicity** - If things are simple they will be easy to understand and, therefore, easy to learn and remember.
  - **Ockham's Razor** - Pluralitas non est ponenda sine necessitate - pluralities should not be posited without necessity
  - **80/20 Rule** - The 80/20 rule implies that 80% of an application's usage involves 20% of its functionality
  - **Satisficing** - Combines the conflicting needs of finding the optimal solution that satisfies all the requirements and the need to settle on a solution that will be sufficient to proceed with the design

Interface Hall of Shame



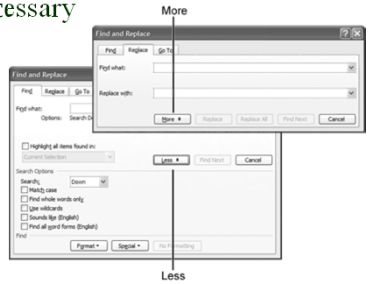
MultiEdit tabs

Simplicity!



Efficiency/Usability

- **Simplicity**
  - **Progressive Disclosure -** Show the user only what is necessary



Efficiency/Usability

- **Simplicity**
  - **Constraints -** Involves limiting the actions that can be performed in a particular design

Controls the design's simplicity

Physical

  - **Paths** - constrain movement to a designated location and direction
  - **Axes** - constrain the user's movement to rotation around an axis
  - **Barriers** -provide spatial constraints that can confine the user's movement to the appropriate areas of the interface

Efficiency/Usability

- **Simplicity**
  - **Constraints**
    - Psychological
      - **Conventions** - exploit learned behavior to influence a user's actions
      - **Mapping** - can influence the way in which people perceive relationships between controls and effects
      - **Symbols** - can influence the way in which we interact with an interface by defining meaning and constraining our possible interpretations of interface elements

Efficiency/Usability

- **Memorability** - Interfaces that have high memorability will be easier to learn and use
  - Many different parameters affect memorability:
    - Location
    - Logical Grouping
    - Conventions
    - Redundancy

Efficiency/Usability

- **Predictability** - Predictability involves a person's expectations and his ability to determine the results of his actions ahead of time.
  - **Consistency-Correctness**
    - Consistency reinforces our associations and, therefore, increases our ability to remember and predict outcomes and processes.
    - Before we strive to be consistent, we must make sure we are correct

Efficiency/Usability

- **Predictability**
  - **Generalizabilty:** can help us use the knowledge we gathered from previous experience and apply it to similar situations
  - **Conventions:** allow us to use our intuitions
  - **Familiarity:** familiar menu names and options help users locate objects and functions more easily
  - **Location, Location, Location:** Not all areas on the screen are created equal

Efficiency/Usability

- **Predictability**
  - **Modes:** Modes create instability in mental models because they change the way objects function

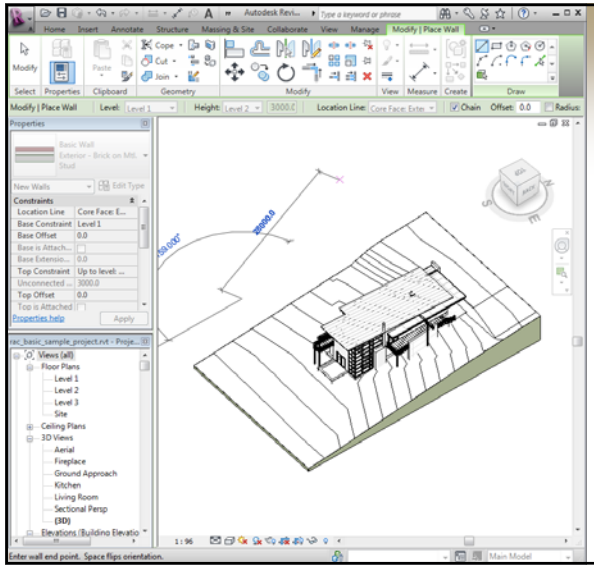
Efficiency/Usability

- **Visibility** - The principle of visibility involves making the user aware of the system's components and processes, including all possible functionality and feedback from user actions.

Show everything at once, and the result is chaos.

Don't show everything, and then stuff gets lost.

(Norman, 1998, 74)



Efficiency/Usability

MAXIM

The principles of progressive disclosure and simplicity should be used in conjunction with the principle of visibility to avoid overload

- **Visibility**
  - **Overload:** Following the principle of visibility without also applying progressive disclosure can lead to visual overload
  - **Feedback:** Direct Manipulation interfaces provide immediate visual feedback about user actions. It is the task of the interaction designer to decide what form that feedback takes

Efficiency/Usability

- **Visibility**
  - **Recognition/Recall:** The principle of visibility is based on the fact that we are better at recognition than we are at recall
  - **Orientation:** People need to be able to orient themselves, especially in complex information spaces