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# Human Computer Interaction

## 2. Usability and heuristics

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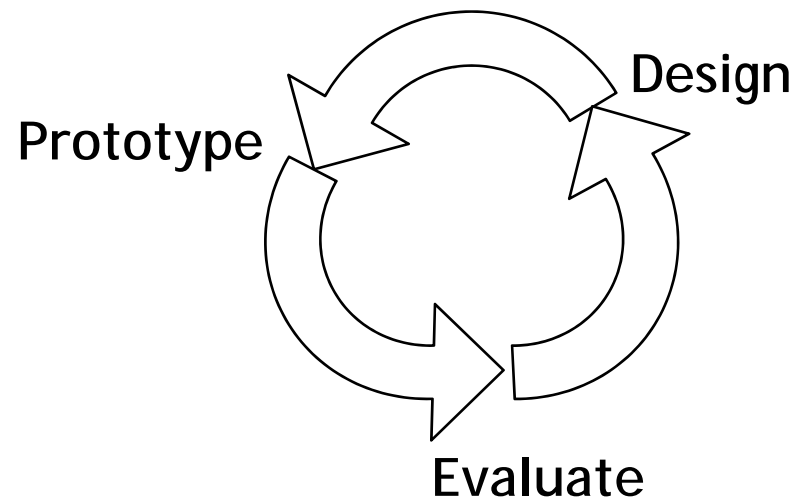
"One most unfortunate product is the type of engineer who does not realize that in order to apply the fruits of science for the benefit of mankind, he must not only grasp the principles of science, but must also know the needs and aspirations, the possibilities and the frailties, of those whom he would serve."

-- Vannevar Bush

# User-centered Iterative Design

- Developers working with target users
- Think of the world in users' terms
- Identify usability and user experience goals
- Understanding work process
- Not technology-centered/feature driven

- Iterate at every stage



# Objectives of this chapter

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- The goals of interaction design
- Understand when and how design tradeoffs are made
- Have a first-level knowledge of the major concepts in usability and their associated guidelines

Ref:

- CS, UC Berkeley, "User Interface Design, Prototyping, and Evaluation"
- CS, Stanford, "Introduction to Human Computer Interaction Design"
- J. Preece, Y. Rogers, and H. Sharp, Interaction Design beyond Human Computer Interaction, John Wiley & Sons, 2002.
- D. Stone, et al., "User Interface Design and Evaluation", Morgan Kaufmann Publishers


# Usability goals

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- Effective to use (effectiveness)
  - General goals
- Efficient to use (efficiency)
  - E.g. number of steps, one-click option...
- Safe to use (safety)
  - Preventing users from serious errors.
  - Recovery functions [e.g. undo...]

**Convert To Ringtone Wizard** [?] [X]

**Select ringtones format**  
What type of ringtones do you want to get?



Select your phone vendor and model and then pick ringtone format that best fits your phone. If you didn't find your phone in the list choose "Not listed" and choose ringtone format manually.

Your phone vendor:  Phone model:

Motorola  
 Samsung  
 Nokia  
 Siemens  
 LG



WAV  
 MP3  
 MMF

Ringtone format:

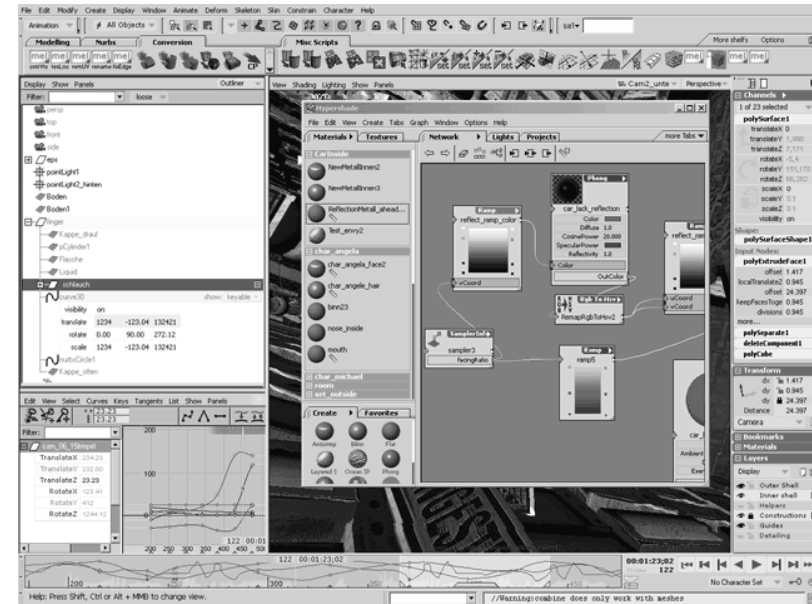
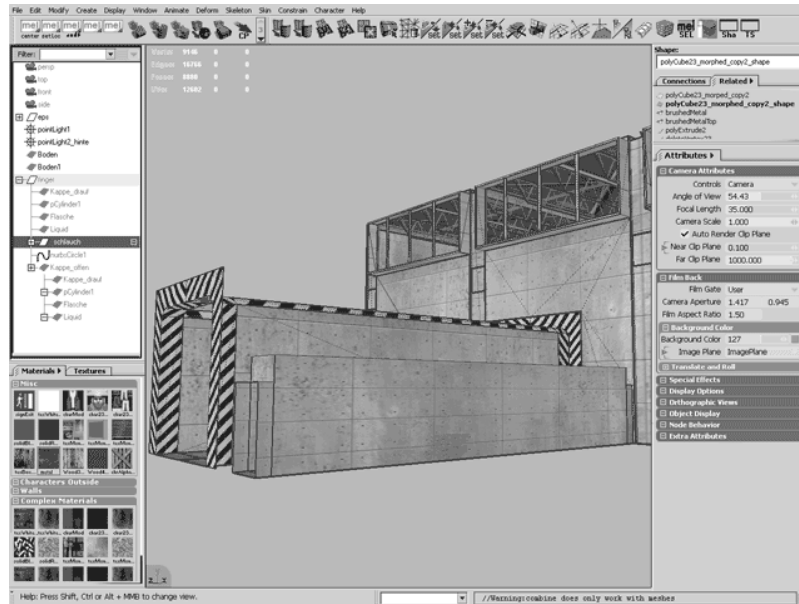
- Medium quality WAV
- High quality WAV
- Medium quality MP3**
- High quality MP3
- Yamaha SMAF (MMF)

< Back   Next >   Cancel   Help

# Usability goals (cont.)

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- Have good utility (utility)
  - With powerful tools
- Easy to learn (learnability)
  - E.g. Tutorials ...
  - 10-minute rules (Nelson, 1980)
  - Dependent on frequency of usages, complexity of tasks, etc.



Maya interfaces, <http://www.pixtur.de>



# Usability goals (cont.)

- Easy to remember how to use (memorability)
  - E.g. meaningful icons, command names,...



*These goals can be in conflict with one another !*

# User experience goals

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- Satisfying
- Enjoyable
- Fun
- Entertaining
- Helpful
- Motivating
- Aesthetically pleasing
- Supportive of creativity
- Rewarding
- Emotionally fulfilling

*These can be hard to evaluate!*

*Some combinations will also  
be incompatible*

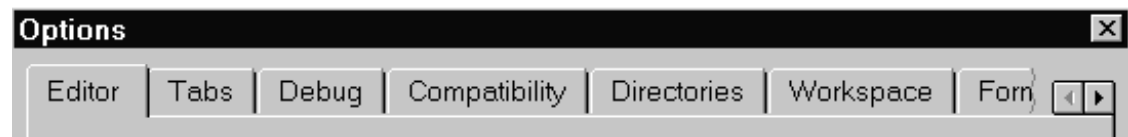
# Heuristics

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- "Eight Golden Rules of Interface Design"  
[Shneiderman]
  1. Strive for consistency.
  2. Enable frequent users to use shortcuts.
  3. Offer informative feedback.
  4. Design dialog to yield closure.
  5. Offer simple error handling.
  6. Permit easy reversal of actions.
  7. Support internal locus of control.
  8. Reduce short-term memory load.

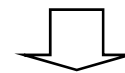
# 10 usability principles [Nielsen]

1. Visibility of system status
2. Match between system and the real world
  - Speak the users' language
3. User control and freedom
  - "Emergency exits"?!
4. Consistency and standards



Tabbed dialog for setting options in MS Web Studio

- Inconsistent display of possible tabs



# 10 usability principles [Nielsen]

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5. Help users recognize, diagnose, and recover from errors
  - Good error messages
6. Error prevention
7. Recognition rather than recall
8. Flexibility and efficiency of use
  - Invisible to novice users but for experienced users
  - E.g. shortcuts

# 10 usability principles [Nielsen]

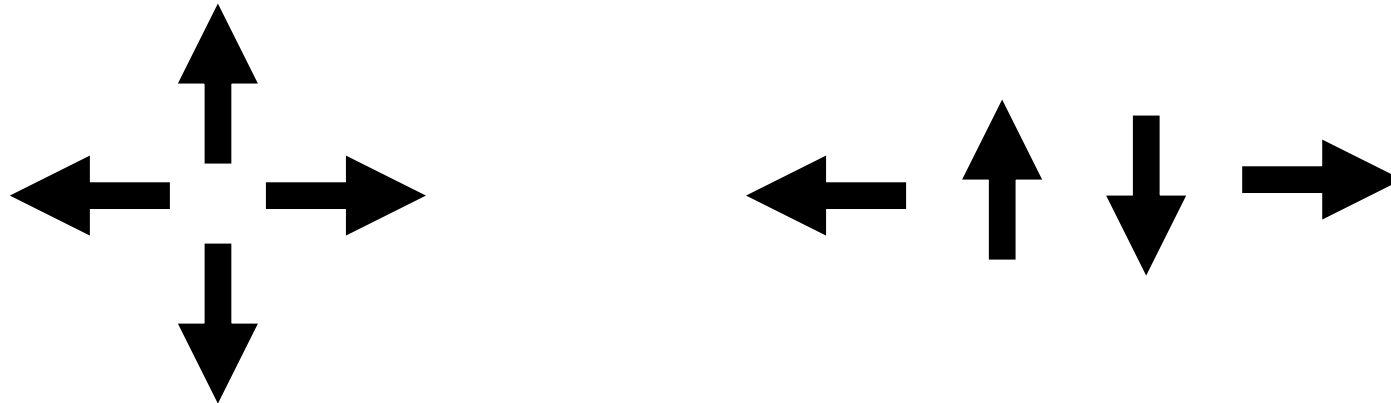
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9. Aesthetic and minimalist design
  - Avoid irrelevant information
10. Help and documentation

# Principles for Transforming Difficult Tasks into Simple Ones [Norman]

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1. Use both knowledge in the world and knowledge in the head
2. Simplify the structure of tasks
3. Make things visible
4. Get the mappings right



# Principles for Transforming Difficult Tasks into Simple Ones [Norman]

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5. Exploit the power of constraints
6. Design for error
7. When all else fails, standardize



# Design Tradeoffs

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- How can dimensions be evaluated together?
  - Defined in context of users and tasks
  - Require clear consensus on priorities
- Can require violating one to satisfy another
  - e.g., Consistency/efficiency

# Design Guidelines Meet the Real World

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- Design organizations and their cultures
- Different assumptions about users and goals
- History and legacy
- Conflicting priorities
- External constraints and regulations

*Don't be so quick to assume that "bad" designs are the result of ignorance or stupidity*

# Usability & our project 1



Eyetoy games, PS2

- Interactive games usually have to fulfill user experience goals.
- Usability goals are also important in initiation, game stages, etc.