+ The Design Challenge
  - Chapters 6 & 7 of Don Norman's The Design of Everyday Things

+ Common Problems with Designs
  - Too many controls
  - Poor feedback
  - No natural mappings
  - No conceptual model
  - Manufacturing constraints
  - Aesthetic goals

+ Why is good design hard?
  - World and people always changing
  - Predicting human behavior is not an exact science
  - Complexity of design process
  - Conflicting goals
  - THEREFORE:
    Designs evolve in the world

+ What works against evolving good designs?
  - Not enough time to design right
  - Need for individuality in design
  + Designer-centered design
    - Designers are not typical users
    - Designers' clients may not be users
  - Creeping featurism
  - Worshipping complexity and technical sophistication

+ "Easy to Learn and Use": 7 Principles for Good Design
  - Put knowledge in the world; exploit knowledge in the head
  - Simplify the structure of tasks
  - Make things visible
  - Get the mappings right
  - Exploit power of constraints, both natural and artificial
  - Design for error
  - When all else fails, standardize

+ 1. Put Knowledge in the World and in the Head
  + Put knowledge in the world
    - affordance
  + Exploit knowledge in the head
    - conceptual models

+ 2. Simplify the structure of tasks
  - Focus on the most useful functions
  - Minimize steps for tasks, especially frequent (core) ones
  - Organize functionally
  - Modularize
  + Consistency
    - Use identical actions for identical goals
    - Use identical feedback for identical state changes
    - Give user the control

+ 3. Make things visible
  - Affordance: cues of how to use
  - Controls not visible
- Too much "visibility": Which controls do what?
- Conceptual model: Glass box versus Black box
+ Bridge the Gulf of Execution
  - options readily available
  - show mode changes
+ Bridge the Gulf of Evaluation
  - always give understandable feedback for actions

4. Get the mappings right
+ Physical
  - Spatial positioning and movement of controls related to result
+ Psychological
  - Flashing draws attention to most important item
+ Logical
  - Light switch has only two states
+ Cultural
  - Searching follows scanning of reading (left to right, top to bottom for English)
  - Common icons (trashcan, mailbox) have cultural meanings

5. Exploit the power of constraints
+ Constraints limit possible actions or interpretations
  - Physical
    - Example: Diskette ejection
    - Example: Button has only two states
  + Cultural
    - Example: Hot water on the left
    - Example: Logging on requires typing your full name and password

6. Design for Error
- Understand the causes of error and design to minimize
+ Make it easy to discover errors understandable
  - feedback
  - good messages
  - mapping of conceptual model to system image
- Make it possible to correct errors
+ Make it possible to reverse actions
  - undo
  - Make it hard to do what can not be reversed
  - Test designs with users!

7. When all else fails, standardize
- Standardization is creating cultural constraints!
- Standardization promotes consistency and thus transfer of training
+ Pitfalls
  - Lowest common denominator
  - May not be the best
  - May have to violate standard for better design
+ The Paradox of Good Design
- If it is a good design, we frequently will not know it!