



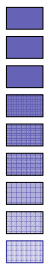
# chapter 7

## design rules



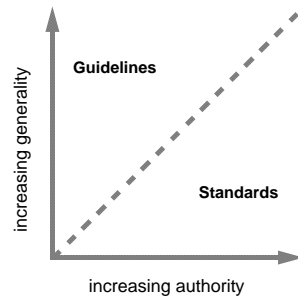
## design rules

- Designing for maximum usability
  - the goal of interaction design
- Principles of usability
  - general understanding
- Standards and guidelines
  - direction for design
- Design patterns
  - capture and reuse design knowledge



## types of design rules

- principles
  - abstract design rules
  - low authority
  - high generality
- standards
  - specific design rules
  - high authority
  - limited application
- guidelines
  - lower authority
  - more general application



## Principles to support usability

- Learnability
  - the ease with which new users can begin effective interaction and achieve maximal performance
- Flexibility
  - the multiplicity of ways the user and system exchange information
- Robustness
  - the level of support provided the user in determining successful achievement and assessment of goal-directed behaviour



## Principles of learnability

### Predictability – users don't like surprises (with exceptions like games)

- determining effect of future actions based on past interaction history
- operation visibility

### Synthesizability – requires user to have a mental model (chap 1)

- assessing the effect of past actions
- immediate vs. eventual honesty – changing wysisyg doc vrs updating web pages

### Familiarity

- how prior knowledge applies to new system
- guessability; affordance

### Generalizability

- extending specific interaction knowledge to new situations

### Consistency

- likeness in input/output behaviour arising from similar situations or task objectives

5



## Principles of flexibility

### Dialogue initiative – system and users in a conversation

- freedom from system imposed constraints on input dialogue
- system vs. user pre-emptiveness
- understanding of main use-cases

### Multithreading

- ability of system to support user interaction for more than one task at a time
- concurrent vs. interleaving
- multimodality – button click / alt + / menu item

### Task migratability

- passing responsibility for task execution between user and system
- ultimate user control

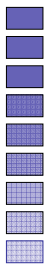
### Substitutivity

- allowing equivalent values of input and output to be substituted for each other
- representation multiplicity (graph/values)
- equal opportunity (define line by drawing or specifying length/position)

### Customizability

- modifiability of the user interface by user (adaptability) or system (adaptivity)

6



## Principles of robustness

### Observability

- ability of user to evaluate the internal state of the system from its perceivable representation
- browsability; defaults; reachability; persistence; operation visibility

### Recoverability

- ability of user to take corrective action once an error has been recognized
- reachability; forward/backward recovery; commensurate effort

### Responsiveness

- how the user perceives the rate of communication with the system
- Stability

### Task conformance

- degree to which system services support all of the user's tasks
- task completeness; task adequacy

7



## Standards

- set by national or international bodies to ensure compliance by a large community of designers standards require sound underlying theory and slowly changing technology
  - many large organisations have their own standards
- hardware standards more common than software high authority and low level of detail
- ISO 9241 defines usability as effectiveness, efficiency and satisfaction with which users accomplish tasks

8



## Guidelines

- more suggestive and general
- many textbooks and reports full of guidelines
- abstract guidelines (principles) applicable during early life cycle activities
- detailed guidelines (style guides) applicable during later life cycle activities
- understanding justification for guidelines aids in resolving conflicts

9



## Golden rules and heuristics

- “Broad brush” design rules
- Useful check list for good design
- Better design using these than using nothing!
- Different collections e.g.
  - Nielsen’s 10 Heuristics (see Chapter 9)
  - Shneiderman’s 8 Golden Rules
  - Norman’s 7 Principles

10



## Nielsen's 10 Usability Heuristics

1. *Visibility of system status*
2. *Match between system and the real world*
3. *User control and freedom*
4. *Consistency and standards*
5. *Error prevention*
6. *Recognition rather than recall*
7. *Flexibility and efficiency of use*
8. *Aesthetic and minimalist design*
9. *Help users recognize, diagnose, and recover from errors*
10. *Help and documentation*

11



## Shneiderman's 8 Golden Rules

1. *Strive for consistency*
2. *Enable frequent users to use shortcuts*
3. *Offer informative feedback*
4. *Design dialogs to yield closure*
5. *Offer error prevention and simple error handling*
6. *Permit easy reversal of actions*
7. *Support internal locus of control*
8. *Reduce short-term memory load*

12



## Norman's 7 Principles

1. *Use both knowledge in the world and knowledge in the head.*
2. *Simplify the structure of tasks.*
3. *Make things visible: bridge the gulfs of Execution and Evaluation.*
4. *Get the mappings right.*
5. *Exploit the power of constraints, both natural and artificial.*
6. *Design for error.*
7. *When all else fails, standardize.*

13



## HCI design patterns

- An approach to reusing knowledge about successful design solutions
- Originated in architecture: Alexander
- A pattern is an invariant solution to a recurrent problem within a specific context.
- Examples
  - Light on Two Sides of Every Room (architecture)
  - Go back to a safe place (HCI)
- Patterns do not exist in isolation but are linked to other patterns in *languages* which enable complete designs to be generated

14



## HCI design patterns (cont.)

- Characteristics of patterns
  - capture design practice not theory
  - capture the essential common properties of good examples of design
  - represent design knowledge at varying levels: social, organisational, conceptual, detailed
  - embody values and can express what is humane in interface design
  - are intuitive and readable and can therefore be used for communication between all stakeholders
  - a pattern language should be generative and assist in the development of complete designs.
- Start point for more info
  - <http://www.hcipatterns.org/tiki-index.php>

15



## Summary & Exercise

### Exercise

- Match Nielsen/ Shneiderman/Norman lists to earlier principles

### Principles for usability

- repeatable design for usability relies on maximizing benefit of one good design by abstracting out the general properties which can direct purposeful design
- The success of designing for usability requires both creative insight (new paradigms) and purposeful principled practice

### Using design rules

- standards and guidelines to direct design activity

16