



UNIVERSITY OF SCIENCE  
HO CHI MINH CITY

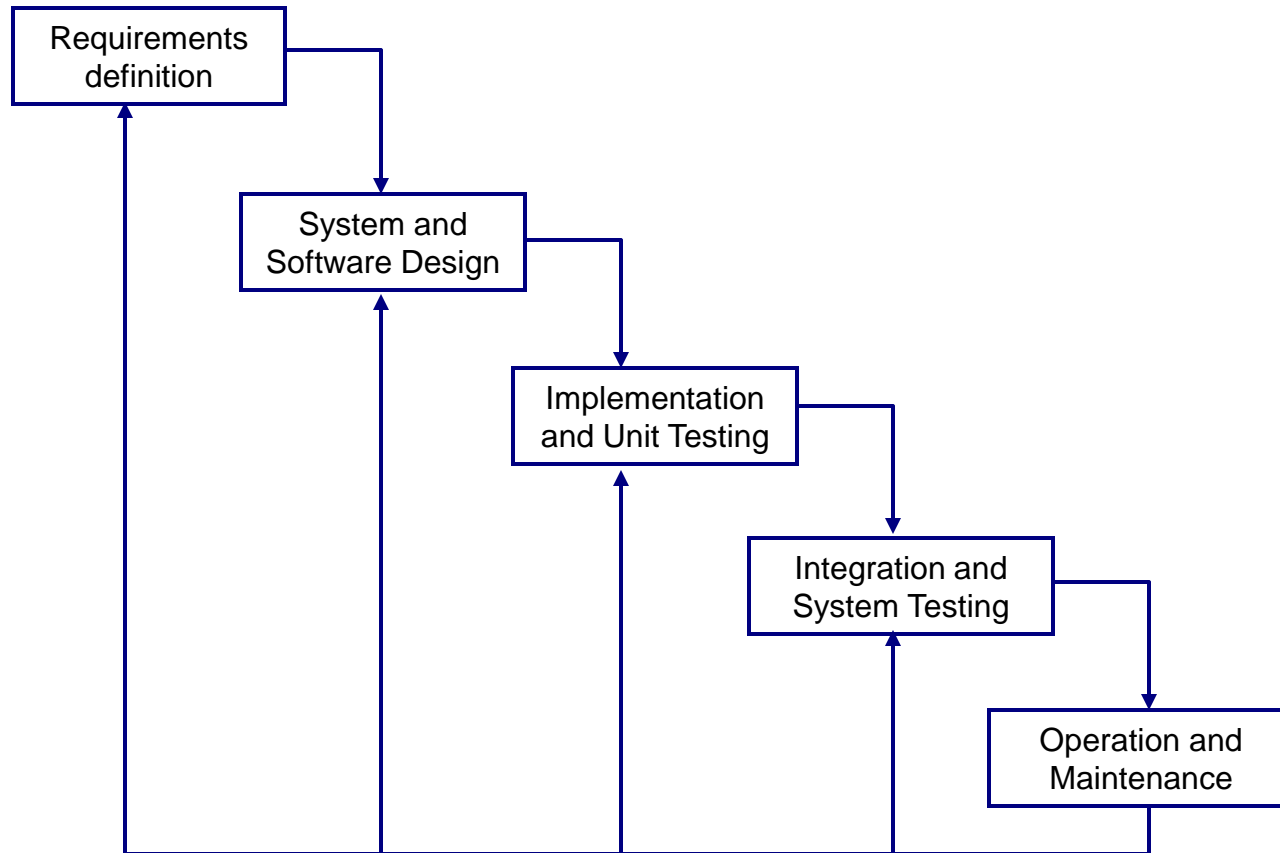
# UI Design Processes

3/3/2014

# Outline

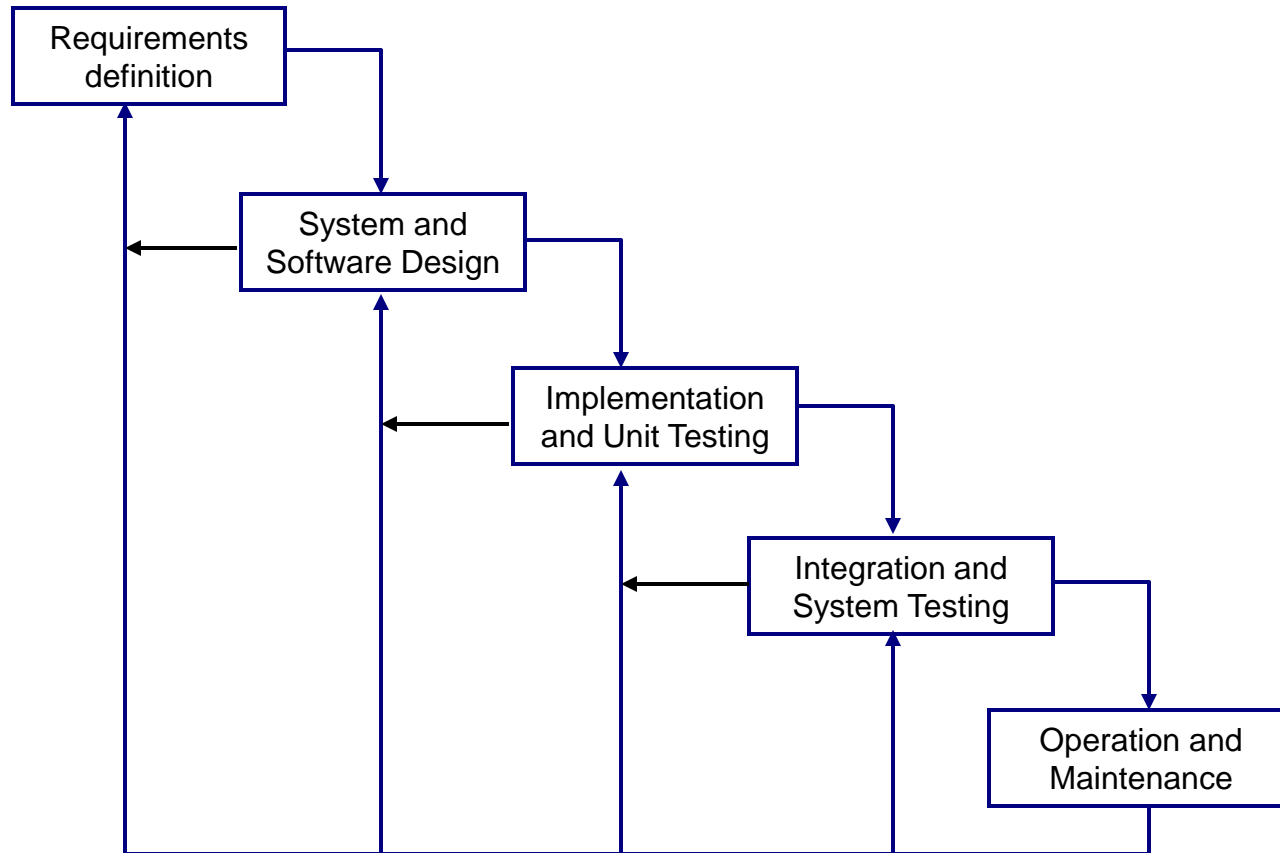
- UI Design processes
  - Waterfall model
  - Iterative design
  - Spiral model
  - User-centered design
- UI Design principles and rules
- UI Hall of Fame or Shame

# Waterfall Model



☞ Disadvantage: difficult to handle changes

# Waterfall Model Revised



# Waterfall Model Problems

- Users are not involved in evaluation until acceptance testing
- UI problems result in changes in requirements and design
  - Waste of effort spent earlier
- Inflexible partitioning of the project into distinct stages
  - it is difficult to respond to changing customer requirements
- It is only appropriate when the requirements are well-understood
  - Few business systems have stable requirements

# Shneiderman's Interactive Systems Lifecycle

## Software development lifecycle for interactive systems:

1. **Collect Information**
2. **Define Requirements and Semantics**
3. **Design Syntax and Support Facilities**
4. **Specify Physical Devices**
5. **Develop Software**
6. **Integrate System and Disseminate to Users**
7. **Nurture the User Community**
8. **Prepare Evolutionary Plan**

# Shneiderman's Interactive Systems Lifecycle

## 1. Collect Information

- ❑ Organize the design team
- ❑ Obtain management and customer participation
- ❑ Conduct interviews with users
- ❑ Submit written questionnaires to users
- ❑ Estimate development, training, usage, maintenance costs
- ❑ Prepare a schedule with observable milestones and reviews

## 2. Define requirements and semantics

- ❑ Define high-level goals and middle-level requirements
- ❑ Consider task flow sequencing alternatives
- ❑ Create task objects and actions
- ❑ Obtain management and customer agreement on goals, requirements, and semantic design

# Shneiderman's Interactive Systems Lifecycle

## 3. Design syntax and support facilities

- ❑ Compare alternative display formats
- ❑ Design informative feedback for each operation
- ❑ Review, evaluate, and revise design specifications
- ❑ Carry out paper-and-pencil pilot tests or field studies with an online mock-up or prototype

## 4. Specify physical devices

- ❑ Choose hard- or softcopy devices
- ❑ Select audio, graphics, or peripheral devices
- ❑ Consider work environment noise, lighting, table space, etc.
- ❑ Carry out further pilot tests and revise design



# Shneiderman's Interactive Systems Lifecycle

## 5. **Develop software**

- ❑ Use appropriate development tools
- ❑ Develop code
- ❑ Perform unit test

## 6. **Integrate system and disseminate to users**

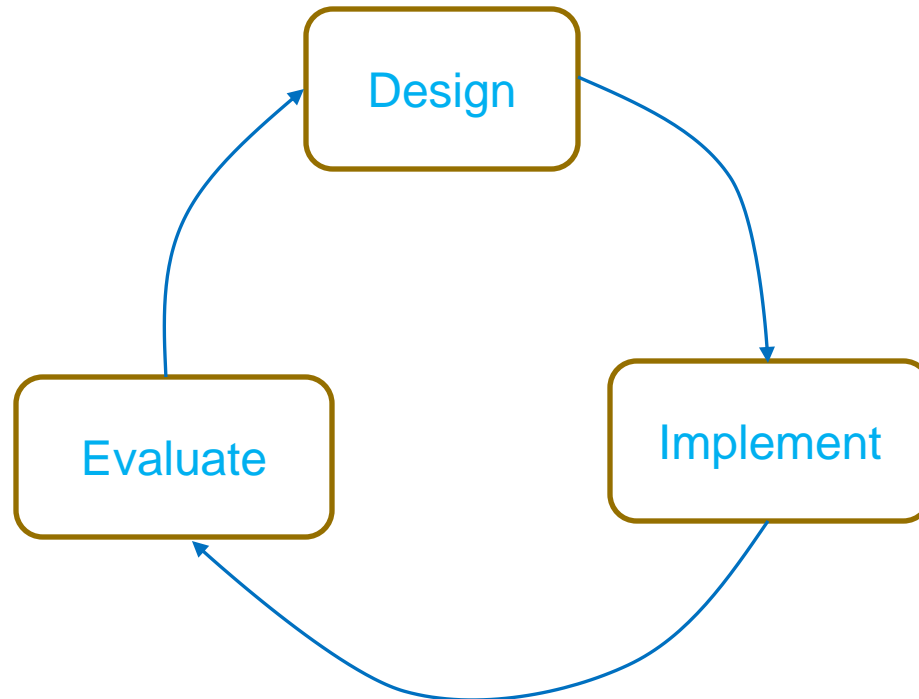
- ❑ Assure user involvement at every stage
- ❑ Conduct acceptance tests and fine tune the system
- ❑ User documentation and training

## 7. **Nurture the user community**

- ❑ User support
- ❑ Monitor usage and measurement

## 8. **Prepare evolutionary plan**

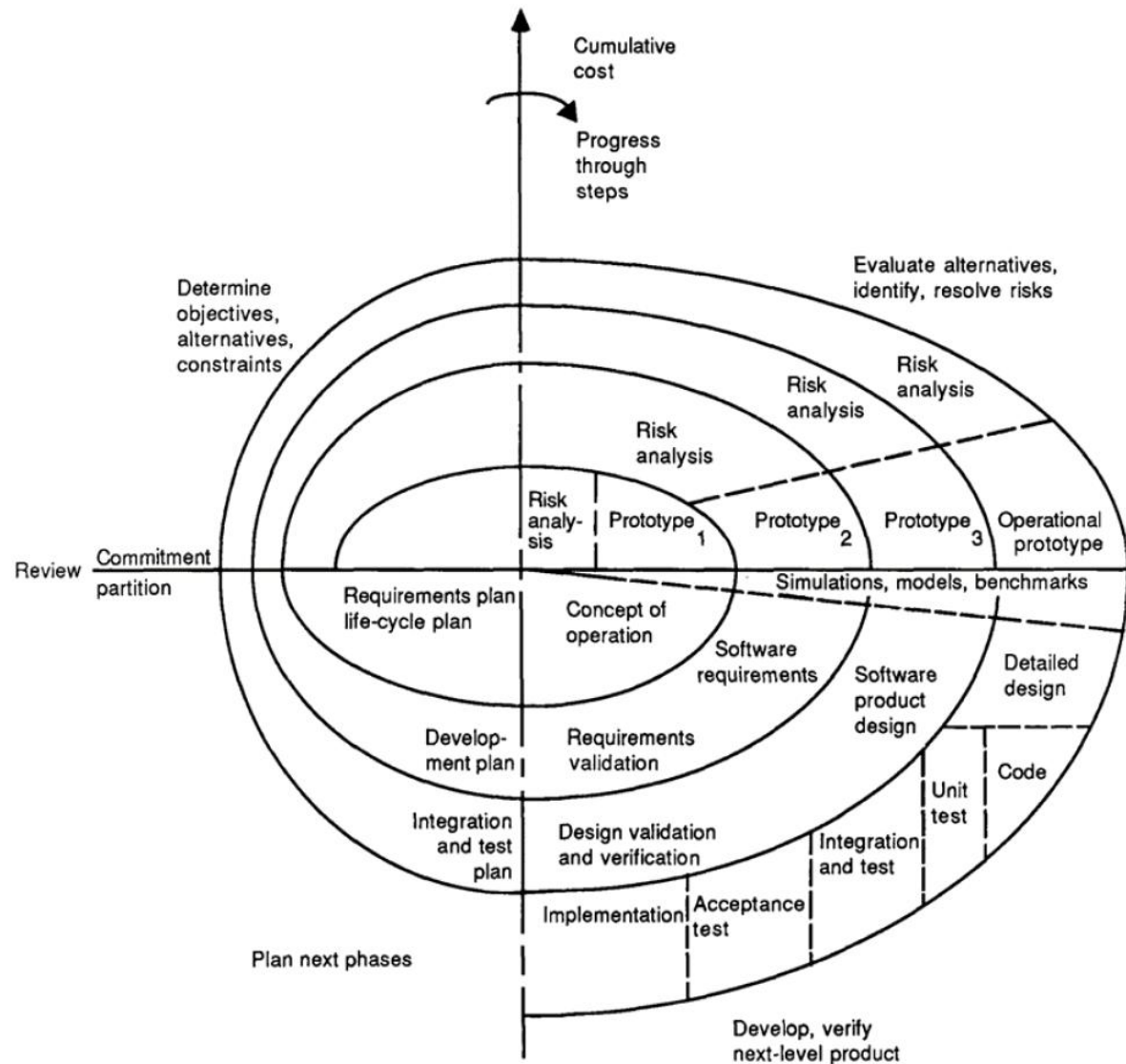
# Iterative Design



# Interactive Design (cont'd)

- Each cycle is one iteration
- Release is produced at the end of each iteration
- Customer's feedback and evaluations can be incorporated into next release
- Problems
  - It's expensive to use customer's time to test
  - Customers may not be available
  - Customers don't like → they don't buy

# Spiral Model



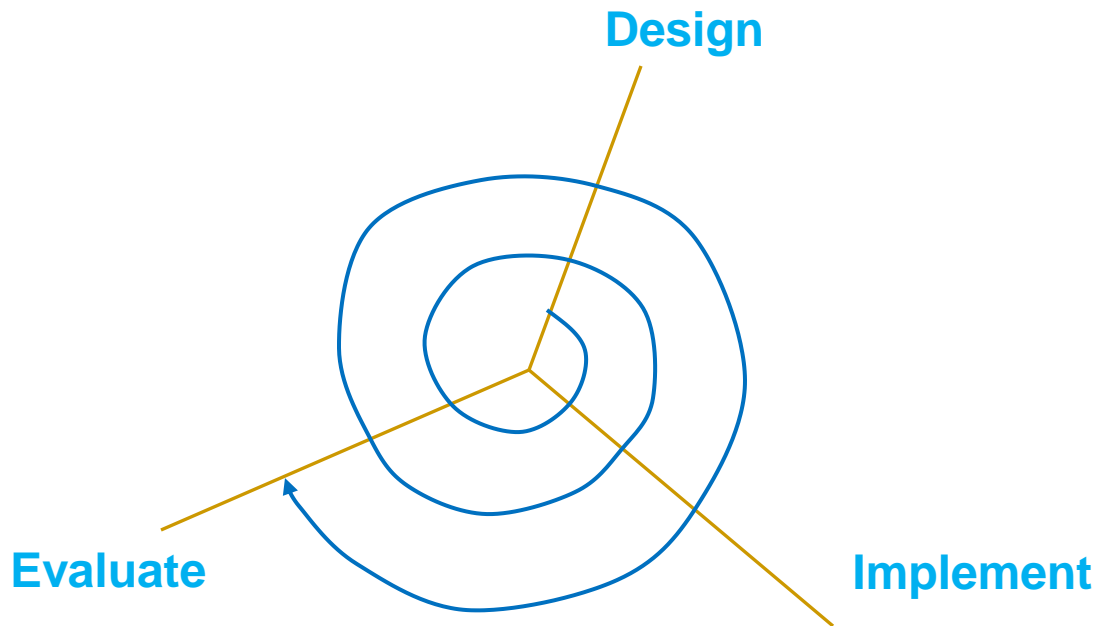
(Boehm 1988)

# Spiral Model (cont'd)

- Process is represented as a spiral rather than as a sequence of activities with backtracking
- Each loop in the spiral represents a phase in the process
- No fixed phases such as specification or design - loops in the spiral are chosen depending on what is required
- Risks are explicitly assessed and resolved throughout the process

# Spiral Model for UI Design

- An improvement of iterative design



# Spiral Model for UI Design (cont'd)

- Early cycles use cheap prototypes
  - Paper prototypes
  - Sketches on computer
  - Quick prototyping tools
- Providing multiple prototype alternatives
  - Parallel prototyping
- Later cycles should be better than early ones
- Only mature releases of later cycles can be distributed to users

# User-Centered Design

- Also known as Participatory Design
- A type of iterative design with Spiral
- Focusing on users and tasks
  - User analysis: who uses the system
  - Task analysis: what users need to do
- Getting users involved in the process
  - Users as evaluators, consultants and designers (sometimes)
- Constant evaluation
  - Users evaluate prototypes and releases



# User-Centered Design (cont'd)

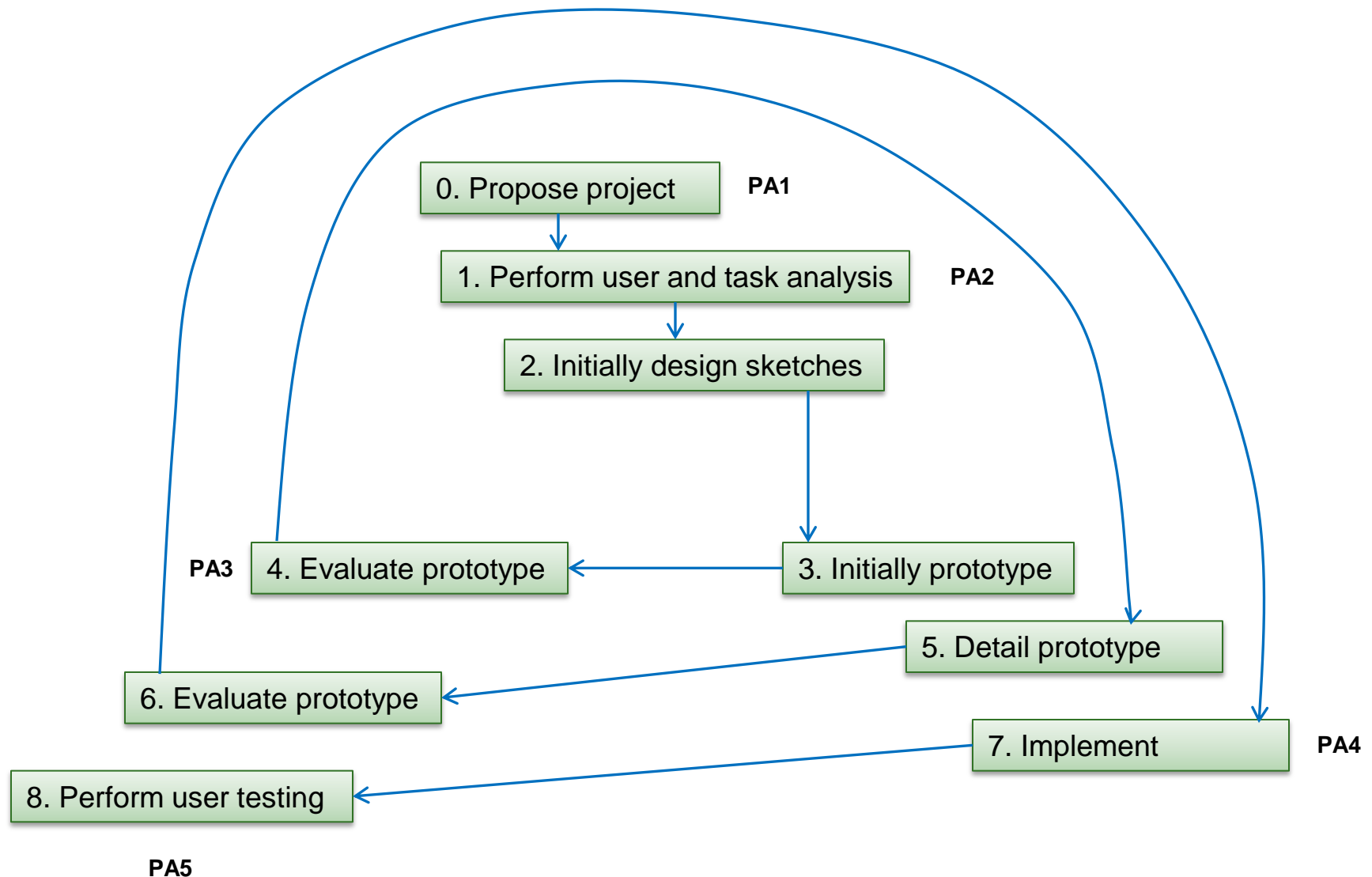
## ■ Advantages

- ❑ Accurate information and useful suggestions
- ❑ Opportunity to argue over design decisions
- ❑ Increased ego involvement in system success

## ■ Potential problems

- ❑ Users are not always available to participate
- ❑ Their time maybe expensive
- ❑ Users are not UI designers
- ❑ Users have strong ego and preferences
- ❑ UI designers overly obey users' preferences

# Process for Projects in This Class





*"I haven't read it yet, but I've downloaded it from the Internet."*

© The New Yorker collection. All rights reserved.  
From *The New Yorker Book of Technology Cartoons*.

# Outline

- UI Design processes
  - Waterfall model
  - Iterative design
  - Spiral model
  - User-centered design
- UI Design principles and rules
- UI Hall of Fame or Shame

# Principles

- Determine users' skill levels
  - ❑ Novice/first-time users
  - ❑ Knowledgeable intermittent users
  - ❑ Experts and frequent users
- Identify the tasks
  - ❑ Frequent actions
  - ❑ Less frequent actions
  - ❑ Infrequent actions
- Choose appropriate interaction styles
  - ❑ Direct manipulation
  - ❑ Menu selection
  - ❑ Form fillin
  - ❑ Command language
  - ❑ Natural language

# Principles

- Use Shneiderman's eight golden rules of interface design
  - To be discussed in the next slide
- Prevent errors
  - Constructive and informative error messages
  - Organizing screens and menus functionally
  - Providing feedback about the state of the interface
  - Correct actions
    - E.g., grayed menu items
  - Complete sequences
    - E.g., wizard windows often have both Next and Finish buttons
- Increase automation while preserving human control
  - Auto suggestion
  - Auto completion
  - Allowing users to change

# Shneiderman's Eight Golden Rules

- Strive for consistency
- Cater to universal usability
- Offer informative feedback
- Design dialogs to yield closure
- Prevent errors, rapid recovery
- Permit easy reversal of actions
- support user control
- Reduce memory load

# Summary

- User-centered design is a preferable process in UI design
- Groups in this class follow this process
- UI design principles and rules
  - Discussed across the lectures including this one



# Let Your Ideas Flow

- Chindogu, Japan



# UI Hall of Fame or Shame



# UI Hall of Fame or Shame

