Topics
- Connections of user interaction development to software engineering
- Development activities in the usability engineering life cycle
- Usability management
- User interface development team

Typical Software Engineering LC
- The Waterfall Model
The Process of User Interaction Development

- Connections of user interaction development to software engineering
- All these figures depict communication paths, not temporal ordering of activities
- Distinction between design and implementation
- Start with basic software engineering concept:

```
Software design
  | Constraints and problems
  v
Software implementation
```

The Process of User Interaction Development

- Adding systems analysis, testing, and problem (application) domain

```
Software design
  | Constraints and problems
  v
Software implementation
```

The Process of User Interaction Development

- Analogous activities for user interface development

```
Interface design requirements, usability
  | Constraints and problems
  v
User interface design
  | Constraints and problems
  v
User interface implementation
  | Constraints and problems
  v
User interface evaluation
```

Main feedback is due to low usability: design flaws, errors, modifications
The Process of User Interaction Development

- Connecting the processes together and adding rapid prototyping

The rest of this course is about just this part:
The Wheel – Usability Engineering Life Cycle Process Model

- Iterative, evaluation-centered process model for interaction development
- New life cycle concept comes from:
  - The waterfall model – movement toward completion
  - Star (Hartson & Hix, 1989) – evaluation centered
  - LUCID (Cognetics, Inc.) – development activities
  - Boehm’s Spiral Model – iteration
  - New work by Helms & Hartson (2001) – put it together

- Star (Hartson & Hix, 1989)
  - Evaluation centered

- Boehm’s spiral model – evolution through iteration
The Wheel – Usability Engineering Life Cycle Process Model

- Boehm’s spiral model abstracted

- Spiral model adapted

- Spiral unwound
The Wheel – Usability Engineering Life Cycle Process Model

- Spiral unwound and stretched out

The Wheel – Usability Engineering Life Cycle Process Model

- Waterfall with whirlpools

Wheel

- Connecting into Wheel, for inter-cycle iteration
The Wheel – Usability Engineering Life Cycle Process Model

- Life cycle = iterative configuration of cycles (each associated with a stage/form of the product)
  - Example: System analysis model, scenarios and screen designs, lo-fi prototype, hi-fi prototype, software production & integration
- Cycle is a sequence of four development activity types:
  - Analyze
  - Design
  - Build
  - Evaluate

Cycle as sequence of four types of development activities:

- Analyze
- Design
- Build
- Evaluate

Zoom in on details of a generic cycle activity
Choose a technique for each activity type in each cycle.

- Shows how each activity type is assigned a technique, the role of the person doing the activity, support tools, and documentation.
  - Example: In scenario and screen design cycles, design walkthrough is used as evaluation technique.

**Basic Principles**
- Process is product oriented
- Products evolve through cycles (cycles named for product forms)

- Each cycle is iterative
- Each cycle contains same activity types
- Each cycle is evaluation-centered
- Work products (documentation) evolve over cycles
- Process can be viewed at different levels
  - Process, cycle, activity, documentation
The Wheel – Usability Engineering Life Cycle Process Model

- Any part of the process is an instance of what is possible
  - Pick and choose cycles, activities, iterations to meet schedule, budget, management style
- Integrate with software engineering development process
- Validated by Helms & Hartson (2001) in e-commerce start-up company

Usability Management

- The control mechanism for the iteration
- Control involves:
  - Establishing usability specifications
  - Evaluating against usability specifications
  - Performing impact and cost/benefit analyses
Usability Management

- Deciding on changes to make to interaction design
- Deciding when to stop iterating
- Same process can be applied to develop user documentation or training course

Meet the User Interface Development Team

- Roles on user interface development team
  Note: Different roles, but not necessarily different people
  - User interaction designer (or usability engineer or usability specialist)
  - Evaluator (or facilitator)
  - User (and/or user representative)
  - Software engineer and/or programmer
  - Technical writer
  - Graphic designer
  - Application domain expert (also called subject matter expert)