CS3724 Human-computer Interaction

An Iterative, Evaluation-Centered Life Cycle For Interaction Development

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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:

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Software design  Spec'ns  Software implementation
                   Constraints and problems
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The Process of User Interaction Development

- Adding systems analysis, testing, and problem (application) domain
The Process of User Interaction Development

● Analogous activities for user interface development

Test plan, usability spec'ns

Interface design req'ts, usability spec'ns
Software design requirements
Software implementation spec'ns
Pgms
User-based evaluation of interface software

Main feedback is due to low usability: design flaws, errors, modifications

Major reconsiderations

Systems analysis
User interface interaction design
User interface software design
User interface software implementation
Constraints and problems
Constraints and problems
Constraints and problems

Errors, bugs
The Process of User Interaction Development

- Connecting the processes together and adding rapid prototyping
Test plan, criteria

System analysis

 Req'ts → Problem domain design → Constraints and problems

 Req'ts → Application software design → Constraints and problems

 Spec'n s → Application software implementation → Constraints and problems

 Pgms → Errors, bugs

Main feedback: design flaws, errors, modifications

Major reconsiderations

Interface design req'ts, usability spec'n s

Constraints and problems

User interface interaction design

Software design requirements

Constraints and problems

User interface software design

Software implementation spec'n s

Constraints and problems

User interface software implementation

Pgms → Errors, bugs

Main feedback is due to low usability: design flaws, errors, modifications

Test plan, usability spec'n s

Usability spec'n s

Constraints and problems

Formative user-based evaluation

Rapid prototyping
The Process of User Interaction Development

- 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
The Wheel – Usability Engineering Life Cycle Process Model

- Star (Hartson & Hix, 1989)
  - Evaluation centered
The Wheel – Usability Engineering Life Cycle Process Model

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

- Boehm’s spiral model abstracted
The Wheel – Usability Engineering Life Cycle Process Model

- Spiral model adapted
The Wheel – Usability Engineering Life Cycle Process Model

- 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

Diagram:
- Global evaluation hub
  - User/task model
  - Usage scenarios
  - Screen designs
  - Product concept
  - Lo-fi prototype
  - Hi-fi prototype
  - Integration
  - Deployment
  - Operational system
  - Close down

Direction of evolutionary advancement
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
The Wheel – Usability Engineering Life Cycle Process Model

- Cycle as sequence of four types of development activities

Diagram:
- Analyze
- Design
- Evaluate
- Implement

Cycle of activities:
- Product form in
- Product form out
The Wheel – Usability Engineering Life Cycle Process Model

- Zoom in on details of a generic cycle activity
The Wheel – Usability Engineering Life Cycle Process Model

- Choose a technique for each activity type in each cycle
The Wheel – Usability Engineering Life Cycle Process Model

- 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)
The Wheel – Usability Engineering Life Cycle Process Model

- 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
The Wheel – Usability Engineering Life Cycle Process Model

- Any part of process is instance of what is possible
  - Developers include their favorite UE methods and techniques
  - Omit activities, cycles, iterations indicated by management, budget, schedule, project scope, team composition
  - Can be different every time
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)