Scenario-Based Usability Engineering

- Scenarios are concrete representations of action that help usability engineers address tradeoffs in design/development
- “Scenarios encourage ‘what-if’ thinking that permit articulation of design possibilities without undermining innovation” — Carroll, *Making Use*
- Scenarios provide an integrating thread to the tasks of system development

History of Scenarios

- Narrative and storytelling serve as powerful tools in generating and validating ideas
- Scenarios have been used in a wide variety of areas (military, business, etc) for decades
- Scenarios have shown promise in simplifying cumbersome development efforts
Why Usability Engineering?

• Waterfall models of development do not work
  – Too many unknowns (Brooks: No Silver Bullet)
• Need an iterative discovery-oriented process
  – But at the same time need to manage it
• Demands well-defined process with metrics
  – Specifying usability goals as objectives
  – Assessing and redesigning to meet these objectives
  – Manage usability as a quality characteristic, much like modularity or nonfunctional requirements

Scenarios in Usability Engineering

• Stories of people and their activities, sometimes includes computer use, always includes goals
• Typical elements of the story are:
  – A setting
  – One or more actors or agents
  – An orienting or motivating goal or objective
  – Mental activity, plans or evaluation of behavior
  – A “storyline” sequenced by actions and events
• Emphasis on use, i.e., people’s needs, expectations, actions, and reactions
A problem scenario describing current situation:

Marissa was not satisfied with her class today on gravitation and planetary motion. She is not certain whether smaller planets always move faster or how a larger or denser sun would alter the possibilities for solar systems.

She stays after class to speak with Ms. Gould, but she isn’t able to pose these questions clearly, so Ms. Gould suggests that she re-read the text and promises more discussion tomorrow.


A design scenario describing our initial vision:

Marissa, a 10th-grade physics student, is studying gravity and its role in planetary motion. She goes to the virtual science lab and navigates to the gravity room.

In the gravity room, she discovers two other students, Randy and David, already working with the Alternate Reality Kit, which allows students to alter various physical parameters (such as the universal gravitational constant) and then observe effects in a simulation world.

The three students, each of whom is from a different school in the county, discuss possible experiments by typing messages from their respective personal computers. Together they build and analyze several solar systems, eventually focusing on the question of how comets can disrupt otherwise stable systems.

They capture data from their experiments and display it with several visualization tools, then write a brief report of their experiments, sending it for comments to Don, another student in Marissa’s class, and Mr. Arkins, Randy’s physics teacher.

Why Scenarios?

1.3: Make decisions but keep options open. Scenarios are concrete descriptions but are also very flexible.

1.4: Analyze use but let it evolve. Scenarios describe use in detail, but as a tentative, working representation.

1.5: Be innovative but only if adding value. Scenarios focus on the usability consequences of specific design proposals.

1.6: Be precise but include everyone on the team. Scenarios describe the problem situation using natural language understood by all stakeholders.

1.7: Balance action with reflection. Scenarios offer a vivid description of use that provokes questions and “what if” discussions.

Why Scenarios?

Problem scenarios

Activity scenarios

Information scenarios

Interaction scenarios

Usability specifications

ANALYZE

DESIGN

PROTOTYPE & EVALUATE
Tradeoffs and SBD

- Design by definition is invention, creativity
  - Never just one approach, never one correct answer
  - BUT some answers are demonstrably better
- Interactive system design tremendously complex
  - Many interdependencies, eg schedule, cost, competitive advantage, local expertise, ...
  - Users and their needs are one large set of dependencies
- Tradeoffs are useful in analyzing these relations
  - Here, we focus on tradeoffs affecting *users’ experiences*
  - Guides design thinking, also serves as design rationale

Scenarios and Claims

- Scenarios convey what actors are like, what forces influence their behavior
- Claims elaborate on scenarios, explaining how and why a feature has impacts
- Claims analysis documents why scenarios were written by isolating the most important features
Claims (see pgs 73-4)

| Repeated involvement by same students | + increases competence  
                                  | + encourages community  
                                  | - hard to break in       |
| Competition among students for prizes | + rewards time/effort  
                                  | - increases frustration  
                                  | - hard to compare diversity |

Learning SBD — By Example

- Virtual science fair as a case study
  - Complement to real world physical science fairs
  - Goal is to extend interactions across time & space
- Cumulative, illustrates activities at each phase
  - Detailed examples of the methods used in projects
  - Use as a model for group materials & analyses
- Many details specific to this example
  - E.g., collaboration, community network, education
  - Other case studies under construction on the Web at http://ucs.cs.vt.edu
Limitations of Scenarios?

- Scenarios do not explicitly draw in the goals and motivations of the users
- Difficult to design interfaces with minimal understanding of the users
- Scenarios can become rambling and disjointed
- Unclear how to index and access scenarios/claims

SBD Overview

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