WinWin Usage Support and Future Directions

USC-CSE Annual Research Review

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Outline

- Usage support options
- Future Directions
  - Collaborative design as architecture-based design rationale exploration
  - Extending WinWin - options
  - Evaluating options
WinWin Usage Support

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Coming</th>
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<tbody>
<tr>
<td>Installation Guidelines</td>
<td>Readme file for SunOS 4.x</td>
<td>Guidelines for other platforms (Sun Solaris, HP, others later)</td>
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<tr>
<td>Usage Manuals</td>
<td>WinWin Reference Manual</td>
<td>Worked-out examples</td>
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<td>Training</td>
<td>Visit Arrangements</td>
<td>Periodic classes, Video</td>
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<tr>
<td>Help</td>
<td>Application: call Prasanta Bose Operation: Anne Curran</td>
<td>On-line help</td>
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<td>Joint Experiments</td>
<td>* Arranged as appropriate</td>
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<td></td>
<td>* Explore killer applications of WinWin spiral process model and support system</td>
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Future Directions: Collaborative Design

- Collaborative exploration of objectives, constraints and alternatives space for win-win solutions
  - Stakeholders' objectives, constraints and alternatives fundamental to all decisions
  - Decisions based on collaboration and negotiation between multiple stakeholders
  - Support for collaborative exploration and negotiation

- Envisioning relations, and communicating concerns
  - Architecture-level decision rationale as medium for communication and collaborative decision making
  - Active participation of stakeholders - envisioning use and reflecting concerns
  - Requirements and design decision evaluation
  - Feasibility rationale
  - Partial model construction relevant to concern
  - Incremental and risk-driven decision making
Supporting Architecture-Level Rationale Capture via Collaborative Model Construction: Needs

- Architecture-level modeling of existing WinWin artifacts
  - Models reflecting related stakeholder concerns: separation of concerns
    - Critical concerns at the front-end lifecycle stages
    - Multiple perspective modeling
  - Analysis of Winconditions and options
    - Situating in the context of existing decisions
    - Use of analysis tools to support negotiation
  - Reuse of models and design
- Cooperative construction of rationale
  - Collaborative construction of models: shared contexts
  - Incremental and compositional
- Model management

Challenge: Supporting Collaborative Design

- Media and Infrastructure Support
  - Integrated video conferencing
  - Video attachments to documents
  - Shared workspace support
    - Support for multiple groups of stakeholders
  - Multi-user domain support
Challenge: Supporting Collaborative Design (Contd.)

- Negotiation and Management Support
  - Additional tradeoff tools: performance, reliability, interoperability
    - Sharing models
    - Relating results of tools
  - Change management and coordination
    - Change propagation
    - Issue resolution planning and tracking
  - Instrumentation

- Interfacing with (and assimilation by) CASE tools
  - Requirements engineering
  - Design
  - Estimation, planning and control

Design Rationale, Architecture Linkage: Simple Option
Design Rationale, Architecture Linkage: Powerful Option

Architecture-level Rationale Exploration: An Example

Page 5
Powerful Option: Architecture Artifact Representation

- Representation choices:
  - Textual descriptions
    - Hard to provide analysis support
    - Problem of mapping WinWin elements to specific elements in the description
    - Scalability problems
  - Use of architecture description languages (ADL)
    - Examples: Rapide, Wright, SDL, etc.
    - ADLs makes distinctions useful for specific analysis task
    - Working with incomplete models

- Define a representation that generalizes over existing ADL's
  - Rationale: Provides a basis for sharing models across different tools

- Architecture artifact modelled by
  - A set of entities defining components and connections between them
  - A set of entity attributes
  - A set of constraints on entities and their attributes

- Relations between architecture artifacts: includes, revises, refines, decomposes
Powerful Option: Envisioned Support Capability For Architecture Artifact Capture

- Architecture artifact schema consistent with existing artifacts
  - difference in the body: more structured
  - support for both graphical and textual descriptions in the body

Comparative Strengths

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<tr>
<th>Simple Option</th>
<th>Powerful Option</th>
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<tr>
<td>• Fewer artifacts for users, system to manage</td>
<td>• Linkages in relationships rather than in text: facilitates exploration of decision space</td>
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<tr>
<td>• Less proliferation of relationships</td>
<td>• More explicit connection of architecture and win conditions</td>
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<td>• Attachments allow linkages to different kinds of software artifacts</td>
<td>• Supports constructive process: model construction and reflection</td>
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Next Step: Compare Simple and Powerful Approaches on Classes of Design-Rationale Based Decisions

- Restructure to improve performance, portability ...
- Replace functionality by COTS/GOTS package
- Eliminate or defer functions
- Rework data structures
- Reassign responsibilities for components

Research Problems

- Taxonomy of models
  - Aid in collaborative design through model use
  - Models for capturing quality attributes
  - Perspective oriented models relevant to stakeholder concerns
- Relations between architecture artifacts
  - Facilitate reuse of constructed models
  - Model of composition, refinement, includes, revision and other relations
- Use of existing ADL-based analysis tools for evaluation of decisions
  - Negotiation on winconditions
- WinWin spiral process for collaborative design
  - Distributed decision making
  - Incremental and collaborative exploration of design space
  - Change management and coordination