WINWIN NEGOTIATION MODEL

WINWIN NEGOTIATION ANALYSES

- All WinWin transactions recorded for analysis
- Initial quantitative analysis [Boehm-Egyed, 1997-98]
  - General negotiation characteristics
  - No detailed negotiation process analysis
- Open issues for quality attribute negotiations
  I) Same or different from general results?
  II) Nature of negotiation processes
  III) Validation of stakeholder/attribute priority analysis
  IV) Validation of utility of QARCC, S-COST tools
**ANALYSIS I: ARTIFACT ANALYSIS**

- **Observations:**
  - Most quality win conditions were noncontroversial.
  - Most quality issues were straightforward to resolve.
  - Most quality-conflict issues were resolved without comments.
  - Most quality-conflict options were adapted without comments.

### Quality-Attribute Artifacts

<table>
<thead>
<tr>
<th>Artifact Type</th>
<th>Total</th>
<th>With Comments</th>
<th>Win Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>All issues</td>
<td>776</td>
<td>56 (39%)</td>
<td>140 (57%)</td>
</tr>
<tr>
<td>Quality win issues</td>
<td>622</td>
<td>53 (39%)</td>
<td>115 (61%)</td>
</tr>
<tr>
<td>All options</td>
<td>776</td>
<td>26 (34%)</td>
<td>100 (66%)</td>
</tr>
<tr>
<td>Quality conflict issues</td>
<td>10</td>
<td>6 (60%)</td>
<td>4 (40%)</td>
</tr>
</tbody>
</table>

### Quality-Attribute Artifacts

- **Observations:**
  - In quality requirements, users were more active in identifying win conditions, but less active in identifying issues, options, and agreements.
  - In quality requirements, customers were more active in identifying win conditions, but less active in identifying issues, options, and agreements.
  - In quality requirements, developers were more active in identifying issues and agreements, but less active in identifying win conditions and options.
ANALYSIS II: CONFLICT RESOLUTION PROCESS

- Negotiation Pattern Analysis
  Results:
  - Among the quality-conflict issues having only one option, the number of the issues resolved by directly accepting options were greater than the number of them resolved by adapting options.
  - Among the quality-conflict issues having multiple options, the number of the issues resolved by electing the best option(s) were greater than the number of them resolved by merging or accepting all options, but there is no dominated pattern.

<table>
<thead>
<tr>
<th>Negotiation Patterns for Quality-Conflict Issues Having One Option</th>
<th>Number of Artifacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accepting an option directly to an agreement without changing the option semantics</td>
<td>22 / 39 (59%)</td>
</tr>
<tr>
<td>Adapting an option to an agreement by changing the option semantically</td>
<td>14 / 39 (36%)</td>
</tr>
<tr>
<td>Decomposing an option to multiple agreements</td>
<td>1 / 39 (9%)</td>
</tr>
<tr>
<td>Accepting an option contradicting to an agreement</td>
<td>5 / 39 (13%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Negotiation Patterns for Quality-Conflict Issues Having Multiple Options</th>
<th>Number of Artifacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electing the best option(s) among the proposed multiple options</td>
<td>8 / 19 (42%)</td>
</tr>
<tr>
<td>Merging the multiple options into an agreement</td>
<td>5 / 19 (26%)</td>
</tr>
<tr>
<td>Accepting all the multiple options into multiple agreements</td>
<td>6 / 19 (32%)</td>
</tr>
</tbody>
</table>

ANALYSIS III: STAKEHOLDER-ATTRIBUTE RELATIONSHIP (GENERIC)

Stakeholders and their roles & responsibilities:

General Public

Avoid adverse system side-effects: safety, security/privacy

Avoid current and future interface problems

Interoperator

Execute cost-effective operational missions

User

Avoid low utility due to obsolescence; Cost-effective product support after development

Maintainer

Avoid non verifiable, expendable, flexible, reusable product; Avoid the delay of product delivery and cost overrun

Developer

Avoid overrun budget and schedule; Avoid low utilization of the system

Customer

Avoid non verifiable, expendable, flexible, reusable product; Avoid the delay of product delivery and cost overrun

Stakeholder-attribute relationship:

- Dependability
- Usability
- Interoperability
- Performance
- (Evolvability & Portability)
- Adaptability
- Reusability
- Cost & Schedule

directly-concerns
ANALYSIS III: STAKEHOLDER-ATTRIBUTE RELATIONSHIP (CSCI577A)

- Comparison of the Relationship between Stakeholders' Roles and Quality Attributes (CSCI577A Class Project vs. Generic project)

- The relation shown in generic analysis
- The new relation and shown in generic analysis
- Generic relationship not seen in student projects
- Relation with rating over 70%

- 18 of 21 of relationships in generic project were validated by analysis of student projects

OUTLINE

1. Introduction
2. Analysis I: Artifact Analysis
3. Analysis II: Conflict Resolution Process
4. Analysis III: Stakeholder-Attribute Relationship
5. Analysis IV: Support Tool Effectiveness
   - S-COST (Software Cost Option Strategy Tool)
6. Conclusions