COSYSMO-IP
COnstructive SYStems Engineering Cost Model – Information Processing

Status and Plans

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Ricardo Valerdi
University of Southern California
Center for Software Engineering

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Outline

• Workshop Objectives
• Background on COSYSMO-IP
• Outcomes from PSM Meeting (July 2002)
• Issues and Answers
• Overlap between COSYSMO & COCOMOII
• EIA632 & ISO15288
• Raytheon myCOSYSMO Prototype
• Data Collection Process
Objectives of the Workshop

• Reach consensus on resolving the issues
• Converge on scope of COSYSMO-IP model
• Address INCOSE issues
• Address definitions of model parameters
• Discuss data collection process
• Promote involvement by Affiliates
• Define next steps for CSI and INCOSE conferences
Past, Present, and Future

- Initial set of parameters compiled by Affiliates
- Performed First Delphi Round
- Meeting at CII Forum
- PSM Workshop
- Meeting at CCII Forum
- Working Group meeting at ARR

2001
- Meeting at CCII Forum

2002
- Performed First Delphi Round
- PSM Workshop

2003
- Meeting at CII Forum
- Working Group meeting at ARR
Future Parameter Refinement Opportunities

- 2003: Driver definitions
- 2004: Data collection (Delphi)
- 2005: First iteration of model
- 2006: Model calibration
COSYSMO-IP: What is it?

The purpose of the COSYSMO-IP project is to develop an initial increment of a parametric model to estimate the cost of system engineering activities during system development.

The focus of the initial increment is on the cost of systems engineering for information processing systems or subsystems.
Candidate COSYSMO Evolution Path

Inception | Elaboration | Construction | Oper Test & Eval | Transition
---|---|---|---|---
IP (Sub)system  | 1. COSYSMO-IP  |  |  |  
C4ISR System  | 2. COSYSMO-C4ISR  |  |  |  
Physical Machine System  | 3. COSYSMO-Machine  |  |  |  
System of Systems (SoS)  | 4. COSYSMO-SoS  |  |  |  

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What Does COSYSMO-IP Cover?

• Includes:
  – System engineering in the inception, elaboration, and construction phases, including test planning
  – Requirements development and specification activities
  – Physical system/information system tradeoff analysis
  – Operations analysis and design activities
  – System architecture tasks
    • Including allocations to hardware/software and consideration of COTS, NDI and legacy impacts
  – Algorithm development and validation tasks

• Defers:
  – Physical system/information system operation test & evaluation, deployment
  – Special-purpose hardware design and development
  – Structure, power and/or specialty engineering
  – Manufacturing and/or production analysis
<table>
<thead>
<tr>
<th>Issue</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application scope</td>
<td>COSYSMO-IP first</td>
</tr>
<tr>
<td>Life Cycle scope</td>
<td>Currently front-end; negotiable</td>
</tr>
<tr>
<td>Too many size drivers</td>
<td>Reduced from 7 to 4</td>
</tr>
<tr>
<td>Conflicting cost drivers</td>
<td>Reduced from 17 to 12</td>
</tr>
<tr>
<td>Too software-oriented</td>
<td>IP systems include HW</td>
</tr>
<tr>
<td>Overlap between COSYSMO and CII</td>
<td>Candidate starting point identified</td>
</tr>
</tbody>
</table>
Mapping of Old to New COSYSMO-IP Drivers

Old (7)  New (4)

Size Factors

Number of System Requirements  Number of System Requirements
Number of Major Interfaces  Number of Major Interfaces
Number of Technical Performance Measures
Number of Operational Scenarios  Number of Operational Scenarios
Number of Modes of Operation  Number of Unique Algorithms
Number of Different Platforms  Requirements understanding
Number of Unique Algorithms

Architecture complexity
Mapping of Old to New COSYSMO-IP Drivers

**Old (9)**
- Requirements understanding
- Architecture complexity
- Level of service requirements
- Legacy Transition complexity
- COTS assessment complexity
- Platform difficulty
- Required business process reengineering
- Technology Maturity
- Physical system/information subsystem tradeoff analysis complexity

**New (5)**
- Requirements understanding
- Architecture complexity
- Level of service requirements
- Migration complexity
- Technology Maturity

**Application Cost Factors**
- # of Platforms
- # of TPMs
Mapping of Old to New COSYSMO-IP Drivers

Old (8)  New (7)

Team Cost Factors

Number and diversity of stakeholder communities
Stakeholder team cohesion
Personnel capability
Personnel experience/continuity
Process maturity
Multisite coordination
Formality of deliverables
Tool support

Stakeholder team cohesion
Personnel capability
Personal experience/continuity
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Tool support

Reqs Und
Other Open Issues

• Business Process Reengineering driver
• Difference between # of Modes and # of Scenarios
• Schedule duration driver
• Involvement of Commercial Companies
# of Modes vs. # of Scenarios

Wireless Communications example

<table>
<thead>
<tr>
<th>Modes</th>
<th>Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td>TDMA</td>
<td>Voice</td>
</tr>
<tr>
<td>CDMA</td>
<td>E911</td>
</tr>
<tr>
<td>GSM</td>
<td>E-mail</td>
</tr>
<tr>
<td>Scan for channel</td>
<td>Web browsing</td>
</tr>
</tbody>
</table>
Points of Contact

Dr. Barry Boehm [boehm@sunset.usc.edu]
(213) 740-8163

Ricardo Valerdi [rvalerdi@sunset.usc.edu]
(213) 740-6470

Donald Reifer [dreifer@earthlink.net]
(310) 530-4493

Websites
http://sunset.usc.edu