CSE Leading Indicators Workshop – 27 July 2006

Improving and Extending the SE Leading Indicators (Garry Roedler)

Growing interest in measuring Systems Engineering effectiveness.
- How do we get robust systems?
- How do we achieve effective systems engineering?

SE Leading Indicators Project
- Lean Aerospace Initiative
- Partnerships with INCOSE, INCOSE, PSM
- Major aerospace corporations participated
- Academic institutions participated – MIT Lead
- 3 of the services participated (Army, Navy, Air Force)

Objectives of the SE Leading Indicators Project
- Gain understanding of DoD needs
- Identify information needs
- Identify set of leading indicators for SE effectiveness
- Define and document measurable constructs
- Identify challenges for implementation
- Establish recommendations for piloting and validating

Established a definition of Systems Engineering to ensure common ground for discussions
- Adopted the INCOSE definition
- Included standards that focus on SE activities – ISO/IEC 15288, EIA 632, IEEE 1220

SE Leading Indicator definition
- A measure for evaluating the effectiveness of a how a specific SE activity is applied on a program
- A predictor of future system performance
- Measures factors that may impact systems engineering performance

Problems being addressed
- Leading indicators provide insight into potential future states to allow management to take action before problems occur
- Many leading indicators only address management

These are forward looking indicators – the difference lies in how the information in gathered, evaluated, and used to provide a forward looking perspective

Applied the PSM analysis model in the identification and definition of measures and indicators.

Applying SE Leading Indicators

Integrated into the organizational and program plans
Plan and perform using a current PSM/CMMI compliant process
Leading indicators involve use of empirical data to set planned targets and thresholds
Evaluate effectiveness of the measures – are they working

Measures apply across the lifecycle
Intended to provide insight into key SE activities
Envisioned as suitable to commercial endeavors – may require tailoring

Criteria of Leading Indicators
The team established a set of criteria that Gary reviewed – see page 14 of briefing package

Plan
Validation and rollout through a series of pilots
Pilots would be in various stages of the lifecycle
Create a pilot users group and email forum
Define a Masters or Doctoral project to coordinate pilots and analyze effectiveness
Leverage NDA's with LAI to do data analysis
Results briefing

Leading Indicators
13 leading indicators defined by the working group, includes measures, descriptions, graphs, ….
Beta guide released December 2005
Gary reviewed the list of indicators as presented on page 17 of the briefing package
One basic assumption is the SE process is good, well defined, and followed

COSYSMO Usability Survey (Chris Miller)

- Investigating User perceptions of the COSYSMO results
    - Will decision makers trust and use the data
    - Will look at both inputs to and outputs from COSYSMO
    - Requested feedback on the clarity of the questions and the time it takes to complete – provide any ideas to improve the survey
        - Feedback needed August 7

What we need from workshop attendees
Pilots to try some of the indicators – still need more pilot projects; final update is dependent on feedback from real usage
Feedback for improvement
Additional candidate measures, especially if used successful
Examples indicator graphics

Future Plans
Pilot programs in 2006
MIT graduate research, especially for validation and refinement

Prepare lessons learned
Prepare long term plan and guidance documentation
Expect INCOSE Measurement Working Group to take the lead

Step-Through of the documentation

Gary reviewed the contents of the document released in December 2006.
Gary reviewed the structure of an indicator specification.
Gary walked through some of the measurement specifications; there was some attendee discussion on the content as it relates to their projects
Gary asked the attendees to review the document to see if there are any improvement opportunities

Pilot Plan (Chris Miller)

- Chris reviewed a call for participation for pilot deployment
- Handout provided
- Chris led a discussion looking at the validation of the survey instrument
  - Predictive value – validity as a leading indicator (rate 1-5)
  - Do you currently collect Y, N, Tailored, New, Explain
    - If tailored, then rate the degree of tailoring
    - Chris presented this concept in a grid format
  - Is it planned?
  - Challenges need to be addressed – Globally (Globally, Indicator)
  - Analysis also needs to answer: For each indicator, what is it a leading indicator for? What leading insight is provided? What predictions do you make about downstream consequences/impacts? These questions need to be asked of the people who are collecting and using the data rather than the researchers.
  - Lessons Learned need to be collected – Globally (Guide, Indicator)
  - New – will kick-off future analysis
- Garry reviewed a LM survey instrument for data collection and validation that could be used as a starting point for Chris and Ricardo.
- Pilot – validate the technical content of the guide (released Dec 2005). At the end of the pilot, we hope to remove the “BETA” identifier and release as Version 1.0.
- Pilot asks a company to map the guide to the organization, be willing to collect data, and complete a survey by the end of the year.