

***Practical Software and Systems Measurement***

***Slides #2-8 are introductions***

***Slides #9-18 is the outbrief***

PSM 1

July 2008

***Practical Software and Systems Measurement***

***Practical Software and  
Systems Measurement***

***A foundation for objective project management***



***Systems Engineering Leading  
Indicators***

***15 July 2008***

***Garry Roedler   Donna Rhodes  
Cheryl Jones   Howard Schimmoller***

***PSM Users Group Conference  
14-18 July 2008  
Mystic, Connecticut***

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## **Systems Engineering Leading Indicators Workshop**

- **SE Leading Indicators are measures that provide indications of the effectiveness of systems engineering**
- **This workshop will:**
  - **build on previous work in this area towards the revision of the SE Leading Indicators Guide**
  - **identify and prioritize additional candidate SE leading indicators, as well as other changes**

## **Objectives of the Workshop**

- **Share background and latest results from academia/industry/ government collaboration on leading indicators for systems engineering programmatic and technical performance**
- **Kick-off and prioritize efforts to enhance/ revise the SE Leading Indicators Guide**
  - **Additional indicators**
  - **Incorporate lessons learned and feedback for definitions, guidance and implementation**
- **Determine other support needed and get actions in place to address (e.g., Training)**
- **This is not intended to be a tutorial of the set of indicators**

## **Workshop Format**

- **Agenda**
  - *Background*
  - *Review feedback received to date*
  - *Identify additional changes needed*
  - *Prioritize changes and establish recommendation for scope of revision*
  - *Establish path forward*
- **Techniques that will be used**
  - *Group interaction*
  - *Review of previous surveys, analysis and feedback*
  - *Gap analysis*
  - *Prioritization techniques*

## **Workshop Background**

- **PSM history in this area**
  - *Beta version of SE Leading Indicators Guide published in Dec 2005*
  - *SE Leading Indicators Guide published in June 2007*
  - *Collaboration between LAI, PSM, INCOSE and industry*
  - *Workshops held at PSM UG Conference in July 2007, GEIA Engineering and Technical Management Conference in Sep 2007*
  - *SE Measurement Survey conducted by Don Reifer in June 2008*

## ***Workshop Background***

- ***Where we're heading***
  - ***Kick-off of revision efforts to enhance the guidance, address gaps, and incorporate lessons learned***
  - ***Plan for revision in early 2009***
  - ***Support revision with training***
- ***Issues***
  - ***How to balance addressing the needs without getting too much bulk***
  - ***How to balance providing enough specificity, yet remain flexible for broad application***

## ***Intended Output***

- ***Documentation of additional information needs/issues and indicators that are not currently addressed***
- ***Prioritized set of candidate changes***
- ***Recommendation of scope of the revision***
- ***Rationale for including/excluding previous feedback received***
- ***Plan for going forward***

## **Systems Engineering Leading Indicators Workshop**

### **Results Briefing**

**Garry Roedler  
Donna Rhodes  
Howard Schimmoller  
Cheryl Jones**

## **Systems Engineering Leading Indicators Workshop**

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## **Practical Software and Systems Measurement**

### **Workshop Participants**

- Garry Roedler (LMC)
- Donna Rhodes (MIT)
- Howard Schimmoller (LMC)
- Don Reifer (RCI)
- Gan Wang (BAE)
- Michael Denny (DAU)
- Kacy Gerst (Sikorsky)
- Greg Mazourek (LMC)
- Chris Leighton (Raytheon)
- Trindy LeForge (Raytheon)
- Dan Ligett (Softstar)
- Dan Ferens (ITT)
- Ed Casey (Raytheon)
- Lloyd Caruso (LMC)
- Elliott Reitz (LMC)
- Liz Kung (LMC)
- Valerie James (US Army - PFRMS PEO)
- Jim McCurley (SEI)
- Cristina Cebaallos (CPS)
- George Evans (BAE)
- Antony Powell (SSEI – York Metrics)
- Timothy Addison (NGA)
- Alex Shernoff (BAE)
- Carlos Shaeffers (DCMAG)
- Dennis Ahern (NGC)
- Tom Huyhn (NPS)

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## **Practical Software and Systems Measurement**

### **Priorities for the Revision**

- **New indicators**
  1. Test Completeness [14]
  2. Resource Volatility [ 13 ]
  3. Complexity Change Trends [ 12 ]
  4. Defect and Error Trends [11]
  5. Algorithm & Scenario Trends [ 10 ]

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  6. Architecture Trends [ 8 ]
  7. Concept Development [ 6 ]
  8. SoS Capability Trends [ 6 ]
  9. Productivity [6]

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  10. Baseline Mgmt [ 3 ]
  11. SE Index [1]
  12. Product Quality [ 0]
  13. Team Cohesion [0]
  14. End-to-end Deployment [0]

**Top 5**

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## **Practical Software and Systems Measurement**

### **Priorities for the Revision**

*Matrices to show specific relationships*

#### **1. Cost-effective sets of Base Measures that support greatest number of indicators**

- **Strong utility**
- **Not likely to be a one-size-fits-all**

**May differ by type of program (requiring multiple tables)**

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#### **2. Indicators vs. Program Profile**

- **Attributes should include size, customer type, contract type, application type (e.g., R&D, development, O&M, service mgt)**

#### **3. Indicators vs. SE Activities**

- **Most valuable at process level (use ISO/IEC 15288)**
- **Concern about making too large if lower level**

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## **Practical Software and Systems Measurement**

### **Priorities for the Revision – Other Changes**

#### **1. Revise definition of SE Leading Indicators as follows:**

- **An individual measure or collection of measures that are predictive of future system performance or system engineering performance.**

*Predictive information (e.g., a trend or relationships) is provided before the performance is adversely impacted.*

*Linked to business/project objectives.*

*Aids leadership by providing insight to take actions regarding:*

- **Assessment of process effectiveness and impacts**
- **Necessary interventions and actions to avoid rework and wasted effort**
- **Delivering value to customers and end users**

#### **2. Revise document format**

- **Add descriptive information to indicators in exec summary table – rename section to Introduction**
- **Combine sections 3 and 4 together**
- **Create a set of exec briefing charts**
  - In section use indents to guide users to level of detail*
  - Possibly add a roadmap to document*
- **Look at LM Aero example format for Measurement & Analysis Process guide AC5597**

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## **Practical Software and Systems Measurement**

### **Priorities for the Revision – Other Changes**

#### **3. Changes to existing Indicator Specifications**

- *Improve “Leading Insight Provided”*
- *Add general interpretation/implementation considerations*  
*E.g., expectations may be phase/time dependent*
- *Add timing information – when to collect and when to take action*
- *Rollup – how and when you can roll up the measurement information*

#### **4. SoS Appendix explaining how to use the indicators for SoS (including an example)**

- #### **5. Guidance on how to deal with cross-program factors and impacts (e.g., a track manager getting developed that all the constituent systems in SoS need to use)**
- *Dependencies on reuse and common elements*

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## **Practical Software and Systems Measurement**

### **SE Leading Indicator Training**

- *Need to develop accompanying training that can be provided by user organizations*
  - *1-hour introduction to brief program and business management teams*
    - *Provide understanding of:*
      - What SE Leading Indicators are*
      - Utility provided SE Leading Indicators*
      - Resources needed to implement*
  - *4-6 hour tutorial*
    - *Practitioner is the audience*
    - *Not a general measurement tutorial*
    - *Focus on:*
      - Selecting the right SE Leading Indicators*
      - How to obtain “leading insight” rather than “lagging insight”*
      - Detailed discussion of each of the indicators in the guide*
      - Short exercises*

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## **Practical Software and Systems Measurement**

### **Support for the Revision?**

- **Interested team members and role? (contributor or reviewer)**
  - Garry Roedler (LMC)
  - Donna Rhodes (MIT)
  - Cheryl Jones (PSM)
  - Howard Schimmoller (LMC)
  - Greg Niemann (LMC)
  - Ricardo Valerdi (MIT)
  - Ron Carson (Boeing)
  - Jim Stubbe/Trindy Leforge (Raytheon)
  - John Rieff (Raytheon)
  - Gan Wang (BAE Systems)
  - Paul Frenz (GD)
  - Tom Huyhn (NPG)
  - Elliott Reitz (LMC)
  - Dennis Ahern (NGC)
  - Don Reifer (RCI)
  - Jim McCurley (SEI - may have limited time but wants to be involved)
  - Tony Powell (SSEI – York Metrics)

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## **Practical Software and Systems Measurement**

### **Going Forward**

- **Team Operation to work revision**
  - **Will have 2 Face-to-face meetings**
    - Location and dates are TBD
    - Possibly meetings in conjunction with:
      - INCOSE International Workshop (Jan 2009)
      - PSM TWG – if one is held
  - **Will conduct telecon meetings for most of the work**
    - Approximately every 3 weeks
    - 2-hour working sessions
    - Use dial-in number and web connection
- **Schedule**
  - **Begin telecon meetings in early Sep**
  - **Target Mar/Apr 2009 for release of revision**

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