



# 19<sup>th</sup> Practical Software and Systems Measurement Users' Group Meeting and Workshops

*“Fundamental Measurement Principles: The Basis for  
Advanced Engineering Decision Information”*

**September 10-14, 2108  
Arlington, Virginia**

## Meeting and Workshops Agenda

Time	Monday	Tuesday	Wednesday <sup>1</sup>	Thursday	Friday
7:30 – 8:30	Continental Breakfast	Continental Breakfast	Continental Breakfast	Continental Breakfast	Continental Breakfast
Morning Session* 8:30 – 12:20	PSM Training	Welcome & Introductions; Keynote; Presentations	Presentations	Keynote; Presentations	Presentations Workshop Outbriefs Wrap-up
Lunch 12:20 – 1:30	Lunch	Lunch	Lunch	Lunch	
Afternoon Session* 1:30 – 5:00	PSM Training	Concurrent Workshops 1-2	Concurrent Workshops 3-4	Concurrent Workshops 5-7	

\* Morning and afternoon breaks included

## Other Agenda Items and Schedule

### Monday, 10 September 2018

7:30am - 8:30am On-Site Conference Registration

8:30am – 5:00pm **PSM Training:** This course is an introduction to PSM for those who are new to PSM or who want a refresher course on the PSM principles and information-driven measurement process.

### Tuesday, 11 September 2018

7:30am - 8:30am On-Site Conference Registration

### Wednesday, 12 September 2018

10:40am PSM Picture

5:00pm PSM Dinner: Teds Montana Grill

### Friday, 14 September 2018

10:00am - 12:00pm Workshop Outbriefs

Each workshop lead will summarize the results of their workshop and discuss future goals.

12:00am - 12:20pm Conference Wrap-Up

<sup>1</sup> Group picture Wednesday AM - location will be announced.

**Presentations: Tuesday - Friday**

**Presentation Abstracts are provided starting on page 12**

<b>Time</b>	<b>Tuesday</b>	<b>Wednesday</b>	<b>Thursday</b>	<b>Friday</b>
8:30 - 9:20	<i>Keynote: Monitoring Agile Projects</i>  <i>Matt Kennedy</i>	<i>To Be Specified</i>	<i>Keynote: Mission Engineering</i>  <i>Robert Gold</i>	<i>To Be Specified</i>
9:20 - 10:00	<i>An Approach to Fixed Price Agile</i>  <i>Michael Harris</i>	<i>Complications with Using Affordability Efficiency Measures – \$/FH Tells You How Much a Flight Hour Costs, Not What You Get For It</i>  <i>Dr. Mike Yokell</i>	<i>Integration of Parametric Cost Estimation with System Architecture – It’s a dirty job but someone has to do it!</i>  <i>Barry Papke, Gan Wang</i>	<i>To Be Specified</i>
10:00 - 10:40	<i>Using Complexity Leadership Theory to Assess Significant Factors for Agile Teams in Bureaucratic Environments</i>  <i>Rita Creel</i>	<i>Using Army Software Sustainment Cost Estimating Results</i>  <i>Cheryl Jones, James Doswell</i>	<i>Analysis and Quality in Measurement Reporting</i>  <i>Sal Bruno</i>	<i>Workshop Outbriefs</i>
11:00 - 11:40	<i>Words and Numbers</i>  <i>Anthony Powell</i>	<i>Cybersecurity in the Cloud</i>  <i>Arlene Minkiewicz</i>	<i>Software and Systems Engineering Measurement Challenges in Integrating Software Assurance into Defense Systems Throughout the System Acquisition Lifecycle</i>  <i>Kenneth Nidiffer</i>	<i>Workshop Outbriefs</i>
11:40 - 12:20	<i>Measurement of Software Throughout the Lifecycle Using SRDRs</i>  <i>James Doswell</i>	<i>Integrating PSM, Risk Management and EVM with SCRAM</i>  <i>Stacey Wehmeier, Adrian Pitman, Betsy Clark, Angela Tuffley</i>	<i>To Be Specified</i>	<i>Workshop Outbriefs</i>  <i>Conference Wrap-up</i>

**19th PSMUG Users' Group Meeting and Workshops**  
**"Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information"**

**PSM Users' Group 2018 Workshops**  
*Descriptions on following pages*  
**Workshops: Tuesday – Thursday**

Workshops: 1:30 to 5:00		
Tuesday	Wednesday	Thursday
<p><b>1. <i>Measurement for Agile Programs</i></b></p> <p>Facilitators: Matt Kennedy, US Treasury, Cheryl Jones, US Army ARDEC, Bill Golaz and Greg Niemann, Lockheed Martin</p>	<p><b>3. <i>Resolving Complications with Using Affordability and Affordability Efficiency Measures</i></b></p> <p>Facilitators: Dr. Mike Yokell and Bill Golaz, Lockheed Martin</p>	<p><b>5. <i>Measurement in Mission Engineering</i></b></p> <p>Facilitators: Judith Dahmann, MITRE; Garry Roedler and Ed Moshinsky, Lockheed Martin; Peter Korfiatis, Brian Soeder, and Ryan Jacobs, MITRE</p>
	<p><b>4. <i>Improving Software Maintenance &amp; Sustainment Cost Estimation in Practice</i></b></p> <p>Facilitator: Dr. Robert N. Charette, ITABHI Corporation</p>	<p><b>6. <i>Measurement on Sustainment Programs</i></b></p> <p>Brad Clark, Software Metrics, Inc., James Doswell, US Army DASA-CE, Paul Janusz, US Army ARDEC</p>
<p><b>2. <i>COCOMO III Workshop: Refining the COCOMO III Model</i></b></p> <p>Facilitator: Brad Clark, USC Center for Systems and Software Engineering</p>		<p><b>7. <i>COSYSMO 3.0: The Expert-Based Model for Estimating Systems Engineering Costs</i></b></p> <p>Facilitators: Mr Jim Alstad, Dr Barry Boehm/USC Center for Systems and Software Engineering</p>

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

**Workshop #1: Measurement for Agile Programs**

**Facilitator:** Cheryl Jones, US Army ARDEC, Bill Golaz and Greg Niemann, Lockheed Martin, Matt Kennedy, US Treasury

**Prerequisites:**

- Participants should have a general understanding of the Agile software development process.
- Participants should review the strawman Information Category - Measurement Concept - Measure (ICM) table on measurement

**Materials to Bring:**

- Bring examples of any measures you have used from current agile programs

**Discussion:**

DoD requires cost-plus software development efforts to use Earned Value Management (EVM) to ensure timely delivery of end items within cost and schedule targets. Implementing EVM on Agile projects has been proven to be challenging because software deliveries are planned over fixed time periods so the traditional concept of schedule variance in dollar terms is different. The traditional cost and schedule variances from plan need to be recast into the amount of actual software delivered relative to the amount planned for a given time box.

This workshop will review EVM, Agile and how progress is measured on an agile software programs. The participants will be given scenarios of planned sprints for features with stories and hours along with actual stories and hours. They will compute physical percent complete for each of the scenarios and show the computed cost and schedule variances for each scenario.

**Goals/Products:**

Participants will learn how to

- Use existing monthly planned and actual Agile data (Epics, Features, Stories and Story points) to record “progress”
- Communicate Agile monthly cost and status categories using Agile planned and actual agile metrics

**19th PSMUG Users' Group Meeting and Workshops**  
**"Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information"**

**Workshop #2: COCOMO III Workshop: Refining the COCOMO III Model**

**Facilitator: Brad Clark, USC Center for Systems and Software Engineering**

**Prerequisites:**

An understanding of how a software cost estimation model is used in creating software development cost estimates. Knowledge of the COCOMO II Software Cost Estimation Model would be helpful but not absolutely necessary.

**Materials to Bring:**

Bring pen and paper. Handouts will be provided if needed.

**Discussion:**

This workshop will begin with a brief overview of the proposed COCOMO III model. The focus will then shift to the model parameters, called Cost Drivers. The main purpose of the workshop is to discuss the impact of each Cost Driver in the model estimate.

Participants should come to the workshop prepared to discuss, rank and judge the range of influence each cost driver has in a COCOMO III estimate. The COCOMO II Cost Driver's range of influence will be used for guidance.

**Goals/Products:**

A draft ranking and influence range for each COCOMO III cost driver.

**19th PSMUG Users' Group Meeting and Workshops**  
**"Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information"**

<b>Workshop #3: <i>Resolving Complications with Using Affordability and Affordability Efficiency Measures</i></b>
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**Facilitator:** *Dr. Mike Yokell and Bill Golaz, ESEP (Lockheed Martin)*

**Prerequisites:**

- Review the presentation: Complications with Using Affordability Efficiency Measures
- Review the results of the 2016 workshop on measuring affordability

**Materials to Bring:**

- Any examples you may have that worked around or resolved complications using affordability efficiency measures

**Discussion:**

- Presentation abstract: Affordability efficiency measures are supposed to help us make informed decisions about buying things. For example, we can compare unit acquisition costs, annualized sustainment costs or even miles per gallon. This presentation uses publicly available data about cars to explore some complications in using these kinds of measures. Using simple models, we'll look at a typical "next generation" analysis of alternatives. You'll see how a 5th generation truck can be worse than a 4th generation car on all affordability efficiency measures, while actually being much cheaper at completing the mission when all factors are considered.
- Workshop: Use the presentation to prime some discussion about measuring affordability and value, then look at the results of the 2016 affordability workshop. Resolve Complications with Using Affordability and Affordability Efficiency Measures.

**Goals/Products:**

- Guidance to resolve complications with using affordability and affordability efficiency measures.
- How do we help folks use affordability efficiency measures responsibly and fairly?
- When and how should these measures be used and where do they get us in trouble.
- What can we do about it?

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

**Workshop #4: Improving Software Maintenance & Sustainment Cost Estimation in Practice**

**Facilitator:** Dr. Robert N. Charette, ITABHI Corporation

**Prerequisites:**

An interest in improving software cost estimation for software maintenance and sustainment.

**Materials to Bring:**

Good ideas

**Discussion:**

Recent DoD directives demand that affordability and supportability become as important decision considerations as meeting acquisition cost and schedule when deciding whether to invest in a defense program. Software maintenance and sustainability costs are increasingly becoming a major determinant in whether a defense project will be affordable or supportable in the future due to software's *sine qua non* in whether a defense system meets its military objectives. Accurate software cost estimates, be they for acquisition or sustainment and maintenance, are of paramount importance in assessing a program's affordability and supportability.

However, software maintenance and sustainment cost estimation has long lived in the twilight, perceived as not particularly important to get right. As a result, software maintenance and sustainment cost estimation and sustainment models are not as accurate as they should or need to be. This will only change when cost estimation for this part of the software life cycle is treated truly with equal importance as DoD software acquisition cost estimation.

This workshop will examine the current state of software maintenance and sustainment cost estimation practice, and what need to be done—both technically as well as politically—to place it on equal footing with software acquisition cost estimation. The current ongoing effort in the US Army to improve software maintenance and cost estimation practice for today and into the future certainly highlights what is needed to be improved on the technical front. However, getting the visibility and political support required is not so clear-cut.

One idea to raise the visibility, importance and practice that software sustainment and maintenance cost estimation requires is to eventually establish a Software Maintenance & Sustainment Cost Estimation (SMSCE) Council, similar to the CIO and ERM councils. Both the CIO and ERM councils started out as informal groups that have evolved into formal organizations that today influence both government and DoD policy and practice. The workshop discussion will center how a SMSCE community of practice could be started (e.g., within the PSM community) which could then be evolved into something more formal, like SMSCE Council, that could influence DoD/government software maintenance and sustainment policy and practice.

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

Part of the workshop discussions focus on what would be the objectives of a future SMSCE Council (e.g., how to improve software maintenance and sustainment cost estimation practice throughout DOD, or how to require software maintenance and sustainment data be captured on contracts), what would be needed in both the short-term and long-term to achieve these types of objectives, who should be on such a council and how to convince them to join, and what other infrastructure requirements need to be defined in order to make it successful.

Other ideas on how to make software sustainment and maintenance cost estimation on equal footing with software acquisition cost estimation sooner than later without the need for forming such a community of practice or council will be highly welcomed.

**Goals/Products:**

- Concepts on how to make software sustainment and maintenance cost estimation as important as software acquisition cost estimation
- Ideas on how to create a SMSCE Council or community of practice from which a Council could emerge
- Suggestions on how to improve software sustainment and maintenance cost estimation policy and practice today and into the future

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

**Workshop #5: Measurement in Mission Engineering**

**Facilitators:** *Judith Dahmann, MITRE; Garry Roedler and Edward Moshinsky, Lockheed Martin; Peter Korfiatis, Brian Soeder, and Ryan Jacobs, MITRE*

**Prerequisites:**

An understanding of general measurement approaches, mission analysis, systems of systems engineering, and an interest in mission engineering

**Materials to Bring:**

Readahead materials will be provided; recommend attending Mission Engineering keynote in the morning of the workshop

**Discussion:**

The Department of Defense is putting new emphasis on ‘Mission Engineering’ - the deliberate planning, analyzing, organizing, and integrating of current and emerging operational and system capabilities to achieve desired warfighting mission effects. This workshop will present an overview the key tenets of mission engineering and the key activities involve in mission engineering execution as the basis for examining of the key measurement issues and challenges systems engineering can expect to face as we expand the practice of application of systems engineering to address mission capabilities from a system and systems of systems engineering perspective.

**Goals/Products:**

Clear understanding of the role measurement plans in the application of systems engineering to achieving mission capability outcomes

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

**Workshop #6: Measurement on Sustainment Programs**

**Facilitators:** *Brad Clark, Software Metrics, Inc., James Doswell, US Army DASA-CE, Paul Janusz, US Army ARDEC*

**Prerequisites:**

- Participants should have a general understanding of software sustainment.
- Participants should review the strawman Sustainment Information Category - Measurement Concept - Measure (ICM) table
- Review the SRDR-M

**Materials to Bring:**

- Bring examples of any measures you have used on sustainment programs
- Bring recommended changes to the sustainment ICM Table

**Discussion:**

More and more of DoD funding is spent on sustainment. In this workshop, we will discuss what is different about measurement for sustainment. We will discuss measures at different levels, including:

- Measures for cost and schedule estimation
- Measuring size
- Data availability and evaluation.

We will also discuss the new SRDR for sustainment, and the required data from that CDRL.

In preparation for this workshop, the facilitators have developed a strawman ICM table on sustainment measurement. The intent of this is to focus discussions, and allow us to develop a reasonable set of practical measures that provide useful data to decision makers. The intent is to finalize a sustainment ICM table, and provide sample measurement guidance.

We will discuss the possibility of producing a white paper that provides measurement specifications for the identified measures.

**Goals/Products:**

- ICM Table for sustainment measurement that is ready for use
- Outline and writing assignments for sustainment measurement guidance

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

**Workshop #7: COSYSMO 3.0: The Expert-Based Model for Estimating Systems Engineering Costs**

**Facilitators:** *Mr Jim Alstad, Dr Barry Boehm/USC Center for Systems and Software Engineering*

**Prerequisites:**

Those with experience with systems engineering projects, especially as project leads or estimators, are recommended to attend; however, other systems engineers would also be helpful. Those experienced in other types of cost estimation are also welcome.

**Materials to Bring:**

Experience estimating, leading, or working on systems engineering projects. Experience on other types of cost estimation. Experience designing questionnaires. If possible, data from completed systems engineering projects.

**Discussion:**

Thanks in part to previous PSMUG Workshops, a mature “Expert-Based” version of the COSYSMO 3.0 Systems Engineering Cost Estimating Model is available. This Workshop will go over recently updated versions of the Model, a data gathering questionnaire, and a cost estimating spreadsheet; attendees will be asked for input on these items.

**Goals/Products:**

- Commentary on the Model and its auxiliary material
- Interest in providing actual project data for the final COSYSMO 3.0 model

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

***Presentation Abstracts***  
***Tuesday***

**Keynote Presentation**

Title: Monitoring Agile Projects

Presenter: Matt Kenndy, Comptroller of the Currency (OCC), US Treasury

Abstract: This presentation will discuss various metrics used to monitor agile projects at both the team and project level. We will review what each metric does and does not indicate about the team's/project's performance. We will also discuss how some metrics, depending on their application, may either positively or negatively influence program outcomes. This paper will raise awareness of estimation bias and discuss Nobel Prize winning work on estimation bias to substantiate the need for proper estimation in both Agile and traditional development environments. There is much evidence that viable estimates can make projects successful, make outsourcing more cost effective, and help businesses make the most informed decisions irrespective of the development methodology used. Stakeholders care about cost and schedule irrespective of whether the project is Agile, traditional, or hybrid.

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Title: An Approach to Fixed Price Agile

Presenter: Michael Harris, PREMIOS

Abstract: This presentation will describe an approach to measuring Agile development that allows for an approximation to fixed price contracts. Why is this important? The industry has justifiably bought into the benefits of Agile development for, primarily, improving customer satisfaction and, secondarily, for improving value delivery and shorter time to market. However, there is a group of people who find Agile development hugely frustrating – the business managers, program managers, business owners, venture capitalists, etc. – collectively, the “investors.” This group have gone from being frustrated that estimates of cost and duration for waterfall projects were invariably wrong or, at least, very fragile in the face of change to being frustrated that Agile teams will not even provide estimates of cost and duration to allow them to incorporate change. The presentation describes an approach for cost and duration predictability developed by the author and his colleagues in numerous workshops with a major financial services client as an alternative to paying for all Agile development from outsourced software development vendors on a T&M basis. The approach has subsequently been refined through work with other clients and experts in the field.

Key lessons or concepts that will be conveyed:

- A better way to measure Agile development to help manage investor expectations
- Transition from paying for Agile development as T&M to fixed price
- Implementation issues that might arise and how to manage them

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

Title: Using Complexity Leadership Theory to Assess Significant Factors for Agile Teams in Bureaucratic Environments

Presenter: Rita Creel, Carnegie Mellon University | Software Engineering Institute

Abstract: Bureaucratic organizations generally focus on policies, procedures, rules, and regulations to coordinate massive, complex efforts, often with the best of intentions. In developing today's software- and cyber-reliant systems, the drive for rapid delivery of new capabilities operating within dynamic systems-of-systems runs counter to such bureaucratic norms. While progress has been made balancing agility and discipline, much uncertainty still exists in terms of how to strike that balance, particularly in highly rigid environments. Complexity Leadership Theory provides insights and a structure for identifying and characterizing significant factors regarding agility within a bureaucracy. This presentation will introduce Complexity Leadership Theory as a lens for understanding how environmental factors influence the experiences and project outcomes of agile teams operating in bureaucratic organizations, and what can be done to increase their chances for success.

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Title: Words and Numbers

Presenter: Anthony Powell, YorkMetrics

Abstract: This year's PSM User Group theme is Fundamental Measurement Principles. This presentation revisits these fundamentals and their role in managing complexity. It will use experiences of several real-world systems and software measurement programs to demonstrate how careful attention to words and numbers is the secret to delivering advanced engineering decision information.

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Title: Measurement of Software Throughout the Lifecycle Using SRDRs

Presenter: James Doswell, US Army DASA-CE

Abstract: As a part of modernizing data collection across the DoD, OSD CAPE has recently published updated guidance and collection forms for CSDR reporting. The updates include additional Software Resource Data Report's (SRDR) to include the SRDR-M for Maintenance and an ERP specific SRDR to attempt to capture the nuances of data reporting specific to ERP programs. This workshop will introduce the new SRDRs as discuss how to best utilize the information being reported in development as well as maintenance. Discussions will include types of data captured, reporting timelines (SRDR-Dev vs SRDR-M), Army implementations, Agile reporting, and challenges regarding CSDR plan structure and ensuring data quality.

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**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

***Wednesday***

Title: To Be Specified

Presenter:

Abstract:

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Title: Complications with Using Affordability Efficiency Measures – \$/FH Tells You How Much a Flight Hour Costs, Not What You Get For It

Presenter: Dr. Mike Yokell, ESEP, Lockheed Martin

Abstract: Affordability efficiency measures are supposed to help us make informed decisions about buying things. For example, we can compare unit acquisition costs, annualized sustainment costs or even miles per gallon. This presentation uses publicly available data about cars to explore some complications in using these kinds of measures. Using simple models, we'll look at a typical “next generation” analysis of alternatives. You'll see how a 5th generation truck can be worse than a 4th generation car on all affordability efficiency measures, while actually being much cheaper at completing the mission when all factors are considered.

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Title: Using Army Software Sustainment Cost Estimating Results

Presenters: Cheryl Jones, U.S. Army ARDEC; James Doswell, U.S. Army DASA-CE

Abstract: The Army has completed an initial analysis of software sustainment cost and performance data collected from ~250 Weapons, C4ISR, and ERP systems. The analysis addresses primary resource distributions and cost estimating relationships across multiple functional domains, and establishes a foundation for efficient resource allocation decisions across the Army systems portfolio, and projected policy and process changes. The results, including the detailed statistical analysis, will be made available for use by participants.

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**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

Title: Cybersecurity in the Cloud

Presenter: Arlene Minkiewicz, PRICE Systems, LLC

Abstract: Cybersecurity and software assurance issues dominate the news these days. As software solutions become ubiquitous and highly interconnected, via networking, the internet, cloud solutions, remote computing, etc., the chance for breaches increases at an alarming rate. Many organizations are adapting cloud solutions, generally relying on a hybrid model for cloud adoption. With a hybrid cloud, organizations use a combination of public, private and on premise solutions which are then intermingled sensibly to provide seamless operations. This model makes it possible for organizations to take advantage of benefits of private and public clouds where this is sensible while still offering protection for sensitive data and applications.

There are however some issues with this intermingling that could create chinks in the armor if not properly addressed. This paper begins with a general description of cybersecurity and software assurance. Cloud computing and hybrid clouds will be defined and discussed. Following this, there will be a deep dive into the potential cybersecurity challenges that may be exacerbated by this intermingling. Mitigation strategies will be presented and discussed, along with the cost implications and considerations surrounding these strategies.

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Title: Integrating Practical Software and Systems Measurement (PSM), Risk Management and Earned Value Management (EVM) with the Australian Schedule Compliance Risk Assessment Methodology (SCRAM)

Presenter: Ms Stacey Wehmeier and Mr Adrian Pitman, Australian Department of Defence, Dr Elizabeth Clark, Software Metrics Inc, Ms Angela Tuffley, RedBay Consulting Pty Ltd

Abstract: SCRAM was developed by the Australian Defence Department as an independent review method to identify root causes of schedule slippage, to quantify the impacts of issues, risk and technical debt and forecast future milestone dates. SCRAM was originally applied relatively late in the acquisition life cycle as a diagnostic tool for projects of concern. Over time, SCRAM has been used earlier in the life cycle in order to pre-emptively identify risks and take action as soon as possible. SCRAM is now being applied prior to contract signing and/or prior to an Integrated Baseline Review. SCRAM was successfully applied to the F-35 JSF Program.

More recently we have combined PSM with EVM IBRs to understand how progress is measured on a project and to discuss additional information needs and potential measures with Cost Account Managers (CAM). We have found that this is an ideal time to bring together a government program office and contractor for a PSM workshop. The addition of a SCRAM review during this time highlights and identifies existing risks, issues and technical debt which provide additional insight into information needs. We are currently using this approach on Australia's largest defense program, the \$50B Future Submarine Program.

This presentation will explain the application of SCRAM and discuss how the program control functions of Risk management. PSM, IBR and SCRAM interrelate and can be integrated to improve the efficiency and outcomes of the individual processes.

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

***Thursday***

Title: Mission engineering

Presenter: Robert Gold, Deputy Assistant Secretary of Defense for Systems Engineering

Abstract: The deliberate planning, analyzing, organizing, and integrating of current and emerging operational and system capabilities to achieve desired warfighting mission effects is a new and growing focus in the US Department of Defense. The FY17 NDAA Section 855 called for the creation of Mission Integration Management for selected missions supported by mission engineering. The Components have been implementing mission engineering in areas where there is a critical interest in achieving mission capability such as ballistic missile defense or naval mission areas, and the Congressional direction is to extend this to support to cross cutting missions which rely on cooperation across Components. This presentation will provide an overview of mission engineering challenges, opportunities, and current plans, including a discussion of the key mission engineering activities, as the introduction to a workshop on key mission engineering measurement issues and approaches..

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Title: Integration of Parametric Cost Estimation with System Architecture – It’s a dirty job but someone has to do it!

Presenters: Barry Papke, No Magic, Inc. and Gan Wang, BAE Systems

Abstract: The rapid adoption and advancement of Model Based Systems Engineering (MBSE) methods and tools opens up new avenues of systems engineering practices. One of them is cost estimation. As a key enabler for affordability analysis and budgetary decision making, cost estimation is an essential component for all system development and sustainment efforts. However, cost estimation is typically a separate endeavor from the design and development effort, creating a professional “chasm” between the worlds of systems designers and of cost analysts, causing a disconnect between the system as designed and the cost and effort required to build it.

This paper describes an approach to “tightly” integrate the existing practice of parametric cost estimation with the system architecture development process by leveraging MBSE and SysML to enable repeatable and efficient estimation of system development cost, and to allow system cost and affordability to be incorporated into the “digital thread” of the design while improving the efficiency and effectiveness of the cost estimation process. By expanding our previous work (Papke, Wang and Pavalkis 2017), this paper describes a new concept of operation (CONOP) for system development, enabled by the integrated SysML and COSYSMO modeling environment, that effectively connects the cost baselines to the technical baselines throughout the project life cycle. This new CONOP presents another step towards “pulling the digital thread” by making affordability and economic analysis an integral part of the system architecture.

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

Title: Analysis and Quality in Measurement Reporting

Presenter: Sal Bruno, Lockheed Martin

Abstract: The program measurement coordinator has a critical and serious role in performing activities and tasks within the world of analytics that can greatly benefit the program management team with their ability to manage the development and delivery of their contractual obligation. The program measurement coordinator can effectively understand this if they understand their subspace of Measurements within the world of Analytics and with the inclusion of a QPI (Quality Performance Index). Thus, this presentation will 1) define the elements and components of Measurements and the role of the program measurement coordinator and 2) introduce a new indicator known as QPI (Quality Performance Index) to demonstrate and illustrate how the theoretical concepts of effectively measuring the quality component of the delivery work product is critical for this success. Audience participation is encouraged and expected with questions and lively discussions to edify the overall experience of the presentation to pursue new studies and for future presentations.

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Title: Software and Systems Engineering Measurement Challenges in Integrating Software Assurance into Defense Systems Throughout the System Acquisition Lifecycle

Presenter: Dr. Kenneth Nidiffer; Software Engineering Institute Carnegie Mellon University

Abstract: This presentation presents systems engineering measurement challenges for integrating software assurance into defense systems throughout the system acquisition lifecycle. It focuses on current Government and Industry efforts to provide program managers with a guidebook for system engineering-In software assurance into defense systems during the entire system acquisition lifecycle. Software assurance (SwA) is the “level of confidence that software functions as intended and is free of vulnerabilities, either intentionally or unintentionally designed or inserted as part of the software, throughout the life cycle.” The latest January 2017 change to Department of Defense (DoD) Instruction (DoDI) 5000.02, Operation of the Defense Acquisition System, includes a new enclosure on cybersecurity that outlines several actions DoD acquisition Program Managers (PMs) should (but not must) implement to ensure system security and related program security across the acquisition, sustainment, and operation life cycle.

Program managers face intense challenges from complex and changing requirements, technology, and agency and stakeholder dynamics with few meaningful software and systems engineering measures to guide them. Furthermore, there is a basic threat associated with development and sustainment of software intensive systems in that a nation-state, terrorist, criminal, or rogue developer may be able to: (1) gain control of systems through supply chain opportunities and/or (2) exploit vulnerabilities remotely. Software vulnerability and exploitation are the root cause of a majority of computer security problems due in part to the increasing complexity and usage of software in our nation’s defense systems and the increasing amount of latent defects and vulnerabilities contained in the aggregate software. Unfortunately due to the dynamics of their job, program managers often do not fully comprehend the magnitude of the treat/risks associated with software assurance issues in their systems or for either the legacy or modern systems their system will interface to achieve mission effectiveness. This situation is compounded by a lack of meaningful software and systems engineering or programmatic measures.

**19th PSMUG Users' Group Meeting and Workshops**  
**“Fundamental Measurement Principles: The Basis for Advanced Engineering Decision Information”**

The effort began as a request by Deputy Assistant Secretary of Defense for Systems Engineering (DASD/SE) in 2015 to obtain an industry perspective regarding opportunities for them to improve the practice of software engineering. The response to the request centered on five phases: Phase 1 - engaging the National Defense Industrial Association (NDIA) System Engineering Division's Software and Security Engineering Committees to research and cull out candidate technical areas of interest and selecting eligible candidates; Phase 2 - ranking selected candidate technical areas in terms of payoff and ease of Implementation, and presenting results to NDIA Systems Engineering Division and DASD/SE; Phase 3- DASD/SE deciding to focus on the software assurance technical area and to develop a DoD Program Manager's Software Assurance Guidebook (Guide); Phase 4 – researching aspects of software assurance acquisition lifecycle activities including Joint Federated Assurance Center (JFAC) activities and deciding on a development framework for the Guide and Phase 5 - development and transitioning the Guide.

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Title: To Be Specified

Presenter:

Abstract:

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Title: COSYSMO Workshop Overview (10 minutes)

Presenter: Jim Alstad, University of Southern California

Abstract: This presentation will provide an overview of the upcoming workshop.

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**19th PSMUG Users' Group Meeting and Workshops**  
**"Fundamental Measurement Principles: The Basis for Advanced Engineering**  
**Decision Information"**

***Friday***

Title: To Be Specified

Presenter:

Abstract:

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Title: To Be Specified

Presenter:

Abstract:

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