15th Annual Research Symposium

Panel #20: Program Management in an Age of Complexity

PEO IEW&S

Program Executive Office
Intelligence, Electronic Warfare & Sensors

10 MAY 2018

MG Kirk F. Vollmecke – PEO IEW&S

PEO IEW&S Acquisition Imperatives

Rapid Acquisition Enabled by Open, Adaptable Programs to Combat Complexity

- PEO IEW&S Leading Threat Agile Solutions
- Streamlined Acquisition Process Focused on Small, Frequent Releases of Capability
- Early and Frequent Involvement with System Users and Small, Qualified, Dynamic Teams will be critical components to rapid acquisitions of complex systems

A shift toward Rapid Acquisition is required to keep pace with the threat and enable relevant technologies in complex systems.

Our Complex Environment

The Multi-Domain Battle Concept

- U.S. supremacy is at risk in the land, air, maritime, space, and cyberspace domains and electro-magnetic spectrum as rivals innovate and leverage technology.
- The Army must be prepared to fight as part of a Joint Force, across multiple domains, to gain the advantage over our enemies and achieve national objectives.
- The Army adapts, evolves and innovates to keep a combat edge by: thinking about future conflict, collaborative learning, analyzing capability gaps, and implementing solutions.

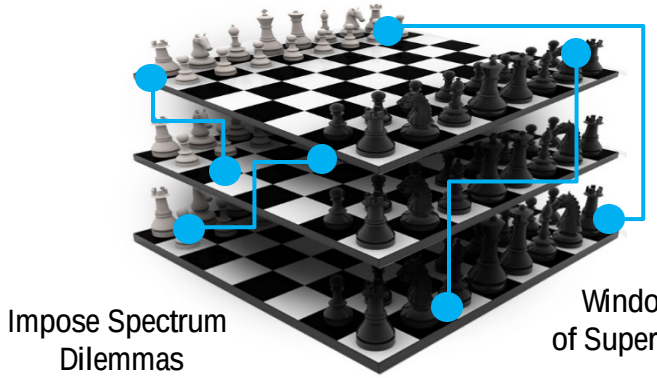
Intellectual Underpinnings

- Our capabilities must "Preserve" the Freedom of Maneuver ... for the Commander
- Use of Cyberspace as a tool of National Security
- Integrated Electronic Warfare, Signals Intelligence and Cyber capabilities must present the adversaries with multiple dilemmas...

  ...in spectrum, time/space, intensity and duration

Gaining Understanding of the Environment we are faced with…

Dimensional Effect



- Define overmatch differently with imperative to impose multiple dilemmas
- Confront technology diffusion and mass surveillance with integrated *EW, SIGINT, and Cyber* convergence
- Enable a cooperative development environment
- Leverage a Joint Combined Arms & Enterprise battle approach

Foster Open and Adaptable Programs to Deliver Now

Leading in a Complex Environment

Today's Environment

Priorities **Rapid**

Decisions **Direction**

ELEMENTS OF ~~MANAGING~~ LEADING

High Risk — Non-Aggressive — Aggressive — Low Risk

- Not aggressively monitoring and controlling actual program activities
- Not having a common set of predictive measures for use
- Not identifying root causes of the "out of bounds" and making timely adjustments
- Not having trip wires or missing early signs of the problem

Elements of Misunderstanding

- Aggressive and rigorous APB management using smart leading indicators (predictive and lagging metrics or measures)
- Have a deep understanding of the OE and essential elements to avoid the ugly side of failure
- Open and collaborative partnership with Industry counterpart (common set of measures and effective Battle Rhythm)
- Understanding performance complexity and art of PM
- Personal and professional accountability

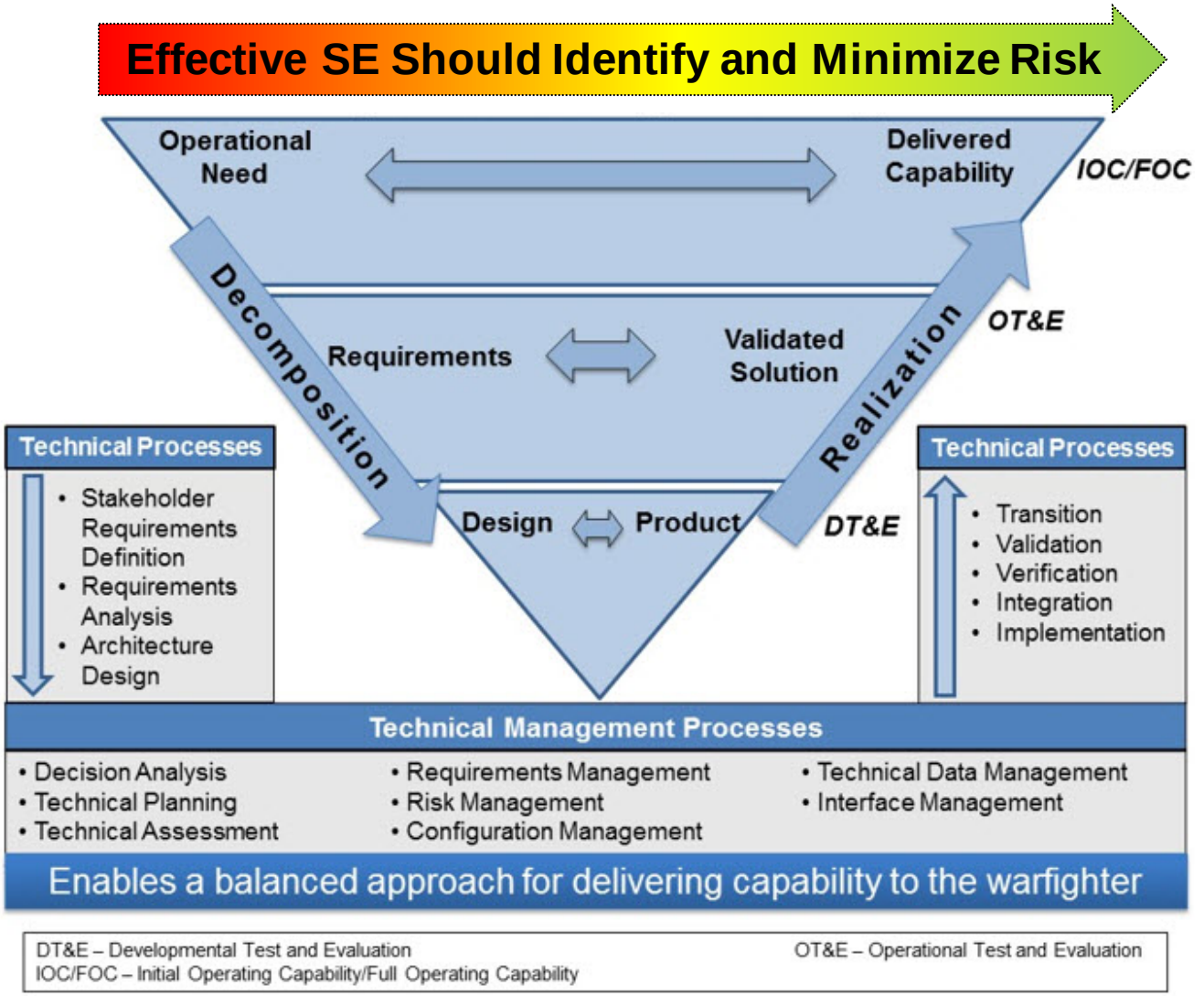
New Paradigm for Success

Combating Complexity with Systems Engineering

Systems Engineering (SE) builds the Foundation for Successful Programs

- The primary means for determining whether requirements can be met with available resources
- A disciplined learning process that translates capability requirements into specific design features
- Identifies key risks to be resolved
- Can resolve/mitigate risks through trade-offs and/or additional investments if done effectively before the start of development

- GAO-17-77, Nov 17, 2016



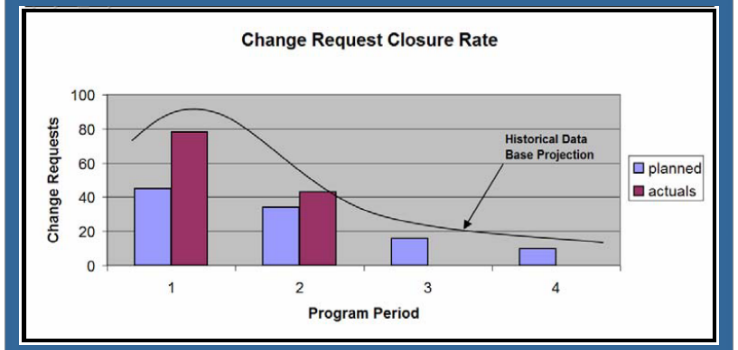
- Graphic from the *Defense Acquisition Guidebook (DAG), Chapter 3 Systems Engineering*

Systems Engineering Leading Indicators

- Leading indicators PROVIDE INSIGHT into potential future states to allow management to take action BEFORE PROBLEMS are realized.
- Conventional measures provide status and historical information, while leading indicators use an approach that draws on trend information to allow for PREDICTIVE ANALYSIS (forward looking).
- Sample SE Leading Indicator Measures include but are definitely not limited to requirements trends, interface trends, work product approval trends, technology maturity trends, and system engineering staffing.
  - *Systems Engineering, Leading Indicators Guide, Version 2.0, January 29, 2010*

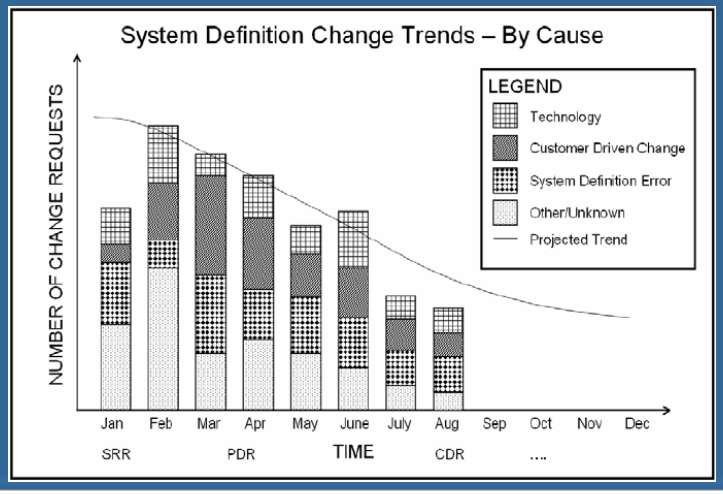
1) Sample SE Leading Indicator & Trend Analysis

- Change Requests Should Decrease Over Time
- Actuals Should Not Diverge Significantly from Planned



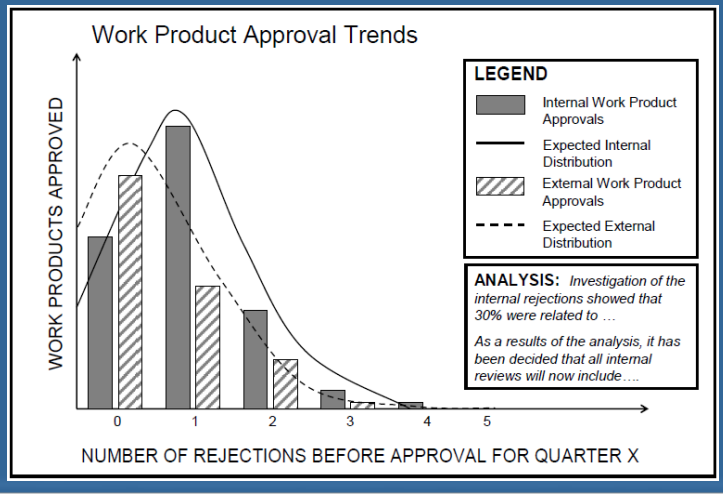
2) Sample SE Leading Indicator & Trend Analysis

- System Definition Should Stabilize Over Time

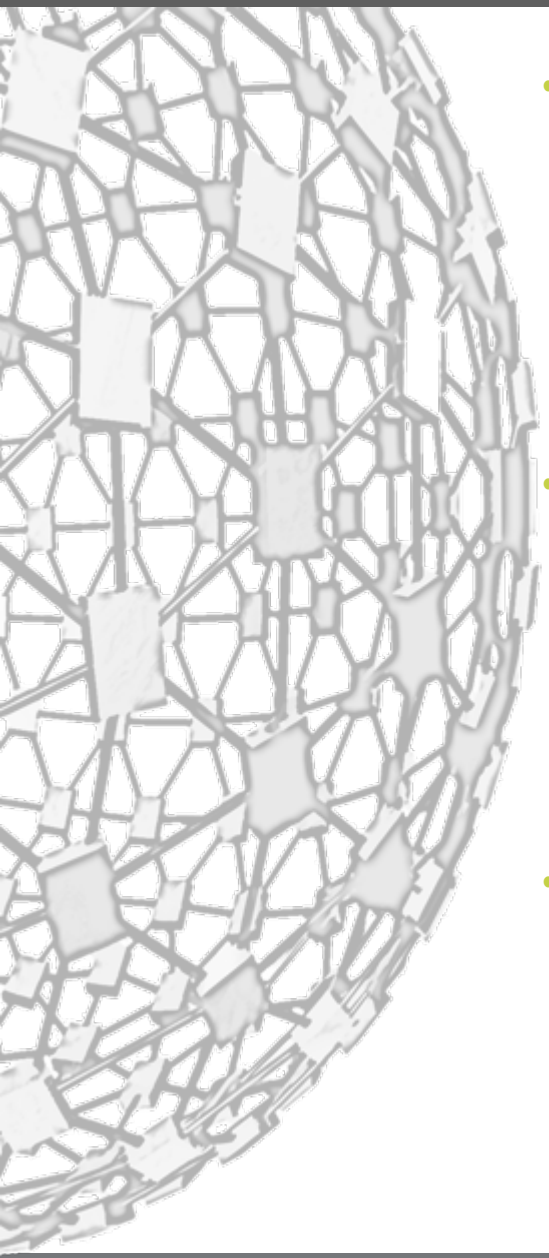


3) Sample SE Leading Indicator & Trend Analysis

- Work Product Rejections Should Decrease Over Time



Panel #20: Program Management in an Age of Complexity



- Acquisition and Development Programs through the Lens of System Complexity, Antonio Pugliese, Stevens Institute of Technology
  - Mr. Pugliese will discuss a new approach to the measurement of network complexity that builds on complexity theory, network analysis, and systems engineering. It examines how the addition of a new system to a network of legacy systems affects the complexity of the network, a situation very familiar and operationally relevant to the Army today.
- Why Do Programs Fail? An Analysis of Defense Program Manager Decision Making in Complex and Chaotic Program Environments, Raymond Jones, COL(R), Naval Postgraduate School
  - COL(R) Jones will present his paper examining why leaders' decision making does not consistently result in improved program performance, and how four basic categories (sensemaking, trust, tacit knowledge, and explicit knowledge) shape leaders' reality in complex environments.
- Enhanced Combat Helmet (ECH) Case Study, Dr. Robert Mortlock, Naval Postgraduate School
  - Dr. Mortlock will present a case study on the U.S. Army's adoption of the Enhanced Combat Helmet (ECH) to help develop critical thinking and analysis skills in the areas of project initiation, stakeholder management, and decision making with ambiguous and contradicting testing and field data.

QUESTIONS

PEO IEW&S

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Intelligence, Electronic Warfare & Sensors

Management Strategy
Battling Complexity during EMD

- Reactive vs. Proactive Management
  - PEO IEW&S Leading Indicator Initiative provides predictive information and analysis to forecast probability of program success by understanding associated confidence and risk
    - Phase 1: Identify Metrics
    - Phase 2: Establish Control Limits
    - Phase 3: Collect/Input Data
    - Phase 4: Visualize metrics and trends
    - Phase 5: Evaluate effectiveness

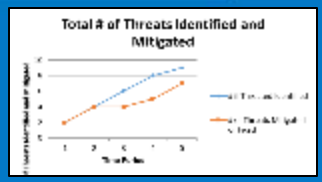
Management Areas

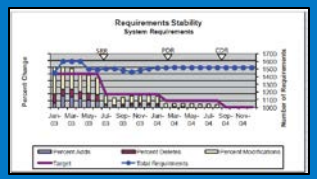
- Contract
- Cost
- Schedule
- Systems Engineering
- Logistics
- Production
- Human System Integration
- Test

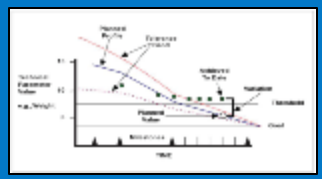
Measures

- TCPI
- Management Reserve
- Line of Base Slack
- Critical Path Slack
- Requirements Volatility
- Reliability Growth
- Software Defects
- Variance off Schedule Path
- TPMs
- Threats
- Risks

Dashboard / Visualization







Specific to each PM, Trends Provide Insight

Complexity Examples at the PEO

EXAMPLE: Electronic Warfare Planning and Management Tool (EWPMT) Complexity

- EWPMT is a software suite that enhances a Cyber-Electromagnetic Activities (CEMA) element's ability to plan, coordinate, and synchronize electronic warfare (EW), spectrum management (SM), and Cyber operations (CO)
- Configuration management of multiple fielded software baselines across different networks
- Why is this complex?

EXAMPLE: 3rd GEN FLIR Performance Complexity

- 3rd Gen FLIR (Third Generation Forward Looking Infrared), the sight for the Abrams and Bradley, is required to work in extreme conditions, pushing the laws of physics, and a systems of systems.
- Part of a larger system of systems that is produced by a large team of contractors tracking to different cost, schedule, and performance risks and goals.

The PEO IEW&S is a Complex Organization Chartered to Deliver Complex Systems to the Warfighter

PEO IEW&S Organization

PEO IEW&S HEADQUARTERS & SENIOR EXECUTIVE LEADERSHIP

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