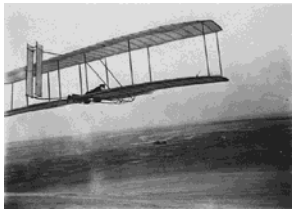
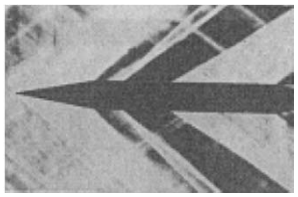
Risk Management in DoD Programs

James Thompson
Director, Major Program Support
Office of the Deputy Assistant Secretary of Defense for Systems Engineering

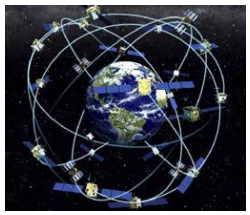
National Defense Industrial Association (NDIA)
Industrial Committee on Program Management (ICPM) Meeting
Arlington, VA | March 19, 2014

Our Nation's Capabilities are Critically Dependent on Risk Management


Powered flight

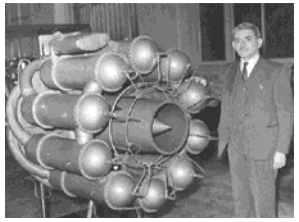

Supersonic flow


Communications


Global positioning

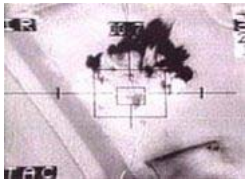

Stealth / LO

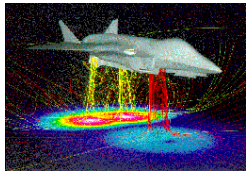

Long-endurance ISR


Gas turbine engine


Night attack


ICBMs


Precision strike


Computer simulations


High-power lasers

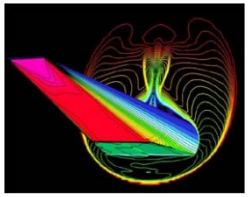

Aerial refueling

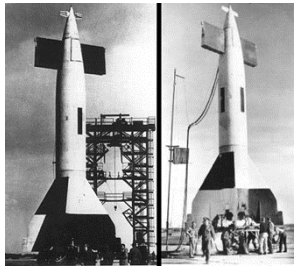

High-speed flight

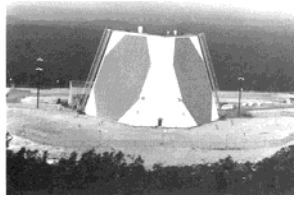

Space ISR


Space launch


Directed energy


Hypersonics

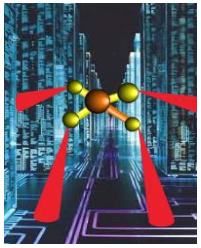

Rocket flight


Long-range radar


5th-gen fighters


Blended wing-body


Unmanned systems


Cyber operations

Risk

"A prudent person foresees the danger ahead and takes precautions. The simpleton goes blindly on and suffers the consequences."

– Proverbs 27:12

"The sea is dangerous and its storms terrible, but these obstacles have never been sufficient reason to remain ashore... Unlike the mediocre, intrepid spirits seek victory over those things that seem impossible... It is with an iron will that they embark on the most daring of all endeavors... to meet the shadowy future without fear and conquer the unknown."

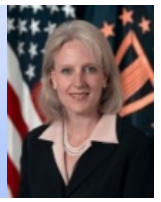
– attributed to Ferdinand Magellan, Explorer (c. 1520)

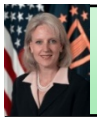
"A ship in harbor is safe, but that is not what ships are built for."

– attributed to J.A. Shedd, circa 1928

DASD, Systems Engineering

DASD, Systems Engineering
Stephen Welby
Principal Deputy Kristen Baldwin





Systems Analysis
Kristen Baldwin (Acting)

Addressing Emerging Challenges on the Frontiers of Systems Engineering

- Analysis of Complex Systems/Systems of Systems
- Program Protection/Acquisition Cyber Security
- University, FFRDC and Industry Engineering and Research
- Modeling and Simulation

Major Program Support
James Thompson

Supporting USD(AT&L) Decisions with Independent Engineering Expertise

- Engineering Assessment / Mentoring of Major Defense Programs
- Program Support Reviews
- OIPT / DAB Support
- Systems Engineering Plans
- Systemic Root Cause Analysis
- Development Planning/Early SE
- Program Engagements

Mission Assurance
Vacant

Leading Systems Engineering Practice in DoD and Industry

- Systems Engineering Policy & Guidance
- Development Planning/Early SE Policy
- Specialty Engineering (System Safety, Reliability and Maintainability Engineering, Quality, Manufacturing, Producibility, Human Systems Integration)
- Counterfeit Prevention
- Technical Workforce Development
- Standardization

Providing technical support and systems engineering leadership and oversight to USD(AT&L) in support of planned and ongoing acquisition programs

DASD, Systems Engineering Mission

Systems Engineering focuses on engineering excellence − the creative application of scientific principles:

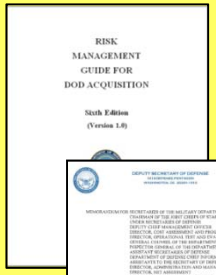
- To design, develop, construct and operate complex systems
- To forecast their behavior under specific operating conditions
- To deliver their intended function while addressing economic efficiency, environmental stewardship and safety of life and property

DASD(SE) Mission: Develop and grow the Systems Engineering capability of the Department of Defense – through engineering policy, continuous engagement with component Systems Engineering organizations and through substantive technical engagement throughout the acquisition life cycle with major and selected acquisition programs.

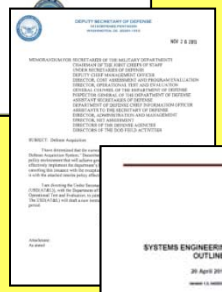
A Robust Systems Engineering Capability Across the Department Requires Attention to Policy, People and Practice

- ***US Department of Defense is the World's Largest Engineering Organization***
- ***Over 99,000 Uniformed and Civilian Engineers***
- ***Over 39,000 in the Engineering (ENG) Acquisition Workforce***

Policy



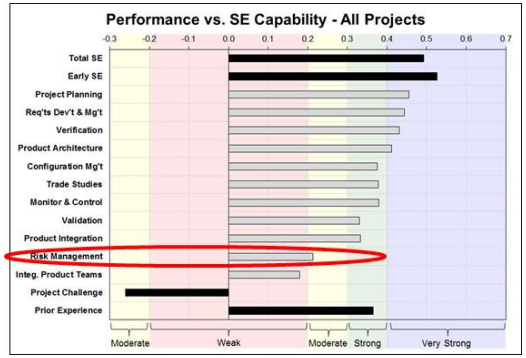
Risk Management Guide (RMG) 2006



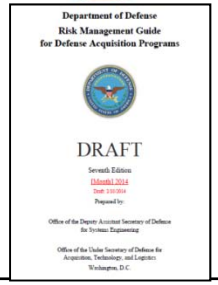
Interim DoDI 5000.02, 2013

SEP Outline April 2011

Practice



Evolving Approaches/ Initiatives

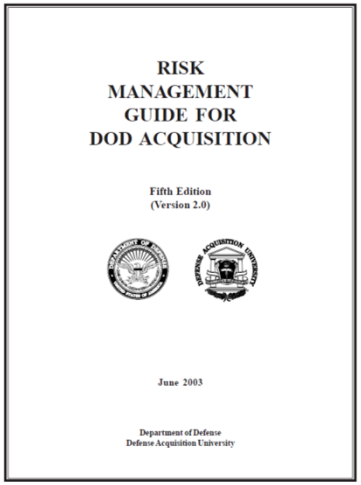


Today's presentation focuses on the status of Risk Management on major acquisition programs, and initiatives

Engineering Risk Management Evolution

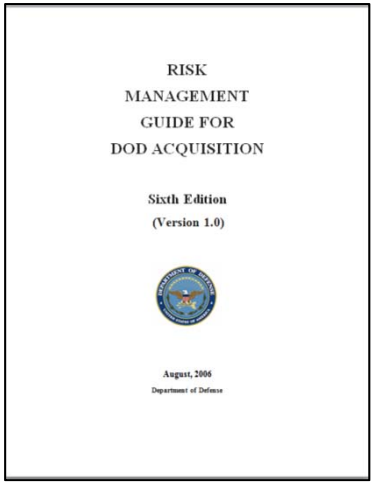
OSD Risk Working Group

Basic RM Process



Root Cause, Issues Vs. Risk

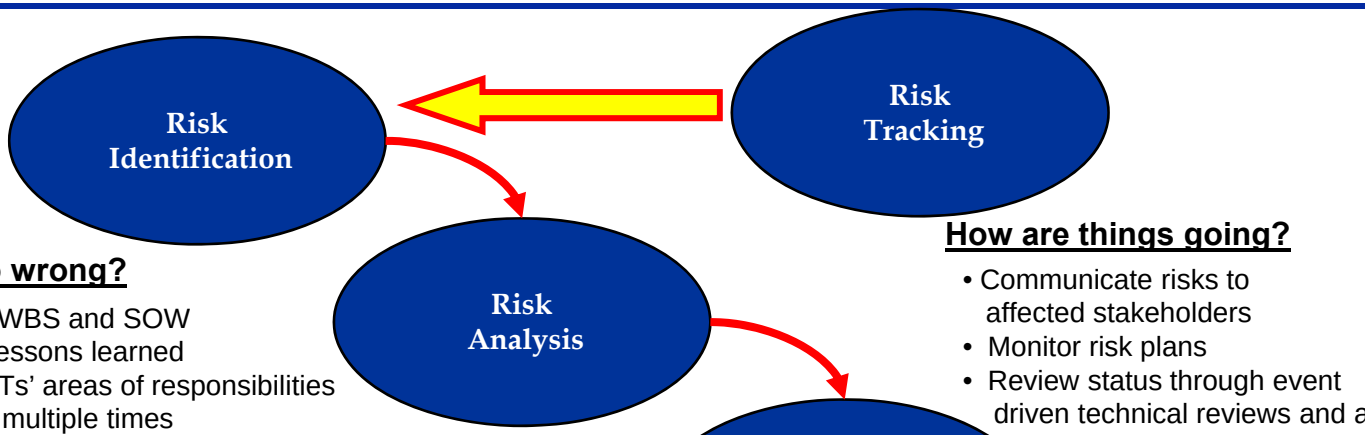
Lessons Learned



1996 1998 2000 2002 2004 2006 2008 2010

Last update to Risk Management Guide in 2006

Current DoD Risk Management



What can go wrong?

- Study the WBS and SOW
- Examine lessons learned
- Review IPTs' areas of responsibilities
- Ask "why" multiple times

How big is the risk?

- Consider the likelihood of the root cause occurrence
- Identify possible consequences in terms of cost, schedule, performance

What will you do about it?

- Eliminate the root cause
- Control the root cause or consequence
- Transfer the risk
- Assume the level of risk

How are things going?

- Communicate risks to affected stakeholders
- Monitor risk plans
- Review status through event driven technical reviews and a Risk Management Board

How is the planned risk mitigation being implemented?

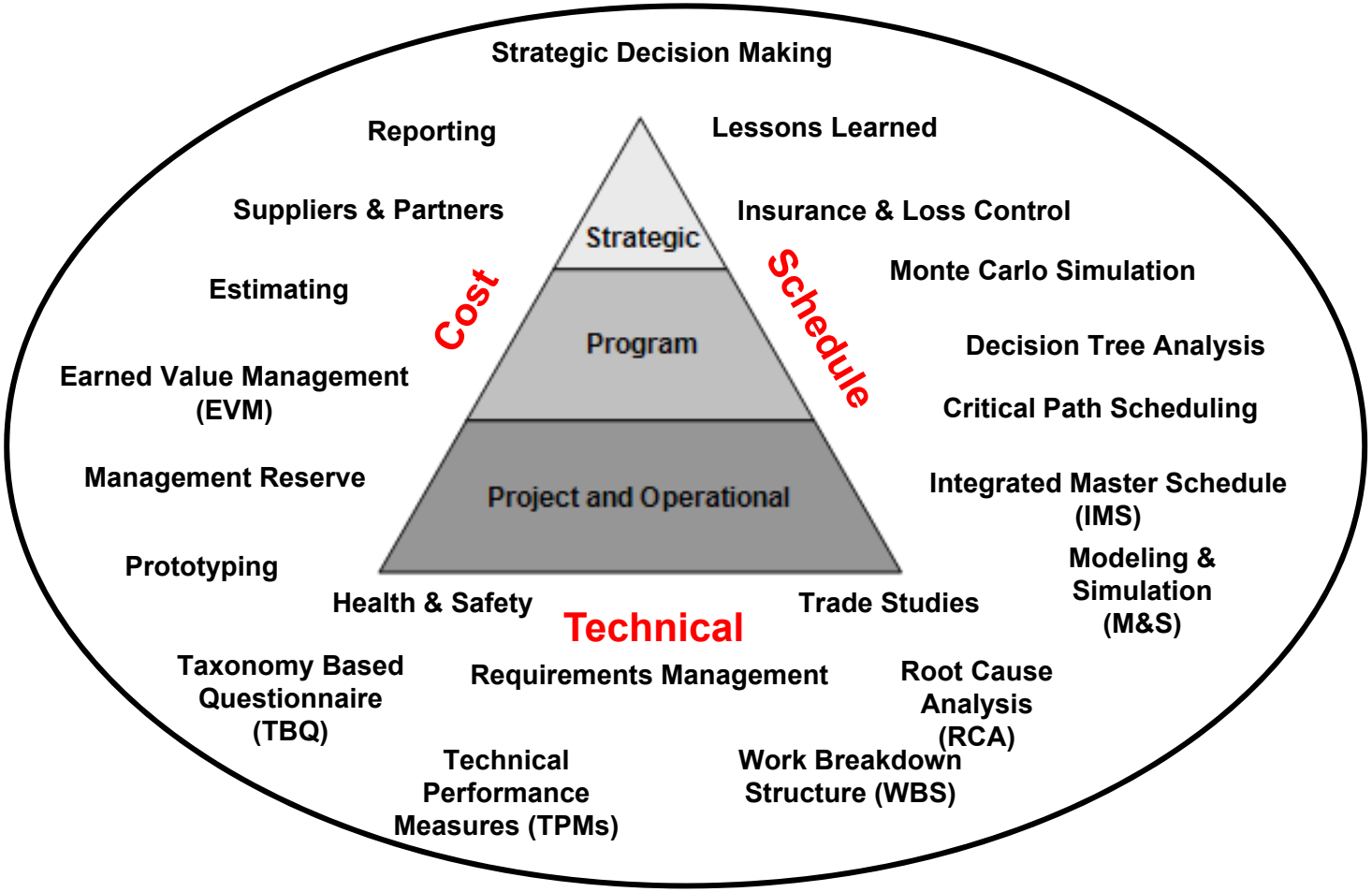
- Determine what planning, budget, and requirements changes are needed
- Provide a coordination vehicle with management and other stakeholders
- Document changes

Risk has three components:

- **A future root cause**
- **A probability (likelihood) of the future root cause occurring**
- **The consequence (or effect) of the future occurrence**

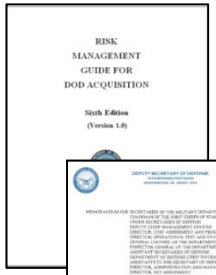
The greatest risk of all is to take no risk at all!

Formal Risk Management Tools and Techniques

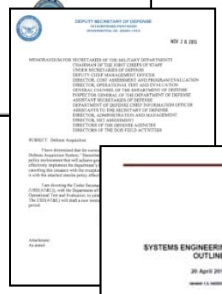


But tools and techniques alone are not enough to help us effectively manage risk

Policy



Risk Management Guide (RMG) 2006



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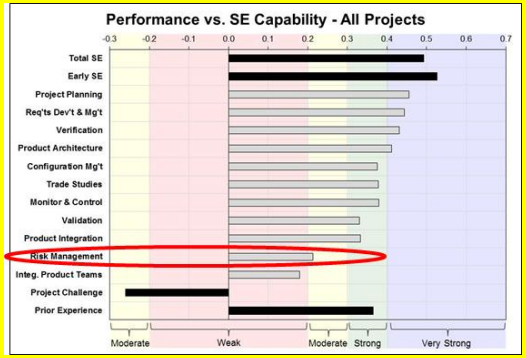
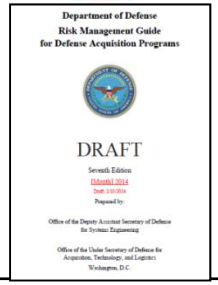


Evolving Approaches/ Initiatives



Risk Management Systemic Findings

- **Risk Management Systemic Findings seen during Program Support Reviews.** ***Comparison of Pre & Post WSARA time frame***

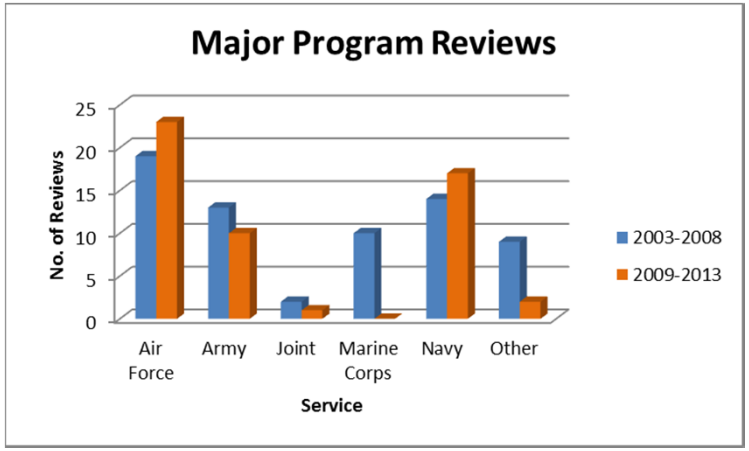
Oct 2013

Risk Management Systemic Finding	% of Program Reviews 2003-2008	2009-2013
Management metrics are not collected, or are not collected frequently enough, or used to monitor program health	19%	8%
Not evident that a formal risk assessment has been performed.	13%	6%
Programs do not have adequate risk mitigation plans	13%	15%
Risk management tools and methodology are not sufficient	16%	25%
There is a lack of properly documented risk mitigation plans	18%	6%

Seeing improvements

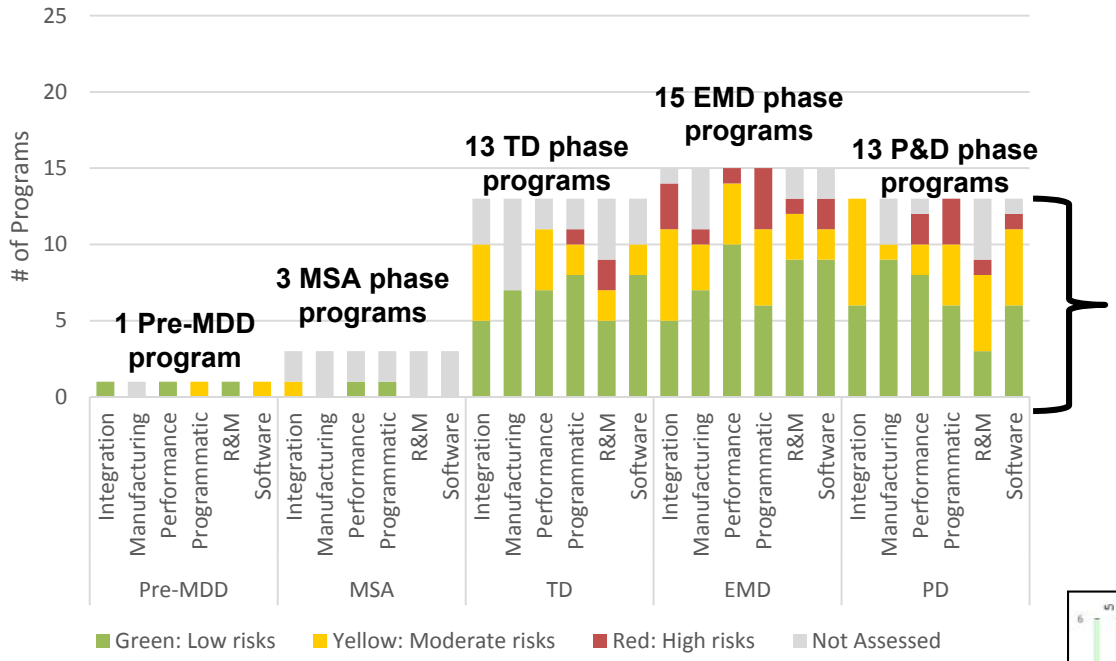
Read as: 25% of programs reviewed since 2009 have insufficient risk management tools and methodologies

- **Trends over time indicate fewer programs showing evidence of risk management issues; improvements in risk assessment, risk mitigation.**
- **Tools & methods still area for further emphasis**



*Representative of data from 120 program reviews covering 12 domains and all Services

SE Assessment of Risk
FY13 Annual Report Programs

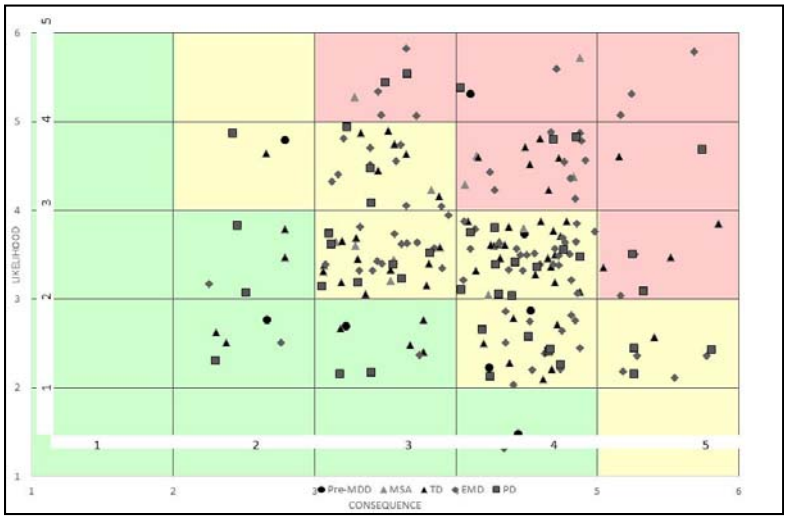


How to read this chart:

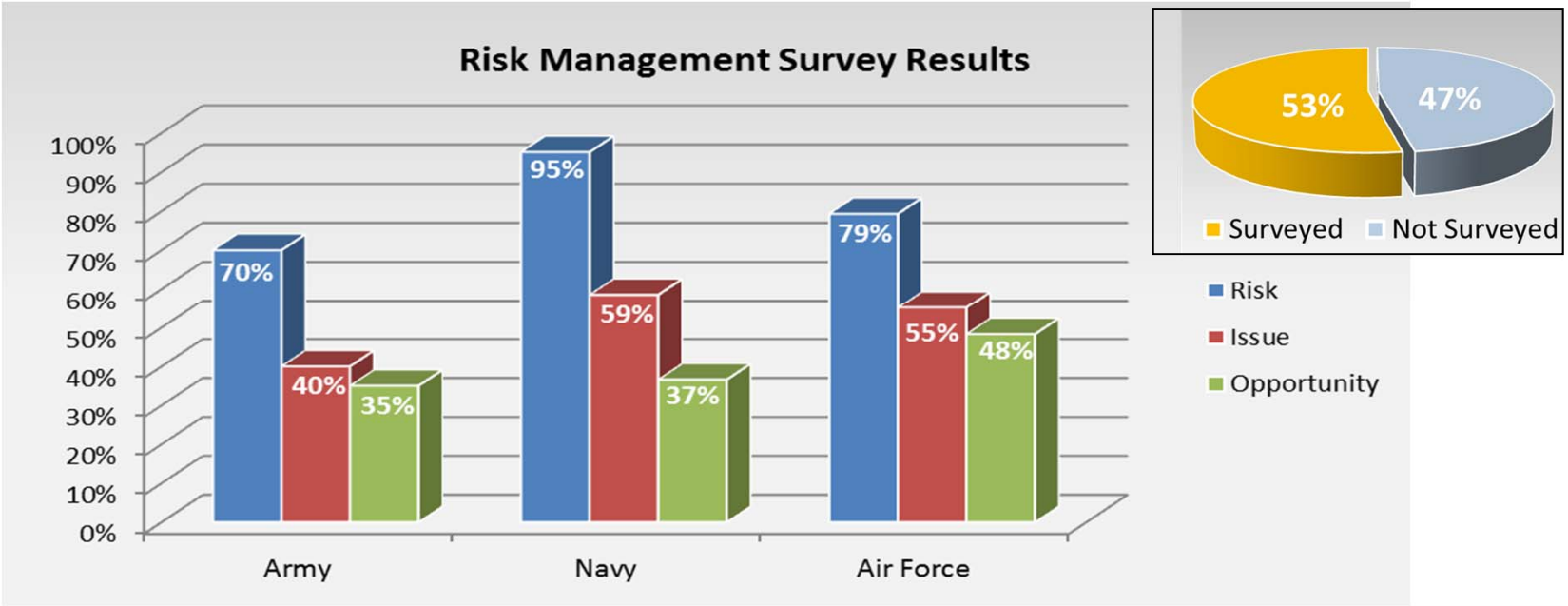
Of the 13 P&D phase programs in the annual report:

- Six are assessed as having low software risks
- Five are assessed as having moderate software risks
- One program is assessed has having high software risk
- One program's software risk was not assessed.

This risk cube depicts where program assessed risks fall by phase of a program



2014 MPS Risk Management Survey



- 84% (76 of 90) programs we surveyed currently have documented Risk management processes
  - 20 Army, 41 Navy, and 29 Air Force Programs
- 53% (48 of 90) programs have documented processes for managing Issues
- 40% (36 of 90) programs have documented processes for managing Opportunities

82% of programs surveyed are assessed as implementing their Risk Management practices in accordance with their documented plans

Deep Dive Assessment of Risk Management on 10 Programs

How well are programs planning and executing DOD RM Guidance?

Process Area	Program A		Program B		Program C		Program D		Program E		Program F		Program G		Program H		Program		Program J		Overall	
	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F	P	F
Identification*																						
Analysis																						
Mitigation Planning																						
Mitigation Plan Implementation*																						
Tracking																						
RM Preparation Planning																						

- **Overall**
  - Sampled programs are planning in accordance with DOD Risk Management guidance
  - However, some programs struggle in execution of Risk Identification and Risk Mitigation Plans
    - Programs not actively opening and closing risks
    - Wide range of program level tracked risks from more than 80 to less than 10
    - Mitigation activities not linked to IMS

Program's Plans						Risk Management Practices	Program's Execution					
1	2	3	4	5	Don't Know	1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree	1	2	3	4	5	Don't Know
						***Risk Identification* is conducted to answer the question "What can go wrong?".**						
				X		1. Employs a formal and repeatable process to identify risks.				X		
		X				2. Identifies root causes that could adversely affect the ability of the program to meet cost, schedule, and performance goals.		X				
				X		3. Decomposes the program into relevant areas at a sufficient level of detail to succinctly identify risks.		X				
				X		4. Classifies risks into appropriate categories and distinguishes between risks and issues.				X		
				X		5. Identifies risks continuously throughout each phase of the program.		X				
				X		6. Explores root causes against objective measures.					X	

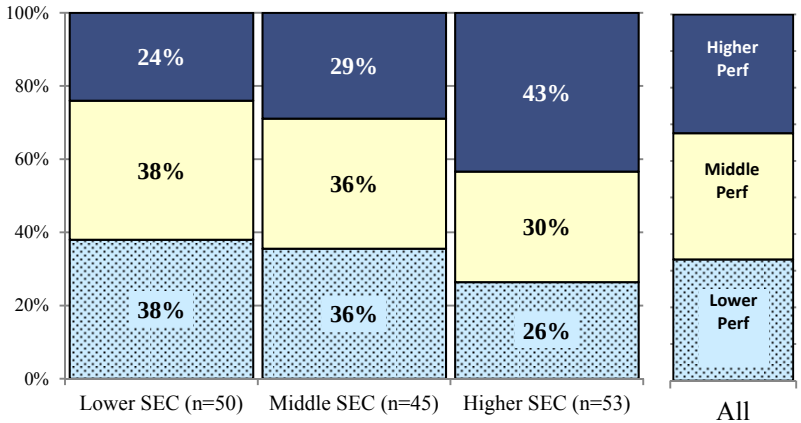
NDIA SE Effectiveness Study

Reference: Quantifying the Effectiveness of SE, J. Elm, 1 Nov 2013

2012 SE Effectiveness Study (NDIA, IEEE-AESS, and SEI) found:

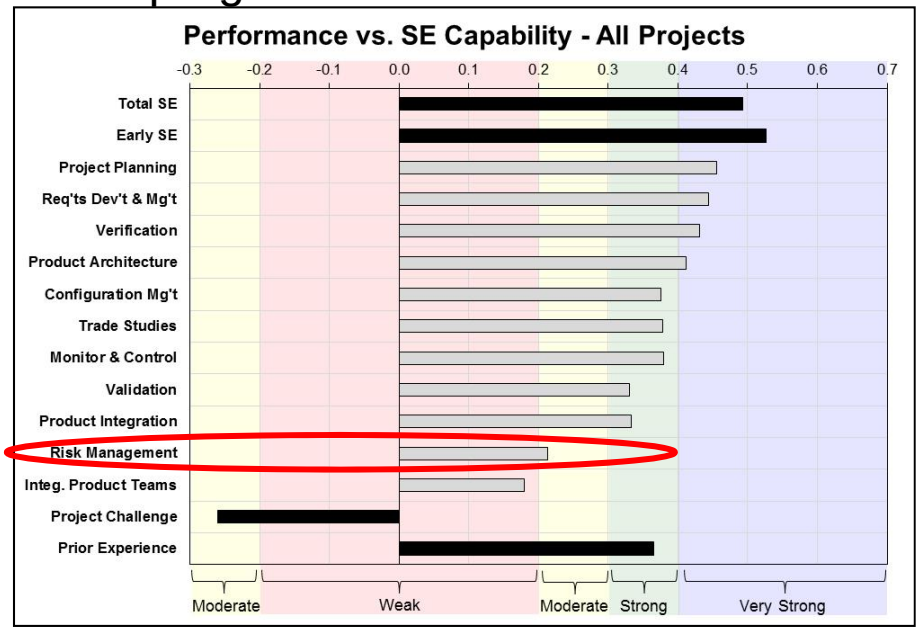
- Better Risk Management yields better programs

Program Performance vs. Risk Management

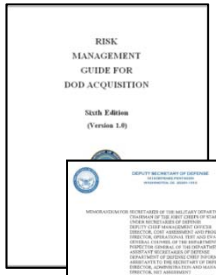


Gamma = 0.21 p-value = 0.05

However, the survey found the acquisition community doesn't see a strong link between risk management and program success



Policy



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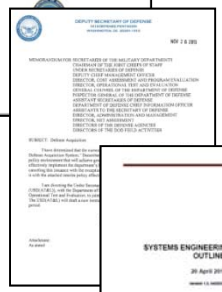

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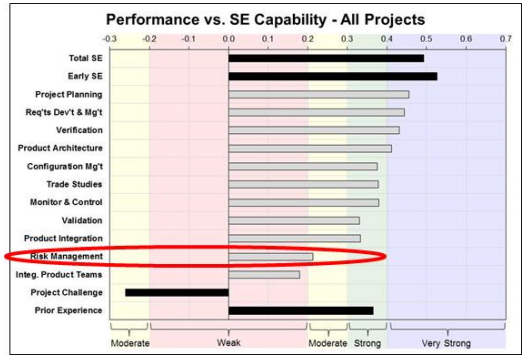

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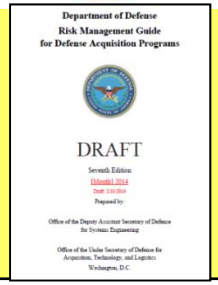
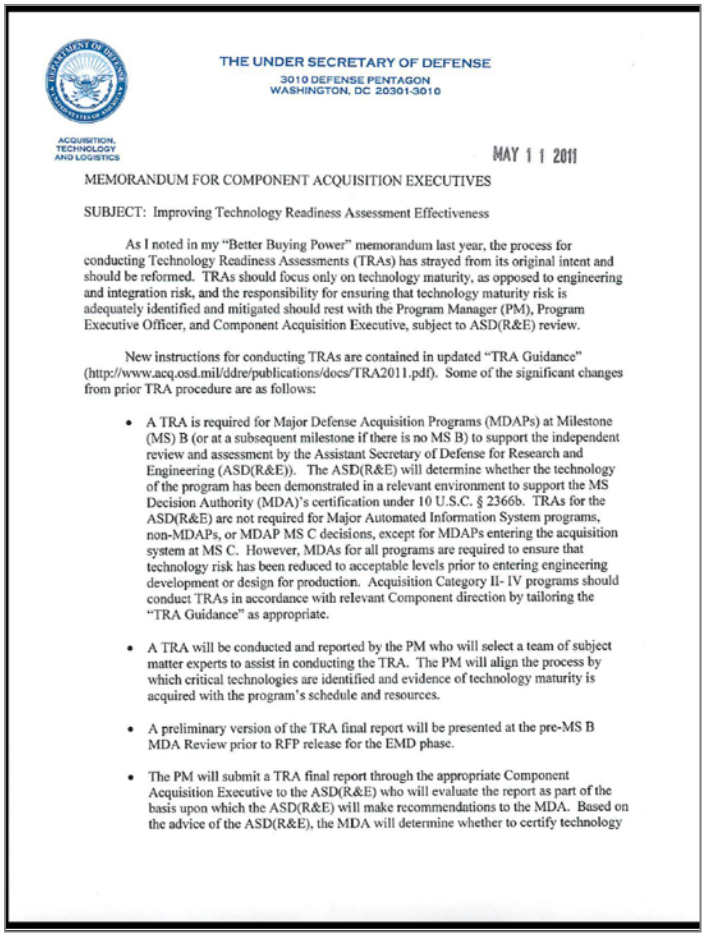


Technology Readiness Assessment (TRA) Policy Evolution



THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION, TECHNOLOGY AND LOGISTICS

MAY 1 1 2011

MEMORANDUM FOR COMPONENT ACQUISITION EXECUTIVES

SUBJECT: Improving Technology Readiness Assessment Effectiveness

As I noted in my "Better Buying Power" memorandum last year, the process for conducting Technology Readiness Assessments (TRAs) has strayed from its original intent and should be reformed. TRAs should focus only on technology maturity, as opposed to engineering and integration risk, and the responsibility for ensuring that technology maturity risk is adequately identified and mitigated should rest with the Program Manager (PM), Program Executive Officer, and Component Acquisition Executive, subject to ASD(R&E) review.

New instructions for conducting TRAs are contained in updated "TRA Guidance" (http://www.acq.osd.mil/ddre/publications/docs/TRA2011.pdf). Some of the significant changes from prior TRA procedure are as follows:

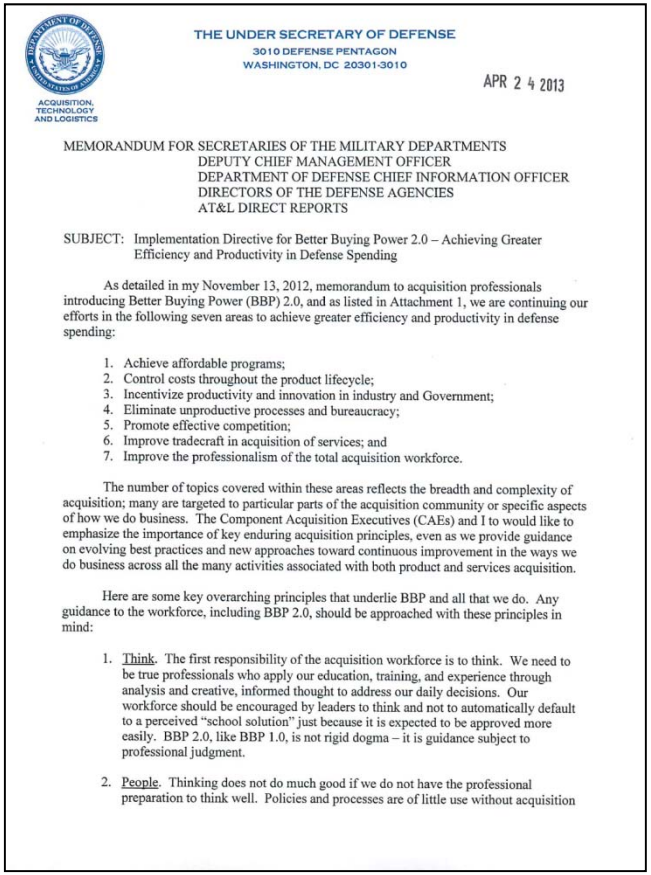
- A TRA is required for Major Defense Acquisition Programs (MDAPs) at Milestone (MS) B (or at a subsequent milestone if there is no MS B) to support the independent review and assessment by the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)). The ASD(R&E) will determine whether the technology of the program has been demonstrated in a relevant environment to support the MS Decision Authority (MDA)'s certification under 10 U.S.C. § 2366b. TRAs for the ASD(R&E) are not required for Major Automated Information System programs, non-MDAPs, or MDAP MS C decisions, except for MDAPs entering the acquisition system at MS C. However, MDAs for all programs are required to ensure that technology risk has been reduced to acceptable levels prior to entering engineering development or design for production. Acquisition Category II- IV programs should conduct TRAs in accordance with relevant Component direction by tailoring the "TRA Guidance" as appropriate.
- A TRA will be conducted and reported by the PM who will select a team of subject matter experts to assist in conducting the TRA. The PM will align the process by which critical technologies are identified and evidence of technology maturity is acquired with the program's schedule and resources.
- A preliminary version of the TRA final report will be presented at the pre-MS B MDA Review prior to RFP release for the EMD phase.
- The PM will submit a TRA final report through the appropriate Component Acquisition Executive to the ASD(R&E) who will evaluate the report as part of the basis upon which the ASD(R&E) will make recommendations to the MDA. Based on the advice of the ASD(R&E), the MDA will determine whether to certify technology

"As I noted in my "Better Buying Power" memorandum last year, the process for conducting Technology Readiness Assessments (TRAs) has strayed from its original intent and should be reformed. TRAs should focus only on technology maturity, as opposed to engineering and integration risk, and the responsibility for ensuring that technology maturity risk is adequately identified and mitigated should rest with the Program Manager (PM), Program Executive Officer, and Component Acquisition Executive, subject to ASD(R&E) review.

Reference: USD AT&L Memo, "Improving Technology Readiness Assessment Effectiveness," May 11, 2011

Technology Readiness Assessments are necessary, but insufficient

Infusing Better Buying Power 2.0 into Risk Management Guide



THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, DC 20301-3010

ACQUISITION, TECHNOLOGY AND LOGISTICS

APR 2 4 2013

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS
DEPUTY CHIEF MANAGEMENT OFFICER
DEPARTMENT OF DEFENSE CHIEF INFORMATION OFFICER
DIRECTORS OF THE DEFENSE AGENCIES
AT&L DIRECT REPORTS

SUBJECT: Implementation Directive for Better Buying Power 2.0 – Achieving Greater Efficiency and Productivity in Defense Spending

As detailed in my November 13, 2012, memorandum to acquisition professionals introducing Better Buying Power (BBP) 2.0, and as listed in Attachment 1, we are continuing our efforts in the following seven areas to achieve greater efficiency and productivity in defense spending:

1. Achieve affordable programs;
2. Control costs throughout the product lifecycle;
3. Incentivize productivity and innovation in industry and Government;
4. Eliminate unproductive processes and bureaucracy;
5. Promote effective competition;
6. Improve tradecraft in acquisition of services; and
7. Improve the professionalism of the total acquisition workforce.

The number of topics covered within these areas reflects the breadth and complexity of acquisition; many are targeted to particular parts of the acquisition community or specific aspects of how we do business. The Component Acquisition Executives (CAEs) and I to would like to emphasize the importance of key enduring acquisition principles, even as we provide guidance on evolving best practices and new approaches toward continuous improvement in the ways we do business across all the many activities associated with both product and services acquisition.

Here are some key overarching principles that underlie BBP and all that we do. Any guidance to the workforce, including BBP 2.0, should be approached with these principles in mind:

1. Think. The first responsibility of the acquisition workforce is to think. We need to be true professionals who apply our education, training, and experience through analysis and creative, informed thought to address our daily decisions. Our workforce should be encouraged by leaders to think and not to automatically default to a perceived "school solution" just because it is expected to be approved more easily. BBP 2.0, like BBP 1.0, is not rigid dogma – it is guidance subject to professional judgment.

2. People. Thinking does not do much good if we do not have the professional preparation to think well. Policies and processes are of little use without acquisition

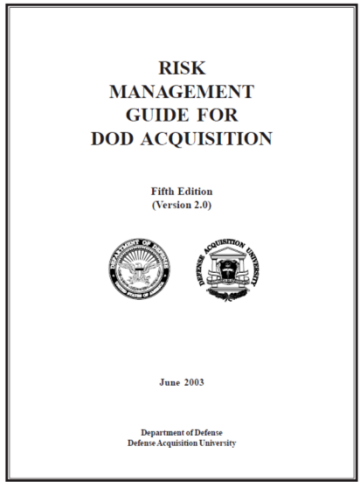
Reference: USD(AT&L) memo, Implementation Directive for Better Buying Power 2.0, Apr 24, 2013

- **Opportunity Management**
  - "Our goal should be to identify opportunities to do better and to manage toward that goal"
- **True TD phase risk reduction**
  - Prototyping during TD can be a valuable tool to reducing risk prior to EMD, but only if the prototyping is focused on reducing the specific technical risks in the design for the product that will be designed and tested in EMD"
  - "Prototype attributes and components should be directly traceable to and reflective of the risks inherent in the products to be designed…"
  - "…in many cases, the Government failed to require meaningful risk reduction during the TD phase"
- **Strong partnerships with Requirements Community**
  - "Acquisition leaders need to understand user priorities, and requirements leaders need to understand cost performance trade-offs and technical risk implications"
- **Reducing Decision making cycle time**
  - "There have been attempts to use arbitrary cycle times to constrain programs; however, these constraints have often been unrealistic and done more harm than good by leading to high risk schedules and acquisition approaches"

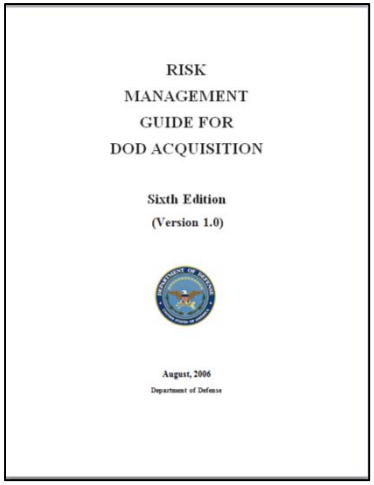
Engineering Risk Management Evolution

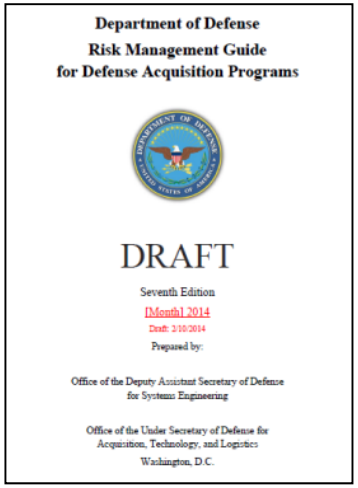
OSD Risk Working Group

Basic RM Process



Root Cause, Issues Vs. Risk





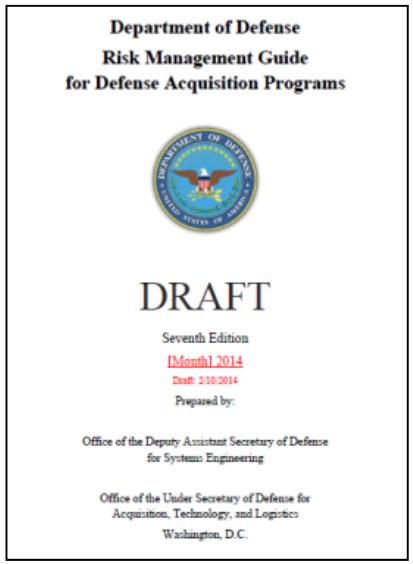
Streamlined, Re-focus on basics – add Issue and Opportunity

Lessons Learned

1996 1998 2000 2002 2004 2006 2008 2010 2012 2014

Practical application of Risk, Issue and Opportunity Management

Draft Risk Management Guide Considerations


Department of Defense
Risk Management Guide
for Defense Acquisition Programs

DRAFT

Seventh Edition

[Month] 2014

Draft: 2/10/2014

Prepared by:

Office of the Deputy Assistant Secretary of Defense for Systems Engineering

Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics

Washington, D.C.

Scope

- (Technology)
- Engineering
- Integration

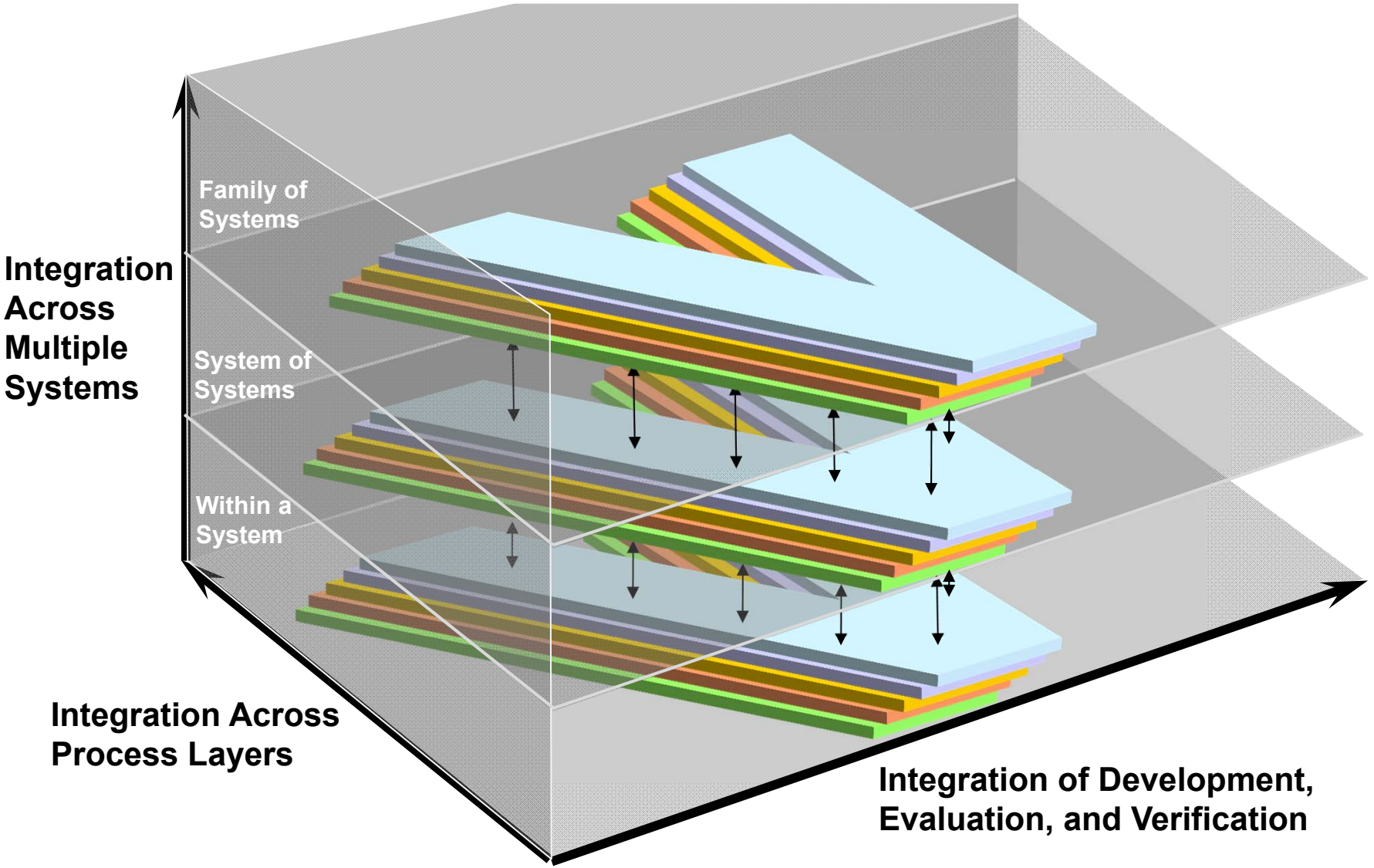
Management

- Risks
- Issues
- Opportunities

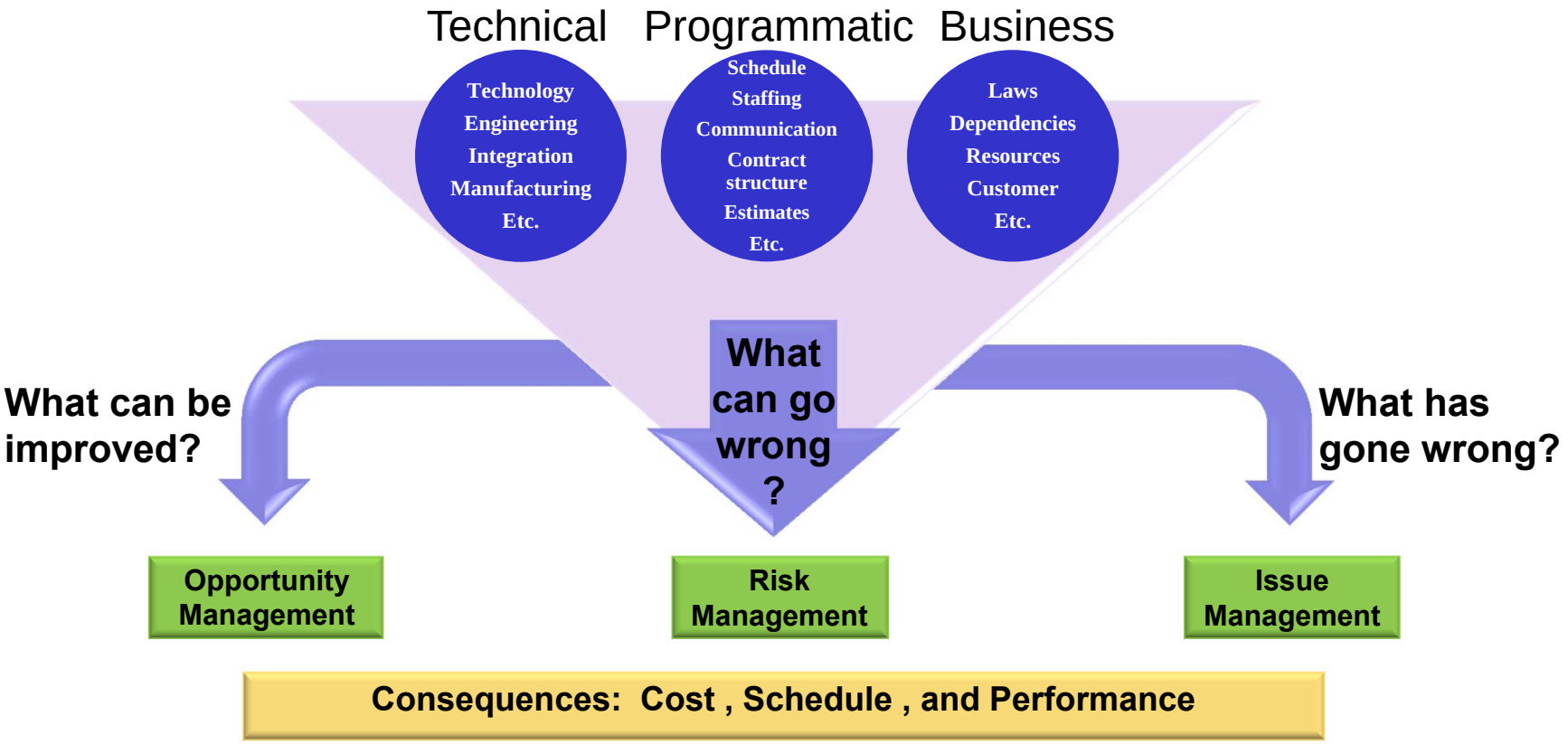
Foundation

- Fundamentals
- Quantification
- Integration of Risk Management with other tools
- Leading Indicators/Metrics
- Best Practice Templates

Integration Across Multiple Systems



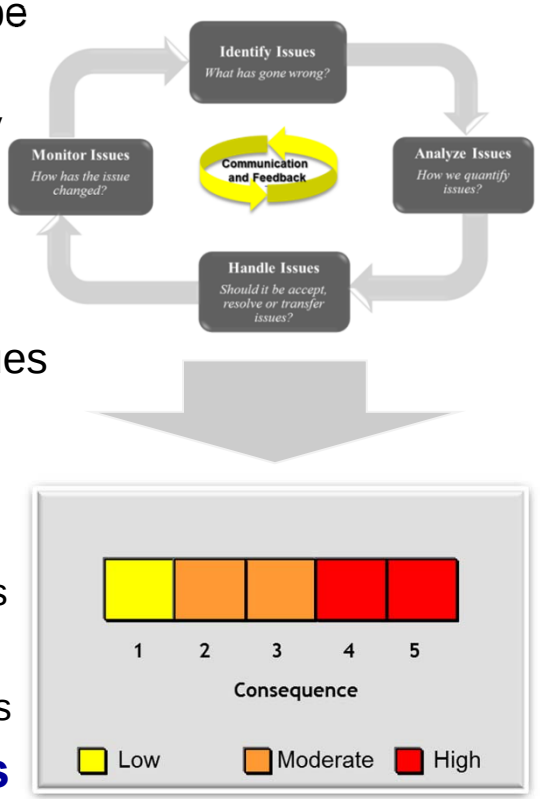
Risk, Issue and Opportunity Relationship



New Guide provides guidance on managing not only risks, but issues and opportunities as well

Issue Management

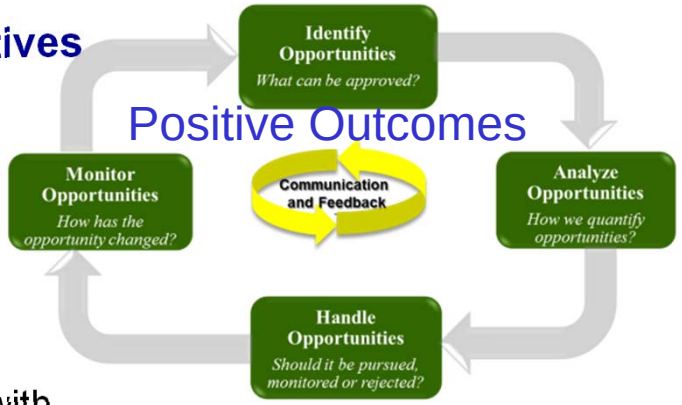
- **Issue Management**
  - Management of current problems (realized risks) that should be addressed with action plans, resourced and resolved
  - Identifies issues that have occurred and assesses the severity and urgency of its possible impact on the program
- **Fundamental to Program Management**
  - PMs and chief engineers develop a Plan of Action and Milestones (POA&M) to address and manage all program issues
  - Addressed during regular battle rhythm of program activities
  - Issue mapped according to consequences
    - Options include resolving, transferring or accepting the issue
    - Resources applied to resolve an issue or minimize its consequences
  - Tracks issues and associated action plans
    - Ensure IPTs and functional teams have current knowledge of issues
- **Programs should have an issue management process separate and distinct from risk management process**
  - Don't confuse issues with risks

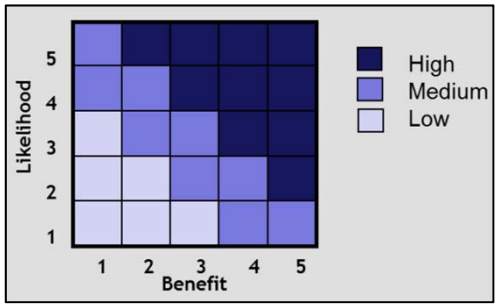


Rigorous Issue Management shifts management from reactive to proactive

Opportunity Management

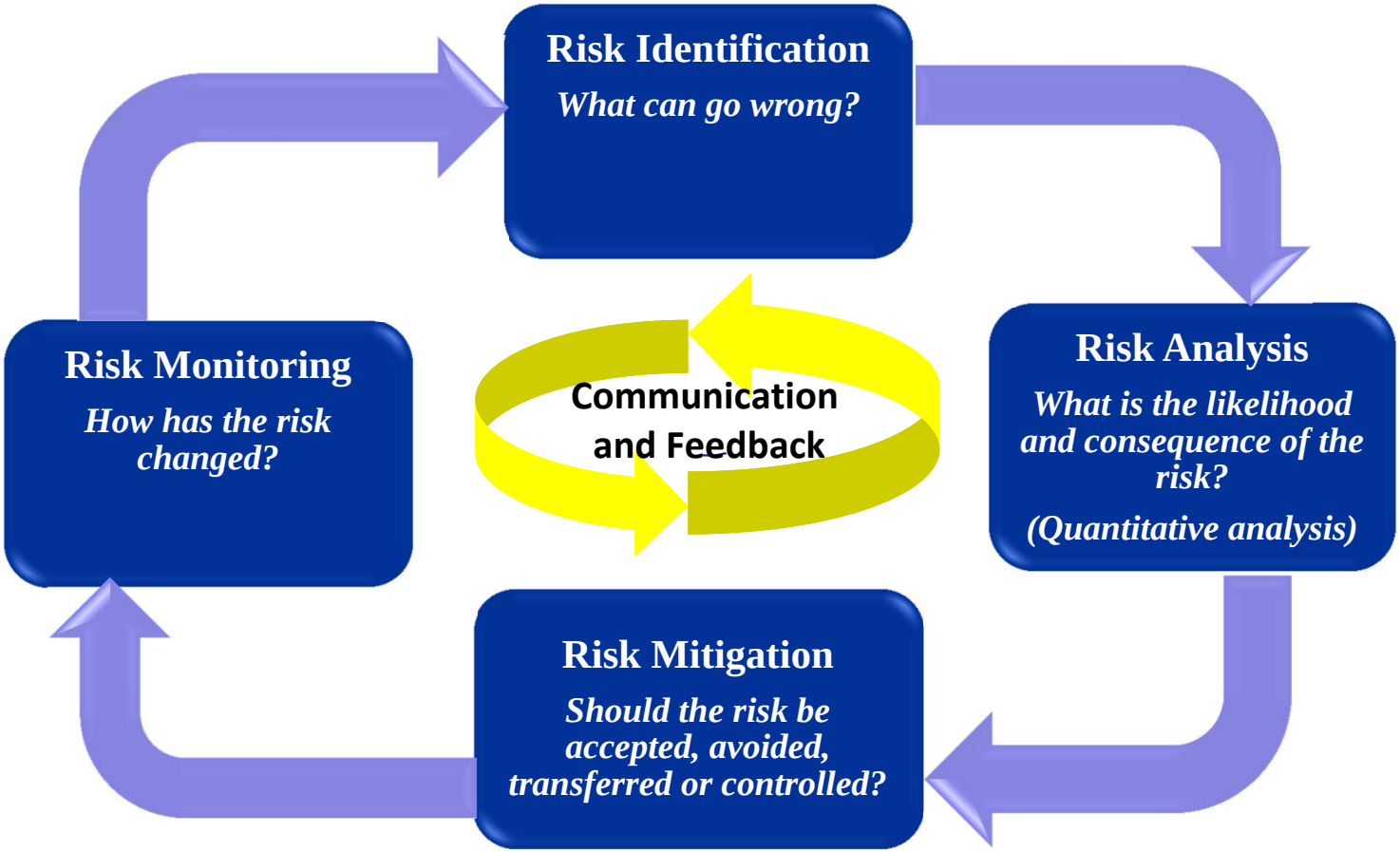
- **Opportunity Management (OM) is a process used to identify, analyze, plan, implement and track initiatives that can yield improvements in the program's cost, schedule, and/or performance baseline <u>through the reallocation of internal or external resources</u>**
- **Better Buying Power 2.0: "Our goal should be to identify opportunities to do better and to manage toward that goal."**
- **OM enables achieving BBP 2.0 "should" cost objectives**
- **Opportunity Management Process:**
  - Identify and implement initiatives to yield program improvements (cost, schedule, and/or performance)
  - Identifying opportunities start with forecasting potential enhancements within the program's technical mission, stakeholder objectives, and contract extensions
  - Balance the cost and likelihood of achieving the opportunity with the benefit of what the opportunity brings
  - Implement handling activities to achieve the opportunity
- **Opportunities exist in every program, but often they are not thought of as an overall part of actively managing the system during its life-cycle**





Effective Opportunity Management* ⟺ *Successful Better Buying Power

Fundamentals of Risk Management

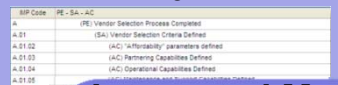


Integration of Risk Management with other Program Management Tools

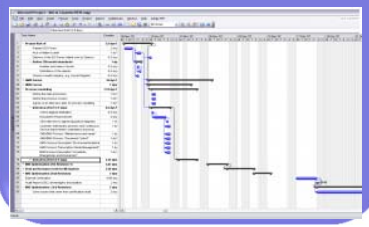
Must have linkage and traceability between IMP and IMS

- Roadmap for entire program

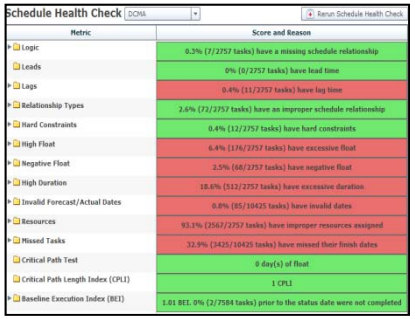
Integrated Master Plan



Integrated Master Schedule



14-point Schedule Health Check



Risk Register should have:

- Risk ID
- Likelihood & consequence
- Risk rating
- Status of designated handling plan
- Tiering

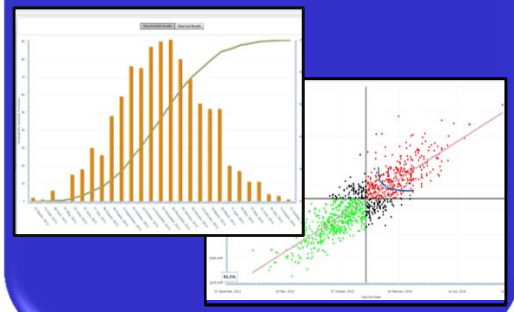
Risk Register

A good IMS has:

- Event driven tasks
- Predecessor/Successor relationships
- Realistic durations
- Allocated resources
- Should provide the critical path

EVM – allows integration of risk assessment with resourced schedule

Schedule Risk Assessment



SRA Provides:

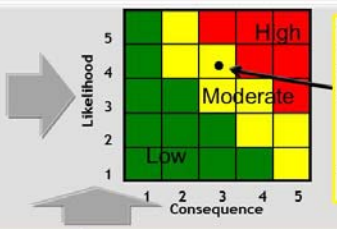
- Quantitative assessment of IMS critical path
- Monte Carlo simulation
- Best case, most likely and worst case schedule scenarios

Quantifying Risks

What we have seen:

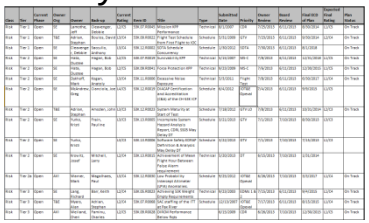
- Despite SEPs and Risk Management Plans containing cost and schedule criteria, many programs in practice do not use the criteria when locating risks on a risk cube
- Varying risk cube formats
- Risk statements don't clearly define the root cause of the event
- Risks confused with "issues" (realized risks)
- Program and technical risks confused
- Substantial cost risks reflected on risk cube
  - The guide provides additional guidance to identify the RDT&E, procurement, and O&S costs

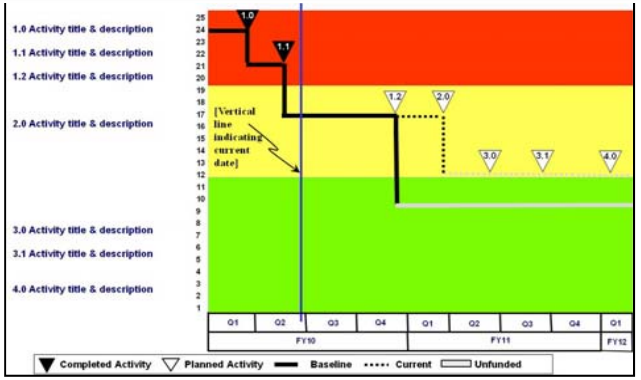
Level	Likelihood	Probability of Occurrence
1	Not Likely	~10%
2	Low Likelihood	~ 30%
3	Likely	~ 50%
4	Highly Likely	~ 70%
5	Near Certainty	~ 90%



- ✓ Risk ID Number:
- ✓ Risk Driver:
- ✓ Risk Mitigation Action: $
- ✓ Closure Date:
- ✓ Cost Impacts:
  - ✓ RDTE: $ or %
  - ✓ Production: $ or %
  - ✓ O&M: $ or %
- ✓ Schedule Impacts:
  - ✓ Months:

Level	Technical Performance	Schedule	Cost		
			RDT&E	Procurement	Operations & Maintenance
1	Minimal or no consequence to technical performance	Minimal or no impact	Minimal or no impact **< $A or _% of budget**	Minimal or no impact **< $A or _% of budget**	Minimal or no impact **< $A or _% of budget**
2	Minor reduction in technical performance or supportability; can be tolerated with little or no impact on program	Able to meet key dates **Slip ≤ months**	Budget increase or unit production cost increase **$A ≤ $B or _% of budget**	Budget increase or unit production cost increase **$A ≤ $B or _% of budget**	Budget increase or unit production cost increase **$A ≤ $B or _% of budget**
3	Moderate reduction in technical performance or supportability with limited impact on program objectives	Minor schedule slip. Able to meet key milestones with no schedule float **Slip ≤ months**	Budget increase or unit production cost increase **$B ≤ $C or _% of budget**	Budget increase or unit production cost increase **$B ≤ $C or _% of budget**	Budget increase or unit production cost increase **$B ≤ $C or _% of budget**
4	Significant degradation in technical performance or major shortfall in supportability; may jeopardize program success	Program critical path affected **Slip ≤ months**	Budget increase or unit production cost increase **$C ≤ $D or _% of budget**	Budget increase or unit production cost increase **$C ≤ $D or _% of budget**	Budget increase or unit production cost increase **$C ≤ $D or _% of budget**
5	Severe degradation in technical performance; cannot meet KPP or key technical supportability threshold; will jeopardize program success	Cannot meet key program milestones **Slip ≤ months**	Exceeds APB threshold **>$D or _% of budget**	Exceeds APB threshold **>$D or _% of budget**	Exceeds APB threshold **>$D or _% of budget**

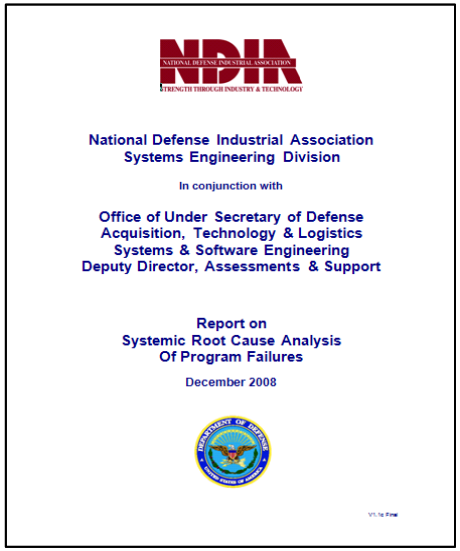


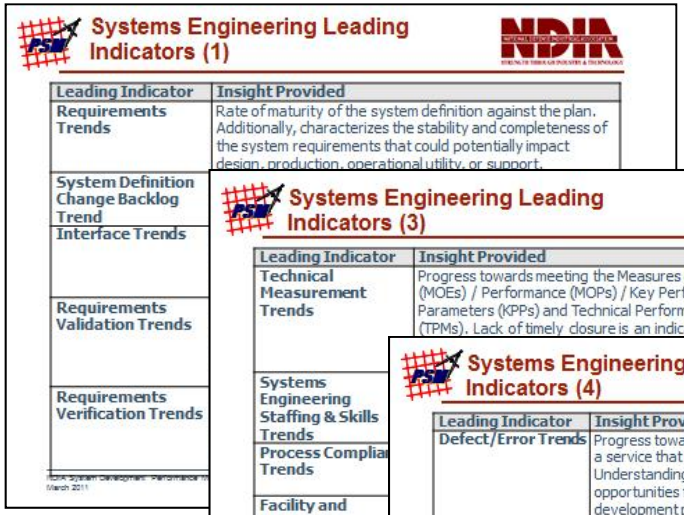


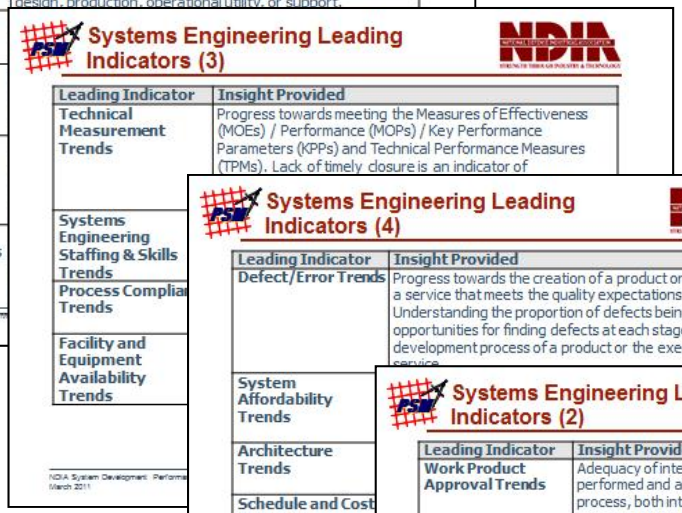
How the Guide addresses it:

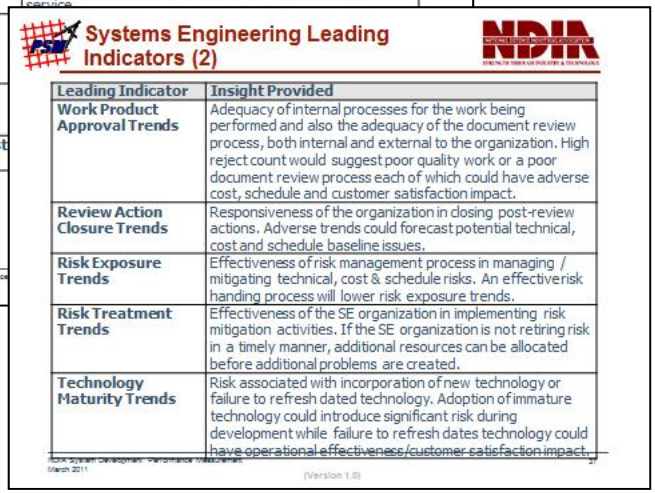
- Guide expanded to include quantitative assessments of the program cost and schedule impacts
  - Quantify associated RDT&E, Procurement and O&S costs on risk cube
  - Quantify schedule impacts in years or months
- Guidance on risk registers and risk burn-down curves

Leading Indicators





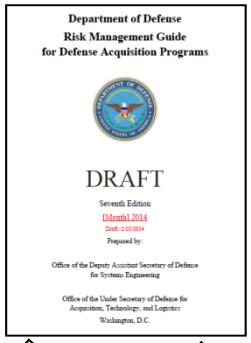


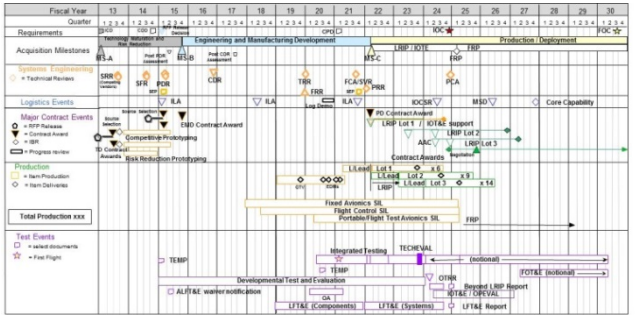


Reference: NDIA Report on "Systemic Root Cause Analysis of Program Failures" December, 2008

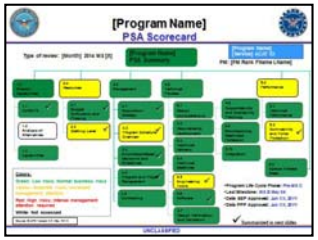
Infusing Risk, Issue and Opportunity Management Across the DoD Enterprise

2014 Risk, Issue, & Opportunity Guide (draft)

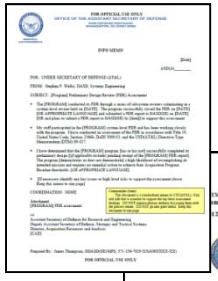




How DASD(SE) will implement it

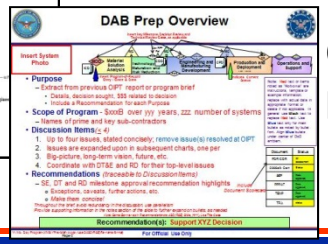


Program Support Assessments



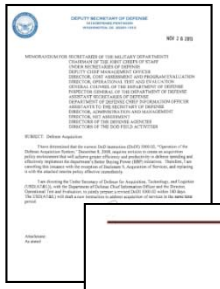
PDR/CDR Assessments

DASD(SE) Annual Report to Congress

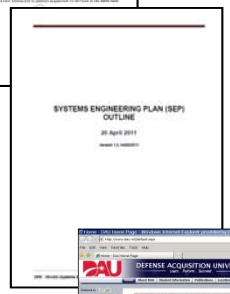


OIPT/ DAB prep

What we are doing to infuse it across the enterprise



Interim DoDI 5000.02



SEP Outline 2014

Defense Acquisition Guidebook 2014

For Additional Information

James Thompson

(571) 256-7029 | james.j.thompson3.civ@mail.mil

Pete Nolte

(571) 372-6152 | peter.e.nolte.civ@mail.mil

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