National Defense Industrial Association
Systems Engineering Division

In conjunction with

Office of Under Secretary of Defense
Acquisition, Technology & Logistics
Systems & Software Engineering
Deputy Director, Assessments & Support

Report on
Systemic Root Cause Analysis
Of Program Failures

December 2008

V1.1c Final

National Defense Industrial Association
Systems Engineering Division
Systemic Root Cause Analysis Task Group Report

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Executive Summary

Background

Since 2004, the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)), Systems and Software Engineering/Assessments and Support (SSE/AS) Directorate has been conducting Program Support Reviews (PSRs) for major defense programs to help identify and resolve program issues and risks; and ultimately improve the probability of program success. Through analysis of the PSR data, SSE/AS has identified systemic issues seen across Major Defense Acquisition Programs (MDAPs) and Major Automated Information Systems (MAIS) that impede acquisition success.

Objective

The National Defense Industrial Association (NDIA) Systemic Root Cause Analysis (SRCA) Task Group was formed to analyze the data and attempt to extract the lowest level root causes of program failures. The Group used information generated from SSE/AS's analysis to derive a joint government-industry set of recommendations to address the systemic issues and improve the execution discipline of acquisition programs. Although the analysis focused on Acquisition Category I (ACAT I) programs, the results are scalable and can be applied to most acquisition programs.

Results

The Task Group developed recommendations and actions in three areas:

- Acquisition Strategy and Planning
- Decision Gate Review
- Enhanced Staff Capability

Acquisition Strategy and Planning (ASP) pertains to the early program planning that is critical to posture a program for success. The ASP recommendations and actions promote the following end states:

- Program planning is executable with a high degree of confidence.
- Requests for Proposal and supporting documentation clearly define the government's expectations in terms of requirements, planning, process, risks, and assumptions and direct offerors to integrate their approach accordingly.
- Independent schedule estimates are performed to support cost estimating source selection and milestone decisions.

Decision Gate Review (DGR) pertains to the Department of Defense (DoD) implementing objective criteria to assess technical maturity at key decision points. The criteria should include independent reviews of program technical maturity and include enforceable criteria specific to the decision gate. The DGR recommendations and actions promote the following end states:

- Technical maturity assessed through systems engineering technical reviews; high-confidence estimates are achieved for both cost and schedule.
- The Milestone Decision Authority (MDA) verifies government program office staffing.
- Defined trigger conditions for conducting in-process reviews.

Enhanced Staff Capability (ESC) pertains to having an adequate number of people with the appropriate skill mix and the required experience to properly staff, manage, and execute a program. The ESC recommendations and actions promote the following end states:

- The number, skills and experience of DoD acquisition personnel are adequate to properly staff acquisition programs.

Recommendations

The Task Group effort formally concludes with publication of this report. The Task Group offers the recommendations contained in this report to DoD and the defense industry acquisition leadership, suggesting following to them:

- Consider and validate the Task Group-developed actions.
- Assign action owners and develop Plans of Action and Milestones to implement selected recommendations.
- Monitor progress of actions to closure.

Summary

The systemic root cause analysis concluded that the most significant causes were directly related to poor or inadequate activities early in acquisition strategizing and planning efforts and in conducting management gate reviews during the early stages of execution. Lastly, the analysis also concluded that there was a significant root cause related to staff size, training and experience.

On the surface, none of these root causes appear to be related directly to poor systems engineering practices, especially envisioning the detailed engineering activities required for good program execution. However, the task group recognizes that there is a strong relationship between disciplined systems engineering and good management decision making in the critical early stages of an acquisition cycle. The creation of a successful acquisition strategy, plan, and staffing profile are heavily reliant on judgement and program management analysis that are often significantly enhanced by the application of good systems engineering practices.

Introduction

In 2004, the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) established a policy to revitalize systems engineering throughout the Department of Defense (DoD). The policy states that AT&L and other Office of the Secretary of Defense (OSD) staff members will conduct program support reviews (PSRs) of programs for which the USD(AT&L) is the Milestone Decision Authority (MDA). These reviews identify and help resolve issues and risks and ultimately improve the probability of program success.

Through these PSRs and other continuous engagement support activities, the Systems and Software Engineering/Assessments and Support (SSE/AS) Directorate works with hundreds of programs (primarily ACAT ID), gaining insight and knowledge regarding program strengths and weaknesses related to program planning and execution. The program review information resides in a relational database that allows for automated query and trend analyses. Utilizing this information, SSE/AS developed a Systemic Root Cause Analysis (SRCA) process that helps identify root causes of recurring program issues. This analysis provides strategic acquisition support by revealing the broad trends that permeate the acquisition community. Although root cause analysis is not new, the SSE/AS approach combines a detailed first hand knowledge of acquisition program issues with a methodology that considers mission capabilities, resourcing, technical processes, technical products, product performance, and other areas of special interest. Driven by fact-based program information, the SRCA process supports the effort to improve policy, guidance, and training and to promote best practices across the Department.

1. Systemic Root Cause Analysis

In late 2006, SSE/AS identified formal root cause terminology that provides a structure in which to perform analyses. In 2007, SSE/AS piloted the root cause structure on 44 major acquisition programs and subsequently revised the structure based on program feedback and lessons learned during the pilot effort. Using this approach, SSE/AS analyzed more than 1,500 negative findings from 44 program reviews and identified 48 systemic issues (see Appendix B).

SSE/AS formed a partnership across government and industry to ensure the analysis incorporated a wide variety of stakeholder perspectives. With participation from these partners, SSE/AS conducted a series of SRCA workshops to focus on the systemic issues and to develop recommendations that address acquisition challenges; workshop participants included recognized acquisition subject matter experts from government, industry, and academia. The workshop series focused on the data sample that consisted of approximately 1,500 findings from 44 program reviews and 48 systemic issues. The workshops generated 95 acquisition-related recommendations, spanning the areas of planning, staffing, cost/schedule/performance realism, and program decision making.

More than 50% of the recommendations pertained to early planning, specifically program initiation and acquisition strategy development. A significant percentage of the remaining recommendations were related to enhancements needed in the gate review process. Both have a systems engineering relationship for the same reasons. While

the primary activities are not specifically considered systems engineering activities, the disciplines utilized to perform those functions are often supported by staff using system engineering practices. The root cause finding that staff experience and training were often lacking, would indicate a relationship between that lack and the effective support to an effective acquisition decision making process.

Briefings and handouts from the workshop series are posted on the NDIA website: http://www.ndia.org (*select Division Pages – SE Division – Major Current Activities and Tasks – NDIA Systemic Root Cause Analysis Workshop*).

While the 95 recommendations were a good step forward in understanding the scope of possible remedial actions, it was recognized that more work was needed to consolidate, refine, and focus the recommendations to enable implementation by the Department of Defense and its defense industry partners.

2. Task Group Process and Methodology

In December 2007, NDIA approved the formation of an SRCA Task Group under the NDIA Systems Engineering Division. Appendix A shows the Task Group membership along with other contributors to SSE/AS's Systemic Root Cause Analysis effort. The Task Group objective was to derive a joint government-industry set of recommendations to improve the execution of acquisition programs.

The Task Group used the 95 acquisition-related recommendations produced via the SRCA workshop series to:

1. Understand and clarify the information.
2. Analyze, categorize, and tier information.
3. Develop actions, implementation mechanisms, and related detail.
4. Perform initial validation.
5. Produce a Task Group product suite.

Although some recommendations were clear and complete as captured during the workshops, others were terse and required clarification or amplification. During this initial review, the Task Group recognized that some recommendations were at a very high level, while others contained specific actions to address particular elements of a systemic issue. The Task Group analyzed, categorized, and organized the information into tiers in the following manner: from the observed symptom, the group identified 1st-tier cause of the symptom, then the 2nd-tier cause of the observed symptom, and finally to the 3rd-tier or root cause of the symptom. This effort produced three recommendation areas: Acquisition Strategy and Planning, Decision Gate Review, and Enhanced Staff Capabilities.

The Task Group developed a framework to ensure a commensurate and complete level of detail across the three recommendation areas. Each recommendation area contains:

- Recommended end states
- Actions with informative detail
- Implementation suggestions

The Task Group was able to leverage the diversity of its membership (through participation from DoD, industry, and academia) by soliciting their respective organizations to conduct a preliminary validation of the recommendations. This involved identifying other places in DoD and industry in which a similar initiative was currently underway or recently accomplished that aligns with the intent of the recommendation put forth by the Task Group. This information will help corroborate the need for the recommendation and will help build synergy among different organizations seeking to improve the acquisition state of the practice.

The Task Group product suite consists of a formal briefing at the NDIA Systems Engineering Conference in October 2008 and this published report.

3. SRCA Task Group Results

The SRCA Task Group developed recommendations in the three areas:

- Acquisition Strategy and Planning
- Decision Gate Review
- Enhanced Staff Capability

The information developed within these recommendation areas follows the framework shown in Figure 1. For each recommendation area, there are desired end states. Each end state has one or more associated actions. Each action has an associated *"suggested"* implementation.

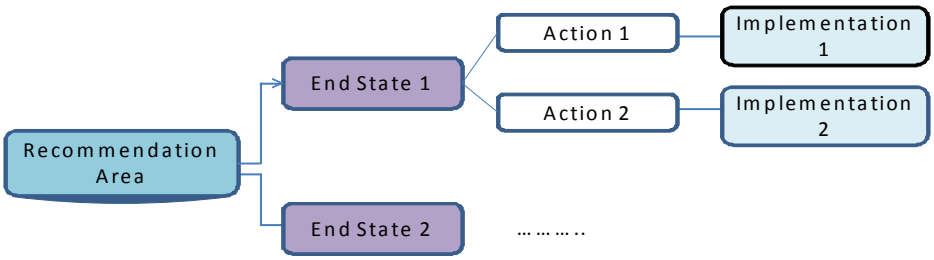

Figure 1. Recommendation Framework

The Task Group analyzed the nature of the action and suggested implementation ranges that include statute, policy, guidance, education, training, best practices, etc. In the initial validation of recommendations, the Task Group identified several instances in which a seemingly similar recommendation is being actively pursued by an organization either in DoD or in industry. Appendix C contains the results of the initial validation check. The information contained in Appendix C is not meant to be exhaustive but rather is only an initial list of pointers to other organizations and efforts pursuing similar acquisition improvements. Additionally, the Task Group makes no claim to the "goodness" or quality of the other efforts listed in Appendix C.

The next three subsections provide the SRCA Task Group recommendations. The recommendations address areas that have been unclear or not sufficiently or effectively implemented on current DoD programs as evidenced by the systemic analysis of more

than 44 DoD programs. The Task Group believes that by implementing these actions, the desired end states can be achieved, thereby improving acquisition success across DoD.

RECOMMENDATION AREA 1: ACQUISITION STRATEGY AND PLANNING

The SRCA evidence shows that acquisition strategies and plans are incomplete, ineffective, and unrealistic, resulting in unachievable program expectations. The recommendation area of Acquisition Strategy and Planning (ASP) pertains to the early program planning elements that are critical to setting up programs for success by clearly defining and communicating achievable expectations and assumptions and then integrating that information into the planning documents that define an executable program.

Recommended End State: ASP 1. Source selections and milestone decisions are based on valid cost projections supported by independent schedule estimates.

Action: ASP1-1. Formalize the minimum requirement for the content and delivery of the Acquisition Strategy.
Implementation: Update the Defense Acquisition Guidebook (DAG) with the Acquisition Strategy template.

Action: ASP1-2. Require identification of alternatives, risk contingencies, and opportunities as part of the Acquisition Strategy.

- Identify the delta impacts to the program planning addressed in the government Integrated Master Plan (IMP)/program schedule (with dependencies), Statement of Objectives (SOO), Systems Engineering Plan (SEP), risk assessments, and resource requirements.

Implementation: Update the DAG, the SEP Preparation Guide, and other guidance to address program risk resource requirements and integrated planning.

Action: ASP1-3. Require establishment of decision points and criteria for executing identified alternatives, opportunities, and risk contingency actions.

- Decision points for execution of alternative solutions or opportunities must be included as events in the program IMP/program schedule with supporting accomplishments and criteria.
- Include risk mitigation steps and opportunity advancement actions in the Integrated Master Schedule (IMS).
- Establish criteria for executing risk contingency plans for all high program risks.

Implementation: Update the IMP/IMS guide to address planning for off-ramps and alternative solutions.

Action: ASP1-4. Update the Analysis of Alternatives (AoA) planning guidance to include AT&L participation in development of an AoA study plan and conduct of the AoA.

- Provide early assessments of the risks and acquisition impacts of alternatives under consideration and support development of effective acquisition strategies for different alternatives or opportunities.
- Invite AT&L participation in initial planning.

Implementation: Implement AoA governance to provide AT&L participation in the planning and conduct of AoAs.

Action: ASP1-5. Ensure AoAs include in-depth analysis of cost, schedule performance, and risk with each proposed alternative.

- Ensure all cost and schedule activities are addressed and the cost and schedule drivers for alternative solutions and requirements are clearly identified.
- Perform schedule risk analysis (SRA) for each alternative or opportunity.

Implementation: Update the AoA planning guidance to better address cost, schedule, and performance trades.

Recommended End State: ASP 2. Request for Proposals (RFPs) and supporting documentation provide full visibility into the Government's requirements, planning, processes, risks, and assumptions/constraints for executing the program

Action ASP2-1. Require the government, prior to RFP release, to provide industry with government expectations and a common understanding for IMP/IMS, risk management, and business rhythms.
Implementation: Update the Defense Acquisition Guidebook, and subject-specific guides on IMP, IMS, and risk management to provide guidance on leveraging the Request for Information (RFI) process to better communicate expectations and plans in these areas, to include expected business rhythm during contract execution.

Action ASP2-2. Require an independent assessment of RFPs prior to release and at the appropriate MDA level.

- Make an evaluation regarding the adequacy and completeness of the government's requirements (requirements verification traceability matrix), planning, processes, risks and assumptions/constraints for executing the program.
- Ensure that: 1) the acquisition strategy and plans are described in the SOO and SEP and are executable; 2) plans are committed to in the IMP/program schedule including required resources support; 3) plans are balanced with respect to performance, cost, schedule, and risk; 4) plans are updated based on results of both contract compliance verification and Initial Operational Test and Evaluation (IOT&E).
- Require the Program Management Office (PMO) to conduct a government-only requirements and risk review prior to release of the RFP and provide requirements verification traceability database (requirements and test method) to prospective bidders.

Implementation: Require MDA (or MDA staff) review of RFPs.

Action ASP 2-3. Require the government to provide offerors with an Integrated IMP/program schedule (with dependencies, internal and external), expected business rhythm, risk assessment, SEP, and SOO in the RFP.
Implementation: Update the DAG to provide for inclusion of government IMP/program schedule, SEP and risk management plans in the RFP.

Action: ASP2-4. The government will require the offerors to provide a Systems Engineering Master Plan (SEMP) and IMP/IMS consistent with government SEP and IMP/program schedule respectively.

- Make an evaluation regarding the adequacy and completeness of the offerors' planning, processes, risk mitigation, and assumptions/constraints for executing the program.
- Ensure that: 1) the offeror's approach and plans as described in the offeror's SEP are reflected in the IMP/IMS and include required resources; 2) offeror's baseline for verification, manufacturing, support, deployment, training, operating, and disposal data, procedures, and plans are balanced with respect to performance, cost, schedule, and risk; 3) the offeror's approach is achievable with respect to both cost and schedule; 4) the offeror commits to updating its plans and products based on the results of both contract compliance verification and IOT&E.

Implementation: Update the DAG to define RFP and evaluation guidelines.

Action: ASP2-5. The government will require the offerors to provide a tight linkage across IMP, IMS, risk mitigation, WBS, and cost.

- The program events, accomplishments, and criteria defined in the government's IMP/program schedule, when combined with the offeror-proposed events, define the top-level structure of the IMS for execution.
- In the RFP, direct the offeror to add the key tasks only to the level necessary to define and sequence the work, identify dependencies, document risk mitigations and deliverables, and support cost estimation and basis of estimate (BOE) preparation.
- In the RFP, direct the offeror to include a cross linkage to the IMP in the offeror's IMS, Work Breakdown Structure (WBS)/BOE, and risk mitigation steps.
- In the RFP, direct the offeror to incorporate additional detailed planning as part of the program kickoff and integrated baseline review (IBR) process.

Implementation: Update the DAG to define RFP and evaluation guidelines.

Action: ASP2-6. The government will require the offerors to provide an IMP with resourced contingency alternatives for high risks identified in the RFP.
Implementation: Update the DAG to define RFP and evaluation guidelines.

Recommended End State: ASP 3. Independent schedule estimates are performed to support source selection and milestone decisions.

Action: ASP3-1. Identify an office of primary responsibility (OPR) to perform independent schedule estimates.
Implementation: Organize and resource an independent schedule estimate capability in DoD.

Action: ASP3-2. Define a process.
Implementation: Implement technical and governance processes providing for independent schedule estimate capability in DoD.
Action: ASP3-3. Perform Independent Schedule Estimate (ISE) on all MDAP and MAIS programs.
Implementation: Execute and govern independent schedule estimate capability in DoD.

RECOMMENDATION AREA 2: DECISION GATE REVIEW

Through Systemic Root Cause Analysis, evidence shows the lack of a timely process and adequately defined and enforceable criteria to assess program maturity at milestones or technical reviews. The recommendation area of Decision Gate Review (DGR) pertains to having enforceable criteria coupled with independent reviews of program technical maturity prior to allowing a program to pass through to the next phase or milestone.

Recommended End State: DGR1. Technical maturity progress is on track as verified during technical reviews and maturity progression is consistent with cost and schedule estimates.

Action: DGR1-1. Include specific entrance criteria for each milestone in the ADM and SEP.

- For Milestone A: Capture alternatives and prototyping priorities.
- For Milestone B: Complete an allocated baseline down to the configuration item level.
- For Milestone C: Complete a product baseline, including all end items, associated production tooling, and planned support elements.
- For Full Rate Production (FRP): Finalize the product baseline as evidenced by a Physical Configuration Audit (PCA).

Implementation: Define and enforce criteria to assess program maturity at milestones.

Action: DGR1-2. Define, implement and require statistical confidence bands for schedule and cost estimates for each milestone.

- Milestone A: 80% confidence in estimates covering competitive prototyping and initial design through Program Decision Review (PDR). [Note: This recommendation was based on a draft 5000.2 that required a PDR be held prior to MS-A and that is no longer a valid assumption.]
- For Milestone B: 90% confidence in estimates covering Engineering and Manufacturing Development (EMD) design, fabrication, and test.
- For Milestone C: 95% confidence in estimates covering production, deployment, and sustainment.
- For FRP: No change to fixed price production and delivery.

Implementation: Establish and enforce statistical confidence bands at milestones.

Action: DGR1-3. Link technical reviews to milestones.

- Require all formal technical reviews be chaired by an independent technical authority.

Implementation: Establish and enforce governance that requires all formal technical reviews be chaired by an independent technical authority.

Action: DGR1-4. Require a Milestone Decision Authority (MDA) assessment of the results from all formal technical reviews by the technical review authority for each milestone.

Implementation: Establish and enforce governance requiring an MDA assessment of results from the ASR, PDR, SVR, and PRR.

Recommended End State: DGR 2. Government program office staffing is adequate to execute the program.

Action: DGR2-1. Require MDA verification that government program offices are staffed to a minimum of 90% of the requirement (e.g., numbers, experience, type, level, etc.) for each milestone.
Implementation: Establish and enforce governance requiring that programs are staffed to a minimum of 90% of the requirement.

Recommended End State: DGR 3. In-process reviews are conducted based on pre-defined trigger conditions.

Action: DGR3-1. Monitor trigger conditions and leading indicators to assess program health.

- Define criteria for trigger conditions.
- Determine a viable set of leading indicators for each milestone phase.

Implementation: Require an IPR when trigger conditions are evident.

RECOMMENDATION AREA 3: ENHANCED STAFF CAPABILITY

Through Systemic Root Cause Analysis, evidence shows that staffing shortfalls (numbers, skill, and experience) lead to adverse acquisition consequences specifically in the areas of requirements, planning, execution, and expectations. The recommendation area of Enhanced Staff Capability (ESC) pertains to having an adequate number of personnel, the appropriate skill mix, and the required amount of experience to properly staff, manage, and execute an acquisition program.

Recommended End State: ESC 1. Number of acquisition personnel in DoD is adequate to properly staff acquisition programs (government and industry).

Action: ESC1-1. Develop and validate a representative staffing model for DoD based on industry best practices balanced with the emerging OSD acquisition workforce framework.

- Identify / review current industry staff models.
- Identify / review current Service staff models.
- Conduct comparative analysis of staffing models (Industry/Services).
- Determine best of breed and/or identify elements of staffing models that are the best fit based on program parameters: milestones, program size, domain area, complexity, COTS, etc.

Implementation: Incorporate staffing model into the DAG.

Action: ESC1-2. Develop a workload analysis to estimate the numbers and expertise needed in the acquisition workforce.

- Determine analysis method and data collection plan.
- Perform analysis of current workforce (numbers, skills, etc.).
- Determine the required total acquisition workforce size to successfully manage acquisition programs.

Implementation: Incorporate workload analysis results into Defense Acquisition University (DAU) Human Capital Strategic Plan and implementation.

Action: ESC1-3. Adjust the number of available acquisition personnel as determined by quantitative program metrics.

- Identify quantitative program metrics. Compare analysis of current workforce against estimated workforce need.
- Request billets from Congress.
- Enact legislation to reconstitute the workforce.

Implementation: Work with appropriate Congressional and other governance offices to increase the acquisition workforce.

Recommended End State: ESC 2. Skills of acquisition personnel in DoD are adequate to properly staff acquisition programs (government and industry).

Action: ESC2-1. Grow Systems Planning, Research, Development, and Engineering (SPRDE)/Program Systems Engineers from the pool of SPRDE/Systems Engineering-certified workforce.

- Support the current SPRDE effort to identify Program Systems Engineers.
- Promote the need to accurately identify / re-code positions.
- Encourage the Services to map functioning program systems engineers to PSE coded positions.

Implementation: Align and assign systems engineers according to acquisition program needs.

Action: ESC2-2. Establish a process to assist operational capabilities and requirements writers in obtaining the tools and knowledge necessary to write requirements that are testable, measurable, and achievable.

- Leverage current acquisition training (may include the DAU ACQ series, Requirements courses) and encourage operational capabilities / requirements writers to utilize tools available.
- Monitor and update the operational capabilities requirements training
    - Take action to SE Forum as discussion topic.
    - Review current training, solicit feedback, identify gaps, and address as appropriate.
- Identify staff needing training.
- Create standards that allow for writing testable, measurable, achievable operational requirements/expectations.
    - Work with industry to identify Best Practices for writing requirements.
    - Document current processes/practices.

Implementation: Services and Defense Agencies implement a program to monitor and train operational requirements writers.

Action: ESC2-3. Broaden expertise to enhance cross-functional and domain knowledge and skills.

- Establish functional area development programs to provide the cross-functional and domain skills training.
    - Develop an intern program to bring new staff on board and cross-train in areas such as advanced research, design, test, etc.
    - Develop a professional development program for current staff and cross-train in areas such as prototyping, developmental test, life cycle logistics, etc.

Implementation: Implement DoD and corporate practices to broaden acquisition experience and skills.

Recommended End State: ESC 3. Experience of acquisition personnel is adequate to properly staff acquisition programs (government and industry).

Action: ESC3-1. Establish professional rotations across SE community and rotate systems engineers to increase their experience.

- Revitalize current rotational program; market program to management.
- Create incentives to promote professional development among engineers, e.g. continuous learning points.

Implementation: Establish governance that promotes the rotation of systems engineers in order to broaden experience and skills.

Action: ESC3-2. Establish program to plan, establish, manage, and fund program acquisition assist teams across Services at the Systems Command (SYSCOM) level and across industry at the corporate level.

- AT&L work with congressional staff to incorporate appropriate language in the appropriations bill to establish the program.
- AT&L work with Services to set up, fund, and manage the program.
- Establish teams at the SYSCOM level to assist programs to develop requirements and address start-up issues.

Implementation: Implement practice of program assistance teams across DoD SYSCOMs.

4. Industry Role

The Task Group recognized that while many of the recommendations and actions seemingly fall to the government to consider and lead, there are several actions on which industry can play a leading role or at least a key contributor role. The table below highlights of few of these specific actions and proposed industry next steps to help move the action forward.

Action #	Description	Possible Industry Role
ASP2-1	Require the government, prior to RFP release, to provide industry with govt. expectations and common understanding for IMP/IMS/risk management/business rhythms.	Provide examples to the Government team to document the variations of business rhythm issues and practices.
DGR3-1	Define criteria for trigger conditions	Industry could provide examples of effective trigger conditions used for a variety of systems
ESC1-1	Develop and validate a representative staffing model for DoD based on industry that can be applied to the govt. given the current OSD acquisition guidance.	NDIA SED to lead effort to gather and provide representative staffing models for a variety of activities that could be used to build the final representative staffing model for DoD.
ESC1-2	Develop a workload analysis to estimate the numbers and expertise needed in the acquisition workforce.	Provide suggested expertise and staff estimates for a variety of program types and sizes
ESC2-3	Broaden expertise to enhance cross-functional and domain knowledge and skills.	Provide examples of their experience in enhancing cross-functional skills and domain knowledge

5. SRCA Task Group Conclusions

The Task Group concluded with a presentation of these results at the NDIA Systems Engineering Conference held October 2008 in San Diego, California and the publication of this report. The Task Group submits these recommendations and actions to OSD and industry acquisition leadership for their consideration and action. By implementing the actions put forth in this report in the areas of Acquisition Strategy and Planning, Decision Gate Reviews and Enhance Staff Capability, the Task Group believes improvements will be made to the acquisition practices that have been driving systemic issues and poor program acquisition performance.

The Task Group has been pleased to consider and analyze the issues addressed here and looks forward to work toward improving acquisition outcomes.

Appendix A
Contributors

The following individuals have contributed to this SRCA effort in one or more of the following categories indicated in the far right columns. In addition, the Task Group Co-Chairs* from government and industry, respectively, are shown in the first two rows.

Prefix	First Name	Last Name	Organization	Task Group Participation	Workshop Series Participation
Mr.	Dave	Castellano*	ARDEC	X	X
Mr.	Harold	Wilson*	Northrop Grumman	X	X
Mr.	Dennis	Barnabe	NSA	X	X
Mr.	Chet	Bracuto	OSD (ED)	X	X
Ms.	Kathryn	Duncan	OSD (ctr)	X	X
Mrs.	Laura	Dwinnell	OSD (ctr)	X	X
Mr.	David	Gallagher	OSD (ctr)	X	X
Ms.	Michelle	Grillo	OSD (ctr)	X	X
Mr.	Stephen	Henry	Northrop Grumman	X	X
Mr.	Scott	Lucero	OSD (SSA)	X	X
Ms.	Darlene	Mosser-Kerner	OSD (DTE)	X	X
Mr.	Richard	Neupert	Boeing	X	X
Mr.	Pete	Nolte	OSD (AS)	X	X
Mr.	Tom	Parry	OSD (ctr)	X	X
Mr.	Robert	Skalamera	Consultant	X	X
Mr.	Brian	Wells	Raytheon	X	X
Mr.	Harold	Wilson	Northrop Grumman	X	X
Mr.	Michael	Zsak	OSD (ctr)	X	X
Mr.	Stuart	Booth	OSD (ctr)	X	
Ms.	Ann Marie	Choephel	OSD(ctr)	X	
Ms.	Nancy	Fleischer	Raytheon	X	
Mr.	Don	Gelosh	OSD(ctr)	X	
Mr.	Pete	Lierni	OSD (ctr)	X	
Mr.	Joe	Massimino	Boeing	X	
Mr.	Ed	Moshinsky	Lockheed-Martin	X	
Mr.	Nic	Torrelli	OSD (ED)	X	
Ms.	Kristen	Baldwin	OSD		X
Mr.	Michael	Bodeau	Northrop Grumman		X
Mr.	Bradford	Brown	DAU		X
Mr.	James	Burgess	Boeing		X
Ms.	Kathleen	Dangle	University of Maryland		X
Mr.	Glynn	James	OSD (AS)		X

Mr.	Ken	Hong Fong	OSD (AS)		X
Col	James	Horejsi	US Air Force (PEO)		X
Mr.	Dan	Ingold	USC		X
Mr.	Per	Kroll	IBM		X
Ms.	Kathryn	Lundeen	DCMA		X
Mr.	George	Mooney	USAF CSE		X
Dr.	Arthur	Pyster	OSD (ctr)		X
Mr.	Bob	Rassa	Raytheon / NDIA		X
Mr.	Paul	Robitaille	Lockheed-Martin		X
Mr.	Ray	Shanahan	OSD (AS)		X
Mr.	Jim	Schultz	OSD (AS)		X
Mr.	John	Snoderly	DAU		X
Mr.	Howard	Sterling	OSD (AS)		X
Ms.	Sue	Van der Veer	OSD (AS)		X
Ms.	Sharon	Vannucci	OSD (ED)		X
Mr.	Dinesh	Verma	Stevens Institute		X
Mr.	Mark	Weitekamp	ANSER		X

Chair, NDIA SE Division: Bob Rassa, Raytheon
Vice-Chair, NDIA SE Division: Hal Wilson, Northrop Grumman
2nd Vice-Chair, NDIA SE Division: Geoff Draper, Harris Corp

Appendix B

Systemic Issues

SSE/AS began the SRCA effort in late 2006 by identifying root cause terminology and descriptions that could provide a structure in which to perform analysis. In 2007, AS piloted the root cause structure on 44 acquisition programs and has subsequently revised the structure based on program feedback and lessons learned during the pilot effort. SSE/AS's SRCA methodology includes three tiers of root cause:

- Root Cause – Textual description; program finding root cause as perceived by the review team.
- Systemic Root Cause – Conditions that are outside the Program Management Office (PMO) below the Service/Defense Acquisition Executive (DAE) level. Includes lateral activities, such as Service staff functions and the Systems Commands.
- Core Root Cause – Issues at the DAE level or above. Requires solutions implemented through DAE coordination with Congress, DoD, Services, Industry, etc.

The three-tier structure facilitates analysis by allowing for textual description and also a list of standard root cause terms geared at two different levels (systemic and core root cause).

For purposes of analysis, systemic issue is defined as an issue prevalent on at least 4 ACAT ID programs. The Systemic Root Cause Analysis effort produced 48 systemic issues that were evident across the data sample of 44 ACAT ID programs. Table 1 summarizes the systemic issues. The systemic issues are not listed in a priority order but rather are grouped by their Core Root Cause (CRC).

Table 1. SRCA-Derived Systemic Issues

	CRC: Culture
1	Process is impeded by the lack of good communication between the government and contractors
2	Acquisition strategy does not address key issues
3	Acquisition strategy supports a decision to proceed before key testing is completed
4	Aggressive, success-oriented, highly concurrent test schedule.
5	Program has an aggressive schedule that does not allow adequate time for corrective actions.
6	Program is schedule driven - success oriented
7	Program is unlikely to achieve schedule
8	Difficult to bring in and retain high-quality personnel
9	Program lacks acquisition expertise
10	Program management structure has major deficiencies.
11	Marginal program office staff (insufficient numbers and skill mix)

	CRC: Business Practices
12	Program lacks properly documented risk management plans
13	Program lacks adequate tools and methodology to support risk management
14	Programs lack a mature risk management program
15	Program does not have an IMS or has a poorly defined schedule
16	Program execution and tactical roles are not clear
17	EVMS does not provide insight and does not reflect work being performed
18	Reliability is not progressing as planned or has failed to achieve requirements
19	Scope of reliability testing is not defined
20	Software reuse was significantly less than planned or expected.
21	Testing and verification approach are inadequate
22	Test strategy documentation does not provide the appropriate level of detail for planning
23	Program has an inadequate systems engineering process
24	Program has an incomplete SEP or lacks a SEP
25	No mechanisms are in place to ensure adequate production readiness reviews are conducted
26	Management metrics are not collected, or collected frequently enough, or used to monitor program health
27	Integrated Master Plan/Integrated Master Schedule are not being used as management tools
28	Programs/contracts are dependent on output from other contracts typically provided as GFI; parallel development and integrated GFI difficult to maintain
29	Requirements are not identified or reflected in the ORD
30	Requirements are not understood or plan to be added later
31	Requirements are vague or poorly stated
32	Requirements creep leads to a constantly evolving baseline
33	Lingering requirements issues increase program costs and risks
34	Programs fail to establish a process for flowing down requirements
35	Requirements churn is slowing program execution
36	Requirements are unreasonable and cannot be met
	CRC: External Influences
37	Schedule is not executable (unrealistic mandated expectations).
38	Inadequate facilities
	CRC: Enabling Infrastructure
39	Inadequate facilities - test equipment, test ranges, and manufacturing
40	Inadequate facilities - special situations
	CRC: JCIDS Process
41	Reliability is not planned well from the beginning
42	Program lacks measurable/testable requirements
43	Issues with weight/transportability
	CRC: Acquisition Reform – Loss of Government Capital Investment
44	Lack of rigorous SE planning
45	Expertise is lacking in key government positions
46	Inadequate staff levels - government side

47	Lack of specific domain knowledge (government and contractor)
48	The program lacks an adequate number of trained military operators for operational tests

Appendix C:
Efforts that Align to SRCA Task Group Recommendations

The table below lists the Task Group's suggested actions and implementation ranges with a descriptor in the far right column of some efforts currently underway or recently accomplished both in the Department and industry that appear to align with the Task Group recommendations. This table is not meant to be an exhaustive list of related efforts but rather a sample from the Task Group's initial preliminary investigation.

SRCA Task Group			Related Current Efforts In DoD and Industry
	Action	**Implementation**	
ASP1-1	Formalize the minimum requirement for the content and delivery of the Acquisition Strategy.	Update the DAG with the Acquisition Strategy template.	Recent policy changes to DoD 5000.2, DAG update to follow.
ASP1-2	Require identification of alternatives, risk contingencies, and opportunities as part of the Acquisition Strategy.	Update the DAG, the SEP Prep Guide and other guidance to address program risk resource requirements and integrated planning.	Recent policy changes to DoD 5000.2, DAG update to follow. *Reliability, Availability, and Maintainability Policy* (*21 Jul 2008*) • Directs Services to establish a reliability improvement acquisition policy • Programs must execute a viable RAM strategy with a reliability growth program .
ASP1-3	Require establishment of decision points and criteria for executing identified alternatives, opportunities, and risk contingency actions.	Update the IMP/IMS guide to address planning for off-ramps and alternative solutions.	*Prototyping and Competition policy (19 Sep 07)*: Requires Services to provide funding and acquisition strategies that include two or more competing prototyping contractor teams through Milestone B. *Mandatory Materiel Availability KPP and supporting Materiel Reliability and Ownership Cost KSAs* (*CJCSM 3170.01C, 1 May 2007*)

			Articulates the definitions for the Material Availability KPP and two supporting KSAs
ASP1-4	Update the AoA planning guidance to include AT&L participation in development of AoA study plan and conduct of the AoA.	Implement AOA governance to provide for AT&L participation in the planning and conduct of AOAs.	
ASP1-5	Ensure AoAs include in depth analysis of cost, schedule performance and risk with each proposed alternatives.	Update the AOA planning guidance to better address cost, schedule and performance trades.	
ASP2-1	Require the government, prior to RFP release, to provide industry with government expectations and a common understanding for IMP/IMS, risk management, and business rhythms.	Update the Defense Acquisition Guidebook, and subject-specific guides on IMP, IMS, and risk management to provide guidance on leveraging the Request for Information (RFI) process to better communicate expectations and plans in these areas, to include expected business rhythm during contract execution.	
ASP2-2	Require an independent assessment of RFPs prior to release and at the appropriate MDA level.	Require MDA (or MDA staff) reviews of RFPs.	
ASP2-3	Require the government to	Update the DAG to	Recent policy changes to DoDI 5000.2, DAG

	provide offerors with an Integrated IMP/program schedule (with dependencies, internal and external), expected business rhythm, risk assessment, SEP, and SOO in the RFP.	provide for government IMP/program schedule, SEP and risk management plans inclusion in RFP.	update to follow. In preparation for proposals, industry flows down the appropriate requirements, schedules, risks, and processes to suppliers.
ASP2-4	The government will require the offerors to provide a SEMP and IMP/IMS consistent with the government SEP and IMP/program schedule respectively.	Update the DAG to define RFP and evaluation guidelines.	Recent policy changes to DoDI 5000.2, DAG update to follow.
ASP2-5	The government will require the offerors to provide a tight linkage across IMP, IMS, risk mitigation, WBS and cost.	Update the DAG to define RFP and evaluation guidelines.	Recent policy changes to DoDI 5000.2, DAG update to follow.
ASP2-6	The government will require the offerors to provide an IMP with resourced contingency alternatives for high risks identified in RFP.	Update the DAG to define the RFP and evaluation guidelines.	Recent policy changes to DoDI 5000.2, DAG update to follow.
ASP3-1	Identify an OPR to perform independent schedule estimates.	Organize and resource an independent schedule estimate capability in DoD.	
ASP3-2	Define a process.	Implement technical and governance processes providing for independent schedule estimate capability in DoD.	
ASP3-3	Perform ISE on all MDAP and MAIS programs.	Execute and govern independent schedule	

		estimate capability in DoD.	
DGR1-1	Include specific entrance criteria for each MS in the ADM and SEP.	Define and enforce criteria to assess program maturity at milestones.	*Integrated DT&E / OT&E policy* (*22 Dec 2007*) • Developmental and operational test activities shall be integrated and seamless throughout the system life cycle • PMs will report results of completed DT&E to the MDA at MS B and C *Configuration Steering Boards* (CSB) (*30 Jul 2007*) • Directs Services establish CSBs for all ACAT I programs to review all requirements changes with potential cost or schedule impacts • Requires program managers to develop descoping options and present to the CSB Some major industry partners have developed and implemented a comprehensive gate review processes that pulses the program status at key milestones, addressing completeness and deciding whether to allow a program to proceed. In one of the major companies, there is a technical review before each gate conducted by people independent from the program- called Independent Reviews (IRs) The Navy is implementing an "Enhanced SE Process" on programs that defines a series of 6 gate reviews to improve acquisition governance.
DGR1-2	Define, implement and require statistical confidence bands for schedule and cost estimates for each MS.	Establish and enforce governance of statistical confidence bands at milestones.	
DGR1-3	Link technical reviews to milestones.	Establish and enforce governance that requires all formal technical reviews be chaired by an independent technical authority.	
DGR1-4	Require an MDA assessment of the results from all formal	Establish and enforce governance requiring	

	technical reviews by the technical review authority for each MS.	an MDA assessment of results from ASR, PDR, CDR and PRR.	
DGR2-1	Require MDA verification that government program offices are staffed to a minimum of 90% of the requirement (e.g., numbers, experience, type, level, etc.) for each MS.	Establish and enforce governance requiring that programs are staffed to a minimum of 90% of the requirement.	
DGR3-1	Monitor trigger conditions and leading indicators to assess program health.	Require an IPR when trigger conditions are evident.	OUSD/AT&L/SSE is sponsoring a study with Stevens Institute to identify SE Leading Indicators.
ESC1-1	Develop and validate a representative staffing model for DoD based on industry best practices balanced with the emerging OSD acquisition workforce framework.	Incorporate staffing model into the DAG.	The Air Force uses the Sustainment Acquisition Composite Model to determine staffing size for programs. The model is a structure questionnaire interview process based on the 5 most common workload drivers. Subject matter experts, former program directors, score the questionnaire and recommend staffing levels. The Navy, Marines, Coast Guard and Home Land Security also use the model.
ESC1-2	Develop a workload analysis to estimate the numbers and expertise needed in the acquisition workforce	Incorporate workload analysis results into DAU Human Capital Strategic Plan and implementation.	Human Capital Strategic Plan goals directly address establishing metrics and data-driven workforce analysis.
ESC1-3	Adjust the number of available acquisition personnel as determined by quantitative program metrics	Work with appropriate Congressional and other governance offices to increase the acquisition workforce.	2008 NDAA Section 852: established an Acquisition Workforce Development Fund to increase the number of available acquisition personnel.

ESC2-1	Grow SPRDE/ Program Systems Engineers from the pool of SPRDE/Systems Engineering certified workforce.	Align and assign Systems Engineers according to acquisition program needs.	Current related efforts address identifying Program Systems Engineers (PSEs) from the pool of SPRDE/ Systems Engineering certified workforce: 1. SPRDE/SE competency assessment 2. Identification of workforce positions to be coded SPRDE/PSE Within industry some major companies identify and groom technical leaders. The program includes competency models and career paths.
ESC2-2	Establish a process to assist operational capabilities and requirements writers in obtaining the tools and knowledge necessary to write requirements that are testable, measurable, and achievable.	Services and defense agencies implement a program to monitor and train operational requirements writers.	*Mandatory Requirements Management Certification Training* (*2 Sep 2008*) • Requires personnel with authority to generate requirements for a program to complete a certification training program to participate in the requirements generation process • Courses include: CLM 041: Capabilities Based Planning; RQM 110: Core Concepts for Requirements Management; a Resident Course; and an Executive Course.
ESC2-3	Broaden expertise to enhance cross-functional and domain knowledge and skills.	Implement DoD and corporate practices to broaden acquisition expertise and skills.	Related efforts include: 1. A specific focus on training and retaining through the 2008 NDAA Section 852: Defense Acquisition Fund 2. A new Core Plus Development Guide available to provide guidance on courses / CLMs considered useful for each career field at each level 3. The SPRDE/PSE requirement that additional

			training courses from other acquisition career fields be completed Within industry some major companies have developed and are implementing engineering assist teams. In one major defense company, an "A" team of systems engineers serves in this assist-team role by helping programs consider and establish thorough and complete systems engineering elements early in their lifecycle and by mentoring and training the less-experienced systems engineers on the program teams.
ESC3-1	Establish professional rotations across SE community and rotate systems engineers to increase their experience.	Establish governance that promotes the rotation of systems engineers in order to broaden experience and skills.	A rotational assignment program, referred to as the One Year Development Assignment program, currently exists, but is not well utilized due to decreased staff levels. Additionally, through the NDAA Section 852: Defense Acquisition Workforce Development Fund, career broadening activities were a major aspect of the proposed initiatives, including rotational and intern programs.
ESC3-2	Establish program to plan, establish, manage, and fund program acquisition assist teams across Services at the SYSCOM level and across Industry at the corporate level.	Implement practice of program assistance teams across DoD Systems Commands.	The DAU Performance Support Office is available to support programs with the following activities: consulting; facilitated decision making; rapid deployment training; and targeted training.