

SAFETY AND MISSION ASSURANCE ROLE IN ACQUISITION

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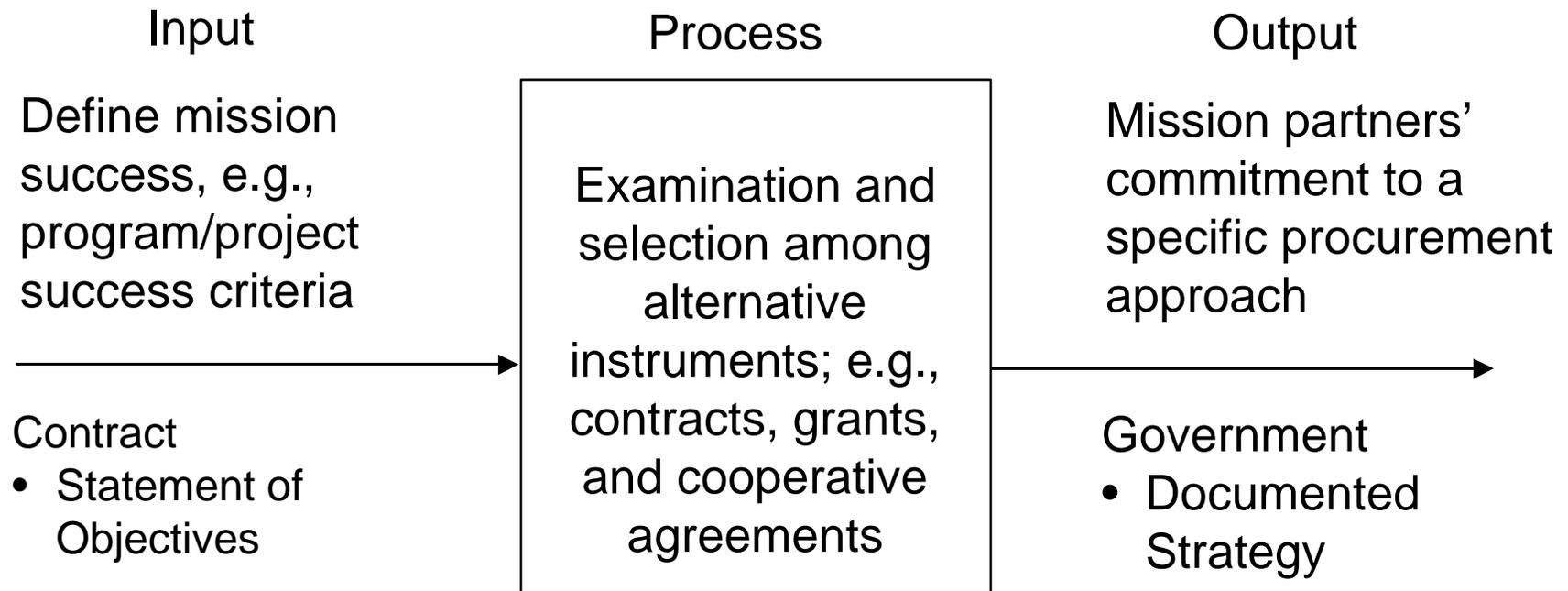
Topics

- Acquisition -- What Is It?
- Past Acquisition Approach
- Importance of SMA Participation
- New Acquisition Approach
- Risk Based Acquisition Management (RBAM)
- Role of SMA in Acquisition
- Activities To Date
- Challenge

Understanding Acquisition

- What is acquisition?
 - Acquisition occurs whenever NASA uses means other than in-house resources to accomplish its mission
- It applies to:
 - Contracts, grants, and cooperative agreements
- It consists of:
 - Requirements development
 - Acquisition planning
 - RFP development
 - Source selection/solicitation
 - Post-award acquisition management

Acquisition Strategy Philosophy



Acquisition Strategy manages risks strategically

- Drives post-award approach to achieving mission success
- Allocates responsibility for accomplishment to mission partners

Past Acquisition Approach

- Focused on procurements only (a subset of acquisitions)
- Delegated to quality organization
 - Review normally consisted of routing documents for SMA concurrence
- De-coupled from early program planning
 - Reviews of PMPs, PRDs and PTRSs tended to occur after development
 - Always playing “catch-up”
- Selective SMA involvement
 - Driven by squeaky wheel (i.e. PM request)
 - SMA support occurred sporadically as opposed to continuously
- Suboptimized; limited data base; poor communication of overall impacts

Environments Are Changing

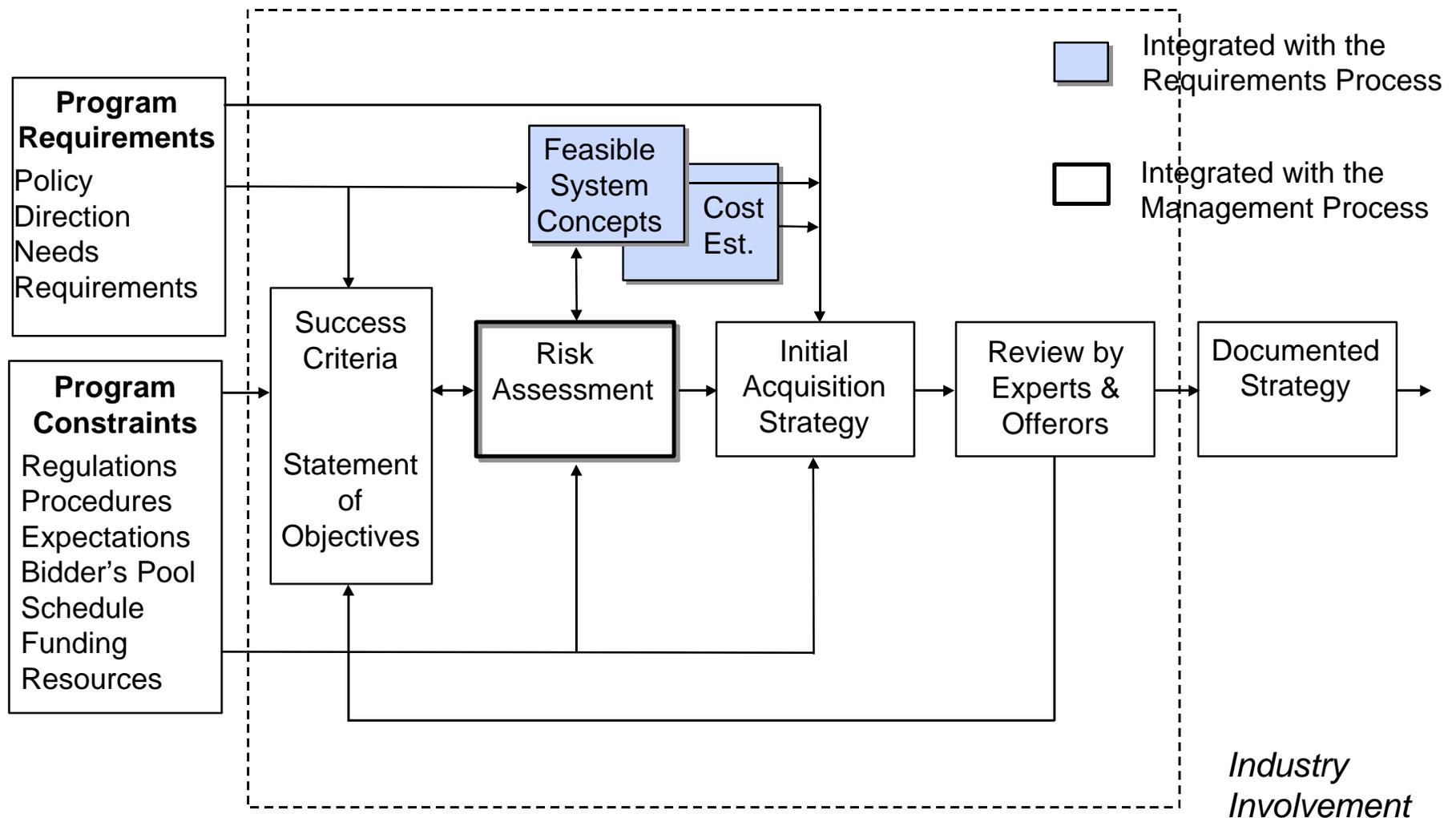
- Resources are diminishing (both human resources and funding)
- Projects are generally smaller and faster (less development time)
- Acquisition rules have changed
- Surveillance methods are evolving (from oversight to insight)
- Fixed price contracts and PBC are becoming the norm
- Technology continues to develop quickly
- Government is emphasizing commercialization and technology transfer
- Management structure and responsibilities have changed

Importance of SMA Involvement

- SMA has the core competencies to serve as risk management consultants to the project throughout the acquisition process
 - Support requirements development
 - Support acquisition strategy planning
 - Support risk management plan development
 - Support up-front risk assessments and analyses
 - Provide risk management training as required
- SMA's role in acquisition must be strengthened

The window is now.

The Acquisition Strategy Process

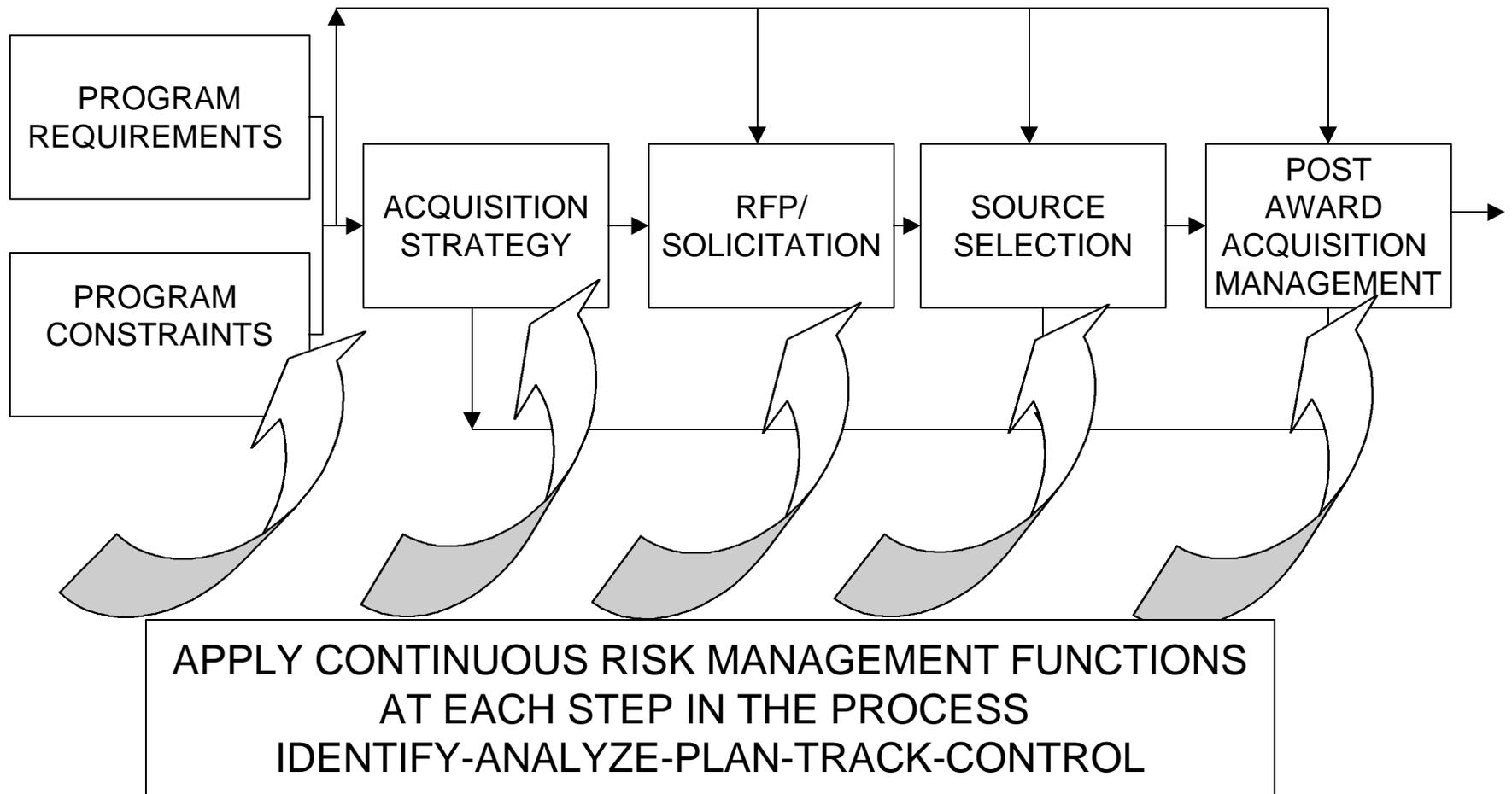


From "Risk Management in the Acquisition Strategy Process," 2nd Annual Risk Symposium, A. Hoheb, The Aerospace Corporation, February 1999

New Acquisition Approach

- Expand the application of Risk Management which is define as:
 - “An organized, systematic decision-making process that efficiently identifies, analyzes, plans, tracks, controls, and communicates, and documents risk to increase the likelihood of achieving program/project goals.”
- Integrate it throughout the Acquisition process
 - Requirements development
 - Acquisition planning
 - RFP development/solicitation
 - Source selection
 - Post-award acquisition management
- Result = “Risk-Based Acquisition Management” approach

Risk-Based Acquisition Management (R-BAM) Initiative



SMA Acquisition Tool Box for Supporting Acquisitions

	Requirements	Acquisition Strategy Development	RFP Development/Solicitation	Source Selection	Post Award
Identify	<ul style="list-style-type: none"> Support to mission needs development Support to architectural development Technical requirements definition specs evaluation Software requirements definitions evaluation Environmental constraints Brainstorming Benchmarking Provide risk management training Program Plan (Verify existence) Risk Planning (Verify occurs) Adequate Resources (Verify) Payload Process review Program/project Readiness Review Identify Limited Life Issues Single String versus Redundancy Technology Proofing/Rapid prototyping 	<ul style="list-style-type: none"> Contractor availability list Program constraints list Mission Success Criteria Identification of Planning constraints 	<ul style="list-style-type: none"> Cost Scheduling Performance Technical Identification of Risk in SOO Offerors Understanding of Solicitation 	<ul style="list-style-type: none"> Proprietary constraints list Review of OSHA 200 log Past experience and knowledge base Stability of management structure Assist in assessment of facilities and operating procedures Assist in vendor qualification Contractor system security SMA requirements for selection 	<ul style="list-style-type: none"> Identify Technology transfer limitations Review of objectives Government Surveillance <ul style="list-style-type: none"> Audits Inspection Insight/Oversight
Analyze	<ul style="list-style-type: none"> System Safety Analysis Report Hazard Analysis Probabilistic Risk Assessment (PRA) Reliability Analysis (FMEA/CILs, FTA, RBD, etc.) Brainstorming Parts Testing Support to Technical Feasibility Analysis Support to Testing and Evaluation Evaluation of Human-Rating Capability Cause and Effect Analysis 	<ul style="list-style-type: none"> List of contract types EEE Parts database access Review and update risk matrix Support to on-site visits 	<ul style="list-style-type: none"> Bidders input to RFP 	<ul style="list-style-type: none"> Evaluation criteria Review of Safety Program (motivation, awareness, training, and certification) Evaluation of ability to meet mission objectives Assist in evaluation of skills, experience, and system approach Pre-award Surveys Review bidders' past safety and mission success performance 	<ul style="list-style-type: none"> Hazard Analysis Probability Risk Assessments (PRA) Reliability Analysis (FMEA/CILs, FTA, Monte Carlo, etc.) Failure Analysis Independent Assessments Mishap Investigation Government surveillance Participation in PDR/CDR/etc.
Plan	<ul style="list-style-type: none"> Occupational Safety and Health Requirements System Safety Requirements Quality System Requirements Qualification Test Requirements Inspection and Test Requirements Brainstorming Flow Charting Key Characteristics <ul style="list-style-type: none"> Manufacturability Producibility 		<ul style="list-style-type: none"> Standard language for section A-K Standard language for Section L and M Assist in Award Fee incentive Planning to reduce risk 	<ul style="list-style-type: none"> Review flow down of requirements to subcontractors Award Fee Plan 	<ul style="list-style-type: none"> Emergency Preparedness Plan Continuity of Operations Plan Risk Mitigation Planning Verification Plan Corrective/Preventive Action Plan Plan for Audits Configuration Management EEE Parts Government Source Inspection Planning
Track	<ul style="list-style-type: none"> Limited Life issues Review and update risk matrix Quality Records System Safety and Mission Success Metrics 	<ul style="list-style-type: none"> Assist in documenting acquisition strategy Review and update risk matrix 	<ul style="list-style-type: none"> Use of Traceability Matrix Inputting SMA data requirements for proposals Verify instructions to offeror match evaluation factors/standards Review and update risk matrix 	<ul style="list-style-type: none"> Review of safety data reporting <ul style="list-style-type: none"> mishaps close call lessons learned Update bidders' safety and mission success performance Review and update risk matrix 	<ul style="list-style-type: none"> Review and update risk matrix Re-addressing the risks Surveillance <ul style="list-style-type: none"> Insight/Oversight
Control	<ul style="list-style-type: none"> Configuration Control/Management Plan Mitigation status report 	<ul style="list-style-type: none"> Mitigation status report 	<ul style="list-style-type: none"> Assist in developing the Contractor Data Requirement list (CDRL) Cost benefit analysis Mitigation status report 	<ul style="list-style-type: none"> Mitigation status report 	<ul style="list-style-type: none"> Control of nonconforming products MRB Mitigation status report

SMA Role in Acquisition (Core Competencies)

- We can demonstrate core competencies in areas such as :
 - System safety analysis/hazard analysis
 - SMA plan development/surveillance plan development
 - Reliability analysis/modeling/testing and evaluation
 - Failure analysis resolution
 - Anomaly reporting/cause and effect analysis
 - Qualification/certification of products
 - Risk management (assessments/mitigation, database and risk matrix development)
 - Emergency preparedness planning
 - Configuration management/process control

SMA Role Implementation (QA Perspective)

<u>SMA Area</u>	<u>Typical Areas Involved With Tradeoffs</u>
QA	Documentation, Surveillance, Inspections, Certifications, Audits, MRB
Configuration Control	Drawings, Equipment Lists, Delivery Schedules, Approval Authority, Freeze Control, As Built Documentation
Environmental Requirements	Design Requirements, Test Requirements, Documentation, Approvals, Functional Test, Environmental Test , Programmatic (Component, Subsystem, System), Analysis
EEE Parts	Parts Lists, Policy, Part Class, Non-Standard Parts, Traceability, De-rating, Failure Analysis, Burn-in, Selection, Acquisition, Upgrades, Lot Control, Screening, Destructive Physical Analysis, Vendor Control

SMA Role Implementation (Safety/Reliability Perspective)

SMA Area

Typical Areas Involved With Tradeoffs

Reliability

Single Failure Point Policy,
Problem Reporting and Corrective Action,
Design Performance Analysis (FMECA, FTA, Part
Stress, Redundancy Switching, Worst Case,
RBDA), Reviews, Redundancy

System Safety

Documentation, Hazard Identification/Impact,
Analysis (FTA, Hazard, FMECA, Sneak Circuit),
Structures/Materials Reviews, ESD Control,
Tests, Inspections, Surveys

Software
Assurance

Initiation, Problem/Failure Reporting and
Disposition, Simulations, IV&V, Tests

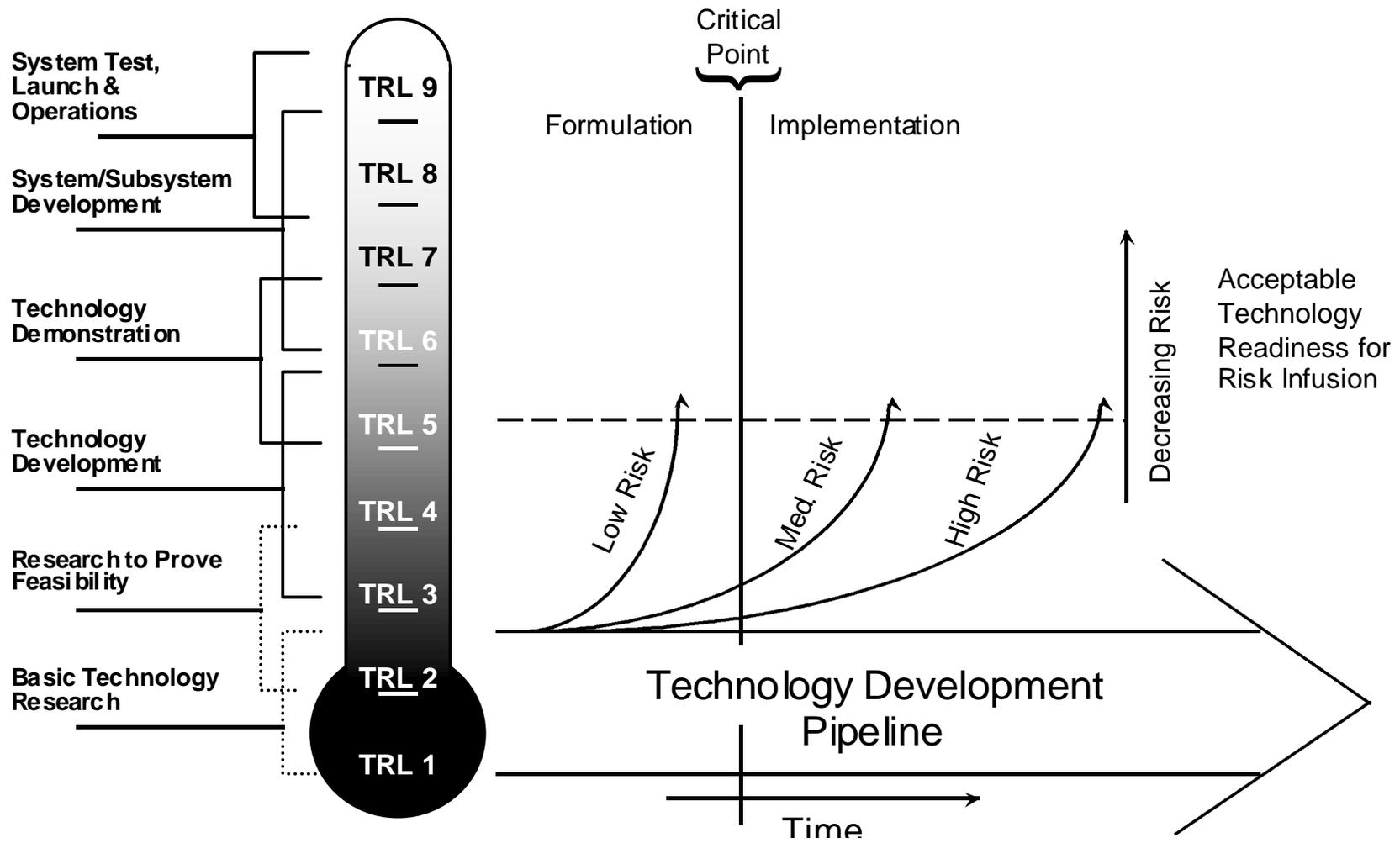
Risk Management Tool (Stoplight Chart for Tracking Risk)

Condition	Risk ID	Risk Statement	Assigned To:	Action Plan	Key Milestones	Comments
RED	1	The Project Technical Requirements Specification (PTRS) for the Project was 95% complete and contained no evidence of SMA involvement --- May result in unsafe and poor quality products	Contracting Officer	<p>Include SMA as part of the acquisition team for Project</p> <p>Submit PTRS to SMA for comments</p> <p>See comment section</p>	Comments due to support SOW	SMA comments include requirements for system and occupational safety, quality plan, hazard analysis, reliability analysis, parts testing criteria, limited life issues, inspections and certifications, software, and environmental testing
YELLOW	2	Concept design of beryllium large 8 foot casting contains numerous safety concerns – May cause health or environmental problems	System Eng/SMA	<p>Perform hazard analysis, and develop safety analysis report</p> <p>Recommend more government oversight/insight</p> <p>Evaluate Occupational Safety requirements</p>	Analysis due 2 weeks prior to RFP release	Beryllium is carcinogenic requiring special precautions for machining
YELLOW	3	Data requirement document (DRD) does not contain provision for contractor to submit a safety and quality plan – The lack of which may affect mission success	SMA	<p>Modify DRD to include appropriate SMA requirements</p> <p>Ensure standard SMA language is included in sections A-K and sections L and M of contracts</p>	RFP release date	Coordinate requirement with contractors
RED	4	No risk management plan exists for the Project - May result in project overruns, schedule slips, or project cancellation, etc.	Project manager	<p>Seek consultant support from SMA in developing the risk management plan</p> <p>SMA to provide risk management training, if required</p>	Plan due prior to Acquisition Strategy Meeting	Project Management Plan should include the Risk Management Plan

Risk Management Tool (Stoplight Chart for Tracking Risk)

RED	5	<p>Project require large composite, load bearing liquid hydrogen tank with complex geometry-</p> <p>Hydrogen leakage could lead to catastrophic loss</p>	System Eng	<p>Include requirements for conducting rigorous manufacturing process FMEA, identifying key characteristic</p> <p>Establish rigorous manufacturing process controls</p> <p>Recommend extensive test and verification program</p>	All actions must be completed prior to finalizing RFP	The TRL is currently low for space use
RED	6	<p>Novel flight termination system design for X-vehicles involving flight control surface activation in lieu of traditional pyrotechnic and explosive devices –</p> <p>May fail to operate</p>	System Eng/SMA	<p>Establish test requirements for FTS component, sub-subsystem and system level testing</p> <p>Provide extensive simulation and modeling of aerodynamic performance</p> <p>Increase government oversight and require fully redundant design</p>	Prior to issuance of RFP	Require “approval of concept” letter from range safety officials prior to issuance of RFP
RED	7	<p>Long lead parts must be procured prior to project contract award</p>	System Eng	<p>Conduct peer review of parts selection against latest design</p> <p>Perform de-rating analysis and order parts with margin</p> <p>Evaluate vendor quality program and ability to produce parts</p>	Last need date minus delivery schedule plus margin	Contact EEE parts personnel for assistance
YELLOW	8	<p>Use of lithium batteries did not include safety warnings and identification –</p> <p>Explosion may occur if expose to improper environments</p>	SMA	<p>Verify all hazardous materials contain the proper safety markings</p> <p>Ensure drawings call for proper identification of all parts and materials</p>	PDR is planned to occur in 2 months	Ensure proper surveillance requirements for hazardous operations

Technology Infusion Risk



Acquisition Strategy Exit Criteria (Documented Strategy Leads To RFP)

- Planning
 - Management strategy (including risk management)
 - System engineering strategy
 - Contract type, incentives, cost, and funding structure
 - Alternatives to procurement and contract phasing
 - Bidder's pool/competition, small business set asides
 - Program objectives for each program phase
 - Mission partners IPT roles

Acquisition Strategy Exit Criteria (Documented Strategy Leads To RFP)

- Requirements
 - Directive and authority
 - Law, regulations, exceptions, waivers
 - Requirements documents
 - System performance requirements and verification criteria
 - Risk acceptance requirements

- Constraints
 - Program constraints
 - Risk assessment

Activities To Date

- Code Q teamed with codes AE and H to form the R-BAM initiative (3-99)
- R-BAM published as procurement initiative (4-99)
- R-BAM advertised in procurement information circular (4-99)
- R-BAM to be addressed in procurement notice (NFS revision) [Planned publication 6-99]
- R-BAM to be emphasized by both code H and Q at Wallops (PM training)
- Initial SMA Acquisition Tool Box developed (4-99)
- Acquisition management seminar being developed for near future

R-BAM and NASA Policy

- The following documents are being reviewed for potential changes to help incorporate risk based acquisition management:
 - NPD 7120.4B
 - NPG 7120.5A
 - NPD 8700.1
 - NPG 8715.DRAFT 2
 - NPG 8705.X (Proposed Risk Management Guidance Doc.)

R-BAM Published as Procurement Initiative (4-99)

→ Goal:

- Initiative will reduce the likelihood and severity of impacts arising from unforeseen programmatic events through rigorous risk management.

→ Key elements:

- Revise the NASA FAR supplement to incorporate risk management (including safety and security considerations).
- Conduct an acquisition management conference to assure a uniform understanding of risk and safety issues relative to the acquisition cycle.
- Develop training on risk management in the acquisition cycle for the procurement, technical, and resource communities.

R-BAM Advertised in Procurement Information Circular (4-99)

- Officially announces R-BAM to the acquisition community
- Defines Risk Management
- Previews draft changes incorporating R-BAM into the procurement process:
 - Requirements development
 - Acquisition planning
 - RFP development/solicitation
 - Source selection
 - Post-award acquisition management
- Ties in OMB risk philosophy with NPG 7120.5 risk management

R-BAM Addressed in Procurement Notice (NFS) (Planned 6-99)

- Inclusion of SMA in Acquisition Planning
- Risk Management as mandatory Acquisition Planning element
- Risk Management inclusion in Mission Suitability for Source Evaluation Boards
- Risk Management inclusion under “Technical” in award fees
- Risk Management as core factor in Surveillance Planning

R-BAM Emphasized by Code H and Q at Wallops Training

→ Code H will:

- Provide insight into the acquisition process
- Highlight the acquisition changes that have taken place
- Identify the acquisition team members

→ Code Q will:

- Explain how Risk Management can be applied to acquisitions
- Identify the tools available to help identify and mitigate risk throughout acquisitions
- Provide insight into the SMA role in early acquisition planning

Summary

- A structured risk- based acquisition management (R-BAM) approach is critical for a successful project
- Teaming with procurement is the key
- Risks must be identified and managed throughout the acquisition cycle
- SMA community can provide valuable support as risk management consultants

Challenge (To The SMA Community)

- Many opportunities await us, so as you continue your participation in the conference, focus on the following:
 - Seek additional ideas to help support early acquisition involvement
 - Get to know your procurement people
 - Meet with them and discuss R-BAM
 - Sponsor joint risk management training for SMA and Procurement staffs
 - Application of Risk-Based Acquisition Management at your Centers