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Check Six Principle Primer for Acquisition Executives

Charles M. Garland
Air Force Center For Systems Engineering
Charles.Garland@us.af.mil

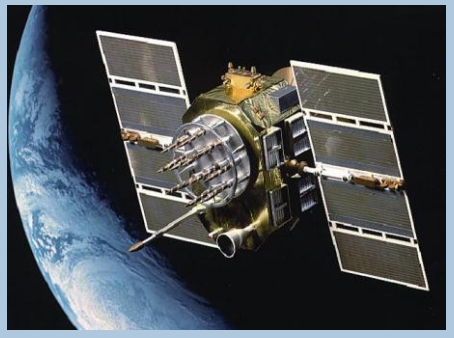
Hyatt Regency Mission Bay

San Diego, CA

Completed Case Studies

Develop America's Airmen Today ... for Tomorrow

Hubble Space Telescope



Global Positioning System

F-111 Aardvark

Global Hawk

C-5 Galaxy

KC-135 Simulators

A-10

T-6 Texan II

Theater Battle Management Core Systems

International Space Station

MH-53

Findings Distribution

Concept Domain	Responsibility Domain		
	1. Contractor Responsibility	2. Shared Responsibility	3. Government Responsibility
A. Requirements Definition and Management		6	9
B. Systems Architecting and Conceptual Design	3	8	1
C. System and Subsystem Detailed Design and Implementation	2	6	
D. Systems and Interface Integration	2	4	3
E. Validation and Verification	2	8	1
F. Deployment and Post Deplyment		4	2
G. Life Cycle Support	2	5	1
H. Risk Assesment and Management	1	5	4
I. System and Program Mangement	1	8	6

Check Six Principle Primer

- A total of 53 findings of “success” and/or “failure” have been gleaned from nearly half a century of systems engineering.
- The primer identifies recurring themes that have emerged as consistent points of failure or breakdown in systems engineering and suggests practical actions, in the form of a “***Check Six Principle*** (CSP)”, to preclude needless repetition of failure or breakdown.
- The primer has listed *25 Check Six Principles* that should be used during a program. These are intended to be practical, straight-forward actions that a PM and a CE can easily take to avoid repeating the problems of the past.

Distribution of Check Six Principles with Friedman-Sage

Concept Domain	# of Check Six Principles
A. Requirements Definition and Management	7
B. Systems Architecting and Conceptual Design	7
C. System and Subsystem Detailed Design and Implementation	
D. Systems and Interface Integration	
E. Validation and Verification	2
F. Deployment and Post Deplyment	2
G. Life Cycle Support	
H. Risk Assesment and Management	3
I. System and Program Mangement	3

Check Six Principles

Requirements Definition & Management Domain

1) Require assessments to be conducted on the risk of achievement of all system-level requirements before the become contractual.

2) Require that a method of verification be set with the establishment of each system-level requirement.

3) Require that an assessment of the risk of achieving system-level requirements be an equal weighting factor with cost and schedule when building concurrency into the program. Key to this is establishing when data that can significantly influence design decisions resulting from lengthy analysis or test activities will become available.

4) Require all system-requirements to be traceable to some aspect of the concept of operations.

5) Clearly define the documentation that constitutes the system functional baseline, allocated baseline, and product baseline. Establish when/if the government will control these baselines and associated documentation at the point in the program schedule where government liability for change is minimal.

6) Require that commercial-off-the-shelf acquisitions be anchored by a concept of operations focused on the military mission and usage of the system. Military mission, usage, and design requirements should drive trade-offs in the establishment of system-level requirements.

7) Identify the customer and specifically who is authorized to make changes to the requirements. Further assure that the end user and desired affect is clearly articulated.

Check Six Principles

Systems Architecting & Conceptual Design, Detailed System & Subsystem Design & Implementation, Systems & Interface Integration Domains

1) Do not permit external influences to drive relaxation of discipline and rigor on the systems engineering process documented in the program System Engineering Plan (SEP).

2) Require a thorough risk assessment before proceeding with any major deviation from the SEP.

3) Keep the operational community focused on capability needs and not directing design details.

4) Use open standards, not specific commercial software solutions for the underlying software architecture.

5) Ensure that external interfaces have been fully tested in a real-world environment at both the functional and technical levels.

6) Require all stakeholders to agree on a documented concept of operations and concept of system employment.

7) Permit/require as many detailed technical trade studies as required to gain clarity in the options to lower risk and meet cost and schedule constraints.

Check Six Principles

Validation & Verification Domain

1) Require assessments to be conducted on the schedule risk of verification and/or validation of all system-level requirements. These assessments should focus on the likelihood of retrofit and/or redesign resulting from disconnects between availability of verification and/or validation testing results and production of particular system configuration.

2) Require that an assessment of the risk of achieving, verifying, and validating system-level requirements be an equal weighting factor with cost and schedule when building concurrency into the program schedule.

3) Keep the operational community focused on capability needs and not directing design details.

4) Use open standards, not specific commercial software solutions for the underlying software architecture.

5) Ensure that external interfaces have been fully tested in a real-world environment at both the functional and technical levels.

6) Require all stakeholders to agree on a documented concept of operations and concept of system employment.

7) Permit/require as many detailed technical trade studies as required to gain clarity in the options to lower risk and meet cost and schedule constraints.

Check Six Principles

System Deployment & Post Deployment, Life Cycle Support Domains

1) Ensure the entire life cycle of all parts of the system (or all systems with the capability) are included in the upfront technical and programmatic planning and are included in any trade and decision space throughout the life cycle. Specifically address how COTS equipment and their associated interfaces with both COTS and non-COTS elements will be addressed and sustained.

2) Bring in key subject matter experts (SMEs) in reliability, maintainability, sustainment, etc. early and often to review planning; not just when there is a problem.

Check Six Principles

Risk Assessment & Management Domain

1) Use the methods available (e.g. prototyping) to aid in managing risk. It may cost more up front but can identify and/or prevent problems down the road by identifying risk areas.

2) Use the tolls available (e.g. Active Risk Manager) to aid in identifying and managing risk. Assure that the information contained in the tool is current and visible.

3) If the program does not have the right experienced Subject Matter Experts (SMEs) to adequately identify risks, bring them in from outside the program. And utilize them throughout the program to review trades and decisions made regarding those risks.

Check Six Principles

System & Program Management Domain

1) Make sure there is a clear and defined leadership structure for accountability and authority. Document the roles, responsibilities and authority in joint programs (e.g. Letter of Agreement, Memorandum of Agreement, etc between the parties).

2) Program leadership should ensure the program is staffed with knowledgeable and experienced personnel to implement SE practices and processes appropriately and consistently. If the program cannot get full time experienced staff, utilize outside subject matter experts (SMEs) to periodically review progress of the program. Do not wait until there is a problem to bring in outside SMEs, be proactive to avoid those problems.

3) Encourage all program personnel to secure peer-reviews with an eye toward indentifying knowledge shortfalls that may be managed through increased education and training.

Most Probable Big Impact Recommendation

Source Documents Reviewed

1) CSE SE Case Studies

2) Report on Systemic Root Cause Analysis of Program Failures

3) A Survey of Systems Engineering Effectiveness

Provide a well trained, experienced, skillful acquisition workforce to the programs.

Questions?