MITRE and **AEROSPACE**

Critical Factors for Acquisition Success
☑ *CHECKLIST*

NDIA
National Defense Industrial Association

14th Annual NDIA Systems Engineering Conference

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October 27, 2011

Purpose

- **To develop an aid for formulating and/or executing a federal acquisition program**
  - **For program managers, chief engineers, and acquisition specialists**
  - *To improve the program's chance of success*

- **Analogous to a pilot's checklist**
  - **"Have we thought about this critical issue sufficiently before moving forward?"**

- **Does _not_ replace the program manager's or systems engineer's training, experience, or judgment**
- **_Does_ remind them when and how to apply their skills and abilities**

Background

- **MITRE and Aerospace collaborated on the development of a "Checklist for Acquisition Success"**
  - Combines cumulative Aerospace and MITRE experience and packages it into a simple, useful form
  - Draws on lessons-learned, best practices, and experience from fifty years each of experience supporting a wide range of federal acquisition programs
- **Corporate champions**
  - Dr. Louis S. Metzger, MITRE Corporate Chief Engineer
  - Rand H. Fisher, Aerospace SVP for Systems Planning, Engineering, and Quality
- **Team members**
  - Dr. Robert Swarz, MITRE Lead, with Nadine Tronick and Debra Basilis
  - Dr. Allyson Yarbrough, Aerospace Lead, with Paulette Acheson and Dr. John Harrell

Checklist Development Process

1. **Assembled comprehensive set of references**
   - **Program Management, Systems Engineering, and Mission Assurance best practices and lessons-learned**

2. **Identified the most critical factors that, if not done properly, could cause a program to fail**
   - **Over budget, over schedule, incomplete requirements**

3. **Developed checklist questions**
   - **Organized by point in SE life cycle and program office role**
   - **Kept in mind:**
     - **The checklist should have wide applicability and be tailorable to multiple life cycle models**
     - **Users need to know where in the checklist they should look for an appropriate subset of questions**

Checklist Development Process (concluded)

4. **Vetted the concept, document organization, and questions**

   – Reviewed by approximately forty senior MITRE and Aerospace staff

5. **Initial validation of the approach with several acquisition programs**

   – "If you had this, would it have been helpful?"

   – "If you have this, will it help you do better in the future?"

   – *Positive responses*

Tenets

- **A checklist should not be lengthy—the key is to focus on the "killer items" that are often missed**

- **Wording should be simple and exact—use language familiar to the profession**

- **Clutter free—no unnecessary information**

- **The checklist should encourage communication**

- **Should not try to be a comprehensive how-to guide—should instead highlight critical and often missed items**

- **Validate and improve in a real operational setting, resulting in changes and a better product**

Source: Atul Gawande, *The Checklist Manifesto: How to Get Things Right,* Metropolitan Books (2009)

Other Tenets
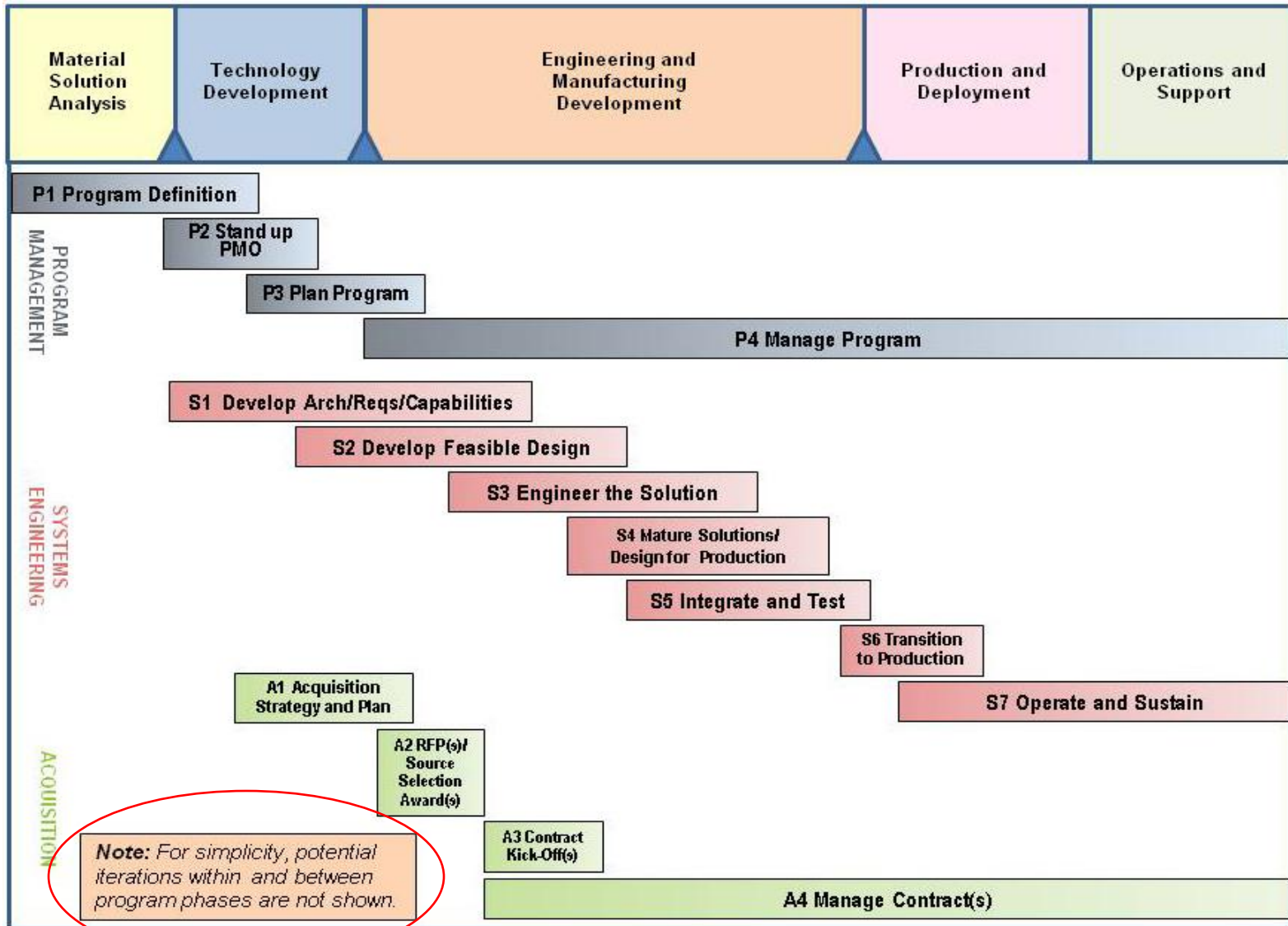
- **From Watts Humphrey:**
  - **"Program management is a matter of detail, and every step must be done precisely and correctly. Just like airline pilots when they do their final preflight checks, they follow a detailed checklist. While they know every step and have done it thousands of times, studies have shown that most airplane accidents involve at least one case of a skipped step or an improperly followed checklist."**

- **Be life cycle model agnostic**

- **Focus on practical advice, lessons-learned, and best practices**
 - **Avoid the standard processes—there is lots of guidance on that!**

Source: Watts S. Humphrey, "Why Can't We Manage Large Projects?"
CROSSTALK The Journal of Defense Software Engineering (July/August 2010)

# Life-Cycle and Track Context

Organization

- **Each activity area in the Checklist is intentionally short, focusing only on the *most critical* elements**

- **Some questions have** 🛑 **in the number column**
  - **Continuing forward without responding "yes" to these selected questions will likely result in future project rework, larger budget overruns, and schedule delays, more so than if the issue(s) had been dealt with earlier**

- **Three horizontal track activity areas describe key work elements in Program Management, Systems Engineering, and Acquisition**

- ***Choosing the appropriate horizontal track activity and the life cycle phase allows an essential subset of the questions to be identified***

Program Management Track
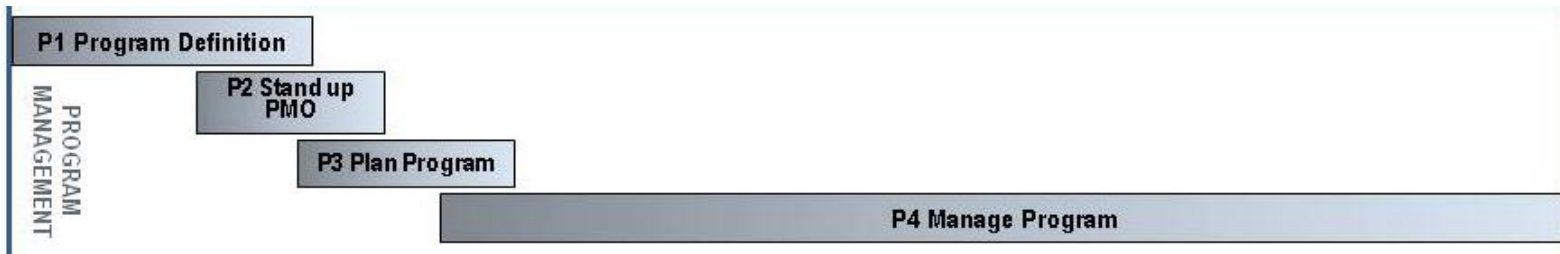
P1 **Program Definition** —Ensure that a clear and valid need can be met with a practical and cost-effective solution

P2 **Stand Up Program Management Office** — Stand up a PMO with the appropriate organizational structure and right resources

P3 **Plan Program** — Define a program to enable rapid, successful outcomes

P4 **Manage the Program** —Implement and execute all management processes fully

Systems Engineering Track
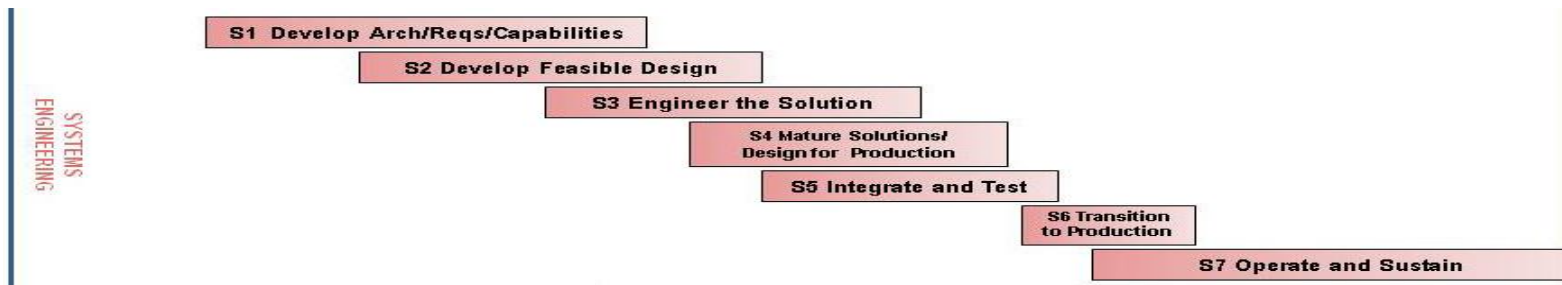
S1 **Develop Architecture/Requirements/Capabilities — Refine the high-level requirements into an architecture and with a more detailed set of operational and technical requirements**

S2 **Develop Feasible Design — Translate operational needs and requirements into a solution**

S3 **Engineer the Solution — Develop and follow a Systems Engineering Plan; address risks associated with the proposed solution**

S4 **Mature Solutions/Design for Production — Fully develop and integrate the capability**

S5 **Integrate and Test — Identify deficiencies in the system**

S6 **Transition to Production —Transition, document results, and capture lessons learned**

S7 **Operate and Sustain — Operate and maintain the system in its operational environment**

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Acquisition Track
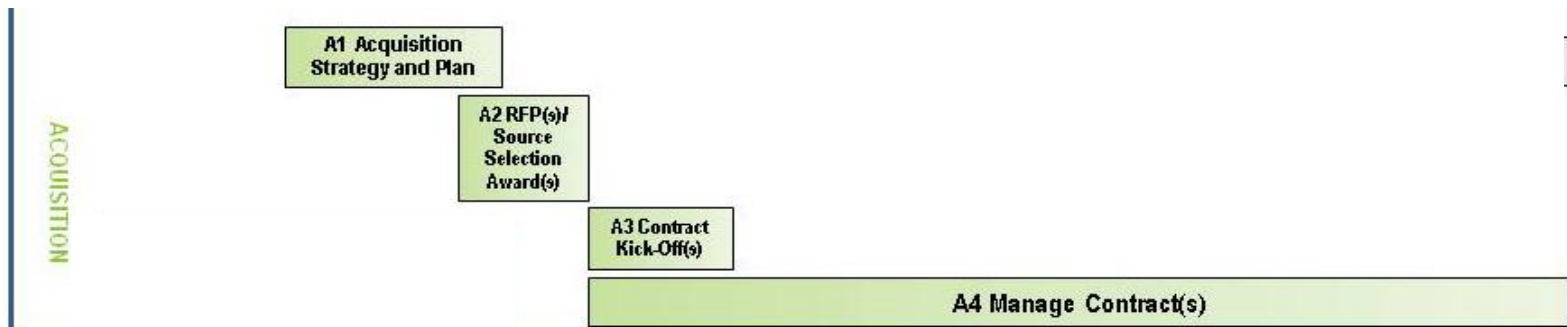
A1 **Acquisition Strategy and Plan —Establish how needed capabilities will be acquired, managed, and supported throughout the life cycle**

A2 **Requests for Proposals/Source Selection**

A3 **Contract "Kick-Off" — Ensure that the contract gets off on the right foot**

A4 **Manage Contracts — Manage for the duration of the contract(s) under the PMO's control**

Example

Note:

- **Stop Sign**
- **Reference**
- **Guidance**

P1 Program Definition		
#	**Question**	**Guidance**
P1.1	• Does the program meet an **urgent need**?[11]	Program success must be judged according to whether or not it meets a set of well-stated requirements.
P1.2 [STOP]	Has the program been clearly defined: • Do **key program objectives** meet user mission needs? • Do they align with the program's business case? • Are they attainable within given cost, schedule, risk, and resource constraints? • Have **outcome-based** performance measures been defined and are they linked to the user's strategic goals? • Have the scope and system boundaries been clearly defined and the basis of this definition documented?	This question addresses the challenge of scoping the requirements and ensuring that they are necessary for achieving the mission purpose intended for the system. Key Performance Indicators inform development of Key Performance Parameters (KPP) in the Acquisition Program Baseline (APB): Make sure that cost, schedule, resources are available to accomplish program objectives.
P1.3	• Are your program objectives reasonable, given multiple stakeholder and user interests? • Is there stakeholder and user buy-in on the program definition and objectives? • Is the stakeholder and user community prepared to provide the support necessary to make this program a success?	
P1.4	• Have the complex processes necessary to implement this new system, interfacing and integrating it with other legacy systems and other systems also under development, been identified, and addressed in the budget and schedule?	The rise of "system of systems" requiring the interaction of multiple systems that were not designed together can greatly increase the difficulty of creating a stable requirements base for a new system, as well as increase the complexity of implementing and interfacing a new system. The concept of coherence should also be addressed (i.e., the constituent systems should work together to efficiently achieve corporate or enterprise objectives).
P1.5	• Is the program achievable given the **political environment**? • Have any **policy issues** (e.g., small business set-asides) that might overly constrain the program been addressed? • Is there **buy-in** from appropriate oversight organizations?	The program executives should ensure that they have the appropriate advocacy. They should also be defining the user constituencies that will have a say in the program and developing a plan to engage them. If needed, the program should also work with the United States Government Accountability Office (GAO), the Office of Management and Budget (OMB), and other oversight organizations.

Way Ahead

- **Pilot and refine with several real programs from various federal agencies, each in a different phase of the lifecycle**

- **Facilitate further evolution of the checklist**
  - **A "living" document**
  - **Needs to be kept relevant**