GAO

Accountability * Integrity * Reliability

GAO Technology Readiness Assessment Guide: Best Practices for Evaluating and Managing Technology Risk in Capital Acquisition Programs

15th Annual NDIA Systems Engineering Conference
Technology Maturity Track

Background

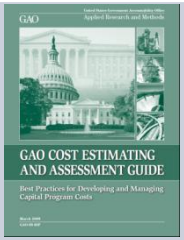
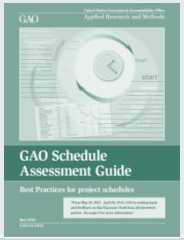
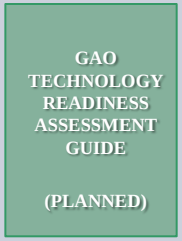
- GAO is planning to develop a Technology Readiness Assessment (TRA) Guide that builds on the success of the GAO Cost Estimating and Assessment Guide (http://www.gao.gov/products/GAO-09-3SP) and Schedule Assessment Guide (http://www.gao.gov/products/GAO-12-120G).

- The TRA guide will describe best practices for conducting technology readiness assessments of hardware and software for capital acquisition projects using established criteria and methodologies and provide program managers and decision makers tools to increase their understanding of technology risk.

- Best practices guides are unique efforts for GAO. They are not the products of audits and rely heavily on input from the expert community.

- GAO hopes to partner with DOD (Army, Navy, Air Force), other executive branch agencies, academia, and private industry to develop the TRA guide.

GAO Best Practice Guides Address Key Issues on Major Acquisition Programs

GAO Findings on Major Weapon Programs	GAO Best Practices Guides	
The total acquisition cost of DOD's 2011 portfolio of 96 MDAPs has grown by over $447 billion since their first full estimates		GAO Cost Estimating and Assessment Guide (GAO-09-3SP)
Delays in delivering initial capability average 22 months		GAO Schedule Assessment Guide (GAO-12-120G)
Most programs carry technology risks into system development that contribute to these poor cost and schedule outcomes		GAO Technology Readiness Assessment Guide (in development)

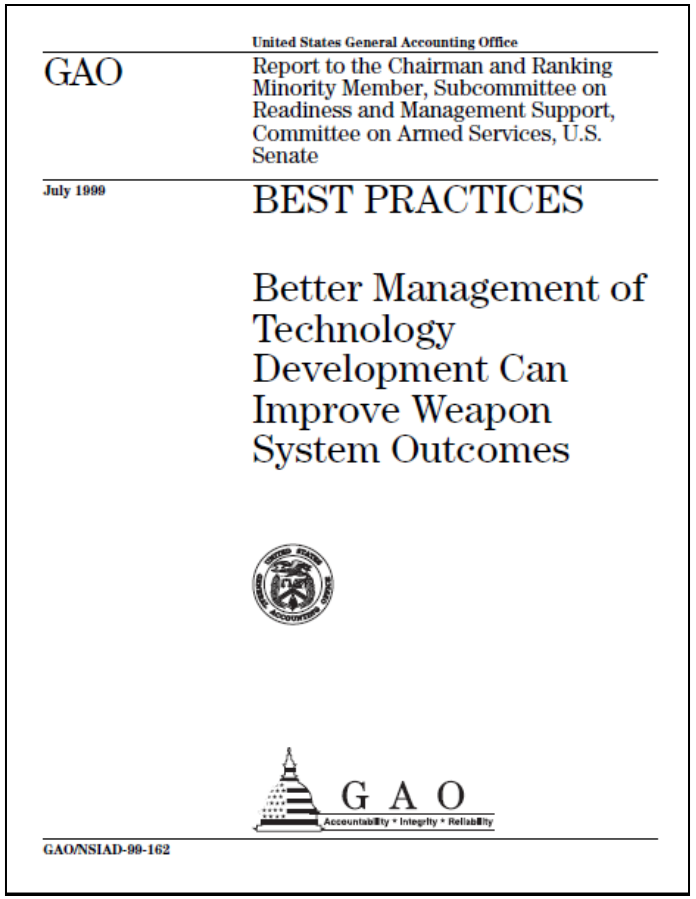
Why GAO is Developing a Technology Readiness Assessment Guide

- Raise awareness about the importance of technology readiness outside of the DOD and NASA. Reinvigorate practice at DOD.
- Give program managers and decision makers tools to put them in a better position to assess technology maturity and manage risk.
- Provide a common language on how to talk about technology readiness-related issues.
- Improve technology investment decisions and outcomes in light of budget constrained environment and decreased federal spending.
- Increase likelihood that science and technology projects are successfully transitioned from the lab to acquisition programs.
- Provide an audit tool for GAO analysts and others examining these issues.

What the Guide is Not

- An in-depth examination of technology development and technology transition practices
- A rigid set of rules that would stifle innovation or preclude risk taking in a science and technology setting
- An endorsement of a particular technology readiness assessment tool
- A technology assessment guide – GAO technology assessments examine the state of a technology area; the interactions of a technological innovation with society, the environment, and the economy; and the present and foreseen consequences and effects of those interactions

GAO's Technology Readiness Assessment-Related Work



United States General Accounting Office

GAO

Report to the Chairman and Ranking Minority Member, Subcommittee on Readiness and Management Support, Committee on Armed Services, U.S. Senate

July 1999

BEST PRACTICES

Better Management of Technology Development Can Improve Weapon System Outcomes

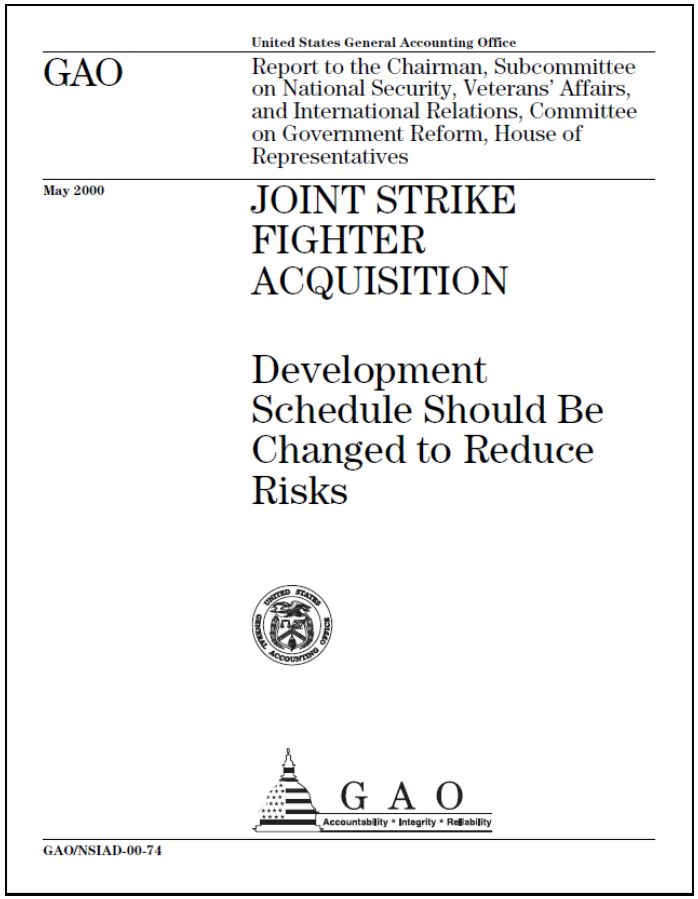
GAO

Accountability * Integrity * Reliability

GAO/NSIAD-99-162

- GAO's body of work on technology readiness began in the late 1990s.
- GAO found, in both DOD and commercial settings, that demonstrating a high level of maturity before new technologies are incorporated into product development programs puts those programs in a better position to succeed.
- GAO recommended that the DOD require that key technologies reach a high maturity level (TRL 7) before beginning system development (GAO/NSIAD-99-162).

GAO's Technology Readiness Assessment-Related Work



United States General Accounting Office

GAO

Report to the Chairman, Subcommittee on National Security, Veterans' Affairs, and International Relations, Committee on Government Reform, House of Representatives

May 2000

JOINT STRIKE FIGHTER ACQUISITION

Development Schedule Should Be Changed to Reduce Risks

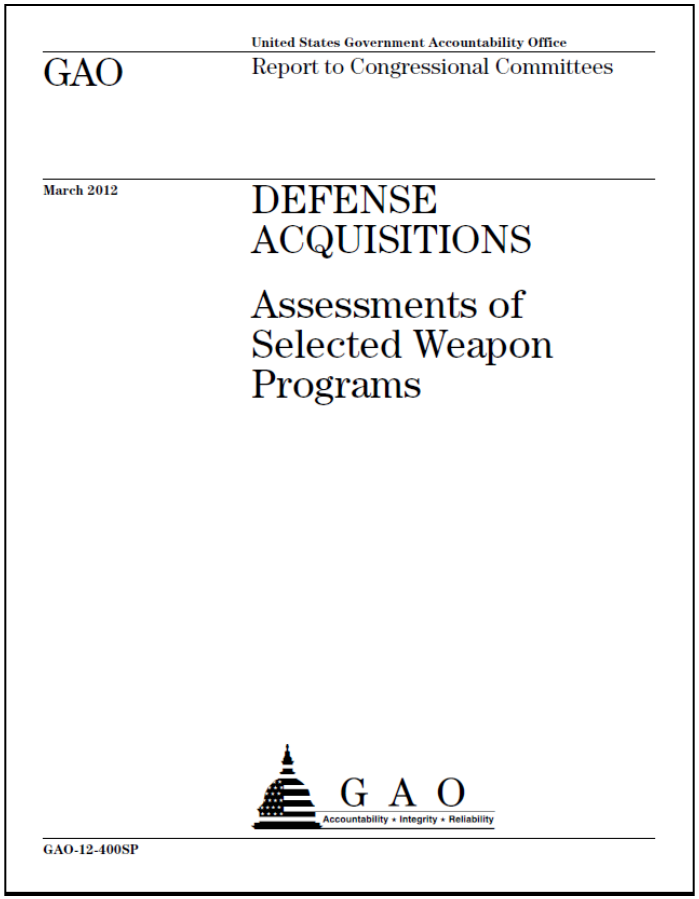
GAO

Accountability * Integrity * Reliability

GAO/NSIAD-00-74

- One of GAO's first evaluations of technology readiness on a major defense program was for the Joint Strike Fighter (GAO/NSIAD-00-74).
- GAO reported that all eight JSF critical technologies were at TRL 2 or 3 at program start and that none of the technologies would reach TRL 7 before the beginning of engineering and manufacturing development.
- GAO recommended delaying the planned start of engineering and manufacturing development until the program's critical technologies were mature.

GAO's Technology Readiness Assessment-Related Work


United States Government Accountability Office

GAO

Report to Congressional Committees

March 2012

DEFENSE ACQUISITIONS

Assessments of Selected Weapon Programs

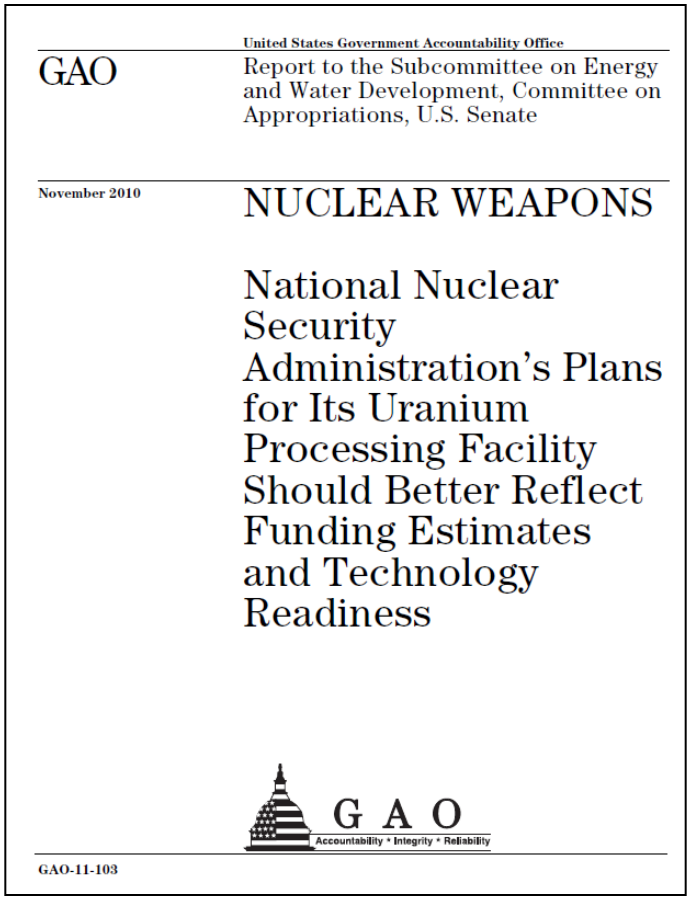
GAO

Accountability * Integrity * Reliability

GAO-12-400SP

- GAO's annual assessment of weapon programs (GAO-12-400SP) examined the technology readiness of 48 programs using technology readiness levels.
- Cost growth and schedule delays on these programs were, in part, attributed to technology risks carried into the development and production phases.
- GAO conducts a similar annual assessment of major NASA projects (GAO-12-207SP).

GAO's Technology Readiness Assessment-Related Work



United States Government Accountability Office

GAO

Report to the Subcommittee on Energy and Water Development, Committee on Appropriations, U.S. Senate

November 2010

NUCLEAR WEAPONS

National Nuclear Security Administration's Plans for Its Uranium Processing Facility Should Better Reflect Funding Estimates and Technology Readiness

GAO

Accountability * Integrity * Reliability

GAO-11-103

- In 2010, GAO examined technology risks on National Nuclear Security Administration's new multibillion dollar Uranium Processing Facility Assessment (GAO-11-103).
- GAO found that the agency was using technology readiness levels to evaluate 10 new technologies. Most of these technologies were not expected to reach the optimal level of maturity by construction start.
- DOE's guidance in this area was also not consistent with best practices or our prior recommendations.

Current Efforts and Next Steps

- The initial phase of the TRA guide project has focused on (1) determining the appropriate scope for the guide; (2) identifying the leading thinkers and organizations; and (3) determining if consensus exist among those thinkers and organizations on how to evaluate technology readiness.

- We are currently focused on finalizing our group of experts and bringing them together to provide input on the scope of the guide.

- Key questions related to the scope of the guide include whether and how to address software readiness and non-TRL based methodologies that are being used to assess technology and system readiness.

- Key dates: Expected kickoff meeting for experts group in Washington, DC (January 2013) – will provide the group an opportunity to comment on the proposed framework for the guide.

How Subject Matter Experts Can Get Involved

- Volunteer to be part of an experts group that would review and provide input on sections of the guide.
- Provide names of experts or groups that have knowledge about technology readiness assessment and risk management.
- Provide studies, reports, and/or articles that identify best practices, methods, and approaches for assessing technology readiness, maturity, and risk.
- Suggest world class companies or successful technology products that could make good candidates for case studies.
- The experts group for the cost guide has become an active community of practice and continues to meet to discuss current issues and possible updates to the guide.

GAO Contacts

For more information, please contact:

- Dr. Timothy Persons, Chief Scientist, 202.512.6522, personst@gao.gov
- Mr. Michael Sullivan, Director, 202.512.7915, sullivanm@gao.gov
- Mr. Ron Schwenn, Assistant Director, 202.512.9219, schwennr@gao.gov
- Mr. John Ortiz, Analyst-in-Charge, 256.922.7519, ortizj@gao.gov