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# ROOT CAUSE ANALYSES OF NUNN-MCCURDY BREACHES

VOLUME 1

*Zumwalt*-Class Destroyer, Joint Strike Fighter,  
Longbow Apache, and  
Wideband Global Satellite

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Prepared for the Office of the Secretary of Defense

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NATIONAL DEFENSE RESEARCH INSTITUTE

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## Summary

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### Background and Purpose

As a result of continuing program cost growth and observations by the Government Accountability Office (GAO) placing defense acquisition on the high-risk target list, Congress continued to refine and expand on program execution controls. In this report, we focus on the mandates for root cause analysis and performance appraisal of major defense acquisition programs (MDAPs) and how RAND supported DoD (that is, the director of the PARCA office in the Office of the Under Secretary of Defense, Acquisition, Technology, and Logistics [OUSD AT&L]) as it executed its responsibilities for analysis and certification of MDAPs that had breached Nunn-McCurdy thresholds. The research and analysis performed by RAND and the conclusions it reached formed a foundation of the inherently governmental function of program certification required by statute.

In the face of six MDAP cost threshold breaches reported by several secretaries of the military departments, the PARCA director determined that he required support to execute his statutory responsibilities and turned to FFRDCs and academia to provide that support for the program execution status research and analysis. Along with the Institute for Defense Analyses (IDA), Center for Naval Analyses (CNA), and the University of Tennessee, RAND was engaged to perform analysis and provide recommendations. RAND was assigned sole responsibility for three programs: Wideband Global Satellite (WGS), Long Bow Apache Helicopter (Apache Block III), and *Zumwalt*-Class Destroyer (DDG-1000). In addition, RAND shared the analytic effort for a fourth program, the Joint Strike Fighter (JSF), with IDA and the University of Tennessee.

For RAND, these efforts were somewhat unusual on several levels. The time allowed under the statute from the moment the breach was announced to the need for certification was very short. The time limit drove the use of already available material held by the government to perform analysis. Research was conducted in concert with government offices (in point of fact, it could not have happened otherwise given the time available), often under the direction of DoD offices and officials. DoD officials used the results of RAND's research and analysis by performing their inherently governmental functions well before the production of even a draft report. As a consequence of the resulting approach to this shared set of responsibilities, the Secretary of

Defense was able to perform his certification responsibilities to allow program continuation. The materials found in Chapters Three through Six of this report represent the results of the RAND research and analysis efforts used by DoD in arriving at program certification.

As noted above, time did not allow for generation of fresh data. DoD made available to four RAND research and analysis teams (one for each of the designated programs) the cost, schedule, and performance data in existing DoD databases. The four RAND teams, each headed by a senior RAND researcher, performed data analysis, engaged both applicable contractor and appropriate government personnel in in-depth discussions on program status, and reviewed pertinent previous RAND efforts and documentation to distill program understanding.

Each program represented a different set of conditions and, as a result, required tailored approaches to produce the requisite material in support of the government's process. The fundamental questions to be answered were stipulated in statute, and the PARCA office established an approach to display the findings at a summary level. Both are discussed in greater detail in Chapters One and Two. Some of the causes identified, such as quantity changes and unfounded technical expectations, were found in most of the programs. Several unique findings led to an examination in greater depth of the metrics available to enable progress review. That, in turn, led to a finding that greater attention needs to be paid to the metrics currently in vogue because they do not appear to cover adequately some aspects of program execution. This issue becomes even more significant in light of another finding. To satisfy statutory demands fully, the root cause analysis and performance assessment processes need to be conducted on a continuum that examines and reports on the same issues over time, thereby requiring more than static metrics. Finally, given the state of the industrial base, a better understanding is required of the interrelationship of government and commercial lines of business within a defense contractor as well as the importance of the financial health of any contractor supplying goods and services to DoD.<sup>1</sup>

What is certain is that if DoD is to continue to perform the PARCA office functions as it did in the initial process, a better understanding of the full range of data available needs to be developed, and access to those data needs to be better enabled. Of particular interest and discussed further in Chapter Seven is greater access to the Defense Acquisition Management Information Retrieval (DAMIR) system and to service program briefings.

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<sup>1</sup> Loren Thompson of the Lexington Institute emphasizes that latter point in his recent article on the financial travails of Oshkosh. See Loren B. Thompson, "Oshkosh Vote Shows Danger of Rewarding Aggressive Bids from Shaky Companies," *Lexington Institute Early Warning Blog*, September 3, 2010.

## Results

### Root Causes

Although our work on root causes identified several contributory factors, our analysis of the four programs indicates that three were common across all four programs: planning, changes in the economy, and program planning. Table S.1 provides a summary of the root cause analyses of the four programs reviewed, listing the causes in

**Table S.1**  
**Comparison Matrix of the Root Causes of Program Cost Growth**

Category	Root Cause of Nunn-McCurdy Breach	WGS	Apache	DDG-1000	JSF
Planning	Underestimate of baseline cost	√	√	√	√
	Ambitious scheduling estimates			√	√
	Poorly constructed contractual incentives	√√			√
	Immature technologies		√√	√	√√
	Ill-conceived manufacturing process			√	
	Unrealistic performance expectations			√	
	Delay in awarding contract			√	
	Insufficient RDT&E	√	√	√	√
Changes in economy	Increase in component costs	√√	√	√	√
	Increase in labor costs		√		√
	Discontinued/decreased production of components	√			
	Decreased demand for similar technology in private sector (economies of scale)	√			
	Inflation	√	√	√	√
Program management	Production delays	√√		√	√√
	Change in procurement quantities				
	Increase	√	√√		
	Decrease			√√	√
	Unanticipated design, manufacturing, and technology integration issues		√√	√	√√
	Lack of government oversight or poor performance by contractor personnel			√	√
	Inadequate or unstable program funding	√	√	√	√
Accounting artifact	√				

NOTE: √ = Root cause, √√ = Significant root cause.

each of the three categories. A single check mark indicates a root cause, and double check marks indicate a significant root cause.<sup>2</sup> As the table shows, underestimation of baseline cost; increases in component costs; insufficient Research, Development, Test, and Evaluation (RDT&E); inflation; and increased, inadequate, or unstable program funding were identified as root causes in all four programs. For the WGS, the increase in component costs was a significant root cause. The prevalence of these same factors across four very different programs may indicate systemic root causes that warrant increased attention in future program planning.

### **Lessons Learned**

Our analysis of the root causes of the Nunn-McCurdy breaches led us to draw the following lessons learned:

- Production delays increase exposure to changing private sector market conditions, which can result in cost growth.
- Acquisition flexibility (e.g., start-stop programs) comes with a cost.
- Cost estimates should be conducted independently of a program manager.
- Combining remanufactured and new build items causes complexity and can lead to cost growth.
- Greater planning of manufacturing process organization is required.
- Large reductions in procurement quantities can significantly increase per unit cost.
- Sufficient RDT&E is required to ensure the “produce-ability” of a program.
- Greater government oversight of the contractor is required in a technologically complex project.
- More “hedges” against risky elements of program are required.
- Additional collaboration is needed on design specifications and discussion of cost-performance trade-offs.

These lessons can help project managers avoid cost increases if they are attended to promptly in the early phases of the program. For example, when a program has obvious technical complexity, the program manager should take steps early in the project to ensure that the government has made adequate provision for oversight of the contractor.

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<sup>2</sup> The discrimination between a root cause and significant root case was a qualitative assessment of the magnitude of the effect in contributing to the Nunn-McCurdy breach.