

Sources of Program Cost Growth

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constant dollars) must submit an annual SAR to the Congress. Summaries of SARs are posted on the Web site of the under secretary of defense for acquisition, technology and logistics at <www.acq.osd.mil/ara/am/sar>.

The SARs for the years since the 9/11 terror attacks show both an increase in the number and cost of reportable major defense acquisition programs. News articles on the subject have somewhat distorted the facts and failed to fully explain the increases. I will discuss three reasons for this apparent cost growth and the root causes of the actual and estimated cost increases. The bottom line is that the actual cost growth isn't as bad as reported in the media. In fact, the actual cost growth experienced in completed programs since 9/11 is comparable to historical program cost growth. Finally, I want to propose a few changes to the SAR that would make it a more effective tool for communicating program costs to the Congress.

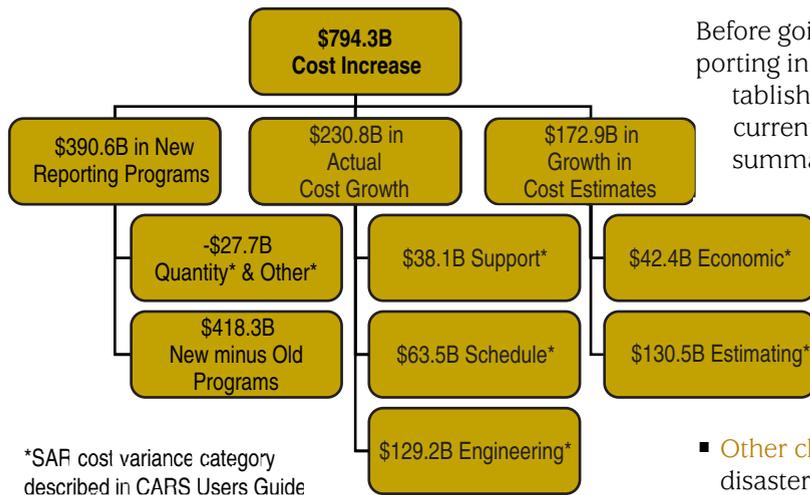
In its budget bulletin of July 28, 2006, the Republican staff of the Senate Budget Committee wrote, "An examination of the most recently posted SAR, dated December 31, 2005, provides data for 85 programs totaling \$1.585 trillion in combined R&D [research and development] and procurement costs. The SAR of September 2001—the last SAR to reflect pre-9/11 acquisition decisions—reported 71 programs totaling \$790 billion. *In only four years, the Department's total cost of major programs doubled*" (emphasis added). What were the causes for this apparent doubling? An analysis of SARs from December 2001 through December 2005 reveals three major reasons for the cost growth of \$794.3 billion: new reporting programs; actual cost growth; and growth in cost estimates.

New Reporting Programs

New reporting programs added \$390.6 billion (49 percent of the increase). The SAR summary tables posted on the Web identify 48 new or reinstated programs from December 2001 to December 2005. During the same timeframe, 34 programs were either completed or terminated. Thus, the net result was 14 additional SAR programs. In nearly every report, new or existing programs meeting the RDT&E and procurement

Congress uses the Department of Defense Selected Acquisition Report (SAR) to oversee defense acquisition programs. In addition to other information, the SAR provides the program's original or current cost estimate baseline and cost growth from that baseline. Acquisition programs requiring expenditures of more than \$365 million in research, development, test, and evaluation (RDT&E) or \$2.190 billion in procurement (both in fiscal year 2000

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Breakdown of Cost Growth

dollar reporting thresholds were added to the SAR, while other programs were deleted, based upon completion or termination.

Among the programs and dollar amounts that became reportable since 9/11 were the Army's Future Combat System development (\$164.6 billion); the Navy's Future Aircraft Carrier procurement (\$31.7 billion); the Navy's Destroyer DDG-1000 initial procurement (\$27.8 billion); and the Joint Strike Fighter initial procurement (\$198 billion). In the case of the Army, the development cost of the Future Combat System was funded by stopping developments or terminating procurements of some 30 lower-priority systems. In addition, the Chemical Demilitarization Program was split into three separate reporting programs. Clearly, not all of this new program increase should be considered as new budget authority. Rather, more of the existing acquisition budget met reporting thresholds and was therefore visible to the Congress in the SAR. All told, the net increase in dollars reported in the SAR, calculated by subtracting completed and terminated program costs from new program cost estimates, was about \$418.3 billion. The breakdown of cost growth is shown graphically above.

The Congress should be happy that the DoD is reporting on a greater percentage of its acquisition (RDT&E and procurement) dollars. From fiscal 2002 to fiscal 2005, DoD's annual acquisition budget authority increased 37 percent, from \$104.7 billion to \$143.8 billion. However, during the same period, acquisition dollars reported in the SAR increased by 57 percent, from \$39.9 billion to \$62.6 billion. In other words, for every acquisition dollar appropriated, the Congress was getting SAR reports on about 38 cents in fiscal 2002 and 44 cents by fiscal 2005. Any way we slice it, the Congress got more information on a greater percentage of the DoD acquisition budget as a result, in great measure, of new reporting programs that met SAR thresholds.

Before going further, we need to understand variance reporting in the SAR. Once a program's cost baseline is established, variances between that baseline and the current estimate of program costs are quantified and summarized. Cost variances are categorized and reported according to seven categories of cost change, as described in the Consolidated Acquisition Reporting System (CARS) Users Guide, and recapped below.

- **Quantity change:** cost variance resulting from a change in the number of end items being procured
- **Other change:** changes in program cost due to natural disasters, work stoppage, and similarly unforeseeable events not covered in other variance categories
- **Support change:** changes in program cost associated with training and training equipment, peculiar support equipment, data, operational site activation, and initial spares and repair parts
- **Schedule change:** cost variance resulting from a change in procurement or delivery schedule, completion date, or intermediate milestone for development or production
- **Engineering change:** cost variance resulting from an alteration in the physical or functional characteristics of a system or item delivered, to be delivered, or under development after establishment of such characteristics
- **Economic change:** cost variance resulting from price-level changes in the economy, including changes resulting from actual escalation that differs from that previously assumed and from revisions to prior assumptions of future escalation
- **Estimating change:** cost variance due to correction of an error in preparing the baseline cost estimate, refinement of a prior current estimate, or a change in program or cost estimating assumptions and techniques.

We have accounted for these categories of cost variances by placing them under the appropriate reasons for cost growth in the graphical representation. Since quantity and other changes are baseline cost changes, usually beyond the control of the program manager, we place them together under new reporting programs. Because support, schedule, and engineering cost changes represent events that have or will result in actual cost variances, we place them under actual cost growth. And, since economic and estimating changes represent future costs that may or may not be realized, we place them under growth in the cost estimate.

Finally, to conclude our discussion of growth resulting from new reporting programs, we can offset the growth in new programs with modest decreases based upon quantity (-\$27.1 billion) and other factors (-\$0.6 billion) reported as SAR variances from December 2001 to December 2005. This is reflected in the figure as “-\$27.7 billion Quantity & Other.”

Actual Cost Growth

The SAR reports from December 2001 through December 2005 indicate that actual cost increases of \$230.8 billion (29 percent increase) break out as follows: support cost (\$38.1 billion); schedule (\$63.5 billion); and engineering (\$129.2 billion). The SAR summary tables also provide some interesting reasons for actual cost growth in these areas.

Support Costs

In one program, a “refined definition of support requirements” added nearly \$4 billion to the program’s cost estimate. In another program, a change in the “mix” of aircraft in a squadron added \$243 million. As program quantities increased, additional simulators and training devices were needed. As programs were stretched out, costs were added to deal with the problems of part obsolescence. In several programs, software support estimates were revised upward. Service-life extension of the system was also cited as a reason for support cost growth.

Schedule

Any stretch-out of the schedule, whether the result of development and testing issues or lower production rates, brought on increased cost. Many programs cited extended development and testing to deal with integration challenges or performance and reliability problems. In addition, several programs lost procurement budget to higher priorities. The resultant lower production rates simply cost more.

Engineering

As expected, additional requirements drove cost increases in this area. However, shifts in policy were also at work to increase cost. For example, within helicopter programs, full component recapitalization and the decision to procure new aircraft instead of remanufacturing old aircraft added billions to the estimates.

Completed or terminated programs are an important subset of the actual cost growth piece of the total cost growth pie. These programs can account for most, if not all of their actual costs and we can now determine their “Cost Growth Factor” or CGF. The CGF is the ratio of actual costs to estimated costs. When we examine only the 19 programs completed or terminated with cost overruns between September 2001 and December 2005, we get a CGF of 1.27. In other words, programs completed or terminated during that period overran their baseline estimates by about 27 percent. Since these programs totaled \$146 billion when completed or terminated, the total overrun was about \$31 billion.

Had we added together cost growth for all programs, including those programs not yet completed, we would have been adding apples to oranges—and in effect, this is what the news articles mentioned earlier did. On the

surface, it would appear that cost growth from the September 2001 to the December 2005 SAR report was over 100 percent. However, that high percentage is based upon a mixture of actual costs, estimated costs, and new reporting programs. Actual or real cost growth, based purely upon programs completed in that timeframe, was significantly less.

In 2006, The RAND Corporation released a study on the historical cost growth of completed weapon systems. Based upon a review of 68 programs completed during the period 1968 to 2003, the study concluded that cost growth was about 46 percent from Milestone B to completion and 16 percent from Milestone C to completion. So our actual cost growth for completed or terminated SAR programs between September 2001 and December 2005 appears to be within the range of RAND’s study.

Growth in Cost Estimates

Growth in cost estimates was about \$172.9 billion (22 percent of increase). Thus, the balance of the reported cost growth lies in the cost estimates of the programs not yet completed. In the December 2001 through December 2005 SAR reports, cost estimate increases are broken into two categories: economic (\$42.4 billion) and cost estimating (\$130.5 billion). Again, the SAR summary tables provide some interesting reasons for estimated cost growth in these areas.

Economic

In numerous programs, revised escalation rates were cited as a reason for cost growth. This is an unfortunate consequence of looking at “then-year or current dollar” rather than “base-year or constant dollar” program costs. “Current dollar” estimates mask true cost growth because they are escalated to account for future inflation and outlay rates. In addition, direct labor and overhead rate increases resulting from changes in the contractor base were common causes of cost growth.

Cost Estimating

The refinement of cost estimates and the use of different cost estimating methods were often cited as reasons for cost estimating growth. For example, one program changed from parametric estimating to extrapolation from the actual costs experienced during prototype development. This resulted in a higher cost estimate. Another program reported more definition to the work breakdown structure and that the estimate had been increased based upon actual labor and materials costs. Reports also indicate that there was greater realism in the learning curve as a program moved into production. Assumptions about great learning made early in the program failed to materialize, and the expected rate of learning was less than the rate assumed when the cost estimate was developed. As a result, costs were higher.



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**Observations and
Recommendations**

Recapping, we found that 49 percent of the apparent cost growth in SAR programs between September 2001 and December 2005 was in new programs meeting reporting thresholds. Twenty-nine percent of the cost growth was actual cost growth characterized by support, schedule, and engineering changes. And 22 percent of the apparent cost increase was to account for changes in economic and cost estimating assumptions.

Clearly, there is a need for DoD to communicate more clearly with the Congress in the SAR. In its current form, costs can easily be misinterpreted. Digging out the statistics for this analysis alone required review of 13 SAR reports spanning five years. For programs filing their last SAR, the costs are actual costs and the associated overrun or underrun is real. For new programs in early development, the costs are weighted heavily toward estimates that may or may not materialize. Moreover, as programs move into the production phase, estimates to completion contain more actual costs and less estimated costs. Therefore, even within a single program, we need to identify actual versus estimated cost growth.

There is also the issue of SAR thresholds. Some programs never meet the reporting thresholds and are never counted in the total numbers. Still other programs suddenly appear in the SAR when they exceed the threshold, even though they may have been ongoing for many years. While necessary to limit the number of programs reported, thresholds have the negative effect of muddying the waters when it comes to comparing total costs from one report to the next or when comparing reports over several years.

The fiscal 2007 National Defense Authorization Act requires that the DoD conduct a study on revisions to requirements related to SARs. The study will focus on incorporating into the SAR elements DoD regards as most relevant to major defense acquisition program performance, especially with respect to program costs and schedule before the program receives Milestone B approval. Based upon the misunderstanding of cost growth over the past four years, it would be prudent for the DoD to recommend several changes to the SAR.

First, by having to report cost variances in base-year and then-year dollars, the DoD is thrust into the political game of predicting the economic future. Take away the issue of inflation and outlays by reporting only in base-year dollars. The added benefit is that programs reported in base dollars of the same year can be compared from year to year to determine real increases or decreases in actual costs and cost estimates.

Second, program costs should be depicted in the SAR as actual costs incurred to date and estimated costs to completion of the program. Don't mix actual and estimated costs. Program managers and contractors already know actual versus estimated costs if they are managing their program using the techniques of Earned Value Management. Furthermore, by breaking out actual costs from estimates, we can calculate the cost growth factor to date and use that factor in testing the cost estimate to completion.

Third, the SAR should tie growth in actual and estimated costs to specific root causes. The current report summarizes cost growth in seven broad categories. Although reasons for growth are identified in the SAR narrative summary, there is no clear audit trail back to the root cause(s) of these increases.

Finally, programs should not be reported based solely upon achieving a threshold dollar amount. Rather, programs should be reported in the SAR based upon the capability they will achieve for the warfighter. For example, if an unmanned air reconnaissance capability is needed, all programs enabling that capability, regardless of program cost, should be reportable in the SAR. This approach would enable the Congress to oversee the linkage of capabilities and funding.

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