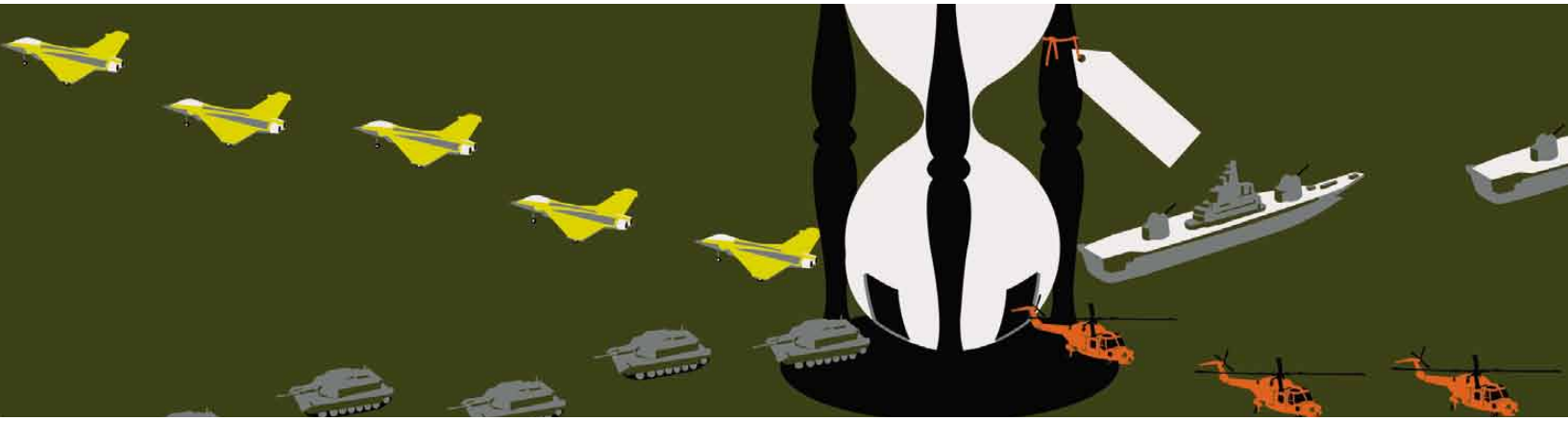


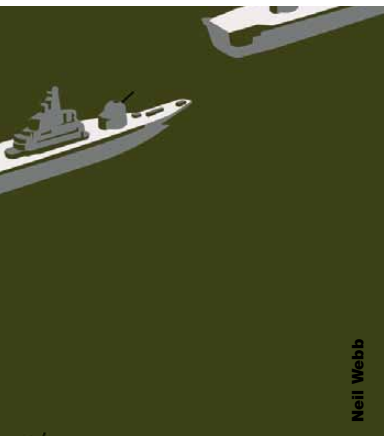
Improving US equipment acquisition

To address the perennial problems of cost overruns and lengthy delays in its major acquisition programs, the United States must introduce two elements critical to lasting acquisition reform: long-range budget planning and objective portfolio management.

John Dowdy and John Niehaus

Equipment acquisition is notoriously difficult, too often characterized by cost growth and years-long delays. Painfully public examples abound from around the world: in the US, the V-22 Osprey aircraft had an estimated price tag of $2.5 billion in 1986, but by 2008 it had cost the US military some $27 billion, and another $27 billion is required—this for only about half the units originally planned. The United Kingdom has had major cost overruns and delays in several of its equipment programs (see “An expert view on defense procurement,” p. 22). The European military transport aircraft Airbus A400M is at least three years behind schedule, as is Australia’s Wedgetail early-warning system. Refit and modernization costs for the Russian carrier Admiral Gorshkov, sold to India, have ballooned from $700 million to more than $2 billion. The list goes on.

Acquisition inefficiency in the United States is notably troublesome because of its scale and persistence. Interestingly, there is a large volume of available information and history to shed light on the issues. In this article, we present our perspective on the root causes of the problem as well as recommended solutions. Although we focus on the United States, the issues should sound familiar to defense ministries around the globe, and most of our recommendations apply equally to other countries seeking higher returns from their national-security investments.


Neil Webb

Too costly, too late, too few

Currently, the US Department of Defense has 96 major equipment programs—referred to as Major Defense Acquisition Programs, or MDAPs—totaling $1.6 trillion in capital commitments. MDAPs are at the center of the US's equipment-acquisition problem. Simply put, the problem is threefold: the programs are too costly, both on a per-unit and aggregate basis; too late; and too few—that is, a typical program routinely yields far fewer units than planned.

In recent years, US taxpayers have faced a series of "capital calls" requiring an additional $300 billion to cover cost growth alone. An examination of individual programs shows that on average, an MDAP experiences 50 percent cost growth per unit. Unfortunately, many programs experience far greater cost growth: the F-22 and V-22 aircraft, the Evolved Expendable Launch Vehicle (EELV), the Expeditionary Fighting Vehicle (EFV), and the DDG-1000 destroyer, among others, all cost two to three times their baseline estimates.

The second problem is timing: the gestation time from program start to initial operating capability for major weapon systems has grown persistently. For example, the F-15 and the F-16 aircraft each took 6 years to develop; 30 years later, the F-22 required almost 20 years and the F-35 is on a similar course. In warships, three decades ago the Aegis cruiser CG-47 took just over 4 years to build; the DDG-51 took 6 years; the planned DDG-1000 is projected to take 17 years.

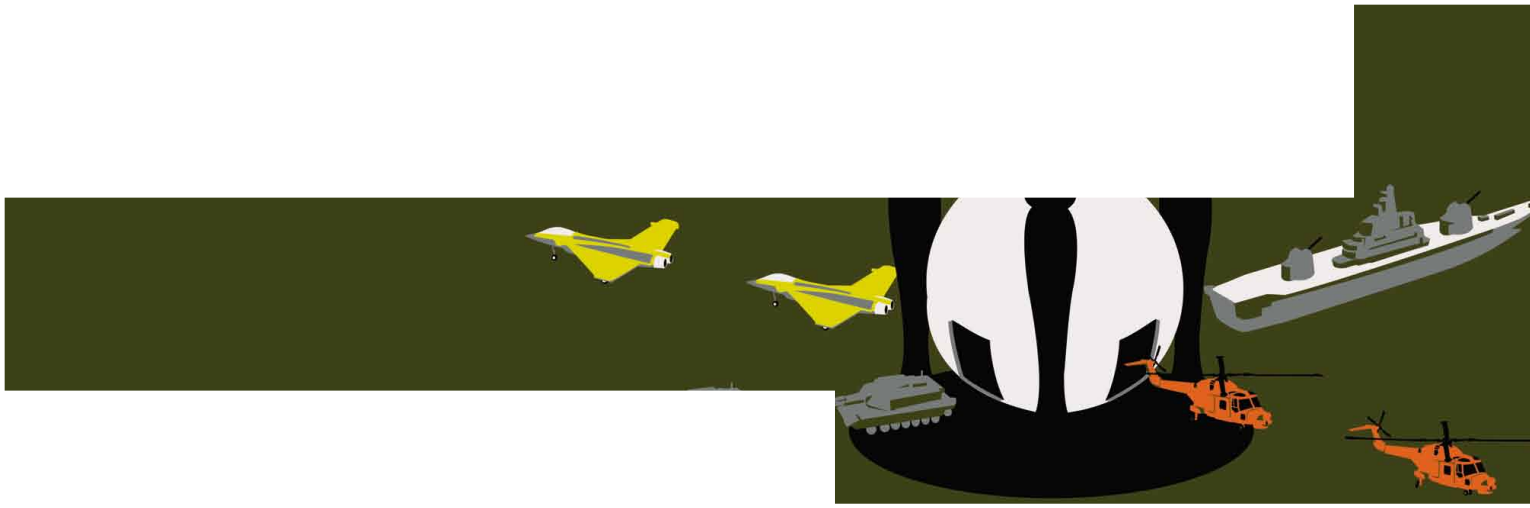
The third problem—not enough volume—tends to become a trade-off made in the quest for maximum performance. Ever-shrinking numbers of ever more "exquisite" weapons, while not the intent, is certainly the result. The armed services wind up procuring far fewer units than they plan for—and almost certainly far fewer than required to maintain force-structure objectives. The number of combat aircraft units that the US Air Force procures, for instance, has declined at an annual rate of approximately 5 percent over the past 50 years. The US Navy's fleet has steadily gotten smaller as well (especially as measured in gross tonnage).

These problems are not new. Take the case of air-superiority fighters. In 1986 the Air Force planned to replace approximately 850 F-15s with 750 Advanced Tactical Fighters—a plan that was never credible given that combat-aircraft costs grow at an annual rate of 4 percent while the military aircraft budget grows at barely 1 percent, if at all, over the long term. It was clear from the outset that the Air Force could not possibly afford more than 400 units of what became the F-22A program. It is hardly surprising that the end result has been about 200 units.

This type of poor planning has persisted well past the end of the Cold War. The Transformation Satellite (TSAT) program is among the most recent examples of aspiration exceeding affordability. Designed to serve as the backbone of the Global Information Grid, TSAT was clearly going to cost two to three times more than its predecessor, the Advanced Extremely High Frequency (AEHF) satellite system—which, in turn, cost a multiple of the Milstar system it is currently replacing. But the budget for military space programs grows at about the same rate as the military aircraft budget—that is, hardly at all. So, from the beginning, TSAT was bound to fail.

Why recent reforms are not enough

Some might say that recent legislation and DOD policy have already addressed acquisition reform. Indeed, the DOD has taken some positive steps. One recent study, the Defense Acquisition



Performance Assessment, made a number of recommendations, the two most important being the recommendation to plan, to an 80 percent probability (as opposed to the typical 50 percent), the development of a technical solution on time and on budget, and the enforcement of "time-certain" development—that is, constraining time and therefore cost, forcing more technically realistic mission solutions. In addition, the Weapon Systems Acquisition Reform Act of 2009 attempts to drive policy that forces more conservative and realistic program strategies.

These steps are helpful and important—but not enough. The focus to date has been on acquisition policy at the program level, often referred to as "small a." We believe it is at the enterprise level—"Big A"—that major gaps remain, the most glaring of which are the lack of long-term budget-planning strategies and effective portfolio management.

The armed services are perpetually seeking to develop higher-performing, and therefore more costly, weapons systems, yet there is no systematic approach to ensure that adequate funds will be available. Detailed program planning and associated budgets are driven by the individual services, and trade-offs are made based on the annual budget and the current political situation. At times, the DOD attempts to bring a long-term view to the process but struggles in part because its approach is more conceptual than quantitative. The Quadrennial Defense Reviews, for example—although certainly necessary—are insufficient because they are largely words.

The closest activity to a long-term plan is the Future Years Defense Program (FYDP). But the FYDP is an obligatory report to Congress, not a proper plan by which the DOD and Congress manage capital investments. Also, the FYDP looks ahead only five years—too short a planning horizon given how long it takes to develop a significant new program or capability. Perhaps most important, the FYDP is not a forcing mechanism to ensure that the armed services' plans, especially acquisition programs, are collectively affordable over the long term.

The other major problem at the "Big A" level is that the US government fails to manage MDAPs as a portfolio of strategic investments. From 2000 to

2008, the number of MDAPs increased from 75 to 95, and the portfolio's capital commitment doubled to an astounding $1.6 trillion. Did the government consciously make this long-term commitment? The answer is no—new MDAPs were assessed and committed to one at a time.

Toward enterprise-level acquisition reform

The root causes of systemic failure in US equipment acquisition are poor planning and an inability to make the necessary trade-offs in a world of finite budgets. In our view, there are two critical elements of lasting acquisition reform: detailed budget planning and objective portfolio analysis. Taking the following steps is imperative if the US government wants to solve its "Big A" issues.

Develop a long-range capabilities investment plan

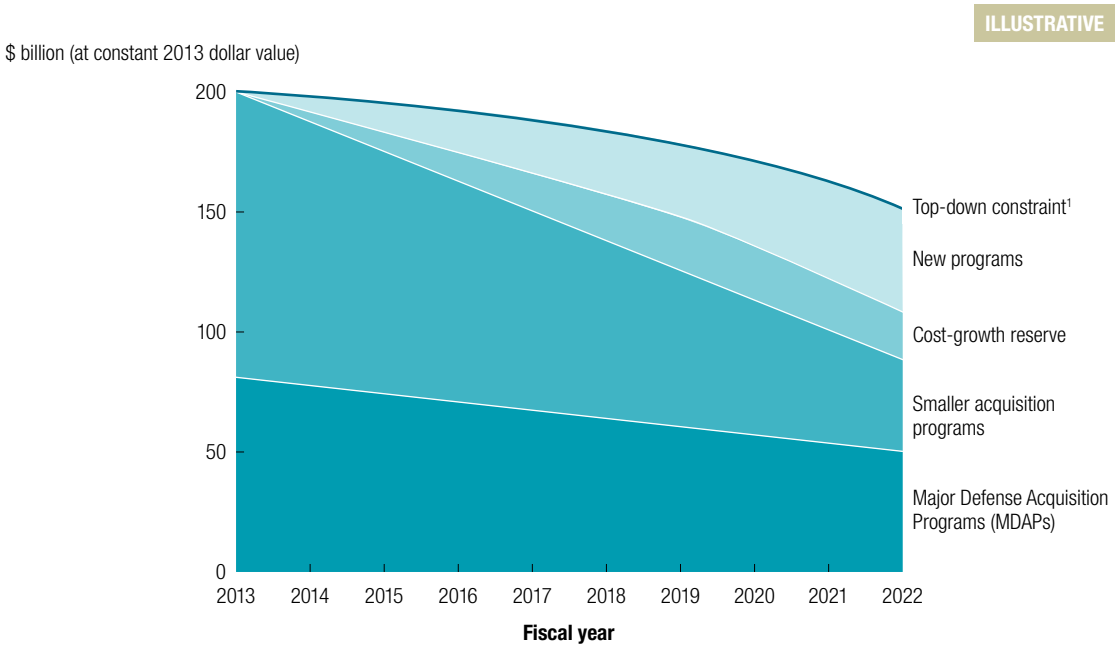
We see an opportunity to leverage the FYDP, among other existing budget resources, to enable the development of a long-range capabilities investment plan (LRCIP)—a fact-based plan that takes into account realistic assumptions and constraints, and one that reconciles "bottom up" estimates with "top down" budgets (exhibit).

Define ten-year budget plans, both top-down and bottom-up. We believe the DOD should extend the planning horizon of accounts within its base budget to ten years, in line with the time horizon of the US government's budget. The line item for national defense in the US budget should be the DOD's top-down budget constraint. In particular,

Exhibit

Long-range capabilities investment plan

The LRCIP should include reserves for cost growth and new capabilities.



[1]DOD investment including both Procurement and RDT&E accounts.

the DOD should estimate how much of the national defense funding will be available for the research, development, testing, and evaluation (RDT&E) and procurement accounts over the ten-year period. These estimates will provide a clear set of top-down boundaries for investment in new capabilities.

The bottom-up program plans should similarly be extended to ten years. Whereas the mechanics behind the FYDP enable the bottom-up summation of DOD's program portfolio, the FYDP's five-year horizon is simply not long enough. The DOD should expand the mandate of the newly created Cost Assessment and Program Evaluation (CAPE) directorate, which is responsible for developing the FYDP, to include the formulation of an LRCIP with ten-year budget projections for all approved programs.

An extension to ten years will expose the hockey-stick effect in projected costs as programs mature from the technology research phase into the production phase. One could argue for an even longer planning horizon given recent development cycle times, but assuming acquisition reform succeeds in driving development cycle time below five years, then a ten-year horizon should suffice.

Add "cost growth" and "new capabilities" as line items. Budgeting for cost growth is not, as some may think, planning for failure; it is merely being fact-based and sensible, given the track record of acquisition programs. But it is also politically sensitive. The independent nature of the CAPE office may be well suited for developing a cost-growth estimate for each program, and then summing up those estimates into an aggregate number to be included in the LRCIP. Of course, higher-risk programs will have higher cost-growth estimates.

Inevitably, and especially over a ten-year planning horizon, new programs will emerge to provide new capabilities to war fighters. If the investment plan is fully committed to existing or "known" requirements, then by definition the plan is flawed—it has no room to accommodate innovations and uncertainty. Although challenging to estimate, some reasonable portion of the budget should be set aside for "white space" future investment needs. Again, CAPE, with input from the services and war fighters, should be responsible for developing this element of the LRCIP.

Reconcile bottom-up with top-down budget estimates. The bottom-up budgets, along with objective estimates for cost growth and new capabilities, must then be reconciled with the top-down budget—the funding available for RDT&E and procurement in the US government's budget. To be clear, there is currently no requirement for DOD to undertake any such reconciliation.

Unquestionably, the process of reconciliation will be immensely challenging. It will expose affordability issues, particularly around high-risk MDAPs, and will compel all key stakeholders

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(Congress, the Office of the Secretary of Defense (OSD), the armed services, and even war fighters) to debate the issues. The LRCIP should be at the center of debate and discussions within DOD, and between DOD and Congress. In fact, the OSD—not the armed services—should lead the LRCIP dialogue with Congress. Through this process, the DOD and Congress will take collective control over an aspect of the acquisition system that currently commits to far more than it can actually afford.

Manage MDAPs as a portfolio

The United States will invest on the order of $2 trillion in developing and procuring weapons systems over the next ten years, and will do so through thousands of programs. Centrally managing all these programs is neither practical nor necessary. But the government's piecemeal approach to managing MDAPs is suboptimal at best—it systematically inhibits the elimination of low-ROI investments, at the expense of higher-return (and often higher-priority) programs.

There are only 96 MDAPs—a reasonable number for the government to manage as an integrated and finite portfolio. How might the government accomplish this? Looking to the commercial realm is helpful. Companies managing R&D budgets or funds managing a large number of equity investments use an approach based on the concept of risk versus reward. Government should apply the same principles to MDAPs.

Ascertain risk versus reward for all MDAPs. An assessment of an MDAP's risk is a function of the confidence levels associated with the probability of completing the program on time and on budget. CAPE should undertake the risk assessment for all MDAPs.

Quantifying an MDAP's reward—or, in commercial terms, ROI—is more challenging. The investment is obviously the total cost to develop and procure a weapons system, but how might the DOD calculate the return?

Economists speak of the value derived from a good or service as utility; in military affairs the analogous concept is "military utility." One way to think about military utility is as a function of three variables: performance of a single unit (for example, one fighter or one destroyer), total number of units, and development time (that is, number of years required to convert a concept into an operational

A war-gaming approach allows major programs to be market-tested in a scarce budget environment, and forces them to compete against both similar and dissimilar capabilities

weapons system). The third variable is often overlooked, but like money—a dollar today is worth more than the promise of a dollar in the future—a capability fielded in 5 years is more valuable than the identical capability fielded in 15 years. The value of a weapons system should thus decline at a compounding rate over the time it takes to develop and procure. An MDAP has the highest military utility when it delivers high performance in large volumes over a short period of time.

To estimate the relative returns of military utility, the DOD should look to war gaming. For example, it can set up teams representing each of the US's ten Unified Combatant Commands (UCCs) and give each team a finite "capital budget," which represents that particular UCC's share of the investment accounts designated for MDAPs over the next ten years. Each team then "buys" equipment at the fully loaded price for each unit.

This war-gaming approach allows MDAPs to be market-tested in a scarce budget environment, and forces them to compete against both similar and dissimilar capabilities. For example, a warship-development program must be sufficiently compelling to cause UCCs to "buy" it and, in doing so, forgo the opportunity to acquire other capabilities, such as additional attack submarines or fifth-generation tactical aircraft. Teams can also opt for off-the-shelf alternatives—for example, a readily available combat aircraft in lieu of one still in development. A key indicator is the number of units the UCCs acquire for a given price and availability date. If too little demand emerges for a future weapons system—if, say, the UCCs buy only 50 percent of planned production—then the MDAP scores low from an ROI perspective.

Who should sponsor this ongoing capital-investment war game? The OSD, supported by the Joint Requirements Oversight Council, is the appropriate entity. Independence and authority are crucial to ensuring that the most realistic scenarios and assumptions are used.

Create an integrated portfolio picture. Once each MDAP is assessed for risk and reward, the next step is to plot each MDAP in a risk/reward matrix, thus allowing government to see the risk versus reward profile of the entire portfolio. Is the portfolio rich—perhaps too rich—in high-risk/high-reward programs? Are there enough investments in priority capabilities? Does the portfolio have a balanced mix of relatively high risk/reward and more modest risk/reward MDAP investments? Or are there programs that are low-risk/high-reward, yet struggling in the competition for scarce investment resources and thus perhaps in need of intervention? If the portfolio includes high-risk/low-reward programs, what is the justification for keeping them in the portfolio? Why should they not be replaced with alternative mission solutions with more attractive risk/reward profiles?

Develop a national-security investment strategy that clearly states the portfolio's risk versus reward objective. Like any investor, the DOD

should have a clear perspective on what its investment strategy should be, especially with the MDAP portfolio. It might decide, for example, that the bulk of the portfolio should center on lower-risk investments that promise a more predictable capabilities return, and that a more limited amount of capital should be allocated to high-risk investments that aim for truly game-changing capabilities.

If, on the other hand, the government opts for a high-risk/high-reward MDAP portfolio strategy, it would be sensible to hold reserves for the higher level of risk (that is, by increasing the cost-growth account) while simultaneously reducing the number of MDAPs. Failing to take these steps will simply set the stage for continued systemic underfunding across defense acquisition programs.

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The DOD's annual budgeting process should include a review of both the LRCIP and the MDAP portfolio strategy so that significant changes in the fact base and assumptions are surfaced and evaluated. The DOD should present both documents to Congress and engage in appropriate discourse and debate. In steady state, the annual review should drive decision making with an eye toward affordability, efficacy (that is, whether current programs adequately cover present and future capability requirements), efficiency, and balance.

Some might say that long-range planning and portfolio management are not worth the effort because the budget process is annual and will remain so, and the immediate political interests of certain members of Congress are sure to trump any long-term plan. But it is this very issue that fact-based dialogue about MDAPs will be able to counter. The stakes are too high, from both a fiscal and a national-security perspective, to continue relying on the current approach.

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