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Introduction

Since the end of the Cold War, and certainly in the post–9/11 world, military forces around the globe have been shifting from a largely static, defensive posture to one that has to support more expeditionary operations far from their home bases. This shift has led them to invest more in training their armed forces, acquire transport assets, and build their supply chain and logistics capabilities—all of which costs money. As the 15th century Italian military commander Gian Giacomo Trivulzio said, "To carry out a war, three things are necessary: money, money, and yet more money."

In this regard, defense expenditure would appear to be unique, in that it is driven more by threat and perceived threat than by affordability. The past decade has borne this out. Since 2001, defense spending in the United States, for example, has increased from about $300 billion to almost $700 billion for the current fiscal year. But the recent decade is not representative of the long-term picture. Defense expenditure, appearances to the contrary notwithstanding, is cyclical: it is simply that the cycle is much longer than in most other sectors, averaging some 20 years between peaks.

Now, with the current economic climate placing enormous pressures on government budgets across the board, it appears that a downturn in global defense expenditures is beginning. And although there are exceptions—such as India and South Korea—the trend is clear.

Yet the world remains a dangerous place. Defense forces must still be capable of deploying and sustaining "boots on the ground." Weapons must be maintained and upgraded. What, then, is to be done?

In this edition of *McKinsey on Government*, we, along with some eminent military thinkers and practitioners, look at a range of challenges facing militaries that must do more things—some of them relatively new things—with less.

"Lessons from around the world: Benchmarking performance in defense" contends that, contrary to what is routinely argued, performance is indeed comparable across defense ministries wherever defense ministries engage in the same types of activities. Evidence from a first-of-its-kind benchmarking exercise comparing 33 of the world's largest national military structures supports our most fundamental claim—that countries can shrink their defense budgets without losing capability.

We proceed from this broad view to take on, in a number of articles, a perennial challenge for all militaries: acquiring and maintaining equipment cost-effectively. "Improving US equipment acquisition" asserts that acquisition reform at the level of individual programs—"small a"—will fail without addressing "Big A," or enterprise-level issues. This candid analysis of America's acquisition problems is followed by an equally candid discussion of the United Kingdom's: Bernard Gray, an adviser to the UK Ministry of Defence, offers "An expert view on defense

procurement." And because maintaining equipment is fully as important as acquiring it, "Mastering military maintenance" explores the changes that defense organizations must make to maximize asset availability while keeping costs down.

The next article, "Big savings from little things: Non-equipment procurement," looks at a seemingly more modest matter. Non-equipment procurement is a subject that rarely makes headlines, but it constitutes a surprising portion of the defense budget: up to 25 percent. As such, it is a rich but typically untapped savings opportunity.

The next two articles deal with the on-the-ground realities of modern war. In "Stabilizing Iraq: A conversation with Paul Brinkley," the leader of the US effort to revitalize Iraq's economy discusses his view that "offering economic opportunity as part of protecting and helping the population is absolutely critical" in both Iraq and Afghanistan. "Supply chain transformation under fire" describes some of the logistical difficulties the UK Armed Forces faced in the Iraqi and Afghan conflicts, evincing the age-old truth that no army, however well equipped, can function without a good supply chain.

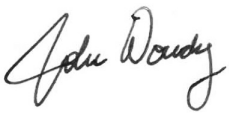
We close this edition with three articles that take on one of the biggest challenges for any large organization, the military being no exception: change.

With the stability of the Cold War having been replaced by an altogether less predictable environment, defense agencies must shift from a traditional model of annual strategic-planning sessions to a more dynamic model attuned to a world in which new threats can emerge overnight. "A dynamic strategy for uncertain times" presents such a model.

Olivier Debouzy, one of the authors of the *French White Paper on Defence and National Security*, makes a similarly robust case for change in "'Without taboos': France's new defense policy." Debouzy discusses, among other things, the relationship between defense and national security in an age of globalization, and the changing nature of activities related to "knowledge and anticipation… without which one wastes time and money preparing for the wrong kind of operations, in the wrong region, and against the wrong people."

Finally, "From R&D investment to fighting power, 25 years later" makes the intriguing claim, based on recent research, that a country's level of R&D spending correlates to the quality of its military equipment a quarter-century later. On the basis of this observation, the authors make some provocative predictions about the defense landscape a couple of decades from now: America maintains its dominance, but the global balance shifts as Asia's rising powers overtake the major European nations in military strength.

We decided to publish an edition of *McKinsey on Government* exclusively devoted to defense because of its overwhelming importance, particularly at present, to governments worldwide. However, the articles in this edition are relevant across a range of institutions, both public and private. We welcome your comments on any or all of these articles at McKinsey_on_Government@McKinsey.com.



John Dowdy
Director, McKinsey & Company

Nancy Killefer
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Lessons from around the world:
Benchmarking performance in defense

A first-of-its-kind benchmarking effort compares the productivity and performance of defense ministries across the globe, helping them pinpoint areas of inefficiency and identify the highest-potential opportunities.

Scott Gebicke and Samuel Magid

With wars under way in several parts of the globe and many countries' defense budgets suffering drastic cuts, defense ministries are under pressure to do more without spending more. And most defense ministries recognize that they have ample room to improve both the efficiency and effectiveness of their operations. Yet a typical defense ministry has little perspective on what constitutes best practice in defense operations, where its biggest opportunities for saving money or boosting productivity lie, or how it stacks up against its counterparts in other countries in the core areas of defense.

Some would argue that comparing the performance of one defense department to another's is neither achievable nor instructive, given that countries are in very different political situations and have different priorities and military strategies. Granted, many variables affect the performance of a country's armed forces, and it would be virtually impossible to account for all the complexities and dynamics that come into play. Furthermore, defense ministries make deliberate trade-offs—for example, choosing to pay more for domestically manufactured equipment. That said, defense departments everywhere engage in the same types of operational activities. Our firm belief is that certain aspects of operational performance are indeed comparable across ministries of defense, and that ministries can learn from one another when it comes to delivering more defense output for the same or less input.

In 2008 and 2009, we undertook a first-of-its kind benchmarking effort—one that compares the performance and productivity of defense ministries worldwide. We gathered and analyzed data from 33 countries that account for more than 90 percent of global defense spending, developing a benchmark that we believe yields valuable insights into where and how ministries of defense can become more effective while reducing or maintaining costs. In the simplest terms, the exercise involved analyzing a discrete set of quantitative inputs—namely, publicly available data on the quantity and type of military equipment, number and general classification of personnel, and annual defense budgets disaggregated into key spending categories—and converting them into a set of ratios that measure outputs in three core budget areas of defense: personnel, equipment procurement, and maintenance. Assembling inputs presented a significant research challenge due to wide variability in the quality and quantity of available data, but defining the inputs was reasonably straightforward; defining and measuring outputs, on the other hand, was a much more complex undertaking (see sidebar, “Our methodology for calculating output,” p. 5).

Our benchmarking results show wide variability across countries in each ratio (Exhibit 1). Once a country has selected a peer group against which to compare itself, it can use these benchmarks to help pinpoint areas of inefficiency and zero in on the highest-potential opportunities.

For the purposes of this benchmarking exercise, we used five straightforward country categories based on types of military strategies: global-force projection (countries with worldwide striking capability), small-force projection (NATO members or countries with a fairly significant presence in international missions), relevant national security threat (countries under attack or threat), emerging regional powers, and non-aligned or neutral countries.

Exhibit 1
Stacking up

Benchmarking showed wide variations in performance.

Budget area (average % of defense budget)	Key ratios	Range	Average
1 **Personnel** (45%)	• “Tooth to tail” (combat personnel as % of total personnel)	16–54%	26%
	• Number of deployed as % of total active troops	1–18%	5.3%
	• Personnel costs per active and other personnel	$800–$146,000	$44,800
	• Personnel costs over military equipment output[1]	$2,000–$218,000	$72,000
2 **Equipment procurement** (18%)	• Military equipment output[1] over procurement and R&D spending (index)	17–330	100
	• Procurement spending over active troops	$1,000–$536,000	$60,000
3 **Maintenance** (8%)	• Cost of maintenance per unit of military equipment output[1]	$2,000–$104,000	$13,000
	• Cost of maintenance over cost of equipment procurement	8.2–446%	13%

[1]One unit of military equipment output is approximately equivalent to one combat-ready unit (eg, a manned and maintained combat vehicle). For more, read "Our methodology for calculating output," p. 5.

This simplified peer-group categorization was adequate for our initial purposes, but to generate the most useful insights from the benchmarks, a defense ministry must thoughtfully and carefully select a peer group based on its military strategy.

One particularly interesting finding was the variability among countries in the level of joint spending, which ranges from almost 70 percent to 3 percent (Exhibit 2). Not surprisingly, we found that countries that share more functions across the armed services tend to be more efficient. Some countries have recently moved toward increasing their level of joint spending, whether by requiring closer collaboration and coordination among service-specific functions or establishing joint functions. (The article "Big savings from little things: Non-equipment procurement," p. 34, describes how some countries have centralized procurement of products and services in certain non-equipment categories; "Supply chain transformation under fire," p. 50, touches on the United Kingdom's move from a service specific supply chain to a joint supply chain.)

In this article, we highlight some of our findings in each of the three budget areas we benchmarked and offer perspectives on how countries might improve—or have already improved—performance in each area.

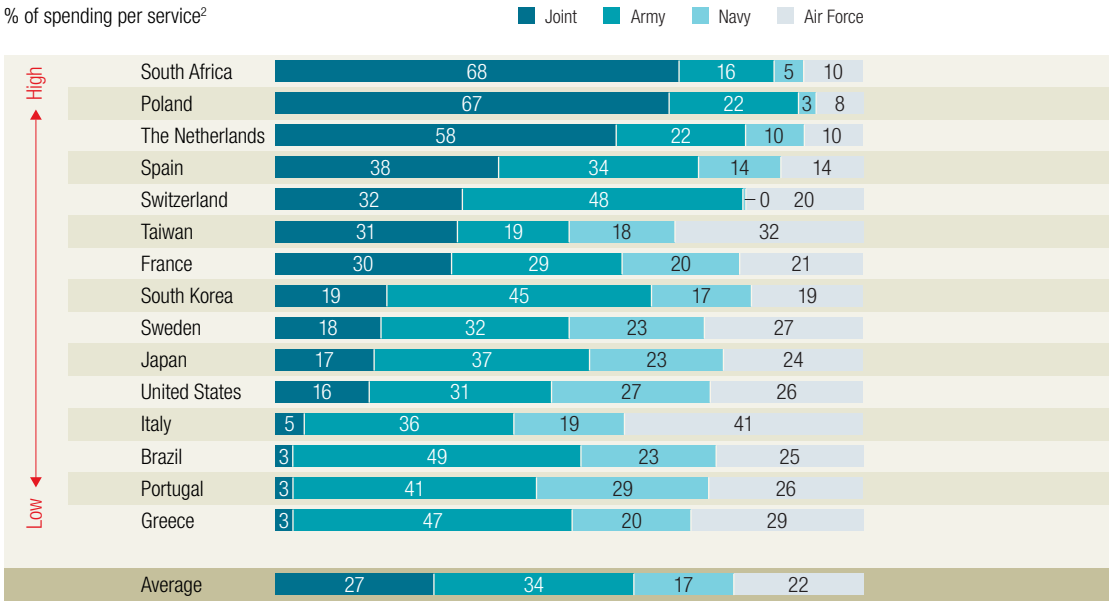
Personnel: Tooth-to-tail and deployment ratios

From most commanders' perspectives, the true test of military strength lies in the front line—the "tooth," in defense industry parlance. The "tail" refers to personnel who perform noncombat functions such as procurement, deep maintenance, accounting, facilities management, or back-office IT. Our benchmarking results show

Exhibit 2

Level of joint spending[1]

Countries that share more functions across the armed forces tend to derive greater efficiencies.

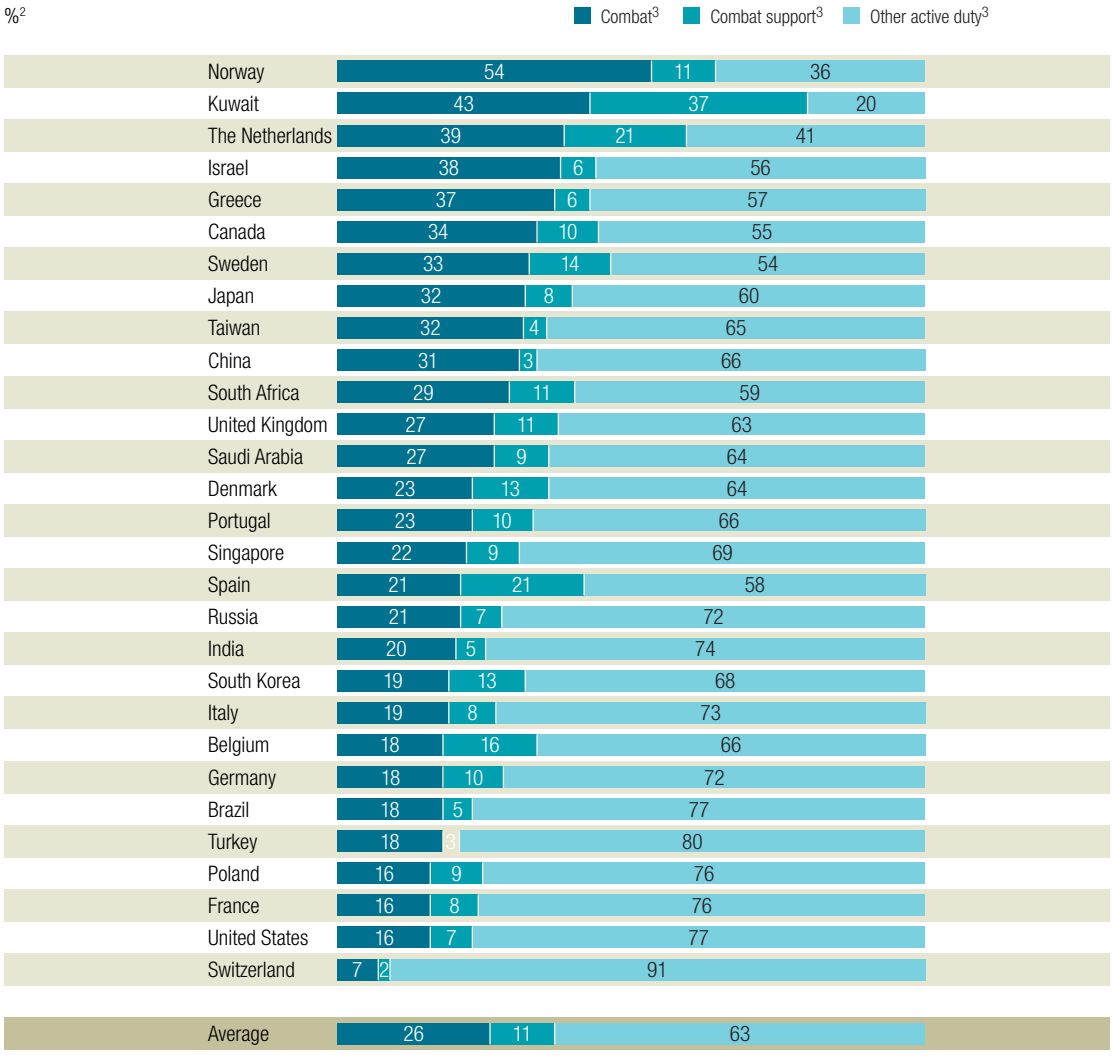


[1]We have removed the benchmark data for Australia as errors in the source data and the methodology as it applied to Australia have been identified.
[2]Figures may not sum to 100%, because of rounding.

Exhibit 3

'Tooth to tail' ratio[1]

Administrative costs can be reduced without sacrificing fighting power.



[1]We have removed the benchmark data for Australia as errors in the source data and the methodology as it applied to Australia have been identified.
[2]Figures may not sum to 100%, because of rounding.
[3]Combat troops: armor, infantry, reconnaissance, and combat aviation. Combat support: artillery, engineers, and signals. Other active duty: general and administrative functions including HR, IT, procurement, accounting, etc. Reserve personnel not included.

Source: *The Military Balance 2008*, The International Institute of Strategic Studies; McKinsey analysis

stark differences in tooth-to-tail ratios, indicating opportunities to reduce administrative costs in several countries without diminishing fighting power (Exhibit 3).

Some countries are proactively trying to improve their tooth-to-tail ratio. France, for example, is aiming for a dramatic reduction of administrative personnel through investment in IT systems and outsourcing of certain noncombat operations to the private sector (see "'Without taboos': France's new defense policy," p. 64).

The defense ministry of a Northern European nation, under pressure to increase military output in the period after the Cold War, set a goal a few

Our methodology for calculating output

Comparing the performance of one country's armed forces with another's involves both art and science, in part because data on budgets, equipment, and personnel are not always available, reliable, or reported in a comparable way. To develop our benchmarks, our research departments in various countries scoured public data sources and made a number of assumptions to normalize the data. A key part of our analysis was the creation of a new metric for measuring the performance of military equipment. We call our metric "military equipment output," and we used it to calculate some of the key ratios as shown in Exhibit 1 of the article. Military equipment output is a function of four factors: volume, mix of equipment, age of equipment, and overall equipment quality.

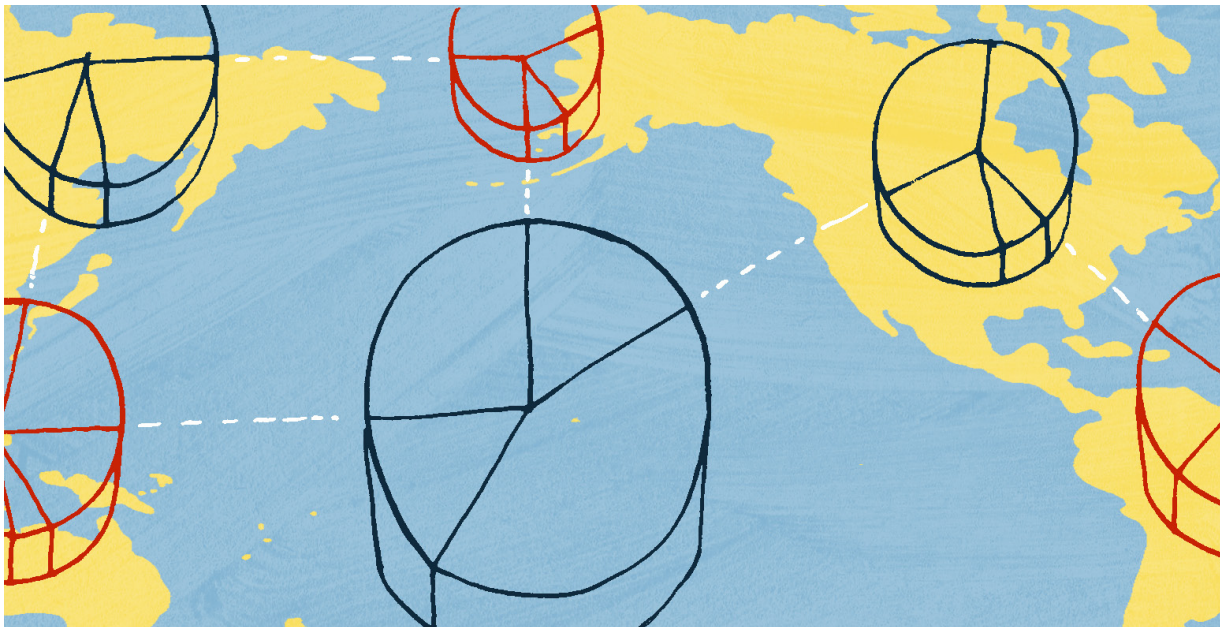
Volume. To calculate military equipment output, we first gathered data on several countries' active equipment inventory—specifically, how many serviceable units of each type of equipment a country has in each of its armed services (for example, the number of submarines in the navy, the number of main battle tanks in the army). This exercise proved challenging because countries report inventories in many different ways—for example, some include only active equipment while others include equipment for reserves or mothballed equipment.

Mix. Then, using the average equipment mix of the United Kingdom and France as our ideal target mix (because both countries have a good balance of army, navy, and air force equipment in all major categories and are sizeable enough but not so large as to skew the data), we assigned a relative value to each type of equipment per armed service—determining, for example, that in the navy an aircraft carrier is the equivalent of 3.5 submarines or 8 surface combat ships. This allowed us to compare armed services regardless of the composition of their equipment portfolio. We excluded nuclear equipment from the benchmark because it skewed results significantly.

Age. Recognizing that there are variations even within the same type of equipment—the F-35 aircraft has significant advantages over older fighter jets like the MiG-19, for example—we also adjusted for age. We determined that a fifth-generation fighter like the F-22 or the F-35, for instance, is equivalent to 3.6 second-generation fighters.

Quality. We then took into account a military equipment quality (MEQ) score for each of the armed services in each country, based on rigorous analysis conducted by third-party consultancy Technology Futures. (For more on MEQ, read "From R&D investment to fighting power, 25 years later," p. 70.)

By calculating military equipment output for each of the armed services—the army, the navy, and the air force—we were able to make comparisons across countries. Our benchmark shows, for example, that the US and Russian armies have almost equivalent output levels largely due to the size of the Russian tank fleet, but that the US Navy and Air Force are far superior to their Russian counterparts—a case of American technology trumping the sheer volume of Russia's older platforms and aircraft. The navies of the United Kingdom and France are on par with South Korea's and Japan's, and Israel's air force has about twice the output levels of the air forces of France, Germany, and Brazil.



years ago to increase its tooth-to-tail ratio from 40:60 to 60:40 over three years. It achieved this goal by centralizing formerly duplicative support functions including HR, IT, finance, media and communications, health services, and facilities management. By mapping the functions' activities and resources—what exactly each function did, who did it, and how many people did it in each regiment—and by comparing itself with other public and private-sector organizations, the defense ministry realized that centralization would yield savings of approximately 30 percent per function.

A number of countries have found that one of the hardest parts in a centralization effort is designing the precise division of responsibilities and the interfaces between the centralized service and the various military services. Political and cultural sensitivities come into play as heads of regiments lose responsibility for certain positions and facilities. The need for coordination increases exponentially, particularly because of frequent rotations among military personnel. Individuals accustomed to tools and processes of their own choosing have to be convinced—and then trained—to use standardized tools and processes.

To ensure the success of a centralization effort, a defense organization must address mind-sets and behaviors. The European defense ministry mentioned earlier held seminars for the top 100 leaders to get their buy-in and to make sure they learned and embraced the new ways of working. To foster collaboration, the ministry also established formal mechanisms; for example, a joint management team, consisting of leaders of each military branch as well as of the centralized functions, participated in an annual prioritization process, ensuring that the most important needs of each branch were well understood and that the centralized service could meet those needs.

Like corporations, defense ministries should seek productivity improvements in administrative functions; in these nonmilitary tasks, productivity growth can and should offset wage growth.

Exhibit 4

Deployed forces

SAMPLE FROM BENCHMARK

Combat forces are under strain in some countries.

	Total active (number of people)	Total deployable[1] (number of people)	Deployed (number of people)	Deployed over total active (%)	Deployed over deployable (%)	Cost per troop deployed ($ thousands)
United States	1,352,494	N/A	250,000	18.5	N/A	N/A
United Kingdom	185,950	74,750	34,000	18.3	45.5	N/A
The Netherlands	44,636	17,724	3,896	8.7	22.0	68
Finland	10,100	6,000	840	8.3	14.0	216
Sweden	11,574	3,122	950	8.2	30.4	611
France	262,592	42,500	17,485	6.7	41.1	35
Italy	191,152	54,800	11,170	5.8	20.4	N/A
Spain	77,800	39,617	3,344	4.3	8.4	195
Germany	221,185	37,275	8,946	4.0	24.0	172
Greece	135,500	22,182	1,290	1.0	5.8	83

[1]Troops trained and ready to deploy.

Increased productivity in back-office functions can then lead to more favorable deployment rates, as uniformed personnel can be reassigned from support roles to combat roles. A country needs to have many more deployable service members than it might expect to deploy at any one time to account for periods of training and recuperation. In certain countries, combat forces are stretched thin, with deployment rates exceeding 40 percent of potential (Exhibit 4).

These countries have the choice of either reducing deployments—which will essentially mean a loss of fighting power—or shifting a significant number of personnel from administrative roles to combat roles. The latter is clearly the better option.

Equipment procurement

Countries deliver substantially different levels of military output for the money they spend on equipment procurement. There is a rough correlation between procurement cost per unit of output and average equipment quality, which naturally raises the possibility of spending large sums in the pursuit of extraordinarily powerful weapons. US Defense Secretary Robert Gates raised this very issue last year when he announced his intent to "pursue greater quantities of systems that represent the '75 percent solution' instead of smaller quantities of '99 percent' or exquisite systems." The United States is currently at the extreme end of the cost/quality spectrum, delivering very high-quality equipment but at very high cost (Exhibit 5). Once again, variations between countries in the same peer group can be substantial.

In general, countries that make it a point to support their domestic defense industries have higher procurement costs than those that rely on imports. Since this represents a narrowing of the market being considered for purchases, this is not a surprising result. Meanwhile, countries that procure older equipment from the global market tend to have very capable fleets for less money. Of

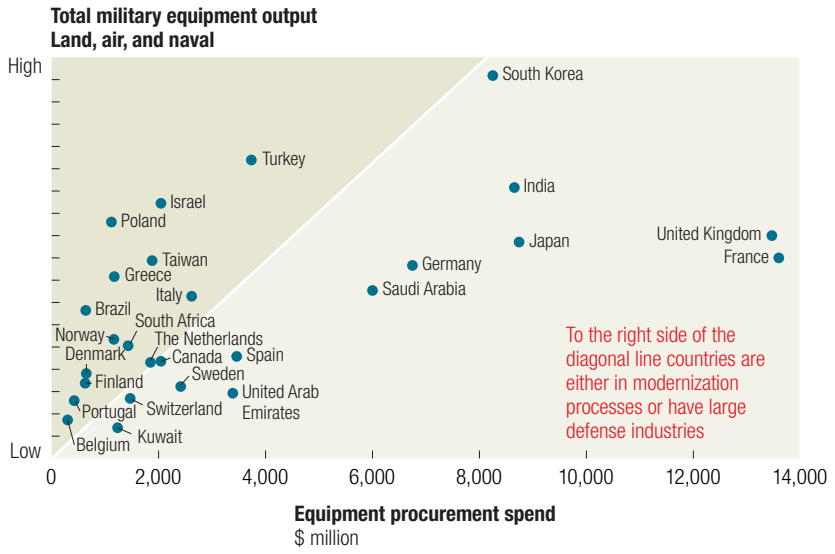
course, one could argue that a strong domestic defense industry is strategically critical to national defense; among other benefits, it gives a country complete control over supply, keeps it from being dependent on foreign providers, and guarantees sovereign protection in critical areas (secure satellite systems, for example). But because maintaining and supporting a domestic defense industry is an expensive proposition and limits financial freedom in other areas, it is critical that countries make sure they develop a strong rationale for their procurement choices by way of a well-defined defense industrial strategy.

Countries with sizable defense industries but declining defense budgets—examples include Germany, South Africa, Sweden, and the United Kingdom—must evaluate each of their defense subsectors, such as secure communications, missiles, and unmanned aerial vehicles, on two criteria: strategic criticality and commercial viability. Strategic criticality is a qualitative evaluation of the subsector's importance to military success, of whether there are other countries exporting the product, and of sovereign importance—that is, whether a bespoke product ought to be manufactured domestically for security reasons (as might for instance be the case with encryption software). Commercial viability is a quantitative assessment based on revenue, margins, and cost base, as well as local and global competitiveness. Subsectors that score high on

Exhibit 5

Output vs spend

Governments that support their domestic defense industries tend to spend more for less output.[1]

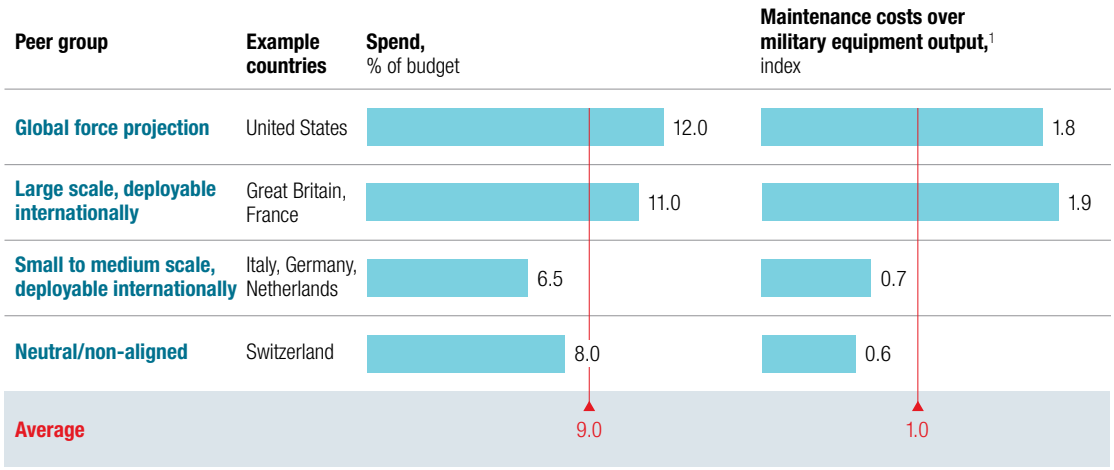


[1]We have removed the benchmark data for Australia, as errors in the source data and the methodology as it applied to Australia have been identified.

Note: United States, Russia, and China have been excluded due to scale.

Exhibit 6
Maintenance costs

Maintenance costs vary substantially, both within and among peer groups.



[1]One unit of military equipment output is approximately equivalent to one combat-ready unit (eg, a manned and maintained combat vehicle). For more, read "Our methodology for calculating output," p. 5.

both criteria ought to be prioritized through R&D funding and export support; subsectors that rate high on only one criterion should receive limited government support; subsectors with low criticality and viability should be considered for divestiture.

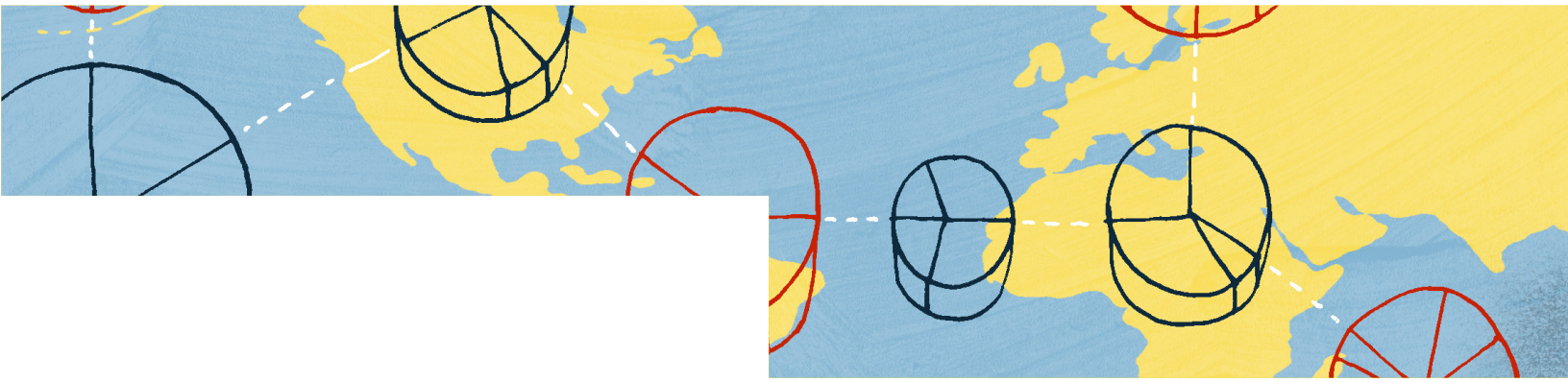
Countries that are increasing their defense spending and looking to grow a nascent domestic industry—India and South Korea, for example—should undertake a similar evaluation, but should of course attempt to assess future commercial viability as opposed to current revenue, margins, and costs. Such an evaluation should be based on comparative advantage and the ability to leverage key capabilities such as engineering talent.

This type of evaluation requires both commercial and analytical skills as well as military strategic-evaluation skills. Defense ministries should create cross-functional teams so that sound commercial and economic analysis can inform equipment-procurement decisions.

Maintenance

Maintenance costs vary substantially, both within and among peer groups (Exhibit 6). Although the most capable forces naturally have some of the highest levels of expenditure, more detailed investigation reveals a number of drivers that help explain the wide variations that we have observed.

Actual maintenance expenditure is driven by at least four factors. The first driver is vintage. As any owner of a vintage car will immediately understand, forces that continue to operate older equipment often incur much higher levels of maintenance expenditure. There is therefore an implicit trade-off between funds to purchase new equipment and the funds to operate and maintain older equipment. Deferring replacement purchases often saves much less money than people expect, because they fail to account for the high and increasing costs of maintaining the older equipment left in place. The second driver of maintenance expenditure is variety. Forces that operate a wide range of different platforms incur



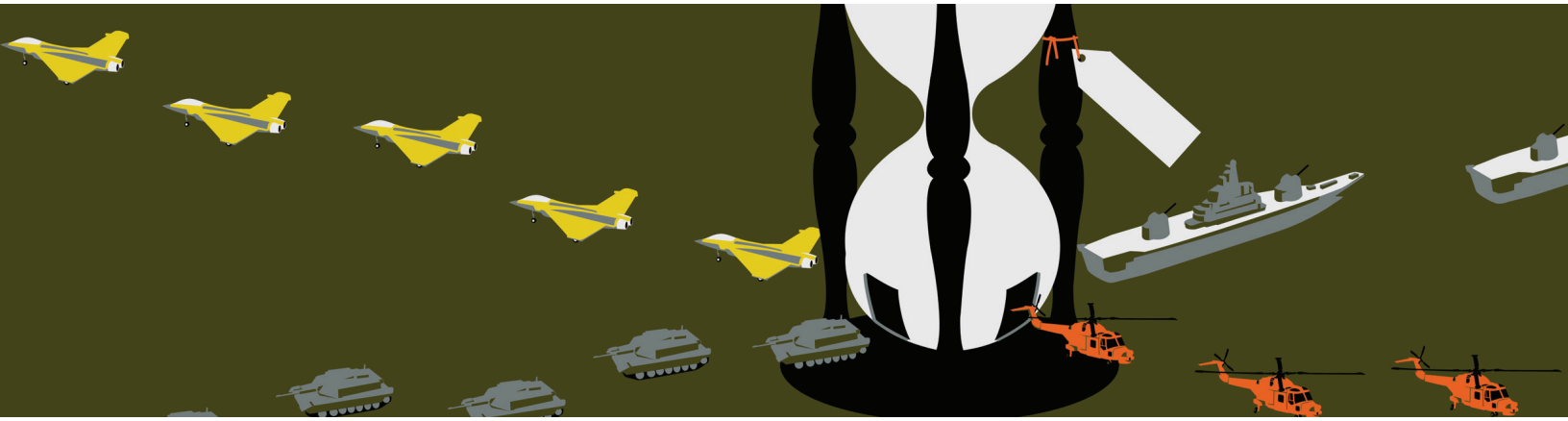
greater total maintenance expenditure than those with a narrower range, with each platform often requiring specialized technicians, dedicated equipment, and its own spare parts and associated supply chain. Operating several small fleets of different types of helicopter offers a good example. The third driver of maintenance expenditure is readiness. Some countries choose not to maintain their equipment at high levels of readiness, which saves money at the expense of fighting power. You can leave your car in the garage and not service it, but if you need to go somewhere, you can't always count on it to work. Of course, operations in difficult geographies can also substantially increase wear and tear, and hence readiness-related maintenance costs, particularly for land equipment. Repairs for battle damage can be costly as well. The final driver of maintenance expenditure is process efficiency—how efficient someone is at maintaining a given piece of equipment of a given vintage at the required level of readiness. We have looked at all of these factors to try to understand the wide range in expenditure we have observed.

This investigation uncovered massive opportunities for improvement in some countries. Indeed, our experience working with a number of defense organizations generally indicates a 40 percent to 60 percent potential for increasing the quality and productivity of the maintenance, repair, and overhaul (MRO) function, without increasing costs. We have found that the best-performing military MRO organizations eliminate unnecessary variety, make smart use of outsourcing, excel at contracting, and constantly optimize their maintenance processes.

• • •

One of the cornerstones of any benchmarking exercise is the selection of a peer group. Once a defense ministry has chosen its peer group, it can identify the areas in which it most needs to improve and implement best practices to elevate its performance in those areas. The benchmarking results can give valuable directional insight into where the ministry can save money, as well as where it can achieve maximum effectiveness without increasing costs—both critical goals in today's changed world.

Scott Gebicke and **Samuel Magid** are associate principals in McKinsey's San Francisco and Copenhagen offices, respectively.



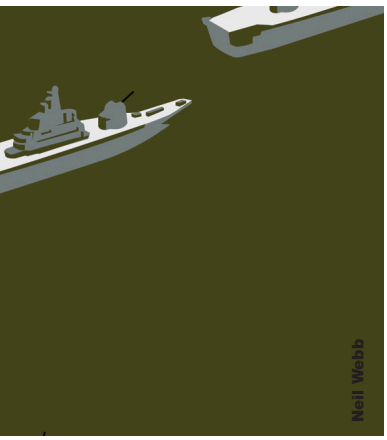
Improving US equipment acquisition

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.



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.

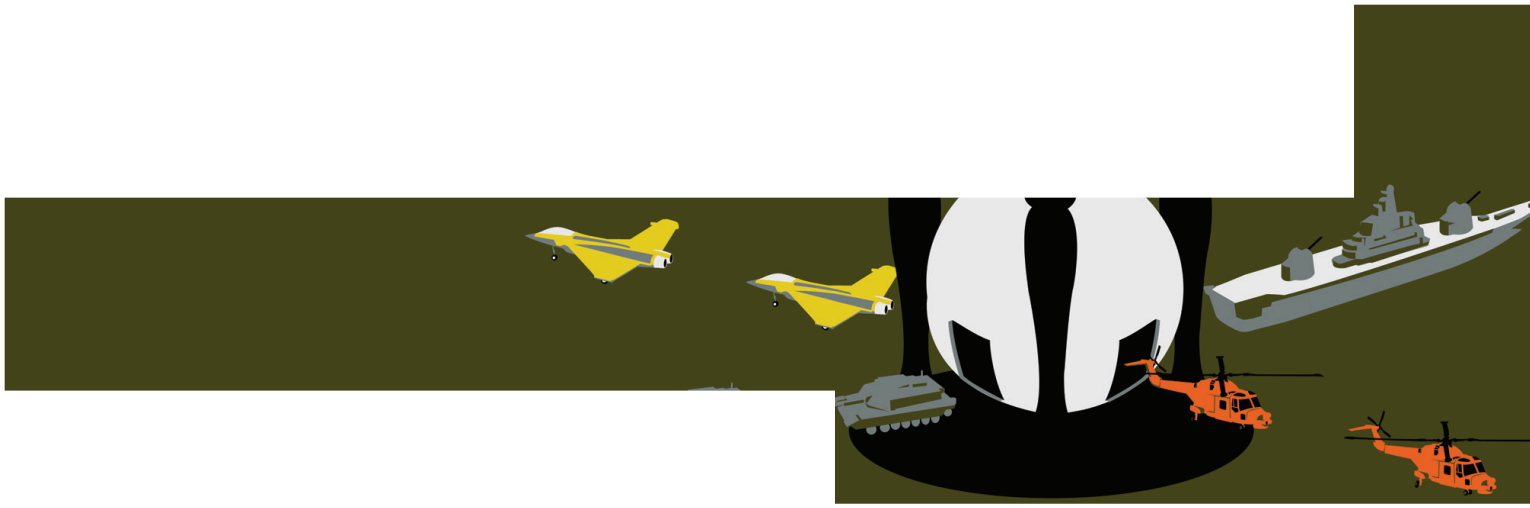
The third problem—not enough volume—tends to become a trade-off made in the quest for maximum performance. Ever-shrinking numbers of ever more "exquisite" weapons, while not the intent, is certainly the result. The armed services wind up procuring far fewer units than they plan for—and almost certainly 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

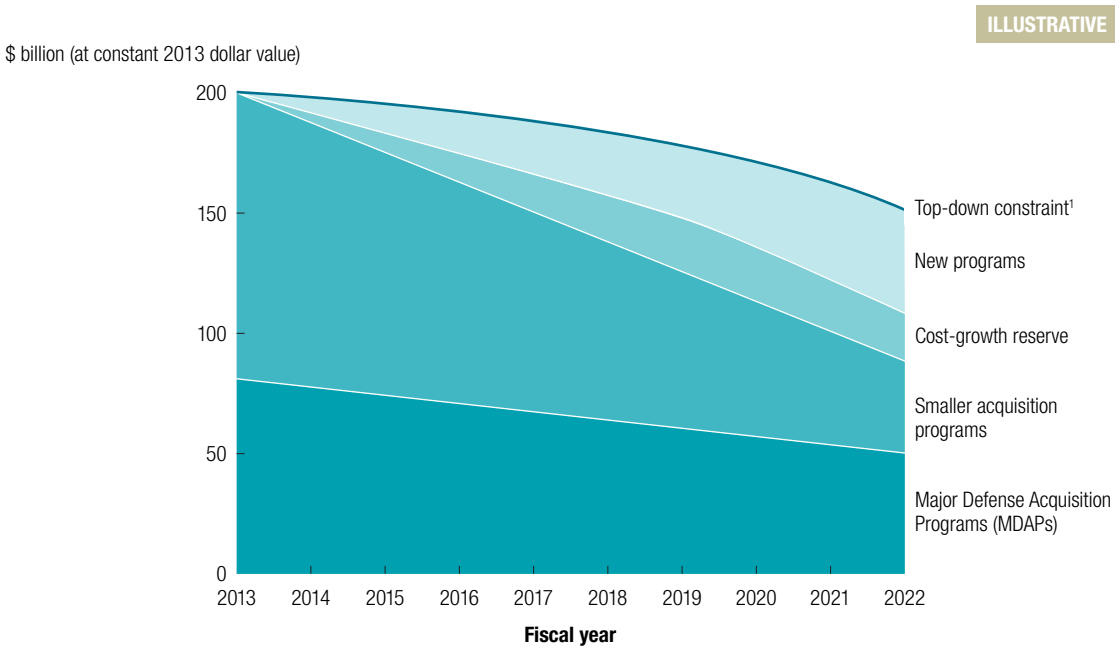
We see an opportunity to leverage the FYDP, among other existing budget resources, to enable the development of a long-range capabilities investment plan (LRCIP)—a fact-based plan that takes into account realistic assumptions and constraints, and one that reconciles "bottom up" estimates with "top down"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

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

(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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An expert view on defense procurement

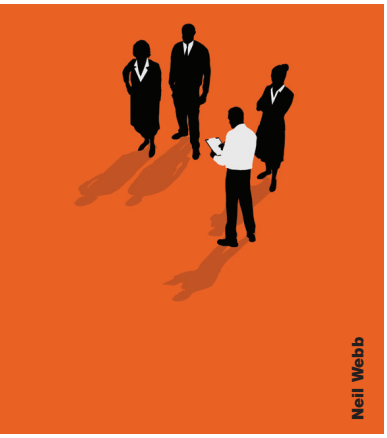
In 2009 Bernard Gray, an adviser to the UK Ministry of Defence, wrote a scathing review of UK equipment acquisition. In this interview, he discusses the massive challenges the MOD faces—and how to overcome them.

David Chinn and John Dowdy

In 2008, the UK Ministry of Defence (MOD) commissioned an independent review of the state of its equipment acquisition program. The resulting report, completed after eight months of research, was made public in October 2009 and immediately got the attention of the British media and citizenry. "The problems, and the sums of money involved, have almost lost their power to shock, so endemic is the issue and so routine the headlines," the report said, declaring the MOD's equipment program "unaffordable on any likely projection of future budgets." Perhaps the excerpt most often quoted in press articles is the following: "It seems as though military equipment acquisition is vying in a technological race with the delivery of civilian software systems for the title of 'world's most delayed technical solution.' Even British trains cannot compete."

The author of the report is Bernard Gray, a former MOD adviser who had directed the Strategic Defence Review of 1998. Early in his career, Gray spent almost a decade as a journalist for the *Financial Times*, including a stint as the newspaper's defense correspondent. He is currently chairman of TSL Education, a UK-based publisher of materials for educators. He is continuing to advise the MOD on acquisition reform. In December 2009, Gray spoke with McKinsey's David Chinn and John Dowdy in London.

McKinsey on Government: *Could you quantify how big the UK's defense acquisition problem is?*


Neil Webb

Bernard Gray: It is a huge cost problem. The exact size depends on what one chooses to include or exclude and what projections one might make about budgets set for the MOD, but it's certainly in the billions of pounds per year and in the tens of billions of pounds in capital risk.

In eight months one can't do everything, so my report is not in any sense comprehensive, nor do I pretend it is. I tried to look at the principal drivers of time, cost, and performance overruns or underperformance. My conclusion was that there is a set of incentives operating at the center of the Ministry of Defence that causes people both to "overprogram"—that is, order more capability than they have the money for—and to systematically underestimate the cost of those capabilities. There are game-theory problems inside this; it's the prisoner's dilemma. The three armed services are competing for scarce resources, and unfortunately it is a stable equilibrium that causes them all to compete with each other rather than cooperate.

McKinsey on Government: *It's a stable equilibrium until the MOD goes broke.*

Bernard Gray: If you have three individuals competing for the same dollar, you might be able to get to a state of play where there is trust among the individuals and each gets 33 cents. But more likely, all three are going to attempt to get the whole dollar, and the most stable state is distrust among the three parties. That's a natural tendency in any government system. And this is an important difference between the performance of the public sector in general and the private sector—you don't have that same revenue constraint bearing down on you all the time. The way incentives are set up in government causes people to behave in ways that are inefficient for the whole group.

Another problem in this case is that the MOD is generating contingent output—fighting capability that may or may not be used at some point in the future. You're not talking about a set of activities that leads to a revenue stream tomorrow or the fulfillment of a revenue stream generated yesterday. Unless one puts constraints around the operation of this game, it will inevitably bias toward increasing cost.

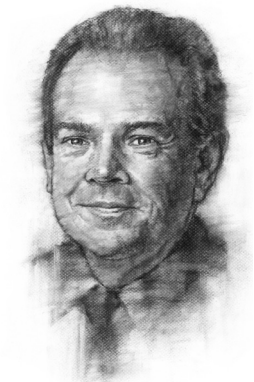
McKinsey on Government: *But surely it's not inevitable that the armed services compete themselves to oblivion.*

Bernard Gray: Well, a knock-on consequence of having this overlarge program is that the aspiration meets an iron gate, which is the amount of cash allocated to the department by the treasury for this purpose every year. If, for example, only two-thirds of the cash requirement for the proposed activity is available, there are only two choices that the system can make: cancel it wholesale, which the system is very reluctant to do for a variety of political reasons, or slow down the rate of cash burned on each of the projects, which has terrible consequences because it's effectively a transfer of resources out of productive output and into unproductive overhead.

A classic case is the construction of the new aircraft carriers. In early 2009, the ministry decided to slow the construction program by two years, but not to remove the people working on the program in the intervening period. So they're carrying two years' worth of not just MOD people, but everybody in industry working on that program and all the capital goods in the shipyards. Our estimates range from £700 million to £1 billion in additional cost—about 20 percent of the program cost, simply as a result of that two-year delay. That's a

particularly large, salient example, but it happens on every program all the time. And of course, delaying a program means you don't have the equipment as soon as you want, so you're forced to spend additional money on maintaining old equipment to keep it in service.

Another problem is that the ministry has a set of contractual relationships with suppliers. When the ministry goes back to a defense company and says, "Can I slow down my rate of cash burn on this program?" the company says, "Of course, but there will be a small additional charge." It's very difficult for the ministry to negotiate that charge. We've estimated the total annual cost of those sorts of problems from roughly £900 million to £2.2 billion. I could have made higher estimates but chose to be conservative.



Bernard Gray

McKinsey on Government: *How can the MOD break out of this downward spiral? Could you give us a broad overview on what needs to be done now to help deliver equipment on time and on budget?*

Bernard Gray: The first component is to constrain the game. One of my proposals is to have defense reviews on a regular basis. There has been no intrinsic mechanism that keeps the program down to size, so what happens is it grows and grows, then every five or ten years there is an ad hoc defense review that hacks it down to some kind of acceptable size—which is why defense reviews have become associated with cuts. My proposal is to have, in the first session of any new parliament, a defense review process that should be formally and appropriately costed, and that costing should be audited by either a major accounting firm or the National Audit Office. The treasury should then fund that plan, and it should be formally reviewed every five years.

To keep the plan on track between reviews, power needs to be vested in a decision maker capable of defeating the game participants. The only person who can effectively discharge this duty is the permanent secretary, who is in any case formally accountable for the financial performance of the department. The permanent secretary is then assisted by the chief of the defense staff representing the military interest and the finance director of the department representing financial rectitude. Those three people make a program recommendation to the defense board, composed of the armed forces chiefs and senior civil servants, and to the secretary of state as the representative of the political interest. If this group is given the responsibility and power to produce a balanced annual capital plan, which is itself subject to audit and publication, it becomes much more difficult for politicians to interfere with that process. So those are two mechanisms for constraining the size of the program.

McKinsey on Government: *Theoretically, the result would be a balanced strategic plan, which is a great first step. But then the plan needs to be put into action. You've identified some things that currently make it difficult for the MOD to put plans into action.*

Bernard Gray: There used to be a clean distinction between the customer community—the armed services—asking for things and the delivery unit charged with completing the acquisition process, but the lines have become significantly blurred. I've proposed a set of measures to recreate that customer-supplier relationship properly inside the department so that there is an appropriate separation of powers and an attribution of responsibility.

Another major component is the delivery unit itself. About three years ago, the acquisition staff

and the support staff—the people responsible for supporting in-service equipment—were merged into a single organization. Advanced private-sector organizations, such as airlines, make decisions on a whole-life cost of a piece of equipment rather than on an initial acquisition cost—so it's hard to object to the idea of making decisions about the total cost of ownership of a project. Unfortunately, there are a number of problems in the way it's been done. One is that there is no financial information that allows the delivery unit to make any such choice. Even if it had the capital to be able to say, "We want to spend 20 percent more on initial acquisition in order to cut 30 percent from support costs," it doesn't have the data to make the choice. A second problem is that the delivery unit, through historical accident, is now also responsible for strategic communications, the joint supply chain, and naval dock yards. So our first proposal is that those should be hived off into separate entities to allow the integrated project teams (IPTs) to focus entirely on the acquisition and support of particular capabilities.

Another problem is the significant capability deficiencies in the IPT structures at present. In particular we found insufficient financial skills. The costing and estimating groups had been cut down in order to save money.

McKinsey on Government: *It's ironic, isn't it?*

Bernard Gray: Yes—a very expensive savings. The ministry can't do a defense review because, to save money, it sacked all the people who could figure out what things were going to cost. We also found insufficient skills in engineering, project and program management, and general management. We found shortfalls in information systems. There was no consistency; each of the IPTs could pick any project-management tool they chose, which made it very difficult for senior management to have visibility into what was going on in individual projects.

Another thing that's happened in the past few years is that the delivery unit lost its status as an external agency with a measure of independence from the Ministry of Defence. It is now operating as a wholly owned subsidiary of the ministry, which means it is under the same cash constraints as the ministry.

McKinsey on Government: *What's the solution, then? What should the ministry do about the delivery unit?*

Bernard Gray: I recommended that the MOD look at the options for the status of the delivery unit over the course of 12 months. I set

out a range of possible alternatives, and I said my favorite option would be to outsource the unit—essentially, to invite a number of qualified major contracting organizations that do not have a conflict of interest to run the unit as a government-owned, contractor-operated entity. This model operates in quite sensitive areas of defense in both the United Kingdom and the United States.

The part of the unit responsible for acquisition has an annual running cost of about £1 billion—that's for roughly 9,000 people and associated support costs. And they are responsible for managing approximately £13 billion worth of equipment acquisition and support. My interest is not so much in the £1 billion but in the £13 billion. A contracting organization could earn a significant margin by making the system more efficient and effective, with fewer, better people working in it. The ministry would benefit from better management of the £13 billion, which is likely to translate into higher output through more initial acquisition of equipment and a higher state of readiness for existing equipment. There has been some general research that says most outsourcing of government services give rise to between 30 percent and 40 percent productivity gains.

In any case, I recommended that the MOD study the options over 12 months. It has decided not to do that, at least for the time being.

McKinsey on Government: *What's your reaction to that?*

Bernard Gray: I'm disappointed, because I think the 12 months of study would have brought to light a number of issues that have to do with the relationship between the delivery unit and the central customer organization, how one affords to pay for the up-skilling of the delivery unit, and how the delivery unit is organized. Unfortunately, the decision that the ministry has adopted at the moment leaves the delivery unit stranded where it is, with no real way forward.

McKinsey on Government: *Your report is done, and the ministry has accepted most of your recommendations. If you had it to do again, would you do anything differently?*

Bernard Gray: If we had more time, I would have looked further into support costs. We looked extensively into initial acquisition costs, but we didn't have the time to look enough at in-service support costs. Also, I would have liked to have the time and resources to do more international benchmarking on a quantitative basis. We looked qualitatively at what other countries are doing, but some quantitative measurement may well have flushed out some further efficiencies.

McKinsey on Government: *I think every country in the world struggles with delivering equipment on time and on budget. Do you think there are some general truths here about how to do defense acquisition well? What can others learn by studying the UK's successes and failures?*

Bernard Gray: I know that the critical weaknesses I've talked about—misaligned incentives, lack of skills—also apply in the United States, Australia, France, and other Western countries. And these truths apply not only in defense but in other areas of capital-intensive government expenditures; transport systems and health care might be two examples. There are inevitably some differences in the ways that countries operate, but how to constrain incentives inside the game-theory problems on the one hand, and how to get highly skilled people to deliver public services on the other, are enduring questions.

In most areas of public service, salaries are lower and career prospects are not as attractive as in the private sector. All Western economies face significant fiscal pressure over the next decade. What I fear will happen in most advanced economies is not a productivity improvement in the public sector, but an output cut. I think a way forward essentially involves importing private-sector incentives into the delivery of public services.

McKinsey on Government: *In his testimony to the Senate Armed Services Committee last year, Secretary of Defense Robert Gates observed that in the United States there have been nearly 130 studies on defense acquisition since the end of World War II. Why is this so hard to get right?*

Bernard Gray: One can do a certain amount with processes and procedures, as I'm trying to do, but there is also a role for leadership and will. Quitting smoking and staying quit are painful decisions because the benefit lies in the long term. The benefit of having a cigarette, on the other hand, lies in the short term, which is the way human beings tend to work—optimizing their short-term benefit and blinding themselves to the long-term consequences. All armed services around the world are heavy smokers, and getting them to quit is going to continue to be a difficult process.

David Chinn is a principal in McKinsey's Tel Aviv office, and **John Dowdy** is a director in the London office.

Mastering military maintenance

Maximizing asset availability without increasing costs will be a critical priority for armed forces in the years to come. We have found that armed forces can improve both the efficiency and the effectiveness of their maintenance, repair, and overhaul (MRO) function by as much as 60 percent, but doing so requires fundamental changes to organization, processes, and mind-sets.

Colin Shaw

As militaries around the globe strive to do more without increasing their costs, one critical area for improving performance is equipment maintenance, repair, and overhaul (MRO). Performance in MRO has an important effect on the availability of equipment: in many armed forces, one-third to half of the total capability of key asset classes is out of action for maintenance at any time. Furthermore, in a typical armed service, MRO accounts for more than 10 percent of the total defense budget and as much as 70 percent of all aircraft-related costs.

Our experience, based on our work with defense organizations across the globe, shows that armed services can typically improve the quality and productivity of their maintenance processes by between 40 percent and 60 percent, and they can increase the consistent availability of critical assets to more than 95 percent. Delivering these kinds of improvements requires armed services to take three fundamental steps. First, they must do maintenance work only when needed, eliminating unnecessary work by reevaluating MRO protocols. Second, they must do it where it counts—that is, they must ensure that their MRO infrastructure meets the requirements of current operations. Third, they must do it as efficiently as possible, which often means adopting best-practice techniques for productivity improvement—techniques pioneered by the manufacturing industry but equally applicable in MRO environments.

By taking these steps, armed services can maximize availability without having to make any trade-offs; the improvements come about even as MRO costs remain the same. In this article, we examine these steps in greater detail and discuss three elements vital to sustaining productivity and quality in MRO processes: smart labor planning, effective information management, and strong operations management.

Do it only when needed

In recent years, companies in various industries—including oil and gas, automotive, and commercial aviation—have reduced maintenance work to the minimum possible level, whether by switching from time-based to condition-based maintenance scheduling, implementing in-service equipment monitoring, or building a detailed understanding of the root causes of equipment failure. In so doing, companies not only cut maintenance costs and increase equipment availability but also reduce the significant risk of introducing new problems during maintenance procedures.

Leading armed services are using some of the same approaches. Typically, they begin with a critical look at current MRO protocols: were the protocols designed for operating conditions that have since changed? Could a simpler inspection or diagnostic test replace a costly and time-consuming intervention? Is the MRO requirement of a few critical parts dictating a larger overhaul? One of the world's ten largest air forces, for example, undertook a review that revealed that the manufacturer requirement for a major overhaul of one aircraft type every 200 flying hours was driven by the likelihood of failure in a few key engine components. By separating engine and airframe maintenance schedules, the air force was able to dramatically increase the time between interventions for the majority of the aircraft while keeping engine reliability under close scrutiny.

In the United States, one armed service replaced conservative, time-based maintenance intervals specified by manufacturers with a reliability-centered approach, thereby extending the time between major overhauls of some large assets from 5 years to 15. Key to the success of this approach has been the development of a comprehensive evidence base that covers the performance of equipment in service. Detailed recording of incidents of equipment failure allows MRO staff to perform maintenance only when needed; parts that do not wear out in normal service remain untouched during overhaul.

Do it where it counts

Many military MRO organizations were designed in an environment very different from that in which they operate today. In Europe, for example, many armed services established their current MRO infrastructure during the Cold War, when the next conflict was expected to take place at or near home and MRO structures needed to be robust in the event of a direct attack. Changing military doctrine brings these structures into question. Are multiple MRO facilities at home necessary when the expeditionary force needs critical capability thousands of miles away? Should resources be reallocated from the maintenance of tanks to aircraft, given that aircraft sees much higher levels of utilization in theater? By better matching their MRO organizations to current need—that is, collapsing processes onto strategic locations and making common MRO services available closer to the front line—armed forces can reduce redundancy, minimize transportation requirements, maximize economies of scale, and improve asset availability.

In the United Kingdom, maintenance work on Harrier vertical takeoff fighter aircraft took place at two separate bases, each with engine-overhaul facilities located nearby. Consolidating these facilities into one site has produced annual savings of £250 million and allowed the introduction of more efficient and flexible maintenance processes. In Australia, a program is under way to consolidate submarine maintenance at a single base, with key suppliers located adjacent to the repair docks. (We note that consolidation of facilities makes sense only for nations without an immediate threat from a neighboring country.)

Moves like these can be challenging to implement. Military commanders tend to be reluctant to close facilities that have received substantial investment, and loss or movement of large numbers of jobs is obviously politically sensitive. To be successful in these kinds of efforts, armed forces must convincingly demonstrate both the operational and financial case for consolidation.

Do it as efficiently as possible

Maintenance personnel take pride in their flexibility and ability to cope with unexpected "emergent" work discovered during maintenance activities. While these skills are important in MRO, they are often accompanied by a failure to recognize that the majority of maintenance work is highly predictable and therefore likely to benefit from the same productivity-improvement techniques that have transformed the efficiency of manufacturing industries around the world. These best-practice techniques eliminate waste and root out unnecessarily nonstandard work practices, unbalanced maintenance loads, and highly variable team structures that have hampered efficient and effective delivery, and that many defense personnel have traditionally—and mistakenly—viewed as unavoidable.

More open-minded leaders of MRO units have delivered dramatic quality and productivity improvements by emulating the processes of modern production facilities. One UK army unit, for instance, halved the man-hours required to refurbish each armored vehicle by moving from a fixed-station approach—in which one team worked on a single vehicle from beginning to end—to a flow-line approach (long used in mass production but only recently proven valuable in military MRO) in which vehicles move through the facility from station to station, with a team at each station focused on a specific task. Teams have thus developed deep expertise in their particular tasks, performing them faster and more effectively. The flow-line approach has delivered other benefits as well: a reduced need for duplicated tools and equipment, and fewer training requirements because individuals have to develop proficiency in only a few tasks.

The same unit also changed its approach to shorter-cycle maintenance processes for bringing vehicles back into full operational order between missions. It used a pit-stop approach inspired by motor-sport processes—that is, rather than working on each vehicle when it arrives, teams do as much preparatory work as possible before a vehicle comes in from the field, ensuring they have the right parts, tools, and people in place to work on damage reported by crews. The pit-stop approach has enabled the unit to do repairs in the field that would previously have required vehicles to be sent to a dedicated maintenance facility. Damaged vehicles are often made ready for use again during the same mission—something that had been rare under the previous system. Since adopting the approach, the unit has reduced by 67 percent the time taken to complete work on each vehicle.

Some MRO staff fear that the rigor inherent in standardized best-practice techniques will

Labor planners and schedulers must strike the right balance between maximizing the availability of individual assets and increasing the efficiency of the system as a whole

hamper their ability to "flex" capacity in response to spikes in demand. However, MRO personnel often find that these techniques actually improve flexibility—both by reducing the time required to complete common tasks and by making it easier to allocate tasks across available labor resources.

Achieving continuous improvement

Once they have designed and implemented efficient MRO processes, military organizations must adhere to those processes and seek to improve them in the face of emerging knowledge and changing demand. To do this, they must have excellent capabilities in labor planning, information management, and operations management.

Labor planning

Leading manufacturing companies use production leveling—a technique that aims to keep the volume and mix of work as constant as possible—to achieve extremely high efficiency. Similarly, labor planners and schedulers must strike the right balance between maximizing the availability of individual assets and increasing the efficiency of the system as a whole. It may be better, for example, to bring forward the scheduled overhaul of a vessel if dock capacity is available than to ensure it completes all its operating hours.

Planning for labor availability can make a big difference in MRO performance. It is common for crews to be assigned to maintenance activities when their vessels or vehicles are not in service, but pressure on this time is particularly intense, as personnel are often required to participate in training activities or are keen to spend the time with their families. Even if they are theoretically available for work, other aspects of military life can limit their actual working hours to as little as 20 percent of the available time.

If MRO organizations are effectively paying five times their standard hourly rate for military personnel, it may be more cost-effective to employ civilian staff for MRO roles. Australia, for example, has outsourced maintenance work on military transport aircraft to the technical organization of Qantas Airways, thus freeing up key military personnel for other tasks. Furthermore, the civilian personnel have applied sophisticated approaches developed for airliner maintenance and thus achieved higher productivity than their military counterparts.

Outsourcing maintenance activities is not without risks, however. If civilian contractors are required in theater, the cost and complexity of providing appropriate protection can be significant. Also, the loss of MRO skills among military personnel could threaten a service's ability to keep key equipment operational in the field; some services have minimized this risk by rotating military personnel into contractor work teams.

Information management

Effective management of information is equally important to sustaining high performance. For example, to optimize scheduling and work allocation, planners need accurate data on how long MRO tasks take. In one military facility,

the shortest time allocated to any task was four hours, even though many tasks took considerably less time. The result: long MRO cycles and an underutilized workforce. MRO organizations can overcome this simply by monitoring how long it takes for experienced staff to complete certain tasks over a few MRO cycles, making these data easy to record and access, and using them as benchmarks for planning and work allocation.

In other military MRO activities, tedious record-keeping places a burden on staff. Excessive paperwork, in fact, is one factor that eats into "wrench time"—the working hours that maintenance staff spend on their assigned tasks (exhibit). Some armed services, for example, require pilots to keep handwritten records of aircraft defects in a log kept in each aircraft. Their notes are then copied into a duplicate log kept at the base, and MRO personnel create a job card for each maintenance task. Once they complete the tasks, they are required to sign off on the cards and in both logs.

MRO organizations must implement information-management processes and systems that allow relevant personnel to enter, access, and analyze data easily and in real time. In one air force, pilots key details of incidents into a computer terminal when their mission is complete, enabling automatic creation of work orders and real-time review of the frequency of incidents by all relevant personnel. This system allows the service to constantly refine its maintenance policies.

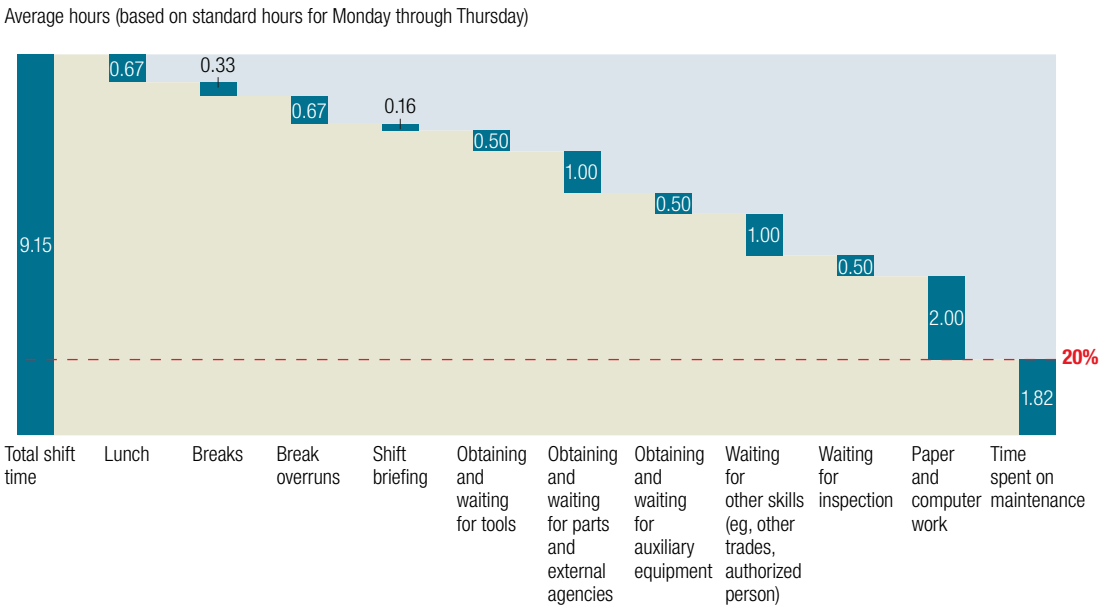
Operations management

One might think that introducing operational changes is relatively straightforward in the military environment, since presumably it can be done by order and maintained as a function of

Exhibit

Time for tasks

When "wrench time" is low, there is a major opportunity for productivity improvement.



Source: On-site observations and interviews with maintainers and supervisors at a European military facility

military discipline. The reality is that the management of MRO is at least as challenging in the military as in civilian life—but the challenges can be overcome with smart operations management.

One challenge is that while military operations can produce pockets of extremely good practice, these practices are far from universal. Aircraft-maintenance personnel, for example, are trained to avoid the risk of foreign-object damage in part by ensuring that tools are returned to their allocated place after each use; a byproduct of these excellent tool-control practices is that an aircraft-maintenance staff never wastes time searching for tools. Yet ground-vehicle MRO units rarely adopt these practices. The most effective MRO leaders establish mechanisms for best-practice sharing and learning.

Another challenge is that best practices in operations can run counter to good practices in other military activities. For instance, many military personnel excel at finding fast and creative solutions to problems on the line. One air force suffered frequent failures of the hydraulic power units used to support aircraft on the ground, and instead of investigating the cause of the failures right away, MRO staff quickly became adept at repairing the units. Only much later, when use was studied in the field, did it become clear that operators were circumventing the unit's time-consuming shutdown procedure by activating the emergency stop, which placed internal components under great strain and frequently resulted in damage. MRO managers must ensure that they train their staff to engage in root-cause problem solving rather than going for quick fixes.

A third management challenge in military MRO is capturing the "hearts and minds" of personnel. After all, few military personnel envisage working in a factory environment when they embark on their careers; furthermore, the connection between improved shop-floor productivity and battlefield success is not obvious. Emphasizing that link through frequent and careful communication can become a vital motivator. The leaders of one air force MRO facility, for example, explained to personnel that savings achieved on the overhaul of an existing aircraft fleet would allow the force to acquire an additional squadron of new-generation fighter aircraft.

• • •

As with any transformation program, the support and commitment of top management is vital to the sustainability of MRO improvement efforts. The explicit and implicit signals that leaders send their subordinates have a direct effect on how well new techniques "stick." Leaders must persist even when MRO staff initially appear resistant to new ways of doing things. Our experience has shown that once military personnel see the benefits of best-practice approaches, they typically become extremely enthusiastic adopters.

Colin Shaw is an expert associate principal in McKinsey's London office.

Big savings from little things:
Non-equipment procurement

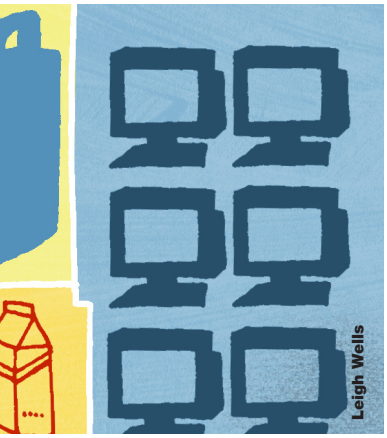
Despite constituting a substantial portion of defense budgets, non-equipment purchases tend to receive scant attention. Defense organizations can capture savings of up to 20 percent in non-equipment categories if they raise their game in several dimensions, including capability building, the use of proven purchasing tools and processes, and performance management.

Hans Arnum, Christian Husted, Frank Klausen, and Yaron Savoray

While costly equipment, such as ships or aircraft, understandably receives much of the attention when it comes to defense spending, non-equipment procurement—the recurring purchase of items related to daily operations—makes up a substantial portion of the defense budget. Our analysis indicates that many large militaries spend as much on non-equipment purchases as they do on equipment—that is, up to 25 percent of the defense budget. Non-equipment purchases include civilian-type categories (for example, food and office supplies), military commodities such as simple munitions and helmets, and spare parts for vehicles and aircraft. Non-equipment spend in the 15 largest militaries exceeds $200 billion, more than the GDP of countries such as Singapore or Israel (Exhibit 1).

Non-equipment procurement in defense shares many of the challenges common to public-sector procurement, such as the lack of a consolidated view of spending, limitations imposed by complex procurement laws, and issues with basic performance.[1] These challenges are aggravated by the lack of scrutiny given to non-equipment purchases; decision makers are understandably most concerned about equipment procurement, which represents the "core business" and for which the risks associated with failure are much greater. Furthermore, few people in a typical

[1] See Christian Husted and Nicolas Reinecke, "Improving public-sector purchasing," *McKinsey on Government*, Summer 2009.



defense organization have commercial capabilities in non-equipment procurement. As a result, even basic approaches for obtaining items at lower prices, managing demand, and challenging specifications are not always applied.

Because non-equipment procurement typically does not receive the senior-management attention it warrants, opportunities to achieve savings often go unnoticed. And these opportunities are significant: a number of studies suggest that defense organizations can attain savings of up to 20 percent, enabling them to redirect 2 percent to 3 percent of the defense budget to better uses—without any reductions in personnel or military capacity (Exhibit 2).

Exhibit 1

Big spenders

Annual non-equipment procurement of the world's 15 largest militaries represents more than $200 billion.

	Annual defense spend (2007) $ billion	Estimated annual non-equipment procurement spend $ billion
United States	552.6	110.5
United Kingdom	63.3	12.7
France	60.7	12.1
China	46.2	9.2
Germany	42.1	8.4
Japan	41.0	8.2
Italy	37.8	7.6
Saudi Arabia	35.4	7.1
Russia	32.2	6.4
South Korea	26.6	5.3
India	26.5	5.3
Brazil	20.6	4.1
Canada	18.5	3.7
Spain	17.5	3.5
Turkey	13.6	2.7
Total	**1,035**	**206.9**

Source: *The Military Balance 2009*, International Institute of Strategic Studies; McKinsey estimates

Exhibit 2

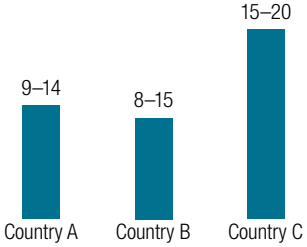
Savings potential

Non-equipment savings can be as high as 20% in some categories.

Examples of specific category savings identified in recent defense procurement projects, %

	Country A	Country B	Country C
Public transportation	12–16		10–18
Vehicles (civilian)		8–12	
Food and catering	8–12	20	14–25
Uniforms and clothing		5–10	10–15
Fuel	5–8	3–5	3–5
Simple ammunition	9–15	10–20	

Overall non-equipment savings identified in defense procurement projects, %



Our work with several military organizations reveals substantial opportunities to better manage non-equipment expenditures. We used a proprietary tool, the Global Purchasing Excellence (GPE) survey, to help military organizations assess the performance of their purchasing organizations. The survey results indicate that non-equipment procurement is undermanaged relative to a benchmark of more than 300 companies: the military average falls near or below the bottom 20th percentile in all but one of the ten survey subcategories (Exhibit 3). We found substantial improvement opportunities in all four performance dimensions covered in the survey: strategic alignment and orientation, capabilities and culture, category management and execution, and structures and systems. In this article, we describe the challenges as well as potential solutions in each of these four dimensions.

Strategic alignment and orientation

Countries use one of three organizational models for defense procurement (Exhibit 4). Each model has advantages and disadvantages.

Exhibit 3

Improvement opportunities

Defense procurement spend is typically undermanaged in comparison to benchmarks.

Procurement managers' evaluation of their organizations' procurement practices, on a scale of 1 to 5, where 5 is best

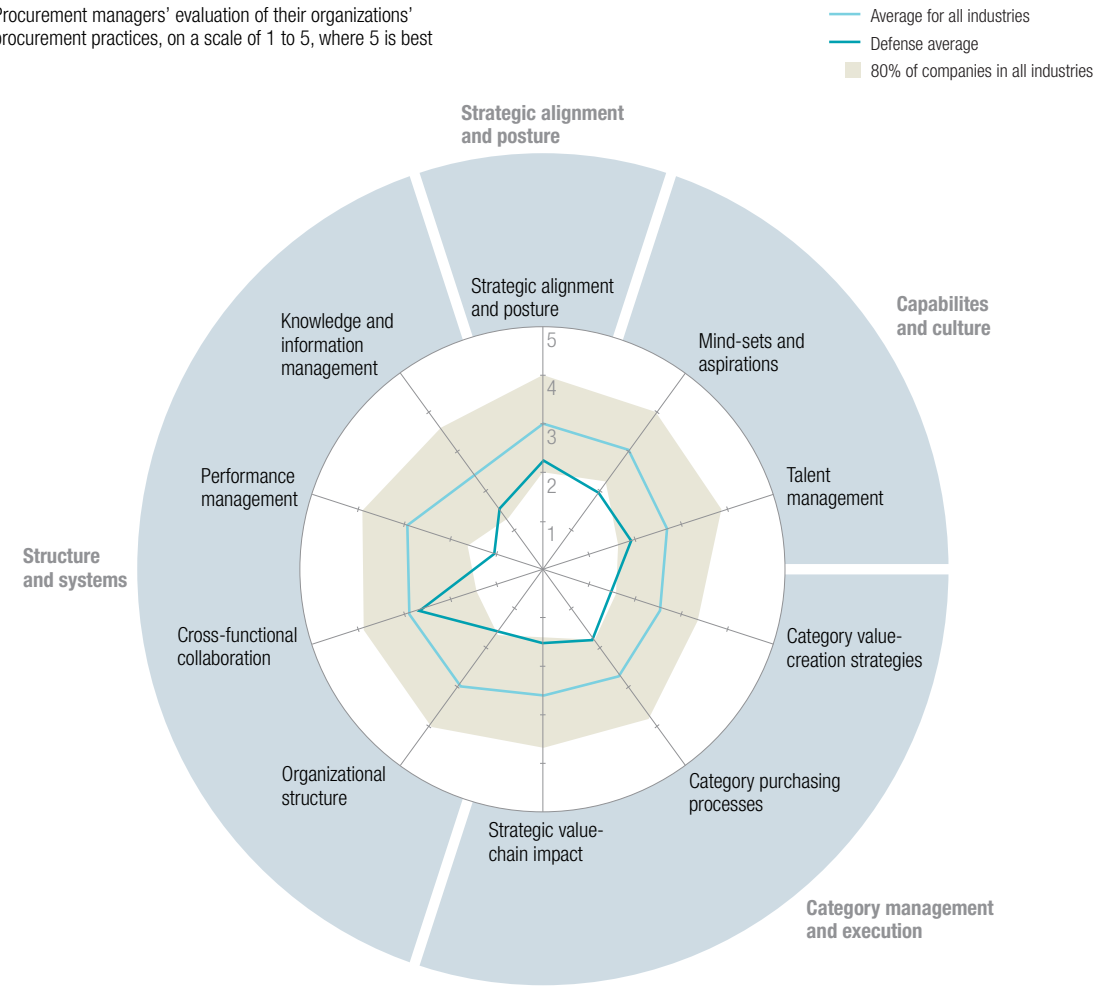
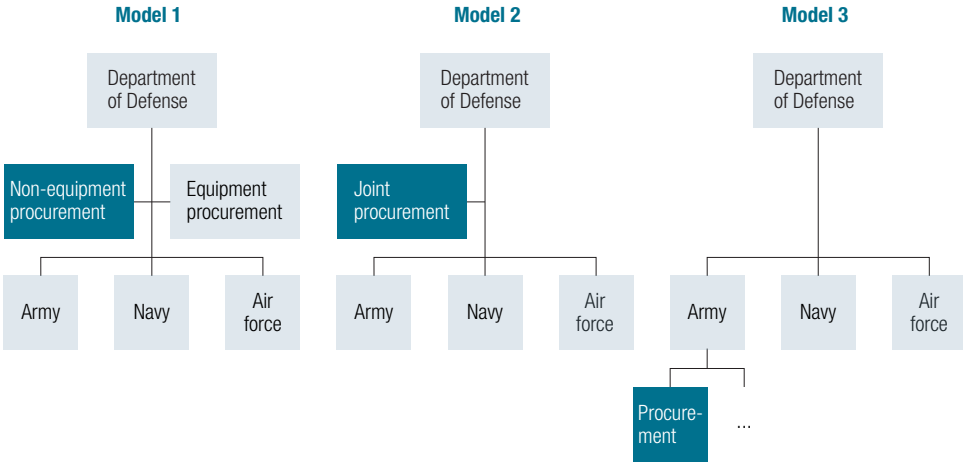


Exhibit 4

Organizational models

There are three options for organizing a non-equipment procurement department.



	Model 1	Model 2	Model 3
Description	Non-equipment procurement is a shared service but separate from equipment procurement	Non-equipment procurement is a shared service, integrated with equipment procurement	Service-specific procurement function, often integrated with equipment procurement
Examples	• Germany • France (certain categories)	• United Kingdom • Israel • Canada	• France (certain categories) • United States

In one model, non-equipment procurement is separate from equipment procurement and is a shared service across all military branches. This model allows the organization to pay adequate attention to non-equipment procurement, hire civilian personnel with extensive purchasing experience, and capture economies of scale. But in this model, the demanding functions or "customers"—the military branches—are separate from the procuring functions, increasing the risk that purchasers will lack a good understanding of users' needs. Also, the procuring function focuses solely on execution and has limited ability to create value by influencing the procurement strategy, challenging product specifications, or managing demand.

The same holds true in the second model, in which a single organization is responsible for both equipment and non-equipment procurement for all military branches. An additional disadvantage of this model is that it tends to result in inadequate attention to non-equipment purchases.

In the third model, each branch has its own procurement organization. This setup increases speed and flexibility in meeting users' needs but often results in unnecessary duplication and missed opportunities to capture scale benefits. It also impedes an organization's ability to get an accurate picture of total spend per category and total spend with specific suppliers—both critical data points for developing a sound sourcing strategy and facilitating effective procurement.

Some countries—including Canada, Germany, Israel, and Sweden—appoint civilian leadership for the procurement organization. Other countries, such as Denmark, France, and the United States, appoint military leadership. While civilian leaders typically have more

Israel: A case study

The Israel Defense Forces (IDF) and Ministry of Defense (MOD) purchase more than $3 billion per year—approximately 2 percent of GDP—in products and services to support defense operations. The defense establishment, in fact, is the single largest customer of many Israeli industries.

For the past 60 years, there has been a clear separation between the demand organization (the IDF) and the procurement organization (the MOD). The IDF defined the need, specified the product and service, and allocated a budget, while the MOD negotiated a price for and purchased the items requested. The separation ensured that military officers did not have responsibility for the commercial aspects of defense operations.

In 2009, the MOD conducted a diagnostic to assess the quality of procurement processes, organizational structures, and outputs in Israel's defense establishment. The diagnostic also assessed the value received for expenditures and the scale of the opportunity for achieving efficiencies. Detailed analyses of six categories covering approximately one-third of non-equipment purchasing identified the potential for annual savings of 8 percent to 10 percent.

The diagnostic homed in on three root causes of inefficiencies. First, the defense establishment lacked a single point of accountability for each category. No function or individual in the organization had visibility into the cost implications of decisions made at each step of the process. Second, the absence of performance metrics resulted in an insufficient focus on cost efficiency. Third, a series of organizational, process, and budgetary barriers impeded efforts to capture scale benefits. For example, the budgeting and ordering processes for some items were on a monthly cycle, limiting the benefits attainable through purchasing larger quantities over the longer term.

The IDF and MOD are piloting several initiatives to address these inefficiencies in four non-equipment categories. For each category, they are creating an integrated category-management team including personnel from both organizations. The team will be accountable for cost, quality, and on-time delivery, and it will have authority over the end-to-end process. The civilian team members from the MOD will be responsible for negotiating with and purchasing from vendors, thereby maintaining the existing prohibition on commercial activities by military personnel. However, the civilian personnel will also work with military team members to develop specifications for the items requested. The MOD is preserving the independence of civilian operations by maintaining existing reporting lines. A function within the MOD's budget department will oversee and challenge the performance of the integrated teams.

The organizations are also establishing performance metrics and targets for savings and customer satisfaction. They are improving the relevant skills of personnel involved in purchasing and category management through on-the-job training and the hiring of experienced civilian personnel. To capture economies of scale, they will make greater use of multiyear budgets and consolidated categories.

To enable implementation of these changes, the IDF and MOD are revising purchasing regulations and standards, conducting a major overhaul of the budgeting process, and redesigning the purchasing organization by appointing a "lead purchaser" to manage each generic category. The government has set a savings target of $250 million per year.

sophisticated commercial capabilities, they may lack credibility with regard to understanding military needs, which can hinder their success in challenging specifications.

Because the organizational model is dictated by issues much broader than procurement efficiency, addressing procurement challenges through large-scale organizational redesign is typically not the first option to pursue. Defense departments can instead focus on two elements to drive effectiveness in non-equipment procurement, regardless of their organizational model.

First, they can establish a cross-functional team, including people from both the military and procurement sides, to oversee each product category. These joint teams would be accountable for setting and challenging specifications as well as procuring items. Defense ministries have found ways to establish joint working teams without compromising the separation of military and civilian responsibilities (see sidebar, "Israel: A case study," p. 38). For example, they require that only civilian team members directly interact with vendors, and they maintain separate reporting lines between the demanding and the procuring functions. Such teams should be relatively small—a dozen people at most—to remain effective.

Second, defense organizations can appoint a sole category "regulator" or "lead purchaser"—that is, a unit within the procurement function that sets standards for purchases within the category. One defense organization had been purchasing 11 types of headsets for the military branches, with varying specifications on cable length, speak/listen functionality, ear-shell design, and electrical impedance. By appointing a category regulator to determine a combination of variants that would meet the needs of all users, the organization was able to set specifications for a single, standardized headset—thereby achieving a savings of 25 percent for the category. While each defense ministry will make different decisions about which product categories to purchase on a branch-specific basis, there are certain categories (for example, food and fuel) that in all cases should be centrally managed because the scale benefits clearly outweigh the need to satisfy different preferences among the branches.

Capabilities and culture

Procurement capabilities in defense organizations are seldom commensurate with the scale and complexity of non-equipment purchasing. Military personnel typically lack a commercial background and, because officers tend to have short rotations in the procurement department, few develop deep

expertise in the area. Moreover, because military personnel do not view non-equipment procurement as an attractive career path, it is difficult to attract and retain the best people. As to culture, defense organizations are primarily concerned about operational preparedness and getting the equipment "right here, right now"—a mind-set that leads to overspecification and lack of standardization.

Building capabilities should be an integral part of all procurement programs. Defense organizations should strengthen capabilities in four critical areas: process knowledge (for example, skills in negotiating and contracting); analytical skills; commodity expertise (that is, for specific items, an in-depth understanding of value drivers, savings levers, and internal demand-management levers); and execution abilities (including defining and tracking performance metrics). Such efforts should emphasize on-the-job training, with classroom instruction kept to a minimum.

One European defense organization paired external experts with motivated internal talent. Through a combination of one-on-one coaching and workshops, the experts trained staff members in procurement skills—for example, equipping buyers with the techniques as well as the confidence to negotiate aggressively with suppliers—thus helping the organization make improvements in category management even after the external experts departed. To embed capability building into the culture of the organization, some procurement functions have set up a daily reinforcement and skill-building system, with talented "champions" within the function serving as coaches.

Hiring civilian talent with extensive procurement experience can also play a critical role in capability building. In many cases, the defense organization is among the largest purchasers in the country, which can make it an attractive employer for procurement professionals. These experienced civilians can help train military personnel and instill a more commercial mind-set throughout the organization.

To attract and retain talent, defense organizations should establish a well-defined career path within non-equipment procurement and offer

Organizations should apply a total-cost-of-ownership approach, calculating costs throughout the life cycle of items. In the case of vehicles, this would include garage, fuel, and maintenance costs in addition to the purchase price

opportunities for moving into and out of the function to build related skills. Detailed job descriptions for each procurement position, including the job's purpose, major accountabilities, and key performance indicators (KPIs), are also essential to track performance and ensure a continuous career-development path. Someone who starts as a local transactional buyer, for instance, should see a clear path toward becoming a regional buyer or category manager, and the steps for getting to those positions should be explicitly integrated into his or her professional development plan.

Category management and execution

There are two main challenges in category management and execution. First, personnel often have limited visibility into the true costs of items—with regard to both total spend and total cost of ownership—particularly across military branches, thus limiting the organization's ability to realize benefits of scale and take advantage of price differences. Second, public-sector constraints, such as strict tender rules, reduce the willingness of personnel to apply the full set of procurement levers. For example, to avoid violating an equal-opportunity rule, personnel might not attend supplier workshops despite the valuable knowledge that they could gain.

To gain better visibility into costs, organizations should get a consolidated view of the overall spend per category. Such an effort will not be straightforward, given that the information needed to create a complete picture of spend will probably not be readily available in the organization's IT systems; many procurement systems in defense organizations contain only an aggregated view for budget purposes (that is, the types of products and services purchased) and item-by-item records of purchases. Procurement personnel will therefore have to estimate the size and composition of these categories by gathering data from a variety of sources, including invoices, department budgets, and current suppliers.

Organizations should apply a total-cost-of-ownership (TCO) approach—that is, they should calculate costs throughout the life cycle of items. In the case of vehicles, for example, this would include garage, fuel, and maintenance costs in addition to the purchase price. Because non-equipment procurement includes spare parts for big-ticket items, the function can play a critical role in managing life-cycle costs for the entire defense establishment.

Once they have the data, procurement leaders should then develop a category-management strategy that includes a sourcing strategy, identification of demand-management levers, and the process for vendor negotiations. They should create clear protocols for supplier interaction (including requests for information and supplier workshops) so as not to unnecessarily restrict the use of procurement tools and methods. And they should streamline

Defense organizations should establish a performance-management system that makes clear to all personnel what they and the department as a whole must achieve, beginning with aspirational savings targets for each category

procurement processes—for example, by setting standards for periodic review of contracts and bid solicitations. One European country captured significant savings by expanding the number of vendors in the tendering process. The procurement staff created detailed specifications for uniforms and bid out the supply contract rather than use its traditional vendor. The resulting contract with a new vendor cut the cost of uniforms by up to 40 percent.

We recommend that organizations first pilot new approaches in categories for which changes will be easiest to implement and that hold significant savings potential. These will typically be the more generic categories in which the military branches are least resistant to change. One European country started its transformation effort in four categories: telephony, canteen food supplies, facilities maintenance, and IT support. For each category, it identified the relevant improvement levers, including product standardization, supplier consolidation, demand management, solicitation of bids throughout the European Union instead of just domestically, and standardized agreements. The total savings ranged from 15 percent to 25 percent in the four categories, and the government is now extending the program to all categories.

Structures and systems

Performance-management systems are often absent or inadequate in procurement functions. In one country, for example, the delivery time for requested items was the sole performance metric for procurement. The lack of KPIs and targets for individuals or for the department often results in limited collaboration among military branches, despite the fact that many defense organizations have established a shared service for procurement.

Some countries outsource non-equipment procurement in an effort to get better prices. However, because third parties are typically compensated based on a percentage of the cost of goods purchased, they have little or no incentive to manage demand or challenge specifications. In the absence of adequate systems for managing the vendor relationship, the defense organization loses the benefits of these two valuable levers for reducing costs.

Defense organizations should establish a performance-management system that makes clear to all personnel what they and the department as a whole must achieve, beginning with aspirational savings targets for each category. Procurement leaders can set these targets by first making top-down estimates based on external benchmarks and then confirming these estimates through a detailed, bottom-up analysis of specific categories. In one defense organization, bottom-up analysis of the clothing category identified savings in the range of 18 percent to 26 percent, comfortably exceeding the benchmark range of 10 percent to

15 percent. Clean-sheet cost analysis suggested that the organization was paying a premium of up to 50 percent for a polyester garrison uniform shirt, for example.

The organization should define a broad set of KPIs for cost savings, quality, and service. Such KPIs might include TCO savings per category, annual and three-year savings, percentage of spend addressed, frequency of using preferred suppliers, advance notice of orders, and internal customer satisfaction, as well as other metrics for demand and supplier management. To hold personnel accountable for achieving these targets, senior management can use tools such as KPI dashboards to track the variance from targets. Consequence management is also critical; the organization should give monetary or nonmonetary rewards for good performance and impose negative consequences for underperformance.

Whenever non-equipment procurement is outsourced, the vendor contract should set clear guidelines and offer incentives for the vendor to manage demand and challenge specifications. For example, the contract could set targets in each category for the vendor to fulfill orders with private-label brands. The contract could also require the vendor to quantify the savings potential for changes in demand-management policies, such as guidelines for travel expenses (for example, how much the organization could save if staff used videoconferencing in place of single-day travel).

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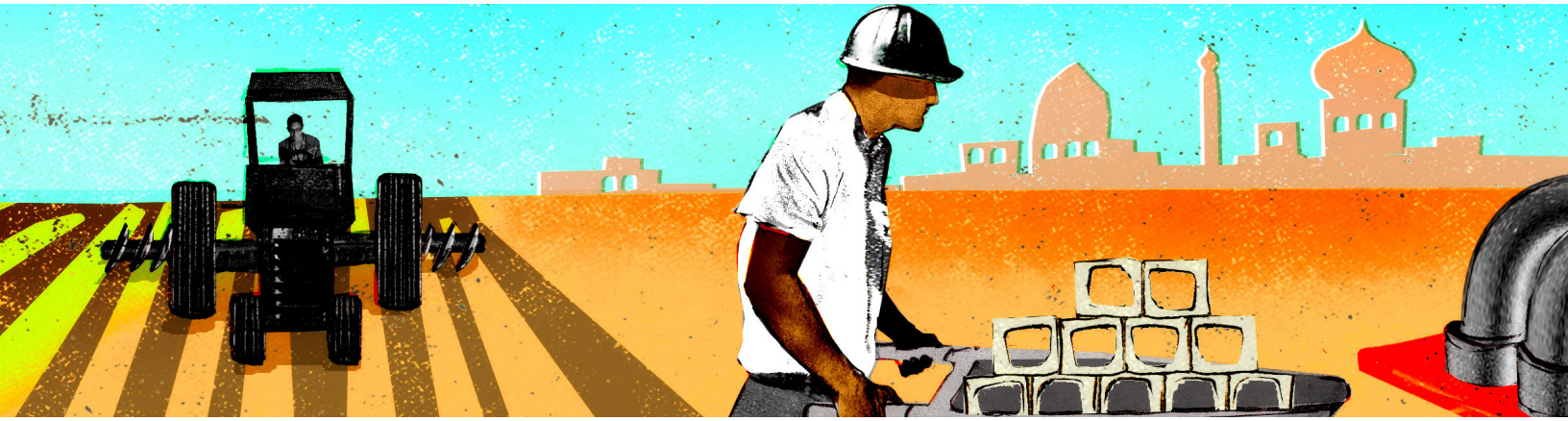
In our experience, it is best to begin the process of improving non-equipment procurement by first addressing a few specific product categories, because quick realization of savings in these categories will help establish credibility within the organization. Early successes will build momentum for addressing more complex issues relating to the organizational structure. Organizational redesign should not, as some believe, be the starting point for procurement transformation, but rather should be addressed over time.

Hans Arnum and **Christian Husted** are principals in McKinsey's Copenhagen office, where **Frank Klausen** is an associate principal. **Yaron Savoray** is an associate principal in the Tel Aviv office.



Stabilizing Iraq: A conversation with Paul Brinkley

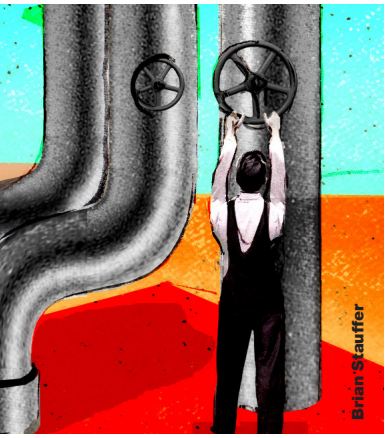
The leader of the US effort to revitalize Iraq's economy talks about the lessons he has learned over the past three years, the relationship between economic development and security, Western misconceptions of the Middle East, and the hardest part of his job.

John Dowdy

When the US Department of Defense (DOD) sought to modernize its business practices, it turned to a Silicon Valley executive with a proven track record in streamlining operations. Paul Brinkley had been the chief information officer and a senior vice president at the technology company JDS Uniphase, as well as a licensed industrial engineer with four US patents to his name, when he joined the DOD in 2004. Brinkley promptly went to work improving the department's processes and systems. But two years later, in a turn of events he did not anticipate, he was spending half of every month in Iraq.

An eye-opening first visit to Iraq in 2006 convinced Brinkley that the DOD could do more to improve economic conditions for the Iraqi people, and that doing so would help stabilize the country. In June 2006, largely through Brinkley's efforts, the DOD established the Task Force for Business and Stability Operations (TFBSO), dedicated to revitalizing Iraq's economy and creating jobs for Iraqis. TFBSO placed civilians with expertise in industrial operations and factory management on the ground in Iraq— skills previously absent from the American presence there.

Under Brinkley's leadership, the task force began on-site assessments of idled Iraqi factories and worked with Iraqi businesspeople to reopen them— providing training for employees, upgrading equipment, and preparing the factories for large-scale private investment. The task force



also engaged leaders from the United States and international corporations to support Iraqi industries, hosting more than 130 private investors and senior executives in Iraq and facilitating several joint ventures. In addition, TFBSO has deployed more than 400 US business leaders, engineers, accountants, and academics across Iraq's provinces. For example, faculty and staff from American universities have worked on farms in central, northern, and western Iraq, helping Iraqi farmers increase production levels and learn modern farming techniques. To date, TFBSO has helped restart production at more than 60 Iraqi factories, facilitated contracts worth more than $1 billion between foreign private investors and Iraq's state-owned enterprises, and helped provide jobs for 250,000 Iraqis.

In October 2009, Brinkley spoke with McKinsey director John Dowdy in Washington, DC, about his work in Iraq and what lies ahead. Excerpts from the interview follow.

McKinsey on Government: *Before 2005 you had never even been to Iraq; now you are there every two weeks. What surprised you most when you went to Iraq for the first time?*

Paul Brinkley: In my private-sector career I had been to East Asia and India, but never the Middle East. My image of the Middle East had been formed by what we see on television and the mass media. I probably wasn't atypical of an American businessperson in that I expected to see desert, camels, palm trees, oil. I never went into Iraq expecting to find a skilled workforce and an industrial economy. That was completely surprising to me.

I think the West has a notion of the Middle East and the Muslim world that is colored by the sensational events that dominate the media. Many Westerners have an impression of an entire people that is extremely unfavorable and not at all representative of that world. I wish every American could get to know the Iraqi people. They have the same hopes, dreams, and aspirations as people in every other country. They aspire to a good life, a job, advancement, an education for their kids. I think so much of what we're exposed to in the media dehumanizes Iraqis and makes the problems in Iraq just seem insurmountable. American businesspeople think, "How could you possibly do business in a place where the people are so different?" But they're not so different. That has been a lesson learned for me, and it's a challenge we really need to confront in the West. How we currently view the Middle East definitely damages our ability to be effective there.

McKinsey on Government: *Most people wouldn't think of economic revitalization as a core defense function. How did you end up doing this in the Department of Defense?*

Paul Brinkley: To answer that question, I'd like to point out a lesson—and I am calling it a lesson because I think what I'm about to say is now a widely accepted proposition in Washington among the people who think about what the government is and should be. The lesson is that we need the ability to use economic improvements as instruments of foreign policy.

Until today, the US government has institutionally had two instruments of foreign policy: diplomacy and force. Yet what the world sees—via mass media, the Internet, mass communications—and what the world wants access to is economic prosperity. America is the predominant actor in terms of projecting economic prosperity. But we've seen in places like Iraq and Afghanistan a synchronous linkage of violence and economic deprivation. We need to look proactively for ways to uplift the

economic prospects of a society to help stabilize it. We don't have that institutionally in the government; the US government is not designed to assist in that capacity.

But the Department of Defense is doing it today. And it is doing it for a couple of reasons. One is that the DOD is in harm's way. It is facing the most immediate consequences of the problems, and it is bearing the brunt of the pain and loss—wounded soldiers and casualties of war. The other reason is that the DOD is itself a huge business operation. It is the world's largest industrial enterprise by a factor of about three, much larger than the world's largest corporation, so it has people who understand business. It can draw on its business expertise. That's how we initially engaged in Iraq.

Paul Brinkley

Institutionally, there's a debate under way about how the government should approach this. Should [business and stability operations] be in the department long term? Should they be in some other part of the government? For the time being, the DOD has been able to marshal the resources to address this problem. There have been challenges in doing it as part of the DOD, and there have been benefits. We'll see how the structures play out over the longer term.

McKinsey on Government: *In the more than three years since TFBSO was formed, what are you proudest of? What do you think has been the task force's biggest accomplishment?*

Paul Brinkley: I'm proud of the way that we as a team have been able to adapt. When [TFBSO] started working in Iraq in 2006, the situation there had deteriorated to a level of violence that no one had predicted, and no one had a plan at that time for how to deal with that violence. Obviously I'm proud of all the successes we've had, and there are a lot of statistics we can cite about the effects we've had across Iraq. Those successes are heartwarming, but I'm proudest of our team's ability to be nimble and adjust to circumstances, particularly in a government structure that makes adaptability very hard, especially in civilian-type work.

McKinsey on Government: *The conventional wisdom is that there has to be security before economic development can begin. You have a different view—that economic development actually helps establish security.*

Paul Brinkley: It can sound like a cliché, but we have to address the fundamental structural brokenness in places where violence has taken hold. What causes people—not just random actors, because you can have random violent actors in any society—but people in general to reach a point where they sympathize with violent actors, and violence takes hold and becomes part of daily life? People without hope—people with no prospects—will act out.

I look at our own experience in the midst of this economic downturn and the decisions we have made in the West that even two years ago may have seemed shocking. We've made certain decisions regarding our banking industry and our automotive sector. Why have we made these decisions? Because we don't want social unrest; we don't want to create an environment where society begins to degrade—so why would it be any different for anyone else in any other part of the world? I think we have lost our perspective because of our long-term prosperity. We have lost a sense of understanding of how hopelessness can cause one to act out in ways that someone in a prosperous situation wouldn't. And now you see our troops dealing with the results of that—our young men and

women are trying to secure areas where the unemployment rate is 50 percent, where people have no hope and no prospects, and where the sympathy with violence is so great. In my view, it is fundamentally unacceptable to send troops into harm's way like that.

I don't think it's an either/or, and I don't think security necessarily creates economic development or vice versa, but to say there's no relationship between economics and security is, I believe, very naïve.

McKinsey on Government: *It's interesting to hear you talk about the decisions the US government has made in the financial and automotive sectors. You came under heavy criticism for helping to revitalize state-owned enterprises in Iraq. Could you comment on how you see the role of state versus private investment in economic stabilization?*

Paul Brinkley: Our efforts to reverse the policy regarding state-owned industry in Iraq—that is, to get state-owned enterprises up and running and then transitionally privatize, as opposed to the economic "shock therapy" approaches that were taken early on—were only one aspect of our total efforts in Iraq, but yes, they did attract a lot of attention. I think it is interesting and ironic—and, I hope, for the West a little discomforting—that we project such a sense of certainty about our own economic model, and yet when confronted with difficult decisions about people's lives and livelihoods, we compromise quickly on those things. By the way, I think it is reasonable that we compromise; it doesn't mean that we're becoming socialists or that we've given up on the free market, but it is an acknowledgment of the fact that government has a responsibility to act in the best interest of citizens. An ideologically driven mind-set on either side is not the right one to have. If we've learned anything in Iraq, it's that you have to take the ideology but then apply some pragmatism to it.

We all agree—and the Iraqis agree—that the end state in Iraq should be a free-market economy. No one is arguing for socialism in Iraq. The question is, how are we going to get there? We're seeing evidence that the approach we've taken is more sound, much less disruptive to society, and results in much less violence.

McKinsey on Government: *The counter-insurgency doctrine says you must protect and help the people in order to win. It sounds like you're suggesting that "help" is at least as important as "protect."*

Paul Brinkley: I'm not crazy about the word "help" because it implies charity; it implies showering people with our largesse. What we mean by "help" is assisting people to build their own capability to live a good life, have upward mobility, feed and educate their children, live in a safe neighborhood, and eventually protect themselves. That to me

is what counterinsurgency means, and you can't do that without an economic capability as part of that "help" equation.

McKinsey on Government: *How would you describe the nature of the opportunity today for private investors in Iraq?*

Paul Brinkley: I would describe Iraq today as a high-risk, high-return opportunity. It's not for widows' and orphans' money. I would not put an entire 401(k) into an Iraqi fund—but certainly the percentage of the 401(k) that is allocated to higher-risk and higher-return investments. I honestly believe Iraq is one of the last great "ground floors" we will ever have in the world. China in the late 1980s and early 1990s was a ground floor—if you got in at that time, you did very well. India followed. Iraq today is a ground floor. It doesn't have the population of China or India, but it has a huge amount of mineral wealth, oil wealth, and agricultural wealth. Geographically, it is positioned to become one of the most prosperous countries in the world. And I don't think that ground floor is going to stay open for too much longer. I think we have a few more months, and then the acceleration of investment in Iraq will take place. I expect that to happen during 2010.

McKinsey on Government: *There has been a lot of press recently about renewed violence in Baghdad. Do you think that is scaring investors off? Should it?*

Paul Brinkley: If you look at the statistics on Baghdad, the violence has not increased. The number of events in Baghdad has actually continued to decline. The performance of the Iraqi army and the Iraqi police after our troops have pulled back has actually been quite strong. I think that what we have seen, especially around the election cycle, is a recurrence of very large, spectacular, desperate acts by a shrinking pool of violent actors—people who are desperate to make one last effort to demonstrate that security is not restored. I was talking to someone recently who had spent a lot of time in Northern Ireland during the Troubles, and he said that the closer they got to a peace agreement, the more spectacular the events became and the more desperate the last remaining hard-core insurgents were to try to reverse course. So I suspect that we will see those kinds of spectacular acts that will attract a lot of attention. For investors, these acts will keep the ground floor open a little longer.

It's also interesting that these acts are centered in Baghdad. Iraq, of course, is far broader than just Baghdad. It is a country with many cities—Basra, Najaf, Karbala, Ramadi, and in the North, Kirkuk, Mosul, and so on—so events in Baghdad do not necessarily reflect the security situation in the entire country.

McKinsey on Government: *All eyes are now on Afghanistan. Do you think the approach that you used in Iraq could be productively applied in Afghanistan?*

Paul Brinkley: Offering economic opportunity as part of protecting and helping the population is absolutely critical in Afghanistan. What gets done tactically is going to be very, very different than what we did in Iraq. It's a different culture, it's different people, and Afghanistan has advantages and disadvantages when compared with Iraq—for example, with respect to educational levels or pre-existing infrastructure to support business. But the general approach—the acknowledgment that there must be a strong tactical economic and private-sector business-development effort in Afghanistan—is absolutely essential.

We have already been impressed by the caliber of the business community that we've engaged in just the short time we've been working there. The more we learn, the more we'll see how we can help, but I am optimistic that the approach at the broadest level is absolutely appropriate for Afghanistan.

McKinsey on Government: *You have now spent three years flying back and forth to the Middle East, initially in a very dangerous situation and certainly in a very complicated one. By all accounts, your job is extremely difficult and challenging. What has been the hardest part about doing it?*

Paul Brinkley: On the personal side, the hardest part of my job is having to be away from my family so often. Professionally, the institutional and structural challenges we face in our Western governments have been the hardest part. Our economies have evolved to a level of maturity such that it has created a mind-set—one that is now so deeply ingrained at all levels of our bureaucracy—that the economy just happens on its own. But if you look at the history of the United States or the United Kingdom or other countries, that's not the way it happened. Interstate highways were built, infrastructure was laid down, industries were created. These were things that the government did; they did not happen spontaneously. Much of our industrial capability here in the United States came about in the middle of the 20th century as a result of massive military spending.

Yet we've grown so accustomed to the success of our free-market model that we've lost sight of the fact that, for a country coming out of violence or engaged in violence, this alchemy isn't natural. So the hardest part of my job has been to confront the deeply embedded belief among people in the government that what we're doing in Iraq isn't necessary, or even that what we're doing is wrong, and this has led to tremendous bureaucratic barriers being thrown up at every stage of the process. That's been our most difficult hurdle. But I think we've overcome it.

John Dowdy is a director in McKinsey's London office.

Supply chain transformation under fire

Deployments to Iraq and Afghanistan exposed weaknesses in the UK Armed Forces' supply chain and provided a powerful impetus for change. The resulting improvements offer valuable lessons for other militaries' supply chains.

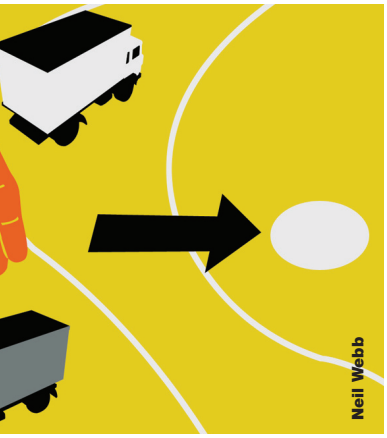
Air Vice-Marshal Matt Wiles CBE and David Chinn

The idea that "[l]ogistics are fundamental to the generation and maintenance of fighting power in every environment"[1] is not new—it has been true in all major combat from Alexander's Macedonian army until today. For commanders of the UK Armed Forces, however, near-continuous overseas operations since the early 1990s have brought the importance of logistics to the fore.

One of the most critical areas of military logistics is the supply chain: the set of processes, infrastructure, equipment, and personnel that moves a force to the theater of operations and sustains it by maintaining stocks and transporting additional goods and people. The supply chain also must meet day-to-day needs at a country's military bases throughout the world. For the United Kingdom, the supply chain involves 11,000 destinations (including air bases, ships, and garrisons at home and abroad), more than 200 million orders a year, dozens of internal organizations, hundreds of suppliers, and billions of pounds in spending.

In some ways a military supply chain resembles a commercial one, and the UK Armed Forces has at times considered adopting the best practices of companies such as Amazon or FedEx. However, commercial practices are far from adequate in meeting all the challenges a military force faces when engaged in a theater of operations. For example, while commercial logistics operations and militaries are both prone to massive peaks in demand, in the commercial world those

[1] *Joint Warfare Publication 4-00: Logistics for Joint Operations*, Joint Doctrine & Concepts Centre, UK Ministry of Defence (2003).



peaks are often predictable (such as product launches or holidays) whereas the military cannot predict where or when peaks will occur. In the military, most of the "points of sale" (such as army units, ships, and air bases) are mobile and move several times a day, and the range of items they need to stock and supply—including spare parts of vehicles and aircraft, heavy industrial equipment, and hospital supplies—is more diverse than that of most commercial businesses. In addition, the military has much more at stake: while commercial operators need to keep a close eye on competitors, the Armed Forces needs to watch out for enemies who can kill drivers, blow up depots, or threaten suppliers. While in the commercial world, stockouts can lead to loss of profits, in the military world stockouts of certain items—ammunition, fuel, blood—can lead to loss of life.

Nobody notices the supply chain when it works well, but it quickly becomes a focus of attention—even among the general public—when it does not meet expectations. This was the case during the UK forces' extremely demanding deployment to Iraq in 2003. Shortcomings in the supply chain became very clear and provided a powerful impetus to make improvements. An important enabler of these improvements was the integration of the supply chains that previously resided in each branch of the military to create a Joint Supply Chain (JSC). In this article, we share some of the most effective changes made as part of the creation of the JSC, the successes achieved, and lessons learned.

Supply chain challenges exposed

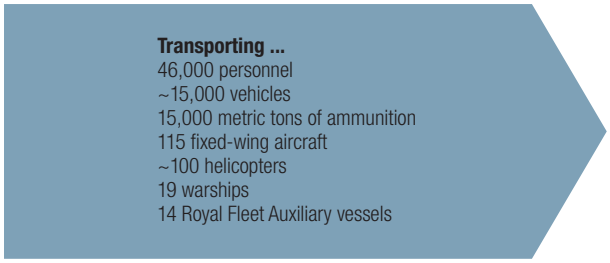
The buildup to the second Gulf War required a massive movement of equipment and personnel from their bases in the United Kingdom and Germany within only ten weeks (exhibit). To put this in perspective, it was roughly the equivalent of moving the entire population of Canterbury, England; Arles, France; or Biloxi, Mississippi, more than 4,000 kilometers (2,485 miles).

Sustaining this force was demanding as well, especially considering the hundreds of different pieces of equipment in use, the complexity of the technology, and the harshness of the environment. To give an idea of how many spare parts were needed in steady supply, a single aircraft may consist of more than 100,000 parts; in this operation, seven different types of aircraft were used. For the troops, the supply chain had to ensure the constant flow of food and water that met UK hygiene standards and tastes, mail and other connections, and medical supplies, as well as a means of transport home for leave and at the end of a tour of duty.

Exhibit

Buildup to Iraq

The 2003 deployment of the UK military involved rapidly preparing equipment and personnel.



Source: UK Ministry of Defence

When we measured the supply chain's performance at the end of the ten-week period, we found shortages of many critical items. A common assumption among the front line was, "If I don't have it with me, it will never arrive." Additionally, the large volumes and tight timelines exposed shortcomings in information systems, particularly with regard to the ability to track items moving through the supply chain. These shortcomings led units to hoard stocks and over-order. For their part, supply personnel focused on expediting urgent deliveries rather than ensuring that everything arrived on time.

Successful improvement initiatives

Based on this experience, we set about improving the supply chain's performance through the Defence Logistics Transformation Programme, a comprehensive program to increase the effectiveness of logistics support to the UK Armed Forces. We identified three areas that needed close attention: supply chain planning, performance management, and supply processes. Here, we discuss some of the most successful and easily replicable initiatives in each of these areas.

Planning

The responsibilities of supply chain planners include identifying supply routes and air- and seaports, estimating volumes, establishing warehouses, and negotiating contracts with suppliers. In a multinational force, decisions about each country's force and its specific tasks often are finalized very late, leaving supply chain planners very little time to deliver and execute on plans. This became a significant challenge for planners in the UK Armed Forces, in part because they were using outdated tools, lacked coherent planning approaches, and relied heavily on their judgment and experience—experience gained during the Cold War, when the logistical challenges were less complex and time-constrained.

Improvements to supply chain planning started slowly; many initiatives launched in Iraq had not yet been fully delivered by the time the United Kingdom deployed to Southern Afghanistan in 2006 as the lead of the International Security Assistance Force (ISAF). We therefore decided to pilot some new processes in Afghanistan. While there was certainly a need for information systems and decision-support tools, we started with a very low-tech solution to help achieve early results. The planning group developed a simple simulation of the supply chain, using different-colored poker chips to represent different types of supplies (for example, fuel and food) and a long table to show the layout of facilities in the United Kingdom and Afghanistan; we used simple computer models to calculate volumes. This visual approach enabled us to test different scenarios quickly and understand their implications and risks. It also made it easy to involve and communicate with a broad range of stakeholders.

Once the approach was proven to work, it was relatively easy to build computerized tools that could conduct the simulations and calculations for future operations in Afghanistan, Iraq, and other theaters of operation. The new supply chain planning process and tools were a success. The United Kingdom successfully deployed more than 4,500 military personnel in the right order and with the right equipment and associated support, despite unreliable land and air communication lines and a very hostile operating environment.

The UK Armed Forces has continued to develop the planning tools since 2006. The tools are now capable of integrating updated data on actual

We had to change the management culture from one focused on expediting and fire fighting to one focused on effectiveness and measurable results

consumption and delivery times, and then creating simulations, testing multiple courses of action, and assessing risks based on those data. These tools are recognized as tools of the trade for supply chain planning and are fully integrated into the standard training for planners.

Performance management

Once a plan is in place, performance management—generating, interpreting, and acting on performance data—comes into play. Here our starting point was very weak, largely because data on supply chain performance resided in multiple legacy IT systems. Getting a complete picture of performance was a tedious and time-consuming task.

The first step was to agree on what measures we would use. We selected delivery reliability (how often the supply chain met targets for delivery time) and customer wait time (CWT—how long customers had to wait between ordering something and receiving it). For example, if the delivery target was 5 days and the supply chain met that target 70 percent of the time, the average CWT might be 7 days or 20 days, depending on how delayed the other 30 percent of items were.

The only sources of data on delivery reliability and CWT were the handwritten order books that every unit maintains. We manually entered the data into a database, extracted from multiple IT systems the records for each item that the units ordered, and then linked all the records to understand how items progressed through the supply chain. The picture that emerged was not encouraging: low delivery reliability and long (sometimes very long) wait times.

Once we had data, we had to change the management culture from one focused on expediting and fire fighting to one focused on effectiveness and measurable results. We formed a supply chain performance-management board, which convened all the individuals involved in the supply chain on a monthly basis to develop tools and review and improve performance.

An early success was a pilot conducted in Iraq. Data showed that items were taking roughly one week to reach units after arriving in the country even though no British unit was more than a four-hour drive from the air- and seaports. The pilot team implemented—in the space of two weeks—a very simple performance-management system using colored stickers: every package sent to Iraq had a colored sticker attached, on which everyone in the supply chain wrote the time and date that they handled the package. When packages arrived at their final destination, the units sent the stickers back to the performance-management team in the United Kingdom. The data were tabulated, then circulated to all involved on a weekly basis. (We had high-tech devices that could read barcodes and electronic tags on packages, but because of the lack of data integration and limited communications in Iraq, we could not use these devices to make quick improvements. We also knew that visual-

management tools—which make performance data highly visible and easy to grasp—have been very effective in industrial settings, and we suspected they would also have impact in Iraq.)

After four weeks, we held a workshop to redesign the supply processes, implementing simple changes such as removing double handling, coordinating delivery timetables, and making deliveries directly from aircraft to combat unit. We also set a new target: next-day delivery. The results were immediate and sustained. When threat levels increased, the target was lengthened to two days to account for added logistical challenges—a target the supply chain continued to meet.

Based on our experience in this and other pilots, we created a permanent performance-management cell—a small team that gathered data and ensured that improvements were implemented—and replaced the ad hoc and largely manual collection of performance data with an automated data warehouse. Performance data has become the main input for the supply chain staff's weekly videoconferences and planning sessions. The impact has been impressive: specific successes include a reduction in delivery times to bases in the United Kingdom and Germany from 30 days to 7 days and, thanks to an improved ability to detect the root causes of delays and intervene accordingly, a more-than-15-day reduction in CWT in Iraq and Afghanistan. Using a new "effectiveness" performance metric, we have been able to determine that the supply chain has given commanders in Afghanistan the operational flexibility they require—a major achievement.

Most impressive, however, has been the cultural change. The supply chain is managed by the numbers, all involved have a clear view of how they are performing relative to their targets and how they contribute to overall performance, and there is a shared set of development goals to maintain continuous improvement.

Supply processes

Among the process changes we made, the one that touched the largest number of units was a change in the way units receive equipment prior to deployment. Traditionally, each unit would have 30 days of stores on its shelves so it could deploy and sustain itself while waiting for the supply chain to operate at full capacity. Many units did not know where and for what type of mission they would be deploying, and therefore stored items that they probably would not need in the near term, resulting in constant shortages—a significant problem in an organization with constrained budgets and suppliers that often need long lead times. When deployments were announced, units quickly tried to stock up on what they did not have, thus creating a massive strain on the supply chain. Furthermore, all units were holding stores when only a few were ever deployed, and each unit designed its own stores holdings; there was no established methodology, and there were limited guidelines.

Today, units no longer maintain their own stores. Instead, the supply chain stores both standard and destination-specific "priming equipment packs" (PEPs), designed based on usage data, expert engineering analysis, and the judgment of experienced quartermasters. PEPs are designed to maximize the ability of the unit to sustain itself. They have been tested in live, high-readiness operations, and they work well. The increase in self-sufficiency substantially reduces the strain on the supply chain in the early days of an operation, when staff is often overloaded and the infrastructure is not fully in place. The concept also allows for gradual withdrawal of stock from units as they gain confidence that what they

need will be available from the depot when required.

In addition, the supply chain has captured cost savings by ensuring that all the items a unit needs for a deployment can be ready at the time they are needed. For example, units being deployed within days have everything packed and ready to load, while units that have a warning time of months have protected inventories in central warehouses and contracts with suppliers that guarantee they will meet the readiness timeline.

Lessons learned

The progress we have achieved since 2003 has been massive. We may not be able to stop delays of freight at the Pakistan-Afghanistan border due to customs checks or poor weather, but we now can anticipate such delays, plan for them, and mitigate their impact through close and sustained management.

With the benefit of hindsight, we can share a few lessons for anyone else embarking on a similar journey:

- A good supply chain plan is the basis for success. Make planning as scientific and quantified as possible, even though there will always be unknown factors. Also, make it easy to test new approaches and adjust course—military operations have a habit of changing direction at short notice.

- Focus on performance. Be clear about the supply chain's objectives and measures, and gather the best data available to make performance transparent. Otherwise, you are navigating without a map or compass. An important starting point is to get consensus on which performance measures really matter. Once all stakeholders are in agreement, start measuring right away.

- The best data available—no matter how imperfect—are better than no data. One critical leadership challenge is to ensure that the team is focused on studying and improving performance, rather than on debating the data and coming up with reasons for why the numbers *must* be wrong.

- Process change, management tools, and cultural change have to develop in parallel. Otherwise change will not be sustainable. Leaders can use a "blueprint"—a vision of the desired future state—as a tool to achieve alignment and drive the improvement process forward.

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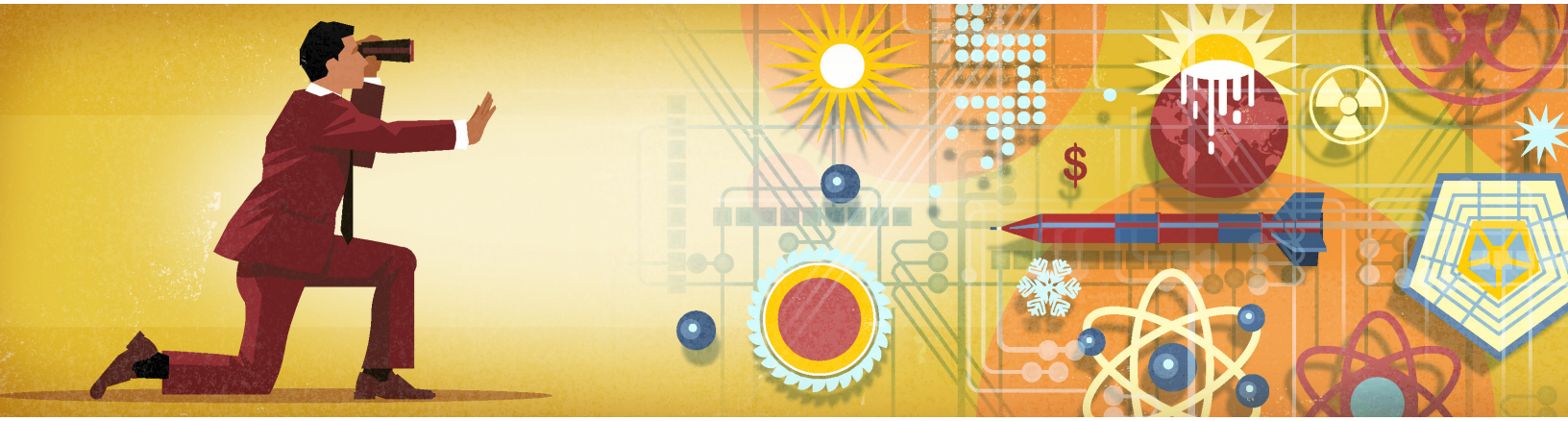
Since our early work, we have completed a major program to provide full consignment tracking visibility across the extended supply chain, started to roll out a single inventory-management system across all the armed services, and developed techniques to balance inventory across operational theaters. We are managing the supply chain's performance in increasingly sophisticated ways, and we are now able to properly cost and benchmark its performance. That said, continual attention to performance management is essential, especially given the ever increasing demands of combat operations in Afghanistan. Our journey is ongoing.

Air Vice-Marshal Matt Wiles CBE RAF is Director, Joint Support Chain, for the UK Ministry of Defence, Defence Equipment and Support. **David Chinn** is a principal in McKinsey's Tel Aviv office.



A dynamic strategy for uncertain times

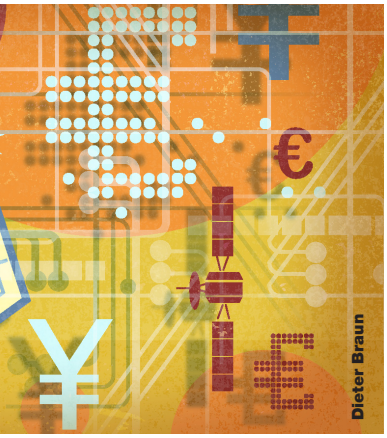
A world of fast-changing conditions and heightened uncertainty demands that defense agencies act with speed and flexibility. They can do so by taking an iterative, dynamic approach to strategic management.

Lowell Bryan, Richard Elder, Becca O'Brien, and Scott Rutherford

In this era of unprecedented global uncertainty, defense agencies—ministries and departments as well as armed services and their major branches—must rethink how they develop and manage their strategies.[1] While some aspects of strategic planning (such as procurement decisions for next-generation equipment) require long lead times, fast-changing conditions—ranging from evolving situations in war zones to civil unrest due to governmental destabilization or the global economic crisis—require fast action.

In this article, we propose an approach to strategic management that involves three basic stages: understanding the context, making strategic decisions and weighing risks, and executing amid uncertainty. These stages will be familiar to agency leaders, and indeed, agencies already conduct many of the activities we describe. We have found, however, that the majority of agencies treat these three stages as discrete tasks, rather than as related parts of an integrated and dynamic process for making the right choices at the right times. Rarely do agencies iterate through all three stages and ensure that they feed into each other. In our experience, agencies also fall prey to common pitfalls that hinder rapid, confident decision making, such as failing to take a broad enough view of the context, developing a static strategy that does not take into account trade-off decisions, creating a strategy document that lists broad principles rather than specific initiatives and pays only cursory attention to strategic risk, and adding

[1] A defense agency's strategy is the overall plan meant to guide major strategic decisions regarding personnel, technology, readiness, equipment, and infrastructure in support of the country's national security objectives. This strategy should encompass several different time horizons (that is, 1–3, 5–10, 10–20, and 20+ year views). A defense agency's strategy is distinct from on-the-ground military strategy (that is, how to invade or defend) and political military strategy (for example, whether to deploy units).



initiatives and programs to the strategy without stopping and eliminating those that have become nonessential.

Our proposed approach to strategic management focuses on iterative, interconnected decision making and incorporates familiar tools as well as several that may be new to some defense agencies. The approach shares some insights with other literature and thinking on military strategy. For example, in the 1970s, Colonel John Boyd of the US Air Force proposed the concept of the "OODA loop," the repeated process of observing, orienting, deciding, and acting. Boyd hypothesized that executing on this loop faster and better than the enemy is the key to winning in warfare. The first stage of our approach (understanding the context) corresponds to "observing" and aspects of "orienting," the second stage (making decisions and weighing risks) corresponds to other aspects of "orienting" and to "deciding," and the third stage (executing amid uncertainty) corresponds to "acting." Our emphasis, however, is on what it takes for a defense agency to observe and orient thoroughly, decide dynamically, and act quickly.

Understanding the context

With varying degrees of formality and frequency, agencies collect data about the external environment and the agency's internal operations to help them understand their context, resolve ambiguity where possible, and identify remaining uncertainties. Many agencies purchase external reports on global trends, administer internal surveys that gauge staff's attitudes or satisfaction, and engage in other information-gathering efforts. To supplement these efforts and gain a fuller perspective, agencies could build a repository of proprietary data—for example, data and trends on personnel, equipment, suppliers, and materials—and collaborate with outside entities (such as private-sector industrial and technology companies) that provide in-depth support or intelligence.

Assessing the external environment

Most defense leaders studiously observe the external environment and identify the trends that could affect the defense and national-security landscape in the near term. However, in part because of annual budgetary cycles, leaders tend to give less thought to contextual trends that will develop over the longer term (say, ten years), such as demographic shifts, economic regionalization, and technological discontinuities. Here, we offer some questions to consider—some rather obvious, others less so—that have been helpful to agencies as they ponder what the future might hold in three general areas: global trends, the competitive landscape (including trends in technology, equipment, and the personnel structure of other agencies and the private sector), and stakeholder perspectives.

Determine the impact of global trends

- What threats and adversaries, whether military or nonmilitary, are expected to emerge? What new weapons, tactics, and areas of operation will come into play? The US military's 2010 Quadrennial Defense Review, for instance, acknowledges climate change and its consequences—including rising sea levels and resource scarcity—as important factors in planning for future operations.

- What is the emerging geopolitical context? Who are the foreign and domestic influencers? Which scenarios and cultural mind-sets might drive future conflicts or produce pressure to avoid them? For example, how might conflict and unrest in Africa—in some cases related to the power struggle over vital raw materials such as oil or water—affect the rest of the world?

- How will the global and domestic economy shape the security context? What trends will develop with regard to domestic budget deficits, productivity, and prices for raw materials?

- What technological trends will shape the security context? To what degree will cybersecurity and other technologies be game changing? Protection from improvised explosive devices (IEDs) was a priority for US and coalition governments in the 2000s, but what technological innovations will be most needed in the next decade?

- What demographic trends will affect the agency? The obesity trend in some countries and aging populations in others, for instance, could significantly reduce the armed services' talent pool.

Analyze the competitive landscape (that is, the agency's position in the market for essential resources)

- How will the agency be positioned to compete for human capital? What is the expected impact of employment rates and economic growth on recruiting and retention? What will be the cultural drivers of propensity to serve?

- How will the agency be positioned to compete for technology and raw materials?

Understand stakeholders' perspectives and their likely evolution

- What are the emerging policy priorities of national leaders? Of major parties and key committees?

- How does the public regard the agency's brand and value proposition? How much public support is there for the country's defense and security policies?

- What are the current and emerging priorities of other domestic armed services and intragovernmental partners (such as intelligence and diplomatic agencies)? Of allied nations and their armed forces?

- What are the principal priorities of key nongovernmental groups, interest groups, and related businesses? What is their current and expected level of influence?

- What trends will affect the agency's major suppliers, and how will their perspectives likely evolve?

Assessing the internal environment

Getting an objective perspective of its internal environment can be difficult for any organization, in large part because organizations tend to have a culture of unexamined adherence to "how we have always done things." An additional challenge in the defense context is that many agencies have very rapid turnover in senior positions. An assessment of the following four areas can help an agency establish a baseline of its current performance and identify performance gaps:

- How well does the agency execute strategic initiatives? What have been the drivers of its successes and shortfalls? Here, an objective performance review—usually conducted by a third party—is crucial, because bias is likely to taint any self-assessment.

- What is the agency's financial situation? What are the assumptions behind the agency's forecasts of appropriations revenue, budgeting, and spending? What factors could cause those assumptions to change? How predisposed is the organization to actively seeking out efficiencies? Is the agency's financial planning process free from institutional biases and justification of sunk costs? For example, is there

a process that would allow the agency to scrap a new IT system that does not meet operational requirements?

- What are the positive and negative aspects of the agency's culture (values and mind-sets)? How strong are the agency's capabilities (skills at all levels of the organization? What is inhibiting improvement? For example, given that most military cultures are hierarchical and rely on strong leaders, does the agency have mechanisms to foster bottom-up innovation?

- How healthy are the agency's leadership dynamics? What are the leaders' capabilities, and how will those change over time? To what degree are leaders aligned with one another? Senior leaders in defense agencies must have exceptional collaboration and communication skills, for example, yet few agencies focus on building such skills among senior personnel.

Cataloguing assumptions

Because the contextual analysis will almost always have to rely on imperfect and incomplete data, an agency must be aware of its most significant unknowns and how much risk lies behind them. For example, to understand how the price and availability of oil might affect its operations, an agency can list all the assumptions it is making about oil prices and availability, and then segment those assumptions based on how much supporting data exists (for example, none, partial, or almost complete). The agency could then conduct a sensitivity analysis on each assumption: what is the anticipated impact of being wrong slightly (5 percent to 10 percent if quantifiable), moderately (approximately 20 percent), or dramatically (30 percent or more)?

This exercise is critical to understanding not only the near-term impact of fluctuations in oil prices and supply but also the longer-term changes that the organization should begin preparing for today. Once an agency has cataloged its assumptions according to their relative uncertainty and potential impact, it can put in place appropriate mitigation or monitoring programs. Frequent updates to this "assumptions catalog" ensure that agency leaders are basing their decisions on the best information available. The assumptions catalog becomes an important input to scenario development during the decision-making process described in the next section.

Making strategic decisions and weighing risks

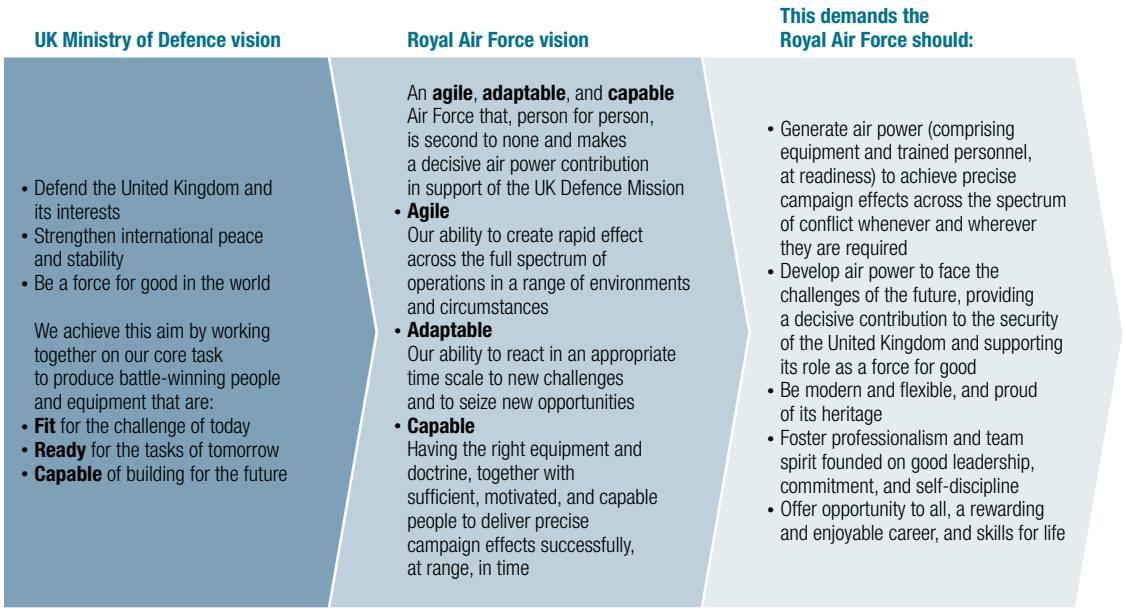
Even agencies that religiously gather data and generate insights about the internal and external context are not always disciplined about feeding these insights into their strategic-management processes. A failure to incorporate contextual insights into strategic decisions can move an organization in the wrong direction. Among the key aspects of dynamic management, therefore, are setting a vision with measurable goals and then translating those goals into initiatives that take into account the uncertainties identified in the contextual assessment.

Setting and adhering to a vision and measurable goals

Most defense agencies have common elements to their mission. The US Army's mission, for example, is "to protect our nation from our enemies, defend our vital national interests, and provide support to civil authorities in response to domestic emergencies." Singapore's armed forces have a similar mission: "to enhance Singapore's peace and security through deterrence and diplomacy, and should these fail, to secure a swift and decisive victory over the aggressor." But these two countries face different environments and challenges.

Exhibit 1
Setting their sights

The United Kingdom's Ministry of Defence and Air Force have a defined vision and goals.



Source: UK Ministry of Defence, Defence Plan 2009-2013; UK Royal Air Force Strategy 2006 (still current in 2010)

To guide day-to-day decision making in support of the mission, a defense agency needs a clear vision of what success looks like within a specific strategic time frame, as well as a set of metrics that will tell the agency whether it has achieved that vision. The vision must be easily understood, inspirational, and—most important—actionable. Disaggregating a vision into a handful of strategic goals, each with its own simple set of metrics, allows everyone in the organization to see the opportunity for individual and collective contribution.

For example, the vision and goals of the Royal Air Force (RAF) build off the United Kingdom Ministry of Defence's vision (Exhibit 1). Taking the example further, the RAF might link its first goal—which has to do with readiness of personnel and equipment—to metrics such as the availability of people by skill type and unit, the adequacy of training, and equipment levels.

Developing and prioritizing initiatives

To translate an agency's vision and goals into a set of linked strategic initiatives, defense leaders can use a range of familiar analytical tools, such as scenario planning. Once they have identified key areas of uncertainty as part of the contextual assessment, leaders can engage in a disciplined exploration of potential scenarios, including rare but catastrophic outcomes. Some of the key uncertainties—for example, the impact of the recent global economic crisis—may be nonmilitary variables. An agency can also use other analytical tools (such as decision trees, war gaming, or probabilistic modeling) to develop scenarios. The next steps involve weighing the likelihood of the various scenarios, identifying any gaps they expose in the agency's strategic goals, and developing initiatives to fill those gaps while allowing for a comfortable level of risk.

The idea of accepting a certain amount of risk can conflict with a prevalent bias in military psychology. Militaries feel the need to always be prepared; the natural inclination within any defense organization is to try to fill every

gap completely and eliminate, or at least reduce, all risks—a laudable but unachievable aim. Part of managing risk dynamically is making informed decisions about which gaps to address and to what extent, and which gaps to tolerate, if only temporarily.

As it determines what to do, what not to do, and the appropriate degrees of risk to absorb, an agency may find two tools very helpful: a strategic playbook and a portfolio of initiatives (POI). A strategic playbook shows both an initiative's absolute value and its value under different scenarios (Exhibit 2). The agency can thus identify its no-regrets moves (those for which it can quickly allocate resources and assign responsibility), its best bets (strategic choices based on advantaged information) and real options (the next-best choice when the best bet involves too much risk or more resources than are available), and its contingency plans (those that would become favorable if a "trigger" event happens). Each type of initiative requires a different level of resources and monitoring.

The agency can then explore the resulting questions of risk and trade-offs using a portfolio of initiatives (Exhibit 3). The most thoughtful defense leaders prioritize initiatives and make trade-off decisions based in part on a realistic accounting of the resources required across the entire portfolio. So as not to impose new burdens on an already stretched organization, they make well-considered choices about what the agency will not do or will stop doing, and then communicate these choices unambiguously to the organization. Almost always, these decisions are difficult and require exceptional levels of clarity and fact-based conversation among senior and mid-level leaders.

Executing amid uncertainty

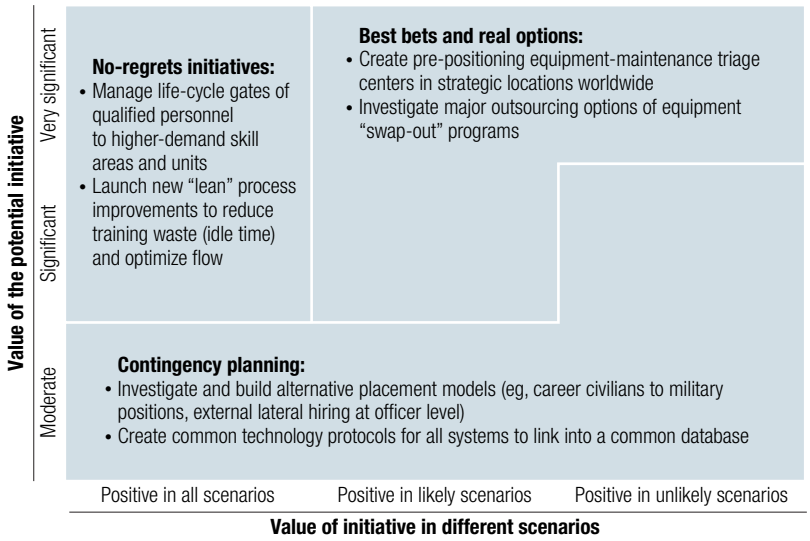
Institutional flexibility is critical to an agency's ability to respond to material changes in the environment and adjust levels of investment. Building this flexibility into an organization will, in many cases, require the introduction of new processes. Some of the most important include the following:

Exhibit 2

By the book

Using lenses of uncertainty and value, a set of initiatives can be translated into a strategic playbook.

ILLUSTRATIVE



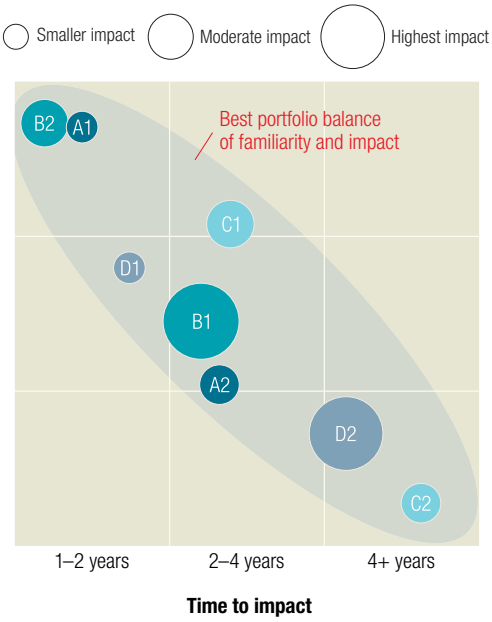
Source: McKinsey proprietary framework and analysis

Exhibit 3
In the mix

A "portfolio" approach balances risk against short- and long-term opportunities and makes resource trade-offs explicit.

Portfolio of initiatives (readiness examples)

ILLUSTRATIVE



A Improve provision of people to operational forces, avoid inventory imbalances
- A1 Manage life-cycle gates of qualified personnel to higher-demand skill areas and units
- A2 Investigate and build alternative placement models (eg, career civilians to military positions)

B Increase trained population
- B1 Institute new training doctrine to tier critical skill training to better reflect 2010 needs
- B2 Launch process improvements to reduce idle time

C Increase equipment preparedness
- C1 Create pre-positioning equipment maintenance triage centers in strategic locations worldwide
- C2 Increase use of "just-in-time" parts supply process to improve equipment uptime

D Leverage technology advancement
- D1 Improve precision of personnel-management system with new architecture design
- D2 Create common technology protocols for all systems to link into a common database

Source: McKinsey proprietary framework and analysis

Exhibit 4
Attitude adjustment

To confront uncertainty, organizations will have to change gears.

From a mind-set of …	To a mind-set of …
• Expecting stability and downplaying variability and making "reasonable" assumptions • Delegating decisions downward to reduce complexity	• Knowing that uncertainty and change are the norm and that the real risks are in the assumptions • Collaborating on critical decisions and making sure the right people are involved to make the best possible choices
• Meeting deadlines at almost any cost	• Individually and collectively making decisions in the best interest of the organization
• Maximizing investments by fully committing resources	• Deliberately accumulating resource reserves and committing them only when risk-adjusted returns are clearly attractive
• Making decisions at the scheduled time	• Making decisions when the timing is right, with the right amount of staff work
• Believing that good leaders inspire confidence by making visionary statements and sticking to a single course of action	• Understanding that good leaders are navigators who confidently adjust course as conditions change

An iterative—rather than annual—management cycle. Recurring forums for bringing leadership together—whether for 30 minutes per week, three hours a month, one day per quarter, or some other regular interval—are more conducive to dynamic management than an annual planning cycle. Such forums should include formal mechanisms for evaluating the POI regularly; repeating the full environmental scan and gathering updates on the most crucial indicators; monitoring thoughtfully selected information triggers (on an hourly or daily basis for imminent threats, quarterly for slower-moving trends); and coming up with contingency plans for potential game-changing events.

An integrative resource-allocation process. A comprehensive look at the POI should factor into

the agency's process for allocating resources (including capital, manpower, and leadership oversight), with careful regard for legislative constraints imposed by appropriations and authorizing processes. End products could include a rolling 18-month budget or multiple financial plans that reflect different scenarios and are updated quarterly. The goal is to allocate resources "just in time" through a stage-gating process in which leadership checks in at specific milestones to decide whether to continue, abandon, or redirect an initiative, thus allowing the agency to change its investment level in each initiative as the environment evolves.

Performance-management systems that drive accountability and foster understanding. Clear metrics and regular performance reviews consistent with agency and military command structure are fundamental enablers of dynamic management. These reviews might include strategic "performance dialogues" throughout the organization. A performance dialogue convenes senior leaders, key commanders, and owners of initiatives to discuss progress against metrics, diagnose the root causes of problems, and develop potential solutions. Such dialogues are helpful for communicating why agency leaders have chosen a certain direction or taken certain actions and for giving individuals a sense of their role in realizing the agency's vision.

A process for collaboration across initiatives. The agency's governance model should enable mid- and project-level leadership to resolve conflicts and share ideas but ensure that a single person is ultimately accountable for the success of an initiative. Because most initiatives will have implications for other initiatives, the leaders of each initiative should have appropriate exposure to one another. Initiatives that focus on personnel readiness, for instance, might each have different leaders and timetables for completion and impact, making collaboration and coordination critical to success.

Processes such as these can help an agency support and monitor its strategy while simultaneously creating mechanisms for adaptability. For many agencies, the introduction of new processes, or even the refinement of old ones, will require a change in mind-sets (Exhibit 4).

• • •

Most defense agencies have implemented at least some of the elements outlined in this article. However, to fully embrace a dynamic approach to strategic management, an agency will need to start by building a baseline of the internal and external context, and the organization's vision and goals. From there, it can begin the kind of iterative strategic decision-making cycle we have described. Initially, the agency could focus on one component of the strategy (such as personnel) and its impact on the other components, or it could focus on a single issue that cuts across all components (such as deployment readiness). A singular focus will allow the agency to become more comfortable with the approach and develop the requisite strategic skills, after which it can expand the scope of the effort. Agencies that engage in dynamic management will be able to adjust course confidently as the context changes and ensure that everyone in the organization quickly and effectively executes any shift in course that leaders deem necessary.

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'Without taboos': France's new defense policy

Olivier Debouzy, one of the authors of the *French White Paper on Defence and National Security*, reflects on its key recommendations and the rationales behind them.

Philippe Cothier

Soon after taking office in May 2007, French President Nicolas Sarkozy established a commission to take a hard look at France's defense and national security policy. In June 2008, this commission published the *French White Paper on Defence and National Security*, the first official statement of French defense policy since 1994. In the paper, the commission says it was given "full latitude to fulfill its task, without any taboos." The French government has begun incorporating the *White Paper's* recommendations into its planning and spending decisions.

In a departure from prior commissions, the 2007–08 White Paper Commission consisted not only of government officials but also of academics, industry representatives, and other external experts. Among those appointed to the White Paper Commission was Olivier Debouzy, a lawyer and a former diplomat. Debouzy held various posts in the French diplomatic service, specializing in nuclear military affairs and strategy, from 1985 to 1991. In 1993 he became an attorney and two years later cofounded the full-service law firm August & Debouzy, which now has more than 130 lawyers.

In November 2009, McKinsey partner Philippe Cothier interviewed Debouzy in Paris about the highlights of the *White Paper*. Excerpts of the conversation follow.

McKinsey on Government*: *It is rather unusual in France to have lawyers participating in national security debates. To my knowledge, the

2007–08 Defence and National Security White Paper Commission was the first to include lawyers—two of them, actually, of which you are one. Why do you think President Sarkozy appointed you?

Olivier Debouzy: I do not claim to know President Sarkozy's motivations, but I have been active in defense and national security debates for the past 28 years, first in the government and then outside it. More generally, I think President Sarkozy wanted to have a diverse array of minds thinking about the issues we are confronting, which is why he chose to appoint to the White Paper Commission military and civil servants as well as outside experts such as myself.

McKinsey on Government: *How would you describe the commission's purpose?*

Olivier Debouzy: Without betraying the confidentiality of the White Paper Commission's deliberations, I can say that when we first met with President Sarkozy in August 2007, he was very clear: he said to us that the French defense and national security policy should be analyzed without regard to any taboos or preconceptions, and that our recommendations should be as bold as we thought necessary. I think we fulfilled that mission. We certainly had debates up to the very end of the drafting of the White Paper. The chairman of the White Paper Commission, Jean-Claude Mallet, kept President Sarkozy apprised of our work on a regular basis, and he never limited our freedom of thought and of proposition.

McKinsey on Government: *What do you think are the main innovations of the White Paper?*

Olivier Debouzy: I shall try to be concise, but this is obviously a big question. The first innovation is reflected in the scope of the White Paper Commission's mission. Previous White Papers had been exclusively about defense, but this one is about defense and national security. What does that mean? In the 20 years since the fall of the Berlin Wall, defense and national security have been integrated into a continuum. In the age of globalization, there are few threats that are exclusively external or internal. For instance, terrorism, which used to be linked much more closely to the local stakes of a given territory (think ETA in the Spanish Basque region or the IRA in Northern Ireland), is now global, in large part due to the increasing mobility of populations and the massive presence of minorities in Western societies. Another reason for this continuum is the evolution of technology and the globalization of the unofficial arms trade, which have resulted in highly destructive means being available to terrorist groups which, 20 years ago, would have been able to obtain such means only if they were backed by states.

At the same time, the post–Cold War world is a world where the United States, the United Kingdom, France, Italy, and even Germany are waging wars. We have not seen that since 1945. Nuclear deterrence is no longer enough; the need for more robust, better-equipped, better-trained, and better-serviced conventional forces has never been so pressing.

All this led the White Paper Commission to reconsider the fundamental paradigms of French defense and national security policy and to establish five priorities, the first of which is knowledge and anticipation. In the days of the Cold War, we knew who the enemy was. Intelligence was mostly about discovering things that the Soviet Union wanted to hide from us. Today and in the foreseeable future,

the scope of knowledge and anticipation will expand to cover who our enemies are, what they are planning, and where and how they will attack us. The technical aspect of intelligence served us well during the Cold War, but we now have to add a strengthened human intelligence component.

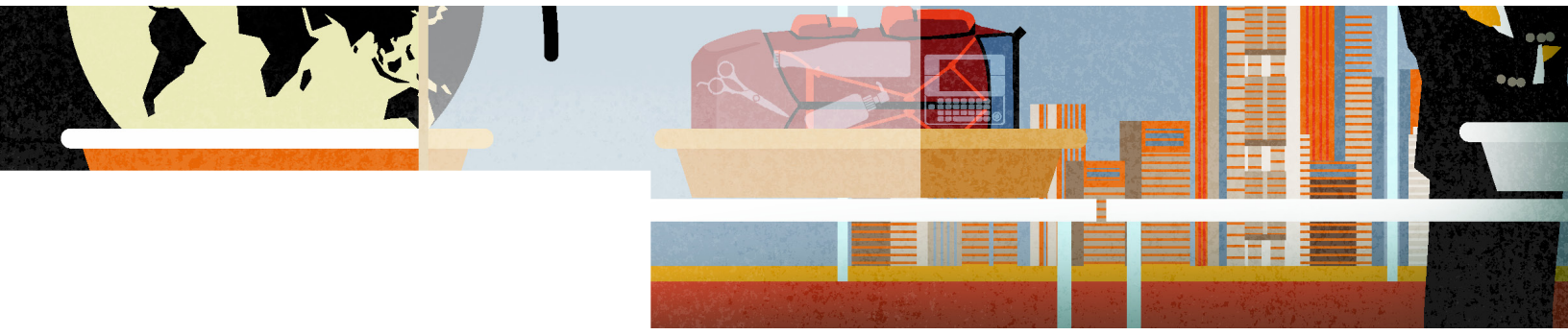
In addition, the nature of knowledge- and anticipation-related activities has changed. In the age of the Internet, most of the intelligence is available on the Web. Secret intelligence covers a much-reduced if still crucial scope. Intelligence in the form of "weak signals" out in the open needs to be analyzed carefully, as it might be predictive of threats on which secret intelligence will then have to focus. Similarly, cultural, religious, and linguistic knowledge may prove decisive in understanding diplomatic moves and future or emerging threats and in adequately preparing diplomatic initiatives, internal security policies, or military moves.

Knowledge and anticipation are force multipliers. Without them, one wastes time and money preparing for the wrong kind of operations, in the wrong region, and against the wrong people. We're not looking only for intelligence; we're looking to mobilize intelligent people to achieve better security at home and abroad.

McKinsey on Government: *What does this mean with regard to technological investments in such areas as space observation, early detection, unmanned aerial vehicles, cyber intelligence, and so on?*

Olivier Debouzy: The LPM [Loi de Programmation Militaire, the 2009–14 defense equipment bill], which the French Parliament recently passed, reinforces the priority of such technological investments, consistent with the recommendations of the White Paper Commission. More than ever, we need both technical and human intelligence.

The second priority is protection. The need to organize protection is based on a concept that our British friends have developed and formalized—that of resilience. Our societies are complex, and their architecture is only as solid as their weakest part. In addition to the strengthening of the internal intelligence agency, the *White Paper* recommends—through energetic action of public authorities and the development of a special kind of public-private partnerships, so to



speak—better organization of the capacity of French society to withstand systemic shocks. And these shocks include not only terrorism but also pandemics and industrial catastrophes, since the means required to treat them are largely similar. The fulfillment of this objective requires not so much more money, but rather a different way to spend it and a reorganization of the way the state works, both internally and with the private sector (for example, telecommunications operators, utilities, food supply logistics, and so on).

One should be careful to avoid restricting civil liberties in efforts to provide better protection to the people. The White Paper Commission was particularly conscious of this and organized several hearings with foreign experts. Obviously, you don't want to impinge on people's freedoms and on their ability to live normal lives; protecting them at that cost is just not worth it. A delicate balance has to be struck.

The third priority is deterrence, which remains a fundamental dimension of the French security paradigm. Its implementation, however, may differ from what it has been in the past. For instance, as President Sarkozy has said, antiballistic missile (ABM) defenses can—and, in all likelihood, will—play a useful role as a complement and reinforcement to our offensive deterrent capabilities. At the same time, no effort and money will be spared to ensure that the capability of our weapons to penetrate other countries' ABM defenses remains intact and even improves.

The fourth priority is intervention. The French, like the British and the Americans, have kept alive a strong tradition of intervention abroad during the past 40 years. But they cannot intervene anywhere and everywhere; choices have to be made. Intervention now is directed toward a strategic axis going from Rabat [Morocco] to Dhâkâ [Bangladesh], or, if you prefer, from Dakar [Senegal] to Peshawar [Pakistan]. This strategic axis is that of the "arc of crisis" where most conflicts can directly threaten Western interests.

Because of the technological evolutions we spoke of a moment ago, the nature of conventional war is changing. The American experience in Iraq was watched and analyzed closely by our military. Similarly, the Afghan war is teaching the French very useful lessons about the wars of the future and the equipment needed to fight them. Joint forces operations; generic equipment easily adaptable to a variety of environments; giving up gold-plating in favor of robustness and simplicity of use; intelligent exploitation of available civil technologies; emphasis on training, maintenance, and readiness—these are the priorities that should be implemented to be able to effectively intervene abroad, in a world characterized by growing instability.

Last, the White Paper Commission put the emphasis on prevention by recommending a restructuring of French bases abroad, the updating of existing defense agreements, and the signing of new ones. The first result of this reorientation of policy was the status-of-forces agreement signed between France and the United Arab Emirates in 2009.

***McKinsey on Government*:** *A few years ago you published an article in the Revue de Défense Nationale that called on France to make some hard choices. Would you say that the 2008 White Paper makes those choices at last?*

Olivier Debouzy: Indeed, the White Paper Commission made some very difficult choices and

recommendations on several issues: the definition of strategic priorities; the reorganization of the Ministry of Defence and the improvement of procurement, training, and support; the reorganization of the internal intelligence agencies; the basing of French forces abroad and in overseas territories; and the reorganization of the French defense industry. These are being implemented as we speak, albeit some more slowly than others.

Olivier Debouzy

***McKinsey on Government*:** *Let's talk about one of the issues you just mentioned—the reorganization of the Ministry of Defence. What do you think the White Paper's impact will be on that?*

Olivier Debouzy: The *White Paper* exercise was conducted in parallel with the Revue générale des politiques publiques (RGPP), which aims to rationalize the ways in which the state is managed. How do the two converge? I think three areas of focus are worth noting.

The first is improving the tooth-to-tail ratio of the French armed forces. Today, many in the armed forces are the "tail"—that is, they are employed in logistical and support tasks that could be, except in theaters of operations, outsourced to the private sector, which is more efficient, less costly, and strongly motivated to provide good service. The armed forces should be doing what they do best, which is fighting, and preparing to fight as well as they can. So in the coming years, there will be a trimming down of ancillary functions. Two evolutions will help in this regard: first, investment in information systems that are now readily available, and second, systematic outsourcing of noncombat functions and equipment used outside theaters of operations. This requires a cultural change in the armed forces, but I am confident that it can be implemented, if only because there is little choice. Also, the LPM that I mentioned earlier represents a major breakthrough in the French budgetary tradition in that for the first time, the Ministry of Defence benefits from the economies it achieves—savings will be 100 percent reinvested in equipment and training. Quite an incentive, don't you agree?

***McKinsey on Government*:** *Indeed. What does the White Paper recommend with regard to improving the efficiency of defense acquisition?*

Olivier Debouzy: The second area of focus addresses this point: rationalizing weapons pro- curement by making a clear distinction between what is strategic and what is not. The consolida-tion of the European defense industry is ongoing, at a painfully slow pace. It is a fact of life. Therefore the French have to distinguish between fields and weapons for which they absolutely need to keep French suppliers (what I call vital competences), fields and weapons for which they can cooperate with suppliers based in other EU member states (what I call strategic competences), and fields and weapons that can be bought off-the-shelf in the world market. Once this is done, the restructuring of the French defense industry, which has been hampered by political prejudice and confusion, will be much easier.

The third area of focus is creating an analytical cost-accounting system allowing, in particular, the calculation of the total cost of ownership of weapons systems. At present, the armed forces do not precisely know how they are spending their money: what proportion on purchase, what proportion on maintenance, repair, training, and so on. The White Paper

Commission recommended that the existing cost-accounting system, which is painfully inadequate, be transformed into a proper one and applied to a wider scope of activities and investments.

McKinsey on Government: *One final question: France has rejoined the integrated military organization of NATO after 40 years of absence. The White Paper clearly advocated it. What consequences will it have?*

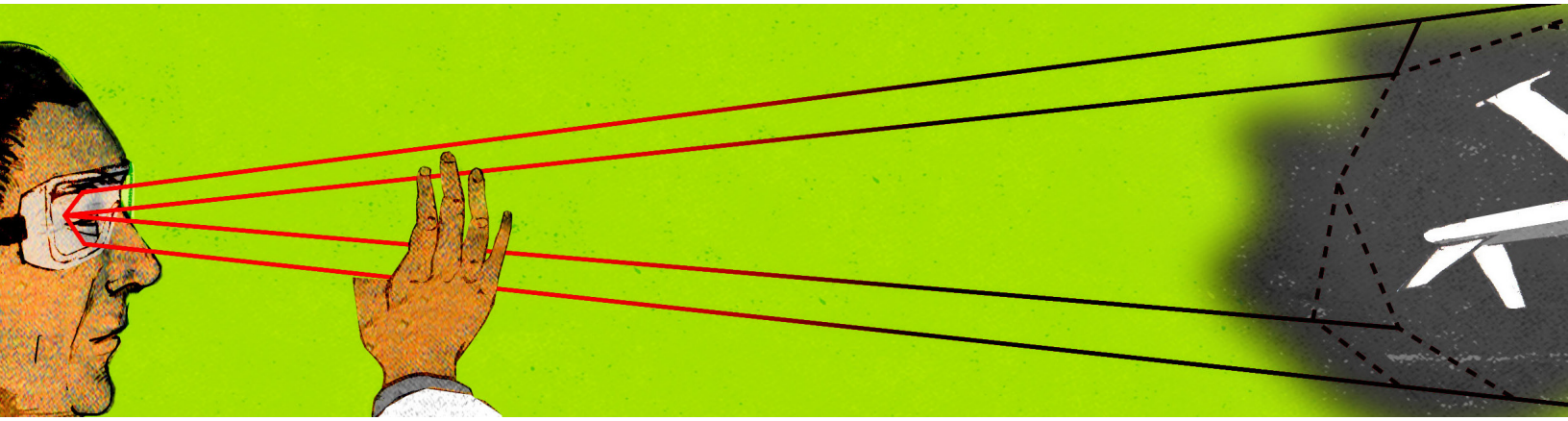
Olivier Debouzy: First, it should be noted that the NATO-integrated military organization that we are rejoining is not the one we left in 1969. It is not integrated any more, hardly a military organization anymore (only the United States, the United Kingdom, Canada, and France are significant military contributors), and the re-thinking of its strategic concept and revamping of its structures are going to be the major tasks of the coming years.

After 1969, France's military cooperation with NATO and the United States was discreet but nonetheless real. France always remained part of the NATO Air Command and Control System (ACCS); it always retained the pipelines supplying the Central Front troops with oil from its harbors in the Nantes region; and it had uninterrupted ex- changes with its military partners in NATO—more specifically, with the United States. Even at the times of the worst possible diplomatic tension, the military link between France and the United States was never broken.

In fact, this "cooperation in hiding" was becoming increasingly untenable on a number of levels. First, diplomatically: how could France reconcile a public stance that at times was virulently anti-American with the reality of cooperation where it mattered? Let us not be blind to the facts: France is a Western country. We are part of Western Europe, subject to the same threats and the same demographic, economic, diplomatic, religious, and cultural challenges. Second, militarily: the absence of coordination between France and the rest of NATO generated multiple problems of interoperability and of coordination where it mattered most—that is, on the battlefield—and limited the exposure of French officers and soldiers to foreign modes of reasoning, experiences abroad, the exchange of ideas, and the confrontations of strategic and operational modes that being part of a coalition entails.

Another advantage of rejoining NATO is that, on issues such as ballistic-missile defense, there is a debate going on within NATO in which France will be an important participant, if only because it faces the Mediterranean. On this issue and on many procurement questions, being within the integrated military structure may allow France and other Europeans to think together, to caucus, and hopefully to be able to have discussions with the United States in a more organized manner. Ultimately—and this is ironic—it may be through NATO that the Europeans will be able to answer Kissinger's question: "Who do I call if I want to call Europe?"

Philippe Cothier is a principal in McKinsey's Paris office.



From R&D investment to fighting power, 25 years later

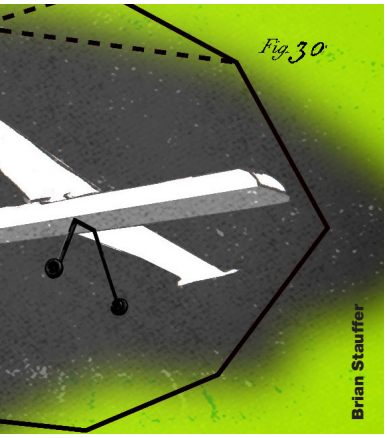
Countries have been investing in defense R&D at widely differing rates—a fact that is likely to lead to significant shifts in the global military balance over the next two decades.

Steven Bowns and Scott Gebicke

In today's constrained budgetary environments, nations are investing in defense research and development at wildly different rates. Some countries are trimming, if not slashing, their budgets, whereas others are boosting their R&D spend, trusting that their investments will pay off down the road. Yet it has never been easy to link defense R&D investment to victory on the battlefield, simply because of the slow pace of testing and adoption of substantial new combat technologies. Generally, the process of moving from lab to field takes decades.

Detailed regression analysis conducted in recent years, however, shows a statistically valid correlation between the levels of R&D investment and the quality of a military's equipment 25 years later. The regression model uses a 25-year time lag for R&D to "pull through" into equipment deployed in the field, which is realistic judging from the development cycle times of combat technologies launched in the past few decades.

We have now used this model to study the evolution of R&D investment from eight major nations and project these nations' military equipment quality (MEQ) out to the 2030s. What emerges are a number of important shifts that governments and industry players will need to factor into their long-range strategic planning. Namely, while the United States



will maintain its MEQ dominance, the same cannot be said of Russia. The major European nations' MEQ will stagnate. The rising military powers of Asia—including China, India, and South Korea—will develop much stronger capabilities over the next 20 years, eclipsing Western European countries in military might.

As a result of these trends, governments will need to make dramatic changes in international policies with regard to the proliferation of military technology. They will also see a greater need to forge force-projection alliances in this increasingly multipolar world. European countries will need to collaborate more closely with one another. And the defense industry, which today is predominantly Western, will have to contend with both new competitors and restrictive regulations in the very markets that offer the most growth potential.

MEQ: Our key metric

Our insights stand atop important work done in 2006 for the UK Ministry of Defence. Using regression analysis, co-author Steven Bowns generated a historical conversion function of R&D investment into a quantified metric, MEQ, which compares one aspect of the fighting power of one military with the same aspect of the fighting power of another. The analysis involved using conjoint techniques to assess 69 categories of military equipment across ten countries and five time periods dating back to 1971, generating like-for-like comparisons of the equipment's fitness for purpose. This work produced expert ratings on the overall quality of 5,500 pieces of military equipment—a statistical robustness that gives MEQ much greater reliability than any other published measure of defense output to date. These ratings were then mapped against R&D spending data from 25 years before. The overall correlation between MEQ scores and R&D investment 25 years prior came out to be 0.9—a very strong indication that, over time, governments got what they paid for.

MEQ alone, however, does not guarantee military victory. Troop quality, doctrine, leadership, morale, and other factors play important roles in combat. In addition, the changing nature of modern warfare—in which counterinsurgency efforts and special-forces teams are as prominent as traditional tanks and artillery—would seem to complicate the value of MEQ as an indicator. While we acknowledge the difficulty of analyzing current conflicts, we nevertheless believe that MEQ, if coupled with a measure of troop quality, could well predict the outcome of future wars.

The shifting military balance

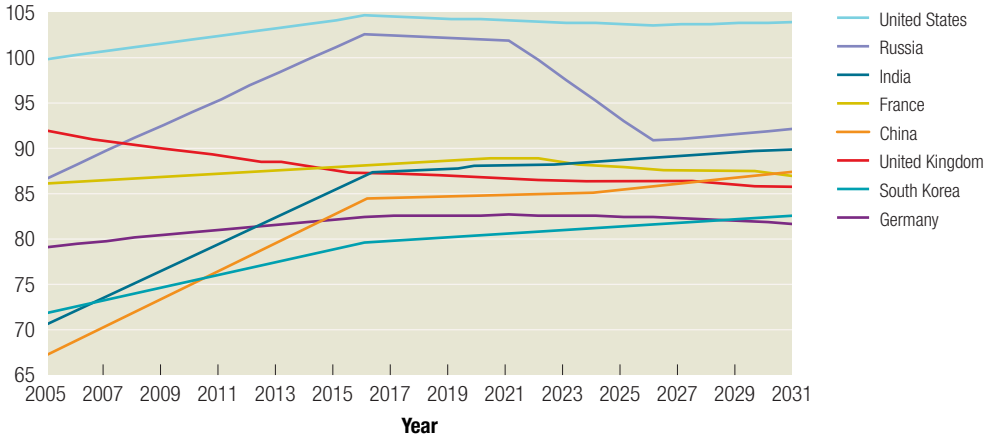
In today's world, substantial shifts in military R&D investment are occurring—shifts that have serious implications for the global defense landscape. We applied the MEQ function to recent R&D spending data drawn from eight countries: Europe's three largest R&D spenders, the United Kingdom, France, and Germany; rising Asian powers China, India, and South Korea; and the long-time R&D spending champions, the United States and Russia, as benchmarks. Our analysis sheds light on an important military technology question: when, if ever, will Asian nations overtake the Western powers? We studied R&D investment levels through 2006 to derive future MEQ scores until 2031 (Exhibit 1).

Our model obviously cannot account for exogenous disruptions such as technological innovations or economic turmoil—thus the imperfect 0.9 correlation. With this limitation in mind, what does this forecasting exercise tell us about the military equipment landscape in the 2030s?

Exhibit 1

Military equipment quality

The US will stay dominant; Asian powers will achieve parity with Europe.



Source: Technology Futures

American edge endures, Russia struggles

The Cold War spending boom and bust still drive a large share of equipment quality, even decades later. The United States remains the dominant force, and perhaps the most striking feature of American MEQ supremacy is that even by 2031, no nation has significantly closed the gap with—let alone overtaken—the United States. The steady rise in the US's MEQ results from the increases in military R&D spending in the late 1980s under the Reagan administration. Spending declined in the 1990s, but climbed again following the attacks of September 11, 2001.

The rise and subsequent fall in Russia's MEQ result directly from the large increase in Russian R&D spending in response to the Reagan defense buildup, then the sharp drop-off after the collapse of the Soviet Union. Whether we will see an effective conversion of Gorbachev-era R&D into real equipment in service remains to be seen; the Russian machinery for pulling through military R&D to the field may well be broken. If that turns out to be the case, the expected near-term upsurge in Russian MEQ might not materialize and the falloff after 2015 might be much more dramatic.

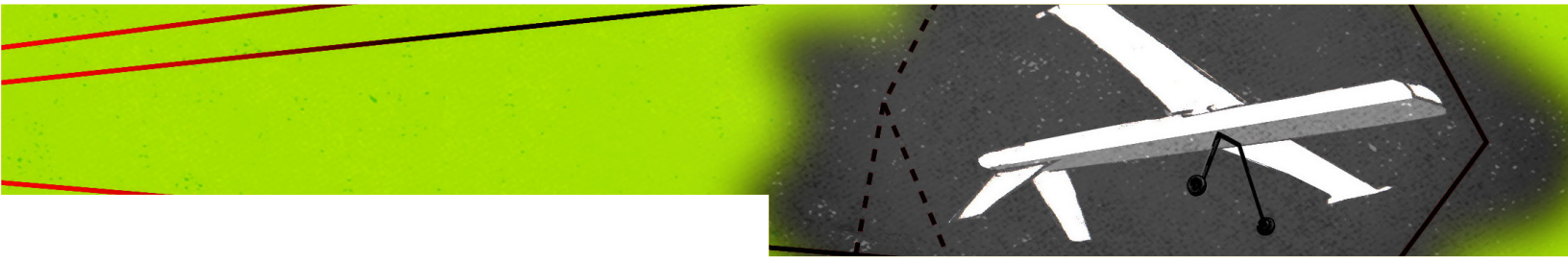
The East rises

R&D investment trends across Asia over the past decade have led us to believe that China, South Korea, and India will see dramatic surges in MEQ over the next ten years. We see these Asian powers overtaking European countries during the next two decades.

Our model may be exaggerating the effect of this growth, as there are certain line items baked into Asian countries' defense budgets that make true comparisons difficult. (For example, the defense budget data for India include program-specific surges.) South Korea is a special case, in that it has historically been a preferred recipient of US technology transfer, so predicting that country's future MEQ based solely on indigenous R&D spending could underestimate its ranking. In any case, the strong growth in these Asian nations' R&D investments is likely to continue for the foreseeable future (Exhibit 2).

Europe risks falling behind

Unlike the roaring tigers of Asia, Europe can expect its MEQ rankings to plateau—or even decline—based on recent reductions in R&D investment. The UK decline stems from

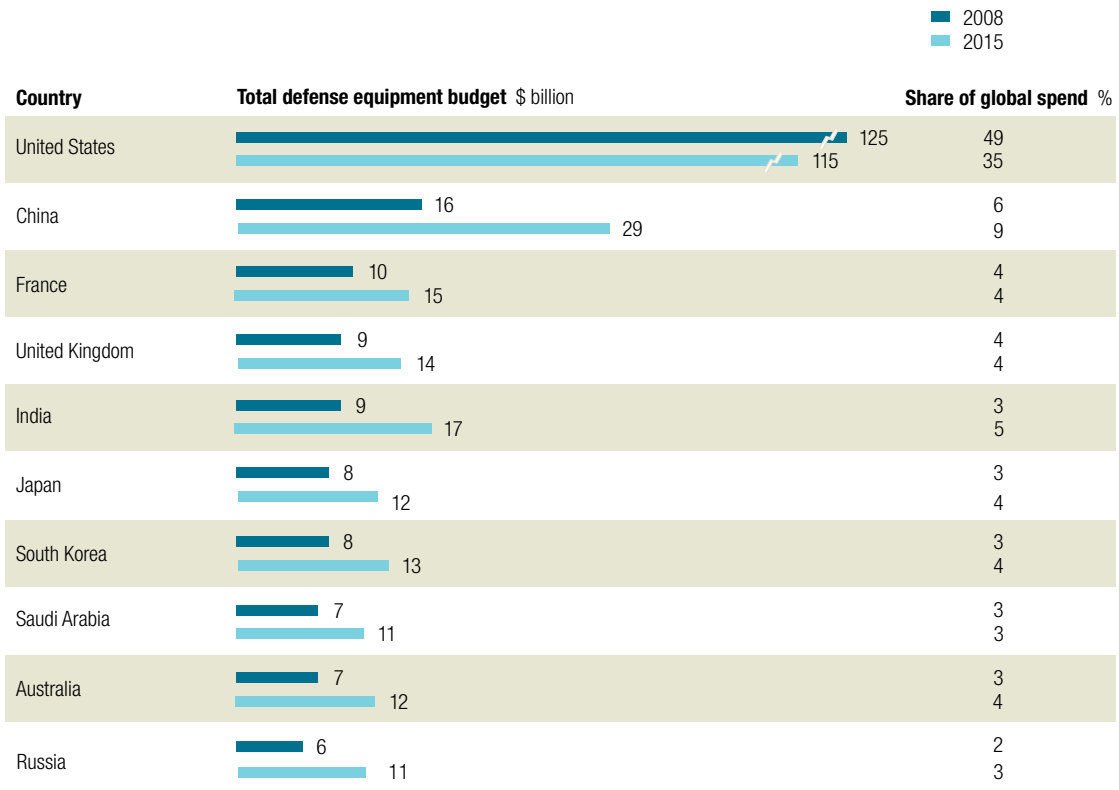


progressive cuts in R&D starting in the mid-1990s as the United Kingdom took a large post–Cold War peace dividend. Further cuts continue, with some coming as recently as September 2009, when the UK Ministry of Defence announced a 25 percent cut in its research budget. France is in a slightly different position, as it took a smaller peace dividend in the 1990s and has since seen some increases in R&D spending. Even so, India is still likely to overtake France in the mid-2020s (Exhibit 3). Germany, a nation that tends to spend comparatively small sums on military R&D, will fall behind India by 2012 and behind the other Asian powers soon thereafter.

Exhibit 2

Defense equipment spending

There is strong growth in Asian nations' investments.



Source: *The Military Balance 2009*, International Institute for Strategic Studies

What remains unclear is whether further consolidation among Europe's indigenous defense industries will occur. Such consolidation may improve European countries' ability to pull R&D investment through to the field.

Implications for defense ministries and industry

These conclusions, some less surprising than others, have complex implications for how governments and players in the defense industry ought to plan for the future. Assuming MEQ is indeed a dominant predictor of behavior, four main implications emerge.

Policy changes in response to increased regionality

The rising Asian powers may focus their investments on equipment that will allow them to project military force far from their shores. An example of this might be the transition of China's navy to more of a "blue-water" orientation. China already has aircraft carriers, amphibious assault ships, and fleet train vessels in its acquisition pipeline; its possession of such platforms could lead to an increased propensity to intervene in regional conflicts. This risk is especially acute in areas of resource disputes such as those around the Pacific Rim and the Indian Ocean, which were previously beyond China's reach because of a lack of long-range force-projection equipment. China's ownership of such equipment will also raise the cost of intervention for powers from outside the region. Governments must plan for this increased regionality and multipolar force projection—a mammoth strategic task.

Evolving proliferation policies

The ultimate direction of weapons proliferation in Asia will be shaped by Chinese policy decisions. If China continues to export advanced combat technology to countries in Asia, Africa, and the Middle East, and if China produces innovations that radically improve its military hardware, the results could include widespread proliferation and an unexpected MEQ catch-up effect for a variety of developing nations.

While American MEQ dominance looks reasonably secure, the United States will need to decide whether to keep high-tech weapons proliferation on the diplomatic docket, particularly as the United States and China do not currently see eye-to-eye on the topic. Proliferation could become a more important factor in Sino-American relations in the future. The outcome of such talks could also affect military sales and technology transfer decisions in other regions, such as Africa or Latin America, which may then require additional policy shifts among the major powers.

Need for pan-European collaboration

As Europe's individual member states continue to reduce their military R&D spending, the region as a whole stands to see its edge in MEQ erode dramatically. This prediction, however, reflects the current industry structure, which features only nascent collaboration among European governments.

Increased collaboration among governments and further consolidation in the European defense industry could help Europe maintain some advantage over the Asian powers. Given the success of existing multinational European ventures, such as missile developer MBDA, and the region's common currency, pan-European collaboration appears to be a promising route. But there seems to be little political will emerging to carry this through. Will the increasing threats posed by the catch-up of the rising East supply this political will? It seems unlikely at present.

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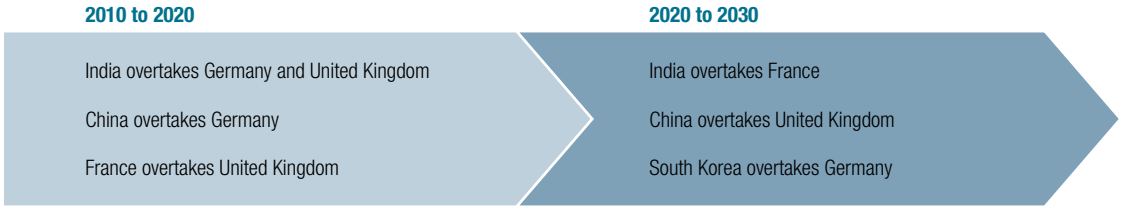
Exhibit 3
Realizing advantage

Asian powers are poised to overtake Western countries in the next 20 years.



Discontinuity in the defense industry

Many Western original equipment manufacturers (OEMs) have already established a presence in Asian markets. However, this dynamic is fragile, as emerging markets tend to be far more demanding today than they were in the past when it comes to technology transfer and local production. Strict regulations and the rise of former partners turned competitors mean Western OEMs risk becoming obsolete in Asia's growth markets—a risk further exacerbated by Western governments' tighter export control laws. This trend has played out in adjacent industries—shipbuilding and high-tech assembly, for example—with dramatic restructuring effects. The defense industry will need to find ways to manage this discontinuity.

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The military balance of the 2030s is unlikely to resemble today's. We see the rising Eastern powers resorting more often to regional conflicts, in the knowledge that a dispute could be fought out to a conclusion without US intervention. And while the United States should retain a significant MEQ advantage, intervention in conflicts in other parts of the globe is likely to become much riskier, even for a superpower. Unless Europe brings together its R&D efforts into a more unified construct, it will risk falling behind Asia—and could thus become highly reluctant or even unable to intervene in any conflict without being part of a coalition led by the United States. In light of these trends, governments and the defense industry must become more flexible and resilient so as to meet the coming challenges and respond to changing market dynamics.

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