C H A P T E R **13**

AFTERWORD

… Reason and calm judgment, the qualities of a leader.
-Tacitus, 55-117 A.D. History

Leadership: The Power of Rationality

THE EXECUTIVE DECISION MAKING course taught by the U.S. Naval War College has three objectives. The first is to familiarize you with the context of many force planning and subsequent programming decisions: the formal U.S. defense resource allocation process. The second is to introduce you to the skills and tools you need to solve complex force planning and programming problems. The last is to acquaint you with ways of using those same skills and tools to reconcile differing views so that you can build consensus and execute a course of action favorable to your organization.

Your professional contribution to your service or agency and to the nation's defense will be increasingly measured by your ability to solve these problems and make decisions rationally; that is, to choose the course of action most likely to secure the nation's objectives within the available resources. Given the uncertainties of the future, the pace of change, and limited resources, this is no easy task. But there is a deeper, less tangible, and more fundamental reason to master the skills of rational problem solving and decision making: good leadership.

Leadership is the ability of an individual to move an organization or group toward an objective. As you know from your own experience and what you have learned studying at the U.S. Naval War College, leadership consists of many skills. The situation determines which of those skills is most important. In the context of a battlefield, the ability to inspire others is an especially important leadership skill. In the context of large, complex organizations, leaders are often characterized by how effectively they interact with bureaucracies and other organizations. In political contexts, the ability to persuade and advocate is an important part of leadership.

In our view, one characteristic underpins effective leadership in all situations: the ability to make rational decisions. Rational decisions offer the best chance of success for you and your organization. Sometimes making a rational decision means extended work with a computer. Sometimes it means reliance on experience and intuition to make an instantaneous decision. Sometimes it means minimizing risk. Sometimes it means waiting for uncertainty to diminish. Sometimes it means taking a deep breath and stepping into the dark. In each of these circumstances, however, effective leaders choose the course of action whose costs and benefits offer the best chance of success.

We think analysis is central to that effort. The most inspirational leaders will soon lose their effectiveness if they consistently lead their people and organization to failure. The most skillful bureaucrat is useless if his or her organizational victories do not enable the service or agency, and its people, to reach the proper objective. Beneath the bureaucratic politics and the inspiration of charismatic leadership there must be a course of action that the leader chose. In the end, the correctness of that choice determines the effectiveness of the leader. The skills and tools we have discussed in this course are central to making those choices. This is the power of rationality.

We are not suggesting that in the hurly-burly of organizational life, rationality is the only thing that matters or that the most rational decision always wins. But it is naive and incorrect to believe, as some do, that "it's all politics" or "it's all the budget." Arguments and debates that accompany all the important decisions about force planning are matters of substance. DoD may not always be able to choose the best course of action; politics, the budget, personalities, history, and chance all influence decision making. Clearly, irrational courses of action are seldom, if ever, among the alternatives senior leaders seriously consider, much less select. There is no doubt that budget constraints are a critical factor in defense decision making in the current era. In DoD, our annual Fiscal Guidance tells us only *how much* we can spend. It never tells us on *what* to spend it. Tight as it may be, we may spend the defense budget, approximately $345 billion per annum, in a myriad of different ways, each with different consequences. To say "it's all budget" is to say that the size of the budget alone completely determines what is in the budget. That is plainly untrue.

It can be difficult to see the importance of rational decision making while in the midst of the Defense Department's formal resource allocation process. Indeed, as we have discussed, there are numerous ways rational decision making may be derailed by malfunctions in that process. For example, if the Defense Planning Guidance is too late or too general, the service force programmers use proxies for guidance, such as the inertia and projections of last year's Future Years Defense Program. This is a form of decision making by procedure, and it is one explanation for the slowness of change in the Pentagon. Similarly, if the Future Years Defense Program arrives at the DoD Comptroller exceeding the President's projected budget, then time constraints may force the Comptroller, rather than senior defense planners and strategists, to make crucial force planning decisions by cutting programs. Such events subordinate rational decision making by senior DoD leaders.

Keep in mind that the formal defense resource allocation process was designed to institutionalize rational decision making. The extent to which we achieve this objective in DoD varies year by year, depending upon the circumstances and the personalities involved. Most participants, researchers, and observers grade the process as adequately rational in a bad year and better in a good one. This can be hard to see when you are in the thick of it, in the same way that a well-organized battle seems chaotic at the foxhole level. By "adequately rational" we mean that the process usually does an acceptable job of developing strategic objectives and selecting courses of action that are likely to achieve those objectives without excessive risk. There is no reason we should be satisfied with this level of performance, and many people are not. We can expect to see continuing changes in the formal process as, every few years, high-level panels are appointed to revise one or another feature of the Joint Strategic Planning System, the Planning, Programming, and Budgeting System, or the Defense Acquisition System.

The process does succeed at producing a rough correspondence between ends and means; in other words, adequately rational resource allocation. This does not happen by accident. Nor could it happen at all if only politics or the budget explained defense resource allocation decisions. This result is obtained year after year because there is enough rational decision making embedded in the formal process to produce it, even though, day-by-day, it may not be easy to see.

Finally, wherever your future assignments take you, we believe that the most important contribution this course makes is a personal one: the intellectual habit of defining a problem carefully, developing realistic alternatives, thinking clearly and objectively about their comparative strengths and weaknesses, and reconciling your choice with that of other parties involved with the same problem. That way of solving problems, large and small, professional and personal, we call the discipline of critical thinking. In your professional and personal lives, proponents of ideas and products who seek to persuade you to take the course of action they recommend surround you. These people are usually good at their jobs. They can muster powerful facts and arguments for alternatives that, in the end, may not be productive. They may be completely convinced of their own correctness. Yet every day, you have to decide who is making sense and who is not, who is telling you the truth and who is not. The discipline of critical thinking taught in this course is the most effective way we know to weigh their arguments and rationally choose among them. In our view this skill, the ability to make sense of confusion and to "see" clearly, is a crucial part of your ability to lead in the future.

CASE STUDY: AFTERWORD
USMC MEDIUM-LIFT REQUIREMENTS: THE V-22 OSPREY AND HELICOPTERS

Throughout 1991 to 2002, funding for the V-22 Osprey Program has been stable. The scheduled procurement of 360 V-22s for the Marine Corps, the same number recommended by the 1997 Quadrennial Defense Review (and remarkably close to the Institute for Defense Analyses's recommendation), 50 Special Operations V-22s for the Air Force, and 48 Combat Search and Rescue V-22s for the Navy is still on-track. Bell-Boeing-Textron, Inc., built four flying V-22 prototypes and ten Low-Rate Initial Production V-22s. However, two of the prototypes and two of the production aircraft have crashed, altogether killing 30 Marines. The most recent incident, as of this writing, occurred December 5, 2000, immediately before the Defense Acquisition Board was scheduled to consider authorizing full production. Then-Secretary of Defense Cohen postponed that decision until several investigations were completed. These accidents re-opened the debate in Congress, the Pentagon, and in the defense community concerning whether the Osprey Program should continue.

In the wake of the December 2000 crash, Secretary of Defense Cohen appointed a four-person panel to make recommendations to the new administration on the V-22 Program. The members examined the V-22 Program's training; aircraft engineering and design; production and quality control; operational suitability; and flight safety and performance. The panel reported their findings to Secretary of Defense Rumsfeld in April 2001.[1] Additionally, Senator John Warner of the Senate Armed Services Committee held hearings on the V-22.

The contentious issues, as in 1990, still include cost and effectiveness but now, with many hours of flying the aircraft available for evaluation and analysis, and the findings of the panel noted above, there is much more discussion of risk. The V-22 has largely met its cost goals and projections; at $40B for the overall program, production model Ospreys will cost $83M each, including research and development costs. But, as we discussed in Chapter 4, the important cost for decision makers is the relevant or production model cost of each V-22 from here on: approximately $44M per aircraft. The sunk costs of the V-22 Program, by reducing its relevant costs remaining, are making a replacement helicopter program increasingly unattractive, unless that helicopter comes off the shelf, like the $8M UH-60 Black-hawk.

The V-22 has another important edge over helicopter program alternatives that grows larger with the passage of time: the Marines need V-22s to replace CH-46s as soon as possible and the Air Force needs to phase out the MH-53 Pave Low in 2007. The CH-46 already operates under severe flight restrictions and MH-53 missions require extensive risk assessment. Both aircraft require intensive maintenance; their cost per flying hour is steeply increasing. Because both services need production aircraft in the near term, there is precious little time to begin a new medium-lift program from scratch.

The effectiveness issues remain similar to those in the Institute for Defense Analyses study we examined earlier: Is the increased speed and endurance worth the additional cost? The background, approaches, models, and results are likely to be similar, too. The V-22, if it works as designed, performs the missions better than helicopters. Is its superior performance worth the cost? More than likely, the answer will again be yes, as in the previous seven studies.

What is different now is the opportunity and requirement for more strenuous risk assessment, in several dimensions. How willing are Congress and DoD to accept risk in the form of reduced readiness and peacetime casualties to achieve superior operational performance? First, there is the question of the vulnerability of tilt-rotor technology itself, especially under combat conditions, which could change our perceptions of its effectiveness. Second, the models must be able to show the benefits of new employment opportunities for the Osprey compared to historical helicopter operations.

The V-22, as a hybrid aircraft, neither glides well with its small wing area, nor do its tilt-rotors generate enough lift to auto-rotate downward as a helicopter can if it loses power. Because it cannot fly with a single tilt-rotor, powered or otherwise, it is susceptible to catastrophic failure if either rotor is damaged. (A fire in an engine nacelle caused one of the prototypes to crash in June 1991.) Drive trains run through the length of both wings so that one engine can power both tilt-rotors, however the wings themselves are necessarily unarmored and vulnerable. The new analyses should assess the Osprey's vulnerability in combat scenarios, e.g., assaults and extractions under fire, in more detail than IDA was able to complete. The analysis should include the probability of being hit and the effects of battle damage if hit, vis-à-vis helicopters.

According to the accident review board, the April 2000 crash was due to a combination of human-controlled factors, principally low forward air speed and a high rate of descent, in excess of 2,000 feet per minute. At high rates of descent, the rotors of a helicopter or an Osprey lose their ability to create enough lift in the turbulent air, a condition called vortex ring state. To re-

1. John R. Guardino, "MV-22 Osprey Reeling From Latest Disclosures, Media Attacks," *Helicopter News*, January 21, 2001: 1.

cover flight control, the pilot increases forward speed to punch through the turbulent air into clear air; this requires clear air ahead of the aircraft and sufficient altitude while the descent continues. The Osprey was, at the time of the crash, at low altitude making a landing approach behind another V-22 (creating turbulent air ahead of it), so there was little or no opportunity for the pilot to recover control. The V-22 was limited to 900 feet-per-minute descents at the time of the accident; ironically, after additional flight testing, the Naval Air Systems Command expanded the V-22 flight envelope to allow descents up to 1400 feet per minute.[2] Another concern, unique to tilt-rotors, surfaced during testing: the possibility that each tilt-rotor may experience different degrees of vortex ring state and develop a lateral torque that would tip the aircraft over sideways.

The V-22 hydraulic system design incorporates technological risk and has been another area of many skeptics' concern. The Osprey hydraulic system operates under 5,000 psi, significantly higher than 2000-3000 psi found in most aircraft and helicopters. Designers selected the higher levels to reduce the size and weight of its components, but that has made them more prone to leaks and they leak more fluid faster. To compensate for the increased vulnerability, the Osprey's critical flight control systems are triple-redundant, i.e., there are three paths to get hydraulic fluid to essential flight controls. If the flight control computers sense a failure in the primary system, they open and close remote valves to change the path to the control surface actuators within 0.3 seconds. While rotating one of the tilt-rotors, the primary hydraulic system failed—a hose rubbed through, according to Lt. Gen. Fred McCorkle, USMC, then Deputy Commandant for Marine Aviation—and the flight control software failed, too, causing the December 2000 crash.[3] Unlike other aircraft that have non-hydraulic back-up systems for critical flight controls, e.g., high-pressure air flasks or electrical servo-motors, the V-22 must rely on hydraulics for tilt-rotor nacelle rotation because there is no alternative motive force strong enough to rotate them in flight.

The V-22 hydraulic system is maintenance-intensive, more so than the manufacturers indicated when they provided reliability estimates to IDA. The flight availability of the Osprey has been low, to the point where the training squadron (VMMT-204) commanding officer decided to misreport aircraft availability, and was relieved for doing so. Furthermore, the media has accused senior Marine aviators of publicizing rosy availability numbers to advocate a Defense Acquisition Board decision for full production. (None of the alleged false reporting is related to any of the accidents, i.e., no one recorded maintenance actions that were not actually completed.)

Viewed dispassionately, much of the confusion about availability and readiness reporting arose because there are three separate maintenance reporting methodologies within the squadron, each with different reliability problems. The manual system is based primarily on the mechanics' subjective evaluation of whether an aircraft is down (unavailable), mission capable (can fly at least one of its missions) or fully mission capable (can fly any of its missions). The second and third reporting methodologies are an older and an upgraded version of the Department of the Navy's automated systems that report readiness based on maintenance actions. According to Marine Corps spokesman Lt. David Nevers, the upgraded automated system is the most stringent of the three and, while it is least subject to manipulation, it also produces distortions like reporting an aircraft down that is undergoing a visual inspection because an access door is open. As a result, for the month of November 2000, the three systems reported mission capable rates 73 percent, 57 percent, and 27 percent, respectively.[4]

2. John R. Guardino, "Catch-22 For the V-22," *Rotor & Wing*, February 2001.
3. Robert Wall, "V-22 Support Fades Amid Accidents, Accusations, Probes," *Aviation Week & Space Technology*, January 29, 2001: 28.
4. Lisa Troshinsky, "Corps Says V-22 Readiness Confusion Caused by Using One System For OPEVAL, Another For Press," *Navy News and Undersea Technology*, Feb.5, 2001:1.

The readiness issue plays into another area of risk that Congress and the Pentagon need to explore: the risk to the production schedule. If the V-22 falls significantly behind schedule, Marines and Special Operations Forces incur greater personal and mission risk by pushing their aged helicopters past their already extended service lives. But the DoD Inspector General, the General Accounting Office, and the DoD Director of Operational Test and Evaluation have all criticized the V-22 program managers for curtailing tests to keep the V-22 on schedule, despite significant technical deficiencies. All three recommended slowing the program down to resolve technical problems.

The DoD Inspector General's August 2,000 report identified 22 major, documented deficiencies that the Department of the Navy was going to waive to get the V-22 into production: "Program officials accepted a higher level of risk to get the program into production, despite uncertainties that the system would work as intended, rather than delaying the program and risk losing the funding." As a result of the report, the Pentagon postponed the production decision to December 2000.[5]

After an eight month evaluation, in November 2,000, Mr. Philip Coyle, then DoD Director of Operational Test and Evaluation, reported to the Secretary of Defense that his organization identified 177 failures in flight-critical systems among 723 other malfunctions including safety-related failures that could trap air crews inside the aircraft or cause in-flight fires. Nineteen test criteria were waived from evaluation, including: shipboard operations; rescue hoist and fast-rope operations; flight performance operations under icing conditions; and aerial combat maneuvering.[6] (Since November, some these tests have been completed.) Mr. Coyle declared the Osprey was not operationally suitable because of reliability and maintenance concerns and therefore not ready for production.

Also in November 2000, the General Accounting Office, relying at least in part upon Mr. Coyle's evaluations and the investigation of the Osprey crash in April 2000, described a decision to approve full-scale production as fraught with "significant risk" because the "baseline development flight test program [was] restructured numerous times to meet program cost and schedule pressures.... Knowledge of V-22 design and performance parameters falls short of what should have been known before beginning production.... Developmental flight testing was deleted, deferred, or simulated. Operational test waivers and limitations reduced testing for operational realism."[7]

But the Marines' need to get replacement helicopters to the operating forces as quickly as possible is compelling; some critics felt that this was compromising Marine leaders' rational decision making. Based upon the publicly reported transcript of his comments, the VMMT-204 Commanding Officer wanted his Marines to shade the aircraft availability reports specifically to get the V-22 past the Defense Acquisition Board's milestone decision to approve full production, despite the warnings in the Pentagon and GAO reports. To remove concerns that the Marine Corps has been seduced by the V-22 program, the Commandant shifted the investigation about the misleading readiness figures, and the possibility of improper command influence on the VMMT-204 Commanding Officer, to the Department of Defense Inspector General.

In a historical context, the V-22's developmental track record of casualties and mishaps in its first five years is not very different than other rotary-wing and some fixed-wing aircraft that intro-

5. Dan Hardy and Ralph Vigoda, "V-22 Osprey Has Strong Allies, Doubters," *Philadelphia Inquirer*, December 14, 2000.
6. Elaine M. Grossman, "Pentagon Test Director Found 177 Osprey Failures Endangered Safety," InsideDefense.com, February 8, 2001.
7. Christian Lowe, "Navy Cut Osprey Tests That Could've Shown Fatal Flaw," *Defense Week*, January 29, 2001: 1.

duced new technology. For example, according to Naval Safety Center data for Class A mishaps (loss of life or greater than $1M of damage), the CH-53D heavy-lift helicopter had nine Class A mishaps in its first five years, the H-3 Sea King helicopter had 28, the UH-1 Huey helicopter had 43, and the F-14 variable geometry wing interceptor had 27.[8] Because naval aviation safety has improved dramatically in recent decades and our tolerance of casualties has diminished, we may be holding the Osprey to an unrealistically high standard.

In addition to the lack of an obvious helicopter alternative that meets the Marines' requirements, there is another down side to canceling the V-22. President Bush campaigned on a promise to strengthen the U.S. military, in part by skipping a generation of technology. Presumably, the V-22 is exactly the kind of next-generational technology he believes is important for the new security environment. The future of the civilian application of tilt-rotor aviation, the BA609, is tied closely to the fate of the Osprey. By March 1999, Textron had 37 customer commitments for its civilian model—which has a 3000-psi hydraulic system.

The Marines are standing by the Osprey because they believe tilt-rotor science is a sound application of achievable technology and the V-22's performance is essential to executing their Operational Maneuver From The Sea concept. On The NewsHour with Jim Lehrer on January 22, 2001, Marine Commandant Gen. James Jones said, "The technology is not the issue, as far as the accidents… I'm confident in the technology. I'm confident in the research that's gone into it. I'm confident in the people who advise me with regard to the potential of this airplane, but we are not going to do anything reckless."

As of this writing the V-22 is undergoing a complete program restructure and a major engineering redesign and modification. To keep the program alive, 11 aircraft a year are being produced. Additionally, the Marine Corps is now committed to an event, vice schedule, driven schedule. Accepting a two-year program pause, the V-22 is now anticipated to be ready for a production decision in August 2003.

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As this drama further unfolds, we invite you to use the Executive Decision-Making Frame-work to evaluate the problem definitions, studies, decisions, and reconciliation about the V-22 Program that ensue. Observe how various stakeholders define the problem, especially when they define it with different emphases on cost, effectiveness, or risk. Notice, too, the role analysis plays in shaping upcoming decisions—what criteria would you use to evaluate the risks associated with tilt-rotor technology or the Osprey hydraulic system? Would you be willing to preserve effectiveness and reduce risk, despite the increased cost and the effects of delays in production, to slow the program down, or can these problems be fixed in stride? How much subjectivity should the Naval Air Systems Command allow operators to evaluate aircraft readiness and availability?

Examine, too, how executive decision makers combine experience and analysis to reach rational decisions—rational at least from their perspective. After leaders make their decisions, identify their approaches to reconciling their decision with other stakeholders, how they use analysis to bolster their arguments, and whether they use a mutual gains approach or more traditional zero-sum strategies.

With apologies to Shakespeare, all the Pentagon is about resource allocation, and all the men and women merely players; we have our exits and entrances; and one man in his time plays many parts as advocate and adjudicator in the course of many executive decisions.

8. Stratfor.com (February 6, 2001), http://ebird.dtic.mil/Feb2001/s20010208fate.com