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McNamara and the Rise of Analysis in Defense Planning A Retrospective

Peter T. Tarpgaard

IN THE 1960S FEW DEFENSE PLANNING TOPICS stimulated more debate and deeply felt opinion than the introduction of "systems analysis" as an official defense management tool by Secretary of Defense Robert McNamara. Proponents viewed it as a way of establishing rationality in, and genuine management control over, the vast U.S. defense establishment. Critics perceived it as a mechanism to impose arrogant and uninformed academic opinion over seasoned military judgment.

If we think of "analysis" as the gathering of relevant information and the systematic examination of that information to help make an informed and rational decision, then analysis in U.S. defense planning obviously has a history going back much further than 1961 and Robert McNamara. Indeed, it would be insulting to earlier generations of defense planners to assert that they did not use analysis and rational processes to improve their decisions. Examples of quite competent early studies can be found, and while more sophisticated methods (and computers) are used today, the objective of supporting better decision making remains the same.

What changed with McNamara had mostly to do with the institutionalization of analysis in the U.S. Department of Defense (or DoD) and its active use to

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impose management control over the individual services. But it was the resulting imposition of effective, as opposed to ostensible, civilian control over the services that probably motivated much of the hostility against analysis and analysts. McNamara established a systems analysis group to advise him directly on decisions he was required to make, including resource allocations. This group, which came to be called the Office of the Assistant Secretary of Defense for Systems Analysis (and is today the Office of Program Analysis and Evaluation), soon became the lightning rod for resentment by the disappointed parties when the Secretary made hard choices.¹ There is a tendency on the part of such disgruntled advocates to denounce the instrument when their real grievance is with the institution; thus systems analysis (the instrument) was denounced along with, or even instead of, Systems Analysis (the institutional office).²

Today, over thirty years later, the McNamara management reforms remain firmly in place, and the use of analysis in support of defense decision making has become routine. Nevertheless, echoes of the critics' arguments continue to be heard, and the old resentments toward "systems analysis" are still felt. We should, therefore, take time to examine the origins of analysis in U.S. defense planning and decision making and to reflect upon the application of these methodologies after three decades of experience.

The Secretary of Defense and the Rise of Analysis

In the years immediately following the establishment of the Office of the Secretary of Defense, the incumbent was more the titular than the actual leader of the defense establishment. McNamara's predecessors, from James V. Forrestal in 1947 through Thomas S. Gates, acted as referees and arbiters in the continuous interservice struggles for missions and budget share. In those days, planning, programming, and budgeting were not parts of an integrated process but were disjoint with respect to each other and to the different services. Planning and programming were related to military operations as perceived by the services, while budgeting was conducted in a completely different format structured to satisfy the appropriate committees of Congress. The overall process, in the opinion of many observers, served more to mask than expose problems.³

In the early years the Secretary had neither the staff nor information resources to make informed, independent decisions. An egregious example occurred even as late as 1958, when Secretary Neil H. McElroy was directed by the Senate Armed Services Committee to choose between the Army's Nike-Hercules and the Air Force's Bomarc as a continental air defense missile. The following year McElroy admitted to the committee that his office was unable to decide and suggested that Congress make the choice. Characteristically, the Armed Services committees of the Senate and House, examining identical data, came to different

conclusions as to what should be done. In the end, an arbitrary cut was made in all continental defense programs.⁴

The statutory authority of the Secretary of Defense, whose office (known as OSD) was established by the National Security Act of 1947, has been defined by a series of laws passed over the succeeding years. By 1958 legislation had clearly given the Secretary the authority to "determine the force structure of the combatant commands, to supervise all research and engineering activities of the Department, and to transfer, reassign, abolish, and consolidate combatant functions."⁵ As to how this authority could be exercised, Alain Enthoven, Robert McNamara's founding Assistant Secretary of Defense for Systems Analysis, describes two broad schools of thought. One, which Enthoven calls the traditional view, sees the Secretary's role as relating to gross budget allocations and resolving disputes among the services while leaving force planning, programming, and strategy to military leaders. The second school, to which McNamara clearly belonged, believed that foreign policy, defense strategy, defense budgets, and choices made regarding major weapons and forces are interconnected parts of national security; to execute his responsibilities properly, in this view, the Secretary must personally grasp the strategic issues and provide leadership in formulating a defense program that coherently relates these factors.⁶

As sometimes happens in life, the need, the means, the people, and the opportunity converged. In early 1961, as Robert McNamara assumed the duties of Secretary of Defense, the problems of effectively exercising that office had been perceived, and means for addressing them had been conceived.

The need was perhaps best articulated by Samuel Huntington in his 1957 book, *The Soldier and the State*: "The greatest single deficiency in the organization of the Department of Defense was the absence of the proper staff assistance for the Secretary. Legal authority was meaningless without the organizational means to exercise it. 'The creation of the staff facilities,' Forrestal said in 1949, 'is paramount even to the increase of power.' The Secretary was surrounded by antagonists. In front were the State Department and the NSC [i.e., National Security Council], presumably pointing out the path of national policy; behind him, the Treasury and the Budget Bureau, always acting as a drag; on either side, the Joint Chiefs and the Comptroller, pushing him off the road in one direction or another. The Secretary, however, was institutionally naked and defenseless. It was not surprising that his functions were encroached upon by other agencies or that he himself found it necessary to identify his interests and role with that of some other agency. He had no support with which to maintain an independent stand. . . . The Secretary had assistance to help him in accomplishing everything except the discharge of the one responsibility which was his and his alone: the formulation and enforcement of over-all defense policy. What was needed was the institutionalization of the secretarial viewpoint: a small,

competent, corporate body to aid the Secretary in developing the interests and advice surrounding him into a comprehensive military program. This absence of staff agencies with a secretarial perspective made the Secretary unable to play an independent role and to formulate his own viewpoint. Instead of rising above the subordinate interests within his department, the Secretary was forced to lower himself and identify his interest with that of one of his subordinate agencies."⁷

Means for addressing the problems inherent to the Secretary's responsibilities—that is, rational methodologies for defense planning and budgeting—had been emerging over the previous decade, at the RAND Corporation and elsewhere. The results of much of this research were summarized by Charles J. Hitch and Roland N. McKean in the seminal book *The Economics of Defense in the Nuclear Age*, first published in 1960 as a new administration was being elected—a propitious moment. Hitch was made DoD Comptroller by McNamara and given the opportunity to put his ideas into practice. Enthoven, who had been a contributor, was named Deputy Comptroller for Systems Analysis under Hitch to begin the task of developing “the small, competent, corporate body to aid the Secretary” Huntington had called for.

Even more important to the rise of systems analysis than such skilled practitioners as Hitch, McKean, and Enthoven, however, was McNamara himself, in whom systems analysis found not only a customer but a committed proponent. McNamara's familiarity with the fundamental ideas underlying systems analysis dated back to his days as a student and, later, as an instructor at the Harvard Business School. During World War II McNamara was one of a small group of junior Harvard faculty members who used their financial skills to develop and implement “statistical control” methods to help the U.S. Army Air Force manage its vast operations. Deborah Shapley, a McNamara biographer, perceives this wartime experience as an important formative experience. “The Stat Control men were like inspector generals. Before them higher-ranking officers trembled. . . . The power of information, the importance of data, the need for control and analysis, were lessons many, including McNamara, took back to their civilian lives. In this new guise *control*, often under the name *management control*, influenced a generation of American managers in the years after the war.”⁸

After the war McNamara did indeed apply these methods, and the power of information generally, in his highly successful business career at Ford Motor Company. He and a small group of “Stat Control” colleagues joined Ford immediately after the war. Known there as the “Whiz Kids” (a term later applied to the analysts recruited for McNamara's OSD systems analysis office), they developed new financial and management control procedures to replace the primitive methods previously used. Ford prospered, and McNamara rose rapidly

in that great industrial organization, becoming its president thirty-four days before being named Secretary of Defense by John F. Kennedy.

The new administration moved quickly to implement in DoD the management concepts and tools that been proposed in *The Economics of Defense* and related papers and studies. Within nine months, the first Five-Year Defense Plan, or FYDP, had been produced; a new budgeting format was installed that displayed forces and related funding by program and mission-oriented packages rather than, as previously, line items; and the Planning, Programming, and Budgeting system, or PPBS, was established as an orderly process for relating budgets to objectives. K. Wayne Smith, a participant in the implementation of PPBS and an observer of its results, describes its impact: "It would be difficult to overestimate the impact PPBS had on defense decision-making, at least in the 1960s. It was more than a management tool; it was, at one and the same time, a central plan, a historical record, and a way of shaping issues for decisions. PPBS's intellectual foundation rested on a series of important and fundamentally new procedural ideas—new, at least, for the Department of Defense. These ideas included making decisions based on explicit criteria of the national interest, considering needs and costs simultaneously, explicitly considering alternatives, actively using an independent analytical staff to assist the Secretary, making analysis open and explicit, and using multiyear time horizons. These ideas may seem commonplace now, but in the early 1960s they were not."⁹

The Systems Analysis Office grew rapidly in the 1960s, both in size and influence. In terms of personnel it peaked at 201 actually "on board" in January 1967 (falling back to just over a hundred today). Concerning the personnel assigned to the office, Smith has this to say: "Two popular myths about the Systems Analysis Office are worth puncturing in passing. First, contrary to the popular myth about hordes of amateur civilian analysts surrounding the professional military staffs, the Systems Analysis Office was, has been, and still is, *tiny* by Pentagon staff standards—tiny in comparison to the service staffs, tiny in comparison to the Joint Staff, and tiny now even in comparison to the congressional staffs. Second, the office has never been as civilian-dominated as its critics have contended. Throughout the twenty-six-year history of the office, military officers have constituted roughly one-third of the office's authorized personnel. . . . In short, the office's power and influence has never rested on the number of analysts it has had but in the role those analysts have played. . . ."¹⁰

Analysis under Attack: The Wrath of the Generals

The OSD Systems Analysis Office quickly became the focus of passionate criticism, and it has remained so to the present day. Every critic of some aspect of U.S. defense policy and every disappointed proponent of some program or

proposal seems to vent his frustration on the Office. A few examples capture the tone of these feelings.¹¹

General Thomas White, a former Chief of Staff of the Air Force, wrote in 1963 that "in common with many other military men, active and retired, I am profoundly apprehensive of the pipe-smoking, 'tree-full-of-owls' type of so-called professional 'defense intellectuals' who have been brought into this nation's capital. I don't believe a lot of these over-confident, sometimes arrogant young professors, mathematicians, and other theorists have sufficient worldliness to stand up to the kind of enemy we face." General Curtis LeMay, another former Air Force Chief of Staff, evinced a similar disdain; writing in 1968, he asserted that "the military profession has been invaded by pundits who set themselves up as popular oracles on military strategy. . . . The end result is that the military is often saddled with unprofessional strategies. . . . Today's armchair strategists, glibly writing about military matters to a public avid for military news, can do incalculable harm. 'Experts' in a field where they have no experience, they propose strategies based upon hopes and fears rather than upon facts and seasoned judgments."

In testimony before a congressional committee in 1968, Admiral Hyman Rickover delivered these acid remarks: "The social scientists who have been making the so-called cost effectiveness studies have little or no scientific training or technical expertise; they know little about naval operations. . . . Their studies are, in general, abstractions. . . . In my opinion, we are unwise to put the fate of the United States into their inexperienced hands. If we keep on this way, we may find ourselves in the midst of one of their cost effectiveness studies when, all of a sudden, we learn that our opponents have ships that are faster or better than ours."

Even some committees of Congress joined in the condemnation. In the authorizing report for fiscal year 1969, the House Armed Services Committee described its view "that too much emphasis has been placed upon the recommendations of persons who lack actual military experience and a frame of reference which can best be gained by long immersion in military matters over a period of years. Not enough emphasis, it is felt, is placed upon the recommendations of those who have attained their knowledge through years of doing and being exposed to the actual threat of extinction by a determined enemy. There are, unfortunately, some policy making civilians in the Department of Defense who seem to know the cost of everything, but the value of nothing."

What motivated such bitter attacks? Were they justified? These may seem like simple questions, but full answers would be complex and as controversial as the issues that motivated them. It seems clear, however, that much of the bitterness arose from the perception that hard-won experience and professional judgment were being brushed aside in favor of arcane analytic techniques that

many senior people did not understand or accept. Analysis also was a convenient object for the wrath of those displeased by decisions made by McNamara and his successors.

The practitioners of the new decision support methods constantly responded that these bitter criticisms were not justified and missed the point of analysis. Far from being ignored, military experience and judgment were often important ingredients in analysis and were, along with analysis, important factors in policy decisions. In a speech given at the Naval War College on 6 June 1963, Alain Enthoven argued that "it is wrong to cover the whole area of defense planning with the mantle of 'military judgment' or 'operational experience.' Military judgment, if by that is meant specifically the experience and knowledge gained by military men in combat or conducting military operations, is something very precious indeed. Unlike most of the things we know and have which are earned at the price of hard work, the military profession has had to pay in blood for its combat experience. This valuable currency is cheapened by attempting to apply it to things to which it does not apply. Military judgment should not be the basis for a view with respect to technical feasibility. Nor is it fair to suggest, when the Secretary of Defense makes a decision contrary to that of his military advisors on the procurement of a weapon system, that military advice and experience are being ignored or that military judgment is being downgraded. Rather, the problem is that the Secretary of Defense has to balance many other factors in his decisions. I am sure we all agree to that in theory. The problem is that it is sometimes forgotten when practical examples come up."¹²

Cases in Point

There is in fact a wealth of "practical examples," and it is instructive to turn to some of these to ascertain, theoretical advocacy and criticism aside, what has been DoD's actual experience with systems analysis. A number of "case histories" are to be found in McNamara's tenure as Secretary of Defense alone. Two of them—precision air-to-ground munitions and the Nato-Warsaw Pact ground correlation—seemed to fulfill the promise held out by the discipline's advocates. Others, however, serve as classic illustrations of the consequences of failing to use analysis properly and of failing to build an effective synthesis between analysis, technical judgment, and military experience. These include the controversial TFX program (which eventually produced the F-111 and FB-111 aircraft) and McNamara's choice between nuclear and conventional power for the aircraft carrier USS *John F. Kennedy* (CV 67). A final example, the Osprey aircraft, is drawn from recent experience; it illustrates the important role that analysis can play in defense decision making today.

Precision Guided Munitions: Analysis Plus Military Insight. “Two years ago,” recalled Alain Enthoven in the 1963 speech already mentioned, “some people in my office became interested in the problem of choice of air-to-ground non-nuclear ordnance for fighter-bomber aircraft. They observed that there had been great advances in the performance of the aircraft, as well as great increases in their cost, but they found that one of the services was procuring essentially the same ordnance as had been procured ten years earlier. They did a few calculations suggesting that it would pay to go to more accurate weapons having greater lethality, even though it cost more, and they went to the Service to ask about it. The first reaction they seemed to get was, ‘We fought World War II with iron bombs and we know best. Leave us alone.’ My men persisted. Among other things, it turned out that these particular Service people were calculating only a portion of the relevant cost. They were calculating ordnance cost per target killed instead of complete system cost. The point here is that the cost to kill a target or to suppress movement in an area by weapons delivered from aircraft is dominated by the cost of buying and operating the aircraft, training and maintaining the pilot, and the cost of the actual ordnance delivered tends to be small in comparison. Complete system cost is the appropriate measure of cost in such cases. It measures what it really costs to do the job. The fact that this was the case encouraged us to press our views all the harder. As we did so, the resistance increased, apparently based on a belief that we lacked operational experience and therefore that the question of choice of ordnance was none of our business.”

Enthoven here paused to reiterate some more general points about the role of analysis and of his office in defense decision making. “But there are important aspects of this and similar problems requiring backgrounds other than military operational experience. Much of our job in the Office of the Secretary of Defense is to help the Secretary to reach balanced decisions by helping him to bring to bear a broad range of other equally relevant considerations including economic, scientific, technical, and diplomatic aspects. Most of the civilians in the Office of the Secretary of Defense have considerable professional training and experience in one or more of these areas. But these other factors interact with the military aspects in a very intimate way, so that in general they cannot be separated out. For example, the whole point of so-called ‘cost-effectiveness’ analysis is that it does not make sense to consider cost and effectiveness separately. They are opposite sides of the same coin. The conclusion I draw from this is that we must all work together and be willing to make the effort to communicate with and learn from each other. Of course, a part of our job is to see to it that Defense Department programs are chosen and carried out as economically as possible. To do this, there is no alternative to questioning the programs of the Services.”¹³

Resuming the air-to-ground munitions example, Enthoven related how an effective collaboration between the analysts and the military experts eventually developed. The analysts learned practical insights from the military experts and they, in turn, gained conceptual insights from the analysts. As a result of this collaboration a realistic perception of the potential of precision guided air-to-ground munitions began to appear.

It is particularly interesting to reflect upon this speech and this very early effort of Systems Analysis in the light of nearly three decades of development of precision guided air-to-ground munitions, their prominent place in the inventory of modern weapons, and the critical role they played in the recent Gulf war. When he delivered his speech in 1963, Enthoven had no way of knowing how important precision guided air-to-ground munitions would become, yet he chose that issue to illustrate the power of the synergistic fusion of analysis and military experience. It is an illustration well worth reflecting upon.

Ground Forces in Europe: Analysis and Strategy. Soon after coming into office in 1961, the Kennedy administration began to seek a defense strategy that would reduce reliance on nuclear weapons and focus more on conventional forces for deterrence and war, particularly in Europe in association with Nato. Such a change proved to be highly controversial, and the new strategy was not officially adopted until May 1967.

The principal reason for the controversy was a perception, dating from the earliest days of Nato and persisting throughout the 1950s, of an overwhelming superiority of Soviet conventional forces over those available to the alliance. In 1961 the conventional wisdom, frequently reiterated among military planners, centered on a force imbalance measured in whole army divisions: that the Soviets had 175 well equipped, well trained divisions while Nato could muster only twenty-five, whose equipment and training problems were only too plain to Western military planners. The result of this perception of drastic conventional asymmetry was despair, a conviction that Nato could not resist an attack by Warsaw Pact forces without almost immediate resort to nuclear weapons. Such a strategy was not only highly unsatisfactory but dangerous, in the opinion of many, because it allowed for few alternatives between the horror of nuclear war and acquiescence to aggression. It was widely considered unavoidable, however, because of the enormous cost of matching the 175 Soviet divisions.

Some, however, began to question the validity of this whole view. In 1959, General Maxwell Taylor examined in his book *The Uncertain Trumpet* whether certain demographic and economic factors were consistent with the "fact" of the 175 Soviet divisions. He noted that the population of the United States and the Soviet Union were roughly comparable, that the total population of the Nato nations exceeded that of the Warsaw Pact allies, and that the economic

strength of the alliance greatly exceeded that of the Pact. It seemed strange, therefore, that with these kinds of fundamental disadvantages such a superior force could be maintained by the latter.

Beginning in 1961, OSD Systems Analysis began to probe the evidence underlying the order-of-battle assessment. As it gathered and critically examined data, the office found that the evidence was often very "soft" and that the conclusions drawn were usually biased (with the best of intentions) toward the "worst case." Ultimately, it was determined, first, that many of the "well trained, well equipped" divisions were, in fact, only cadre organizations, thinly manned and poorly outfitted; and second, that a division in the U.S. Army was equivalent in combat capability to at least three Soviet ones. A "division," therefore, was inappropriate as even a rough measure for comparison of Nato and Warsaw Pact effectiveness. This careful assessment revealed that there was in fact a rough parity between the two sides and that the previously perceived Western vulnerability, and the resulting need for rapid escalation, had probably been mistaken.

This clearer view of the realities of the balance of forces in Europe was of great importance in developing a strategy for Nato; it made possible the more flexible and less dangerous strategy that was adopted in 1967. The OSD analysts, in concert with analysts in the services and in the intelligence communities, had paved the way for fundamental changes in U.S. and Nato defense postures.¹⁴

TFX: Rationality Gone Astray? McNamara learned in briefings conducted soon after he took office that both the Air Force and the Navy had plans to develop new tactical aircraft. At Ford Motor Company, commonality had been the key to manufacturing efficiency and profits; McNamara immediately asked why a single aircraft design could not be used by both services. This simple question was to become the basis of one of McNamara's most difficult interactions with the services and with Congress.¹⁵

The traditional technical answer is that an airplane, particularly a combat aircraft, requires many design compromises and that trying to satisfy too many mission requirements means making too many compromises, producing an aircraft that does nothing very well. This point was to be made many times and in various degrees of specificity, but McNamara did not heed it, nor was any other argument able to dissuade him from the idea of a common tactical aircraft for the Air Force and Navy. Throughout the long and difficult program, McNamara, an avid consumer of facts and the reputed epitome of dispassionate rationality, repeatedly ignored the findings and recommendations of technically competent advisors and made decisions on the basis of his own instincts and preconceived notions.

In early 1961 the Air Force was considering a conceptual fighter that evolved from NASA Langley Laboratory briefings regarding the potential advantages of

variable-sweep wings. With that feature a single aircraft could achieve supersonic speed (with the wings in the high-sweep position) but also operate efficiently at subsonic speeds (in the low-sweep configuration), making high performance compatible with long ranges and slow, short takeoffs and landings. These possibilities led the Air Force to issue Specific Operational Requirement 183, which described the desired capabilities of an F-105 replacement that would be able to penetrate enemy defenses by flying supersonically at low altitudes but would also have an intercontinental ferry range without stops or inflight refueling.¹⁶

The Navy, for its part, needed a new fleet air defense airplane to replace the F-4 Phantom. A subsonic aircraft called the *Missileer* had been in development along with a new long-range missile, the *Eagle*. *Missileer* and *Eagle* were meant to be the new means of fleet air defense, but in late 1960, just before the Kennedy administration took office, *Missileer* was cancelled, because a subsonic aircraft seemed a step backward in the state of the art.¹⁷ (Development of the *Eagle* continued, however, producing eventually the *Phoenix* missile now used on the F-14 fighter.) As McNamara assumed office, the Navy was seeking a higher-performance aircraft than *Missileer* for the air defense mission.

On 14 February 1961, after only three weeks as Secretary of Defense, McNamara ordered, through his Director of Defense Research and Engineering, both services to study development of a single experimental tactical fighter, or "TFX," based upon the Air Force project.¹⁸ Both services initially agreed that a single TFX could be built—but in each case only if the other service gave up some of its mission requirements. This did not happen, however, and on 22 August 1961 the Air Force and Navy informed McNamara that it was not technically feasible to build a single aircraft that would meet the requirements both of an Air Force fighter-bomber and a Navy air defense fighter. On 1 September McNamara overruled this finding and issued a memorandum directing that a "single aircraft for both the Air Force tactical mission and the Navy fleet air defense mission will be undertaken. The Air Force shall proceed with the development of such an aircraft." The memorandum further required that changes to the Air Force version to achieve the Navy mission "shall be held to a minimum." On 1 October a document specifying the joint Air Force and Navy requirements and requesting design proposals was distributed to the aircraft industry.¹⁹

Six airframe contractors responded to the initial solicitation. Their proposals were evaluated by a joint technical team numbering at various points between one and two hundred people, principally from the Air Force but including Navy representatives. Their findings and recommendations were submitted through the military chains of command to the service secretaries, and then to the Secretary of Defense for a final decision. All six proposals were judged to be

inadequate, but the Boeing concept was given the highest score and that from General Dynamics the second highest; the Navy believed that the Boeing proposal could be satisfactory with changes but considered the General Dynamics design unacceptable.²⁰ Secretary of the Air Force Eugene Zuckert and Secretary of the Navy Fred Korth recommended that both firms be given ninety-day study contracts to develop further their designs, and that was done.

Boeing and General Dynamics refined their proposals through three additional rounds of evaluation, lasting through most of 1962. In each round the Boeing design was unanimously recommended by the services' Source Selection Board, and Boeing was the choice of the military leadership of both the Air Force and the Navy. Its version was evaluated as superior technically and with respect to performance; in addition, Boeing had submitted the lower price estimate.

When, therefore, on 24 November 1962, the Office of the Secretary of Defense announced that the TFX contract would be awarded to General Dynamics, the services, the defense industry, Congress, and all who had followed these events were thunderstruck. McNamara had made this decision with the concurrence of the secretaries of the Air Force and Navy, counter to the recommendations of all levels below them, on the basis of largely subjective judgments about the relative reliability of the cost and performance estimates in the rival proposals. The sole written justification was a five-page memorandum for the record signed by Korth and Zuckert and approved by McNamara;²¹ this document was viewed by many, including congressional investigators in the hearings that followed, as inadequate for such an important decision. On 21 December 1962, Senator John McClellan, Chairman of the Senate Committee on Government Operations and the Permanent Subcommittee on Investigations, contacted McNamara to request that award of the TFX contract be delayed until the subcommittee could complete its investigation. Notwithstanding, a letter contract to General Dynamics, setting the decision in concrete, was signed and sent that very afternoon.

This snub to Congress and the controversial nature of the decision inevitably led to long and difficult hearings before McClellan's subcommittee. These hearings must have been an unwelcome burden for McNamara, and they constitute part of the cost of his actions on the TFX issue. The first set extended from February 1963 through November; subsequent sessions were conducted in 1970, after the program had experienced much difficulty, cost growth, and erosion of performance capabilities. The final report of the Senate Permanent Subcommittee on Investigations, following its 1970 hearings, offered a somber assessment of the program. "The TFX program has been a failure. The Federal Government will spend more than \$7.8 billion to procure about 500 aircraft, although the original production schedule called for more than 1,700 aircraft to

be purchased for less money. Of the 500 planes we will have, less than 100 (the F-111Fs) come reasonably close to meeting the original standards." The Senate report went on to place the blame squarely on the shoulders of McNamara and his team. The "primary cause of the TFX fiasco was mismanagement. A series of management blunders, made for various reasons, compounded errors with more errors and caused the failure of the program. The management blunders were made at the highest echelons of the Government. Top Presidential appointees in the Department of Defense during the McNamara era overrode expert advice to impose personal judgments on complex matters beyond their expertise."²²

Thus Robert McNamara, the fabled manager from industry, the imposer of rationality and discipline on U.S. defense management, stood accused of gross mismanagement resulting in the waste of billions of taxpayer dollars. Was this charge justified? At least in part, the charge is true. Though many would argue that the F-111, in its various versions, provided useful capabilities to the Air Force, it seems clear that none of the shared advantages that McNamara had intended were realized. Ultimately, the naval version of the TFX, the F-111B, was cancelled, and the Navy went on to develop its own air defense fighter, the F-14 Tomcat. McNamara's objective had been efficiency through commonality in satisfying the Air Force and Navy needs, but the result was quite the opposite.

However, it may not be true, as charged elsewhere, that billions of dollars were wasted that would almost surely not have been spent but for McNamara's decisions. Had the Boeing proposal been selected, had McNamara stood aside and allowed the services to proceed as they pleased, the end result might very well have been at least as expensive and as unsatisfactory in other respects as the TFX program. We will never know. The TFX program is certainly not the only major defense program to experience significant cost growth, schedule slippage, and performance erosion.²³

What is clear is that in his TFX decisions McNamara repeatedly departed from good management decision-making practice. He ignored facts in favor of intuition when facts would have served him better; he ignored informed judgment in favor of unfounded confidence in advancing technology; and he arrogantly antagonized the institutions (and their leaders) that would have to execute his program. It was perhaps the last mistake that most seriously and needlessly burdened the program. TFX is not an example of the failure of the good, objective decision-making methodology often associated with McNamara but rather of what can happen when one departs from sound practice.²⁴

CVA 67: Right Question, Wrong Answer? Another McNamara decision that strained his relations with the uniformed leadership was the choice of conventional power for the aircraft carrier USS *John F. Kennedy* (today designated CV

67). Although many may still believe this decision was misguided and yet another example of McNamara's arrogant disregard of seasoned military judgment, the truly central issue, that of the tradeoff between quality and quantity, is an enduring dilemma that still challenges force planners today.

The administration's proposed budget for fiscal year 1963, submitted in early 1962 as the first prepared under McNamara's oversight, recommended construction of a new conventionally powered "attack" aircraft carrier, CVA 67. The first nuclear-powered carrier, USS *Enterprise* (CVAN 65), had been authorized in the fiscal 1958 shipbuilding program and completed in late 1961, just prior to the submission to Congress of the 1963 budget. In view of the lack of operational experience with nuclear-powered carriers and also of the significantly higher procurement cost involved, the Chief of Naval Operations and the Secretary of the Navy initially supported the decision that the new ship be conventionally powered. As time went on, however, the Navy's position would change, and influential members of Congress would become increasingly assertive proponents of nuclear power for the new carrier.²⁵

A pivotal event in this regard was the Cuban missile crisis of late 1962. An important component of the U.S. naval force involved was Task Force 135, commanded by Vice Admiral John T. Hayward; it included two carriers, the *Enterprise* and the oil-fired USS *Independence* (CVA 62). Hayward's subsequent accounts of his experiences became a powerful and convincing argument for many in the Navy and Congress in favor of nuclear power. In a letter to Secretary of the Navy Korth of 2 January 1963, he reported that "*Enterprise* outperforms every carrier in the fleet. No other carrier has made over 10,000 landings in her first year of operation. Her planes are easier and cheaper to maintain and are combat ready more of the time because they are not subject to the corrosive attack of stack gases." Hayward stressed the importance, in light of the Cuban operations, of reduced dependence on fuel replenishment—nuclear-powered carriers require refueling only for their aircraft (small amounts of diesel fuel aside). Hayward's letter closed, "My experience tells me that nuclear propulsion offers the Navy tremendous military advantages that will be sorely needed in the years ahead. To maintain fleets at sea against the hostile forces that are sure to oppose us will require every technical advantage we can possibly muster. Frankly, Mr. Korth, I am deeply disturbed that we are not exploiting to the fullest the technological advantage we hold in nuclear propulsion that has been gained through such great effort."²⁶

By September 1963, the Navy position regarding propulsion for the proposed CVA 67 had changed. On the 26th, Secretary Korth signed a memorandum to McNamara recommending nuclear power for the new carrier (making it CVAN 67) and offering to reprogram funds within the Navy to cover the additional costs.²⁷ One month later, however, on 25 October 1963, McNamara directed

the Navy to proceed with construction using conventional power. In a letter dated that same day to Senator John Pastore, Chairman of the Joint Committee on Atomic Energy, McNamara explained some of his reasoning. "This decision was motivated by a desire to avoid further delay, and does not prejudge the larger question of the application of nuclear power to the Navy's surface vessels in the future. . . . It has become apparent that the assessment of the greater costs associated with nuclear power against the advantages to be derived from its use, is a much more complicated question than had been realized. Not only does it involve a determination of the cost of nuclear power for the other ships within the carrier task force, where the carrier itself is nuclear powered, but also an assessment in greater depth of the missions of a carrier task force in a variety of military situations, in order to determine whether the added costs of nuclearization are worth incurring."²⁸

Professional testimony, such as that of Vice Admiral Hayward, based though it was on experience and judgment, was not of itself persuasive for McNamara. To him, the issue of whether the benefits of nuclear power for surface ships were worth the additional cost was one that should be susceptible to analysis, and he demanded that the Navy provide him with such analysis. McNamara succinctly expressed the crux of the matter as he perceived it in a letter to Congressman L. Mendel Rivers, Chairman of the House Armed Services Committee: "No one would argue that nuclear propulsion is not better on a ship-for-ship basis, but in view of the increased cost the question really is which is the better—have fewer nuclear ships, each one somewhat superior, or more conventional ships of lesser capability for the same investment. What concerns me is that regardless of the total amount we spend . . . we could have more than half again as many conventional as nuclear ships, with more than half again as many surface-to-air missiles, more than half again as many antisubmarine weapons, and have them in more than half again as many places in the world. The question is whether these advantages in numbers which accrue to the conventional ships do or do not offset the advantages of nuclear propulsion."²⁹

The Navy repeatedly attempted to persuade McNamara that nuclear power was worth the cost. Numerous analytical approaches were tried, along with various arguments based on professional judgment, but none, apparently, was convincing to the Secretary of Defense. In the end, USS *John F. Kennedy* was built as a conventionally powered carrier, the last to enter U.S. Navy service.³⁰

Once again, McNamara had gone against the weight of professional military advice in making an important decision. Here, however, he had approached the issue on substantive grounds, i.e., the tradeoff between capability and numbers: he demanded analytic proof that the additional value of nuclear power was worth

the additional cost. No such proof was, apparently, ever offered that satisfied him.

In this situation, McNamara may have demanded more than analysis can reasonably be expected to provide. Decisions on matters so complex must, ultimately, be made on the basis of judgment, though analysis can illuminate and inform that judgment. Without perfect knowledge of the future it would not be possible to "prove" that a decision on such a difficult matter was correct.

Osprey: Analysis at Center Stage. The V-22 Osprey is an aircraft being developed today by the U.S. Marine Corps to replace its aging H-46 helicopters for carrying troops and equipment ashore in amphibious landings. Rather than another helicopter, the Marines elected (starting in 1982) to develop a new type: a vertical and short takeoff and landing (VSTOL) aircraft with an innovative "tilt-wing" design. This approach offered significant advantages in speed and other qualities that persuaded not only the Marine Corps but the Army, Navy, and Air Force to undertake development, jointly. Each service had a somewhat different application in mind, but none of the potential missions was as central to the fundamental interests of a service as was amphibious assault to the Marine Corps; budgetary pressures eventually forced all except the Marines to drop out of the Osprey program. At the same time, the technical difficulties inevitable in a new type of aircraft caused costs to rise and the schedule to slip.

As a result, Osprey naturally became vulnerable to cancellation. No one doubted the need for a replacement for the H-46s, however. On the basis of capacity and cost, the successors of McNamara's "Whiz Kids," analysts in the office of Program Analysis and Evaluation (PA&E), suggested to Secretary of Defense Richard Cheney that the Marines' requirements could be realized for substantially less money if the Osprey program were abandoned and new helicopters were procured instead. That analysis and recommendation led Secretary Cheney to eliminate the Osprey from his fiscal year 1990 budget.

This decision was, to say the least, not greeted with enthusiasm by the Marine Corps; more importantly, it was vigorously opposed by certain members of Congress as well. As a result, the House Armed Services Committee directed (in July 1989) that the issue be studied further and a report submitted with the next year's (fiscal year 1991) budget request. Responsibility for the congressionally mandated study was assigned by OSD to the Institute for Defense Analysis, a federally funded analytic organization working primarily for the Office of the Secretary of Defense. IDA conducted a more detailed and sophisticated analysis than had PA&E and concluded that, among other factors, the speed and survivability advantages of the V-22 Osprey made it preferable to any new helicopter, even if procured only in the numbers that the lower outlay required by the proposed helicopter alternative would allow.³¹ Buttressed by

this finding, Congress continued to appropriate, in fiscal 1991 and subsequently, funds for the V-22. OSD, under Cheney, continued to oppose it, and there were additional studies, but the V-22 was saved.

Many other factors also affected the fate of the V-22 program, not the least of them intensive lobbying of Congress by interested parties, but the crucial arguments, and the terms of the debate itself, arose from analyses. Without their insights, the OSD decision to cancel the V-22 would have been final, for better or for worse. The Osprey case can be viewed as an example not only of the important role analysis can play in defense decision making but also of the hazards of deciding a complex issue before thorough analysis has been performed.

Analysis in Current Defense Planning

Today, thirty years after the institutionalization of analysis under Robert McNamara, its use is an accepted, even expected, part of defense planning and policy making. Analysis is imbedded in the formal decision processes that also trace their roots to that period, and almost any significant choice made in the absence of analytic support is liable to be criticized on that basis alone. Despite the initial aversion of so many senior military leaders to analysis and analysts, the military services have now embraced the art, trained their own practitioners (far more than ever worked in the Office of the Secretary of Defense), and routinely use them to support their own decision processes.

It is fair to ask, however, whether all this systematic "rationality" has really resulted in better national security planning and decision making. Despite some notable successes, such as the case of precision guided weapons, there are indicators that would suggest *less* efficiency. One might note, for example, that almost all systems today seem to cost drastically more (inflation aside) than weapons did in the past, that they take much longer to develop, and that they are more expensive to maintain. Critics of analysis point out that such important innovations as jet aircraft, ballistic missiles, and nuclear propulsion date from the 1950s, before McNamara and before Systems Analysis. They also note that since analysis became institutionalized, decisions and the programs resulting from them always seem to take longer and longer. Perhaps most unkindly of all, critics of analysis observe that the heyday of the OSD Systems Analysis Office coincided with the only war the U.S. ever lost.³²

There are, of course, persuasive responses to such criticisms. They include the fact that increasing technical complexity is a pervasive feature of modern life; it is not a phenomenon found only in weapon systems and cannot be reasonably characterized as a perverse effect of analysis. Jet aircraft, ballistic missiles, and nuclear propulsion were innovations brought into being through the technical

momentum of World War II, which stimulated the origins of modern analysis. Extension of program and decision time-lines is attributable, supporters would assert, to the interactive complexities of technology and modern politics, not to analysis. And surely blaming the loss of the Vietnam War on the Systems Analysis Office is so obviously simplistic as to border on hyperbole. Of the many factors that influenced the outcome of that war, systems analysis was at most a secondary one—on some decisions that affected some of those factors.

Now, as in the past, analysis and analysts are viewed differently by different observers. At one end of the spectrum of opinion are those who see the discipline as flawed and mostly counterproductive in defense decision making. Analysis, they argue, focuses too much on the readily quantifiable as opposed to factors that may be more important but are less easily quantified; the necessity to complete an analysis, and to review, brief, and modify it, etc., simply delays a decision and that usually without improving its quality. It is experience, judgment, and hard-won, real-world insight that should govern defense decision making, this argument holds, not arcane analytical techniques performed by specialists of shallow experience. At the other end of the spectrum are those who believe strongly in the power of analysis and logic to illuminate the factors affecting complex situations. The more complex the decision, in this view, the more important analysis becomes for making it. "Experience" and "judgment" are often clouded by prejudice, this school asserts; objectivity should be the key, and analysis promotes just that.

The truth, as so often, lies somewhere between these extremes. There is indeed a tendency for analysts to emphasize readily quantified factors at the expense of those less easily reduced to numbers. This is an inescapable feature of analysis that should be recognized and taken into consideration but probably can be offset only by the consistent application of good judgment. Judgment is a pervasive feature of the analytic process itself, and clearly it is much more effective when informed by insight acquired through experience in the field. Judgment inheres in the preliminary assessments that must be made about the objectives of an analysis, the alternatives to be considered and the measurements to be used in evaluating them, the analytic models to be employed, and a host of other matters. Making the decision itself requires weighing the results of analysis and integrating them with other material that may be relevant. All of these factors—analytical skill, judgment, and field experience—are important, therefore, not only to making a decision but also to the analytic effort supporting it. Because these qualities are not often to be found in the same person, sound analysis is usually a collaborative effort—as is, indeed, a well founded decision.

This, then, is the reality that those concerned about the use of analysis in defense decision making should bear in mind. Almost all important national security decisions are in fact collective products, in which different persons,

groups, and interests have interacted. Analysis is only one element, and it may, indeed often does, itself reflect more than one point of view. The role of analysis should be to collect, organize, and place in context information relevant to a decision; it is a service to the decision maker and the decision process, not a substitute for them. Only in very rare situations can analysis provide "the answer." As they have always been in the past, experience and judgment are the key ingredients in good decisions, but analysis can assist and inform them in most circumstances. The best decisions are likely to come from a proper balance of experience, judgment, and analytic insight; poor decisions, as may have been the case with the TFX, can result when one relies only on personal judgment, ignoring experienced advice and the results of analysis.

Analysis, experience, and judgment may also be viewed as tools with which we examine the products of the still higher intellectual activity of "conceptualization" or "vision." The question naturally arises as to how we decide upon our objectives. What in fact *are* our real objectives? What alternative means to their attainment should we consider? Analysis, by itself, cannot answer these questions. It can neither form values nor create ideas—these are synthesized from experience and judgment, or, occasionally, from the even more remarkable human quality called inspiration. Analysis allows us to relate and compare values; it also helps us to evaluate and refine our ideas and may stimulate the generation of others. It is, however, only the servant of valuation and creativity.

What conclusions can we draw? Has the effort devoted to analysis in defense decision making resulted in a commensurate contribution? I believe the answer is an unequivocal Yes. Although it has too frequently been prostituted for biased and parochial ends, and although it may have too often been done poorly and with misleading results, analysis has, on balance, had a clearly beneficial effect. It has repeatedly brought out important information; it has elevated debate; it has stimulated new approaches to problems; and it has helped pave the way to fundamentally new strategies. Today not only the Office of the Secretary of Defense but all the services and major national security organizations use analysis as a matter of course; indeed, the most definitive evidence of its success may be its ubiquity three decades later. Although arguments against analysis still echo in the halls of the Pentagon and elsewhere, most are aimed, in fact, at its *misuse*. It is quite proper to denounce such misuse, but it is another thing entirely to condemn all analysis accordingly. Those who would become effective participants in national security decision making must acquire a working acquaintance with the tools, potential, and limitations of analysis, because the art has won, for sound reasons, a permanent role in the formulation of national security policy.

Notes

1. The name was changed in April 1973 by Secretary of Defense Elliot Richardson.
2. Ralph Sanders, *The Politics of Defense Analysis* (New York: Dunellen, 1973), p. 4.
3. *Ibid.*, pp. 39–40.
4. *Ibid.*, p. 40.
5. Alain C. Enthoven, *How Much Is Enough? Shaping the Defense Program, 1961–1969* (New York: Harper & Row, 1971), p. 2.
6. *Ibid.*, p. 3.
7. Samuel P. Huntington, *The Soldier and the State* (New York: Vintage Books, 1957), pp. 449–50.
8. Deborah Shapley, *Promise and Power: The Life and Times of Robert McNamara* (Boston: Little, Brown, 1993), p. 37. (Emphasis original.)
9. K. Wayne Smith, "The Origins, Growth, and Accomplishments of the Systems Analysis Office," Thomas E. Anger, ed., *Analysis and National Security Policy* (Alexandria, Va.: Center for Naval Analyses, 1988), p. 28.
10. *Ibid.*, pp. 33–4. (Emphasis original.)
11. *Ibid.*, pp. 38–40. These grumpy quotations regarding systems analysis are among those collected by K. Wayne Smith.
12. Alain C. Enthoven, "Choosing Strategies and Selecting Weapon Systems," address presented at the U.S. Naval War College, Newport, R.I., 6 June 1963. Reprinted in U.S. Naval Institute *Proceedings*, January 1964, p. 158.
13. *Ibid.*, pp. 156–7.
14. For a more complete and authoritative discussion of the "175 divisions" episode, see Enthoven, *How Much Is Enough?*, chap. 4.
15. Shapley, p. 202.
16. U.S. Congress, Senate, Permanent Subcommittee on Investigations of the Senate Committee on Government Operations, *TFX Contract Investigation, Hearings* (Washington: U.S. Govt. Print. Off., 24 March 1970), p. 12 (John Brick testimony).
17. *Ibid.*
18. U.S. Congress, Senate, Permanent Subcommittee on Government Operations, *TFX Contract Investigation, Report no. 91-1496* (Washington: U.S. Govt. Print. Off., 18 December 1970), p. 6.
19. *TFX Contract Investigation, Hearings*, p. 13.
20. *TFX Contract Investigation, Report*, p. 11.
21. *Ibid.*, pp. 14–5.
22. *Ibid.*, p. 92.
23. See, for example, the discussion of the developmental history of the Navy's F/A-18 aircraft in James P. Stevenson, *The Pentagon Paradox: The Development of the F-18 Hornet* (Annapolis, Md.: Naval Institute Press, 1993), chap. 11.
24. Enthoven, *How Much Is Enough?*, pp. 262–6, argues that much of the difficulty encountered by the TFX program stemmed from overly ambitious performance requirements developed by the services largely without the benefit of systems analysis. McNamara's key mistake, in Enthoven's view, was not that he overruled the services with regard to a single rather than separate aircraft or that he selected the wrong prime contractor, but that he did not overrule the services' performance requirements. This decision was made very early in McNamara's term, before the Systems Analysis Office was organized and able to advise him on such issues; Enthoven argues that the TFX troubles derived not from systems analysis but from the lack of it.
25. James M. Roherty, *Decisions of Robert S. McNamara: A Study of the Role of the Secretary of Defense* (Coral Gables, Fla.: Univ. of Miami Press, 1970), pp. 152–5.
26. U.S. Congress, Joint Committee on Atomic Energy, *Hearings, Nuclear Propulsion for Naval Surface Vessels* (Washington: U.S. Govt. Print. Off., 1964), p. 63. Vice Admiral Hayward was not an uncritical, single-minded advocate of nuclear power. Indeed, he later (2 March 1983) testified before the Seapower Subcommittee of the House Armed Services Committee in favor of resuming U.S. procurement of conventionally powered submarines.
27. *Ibid.*, pp. 104–7.
28. *Ibid.*, p. 118.
29. U.S. Congress, House of Representatives, Committee on Armed Services, *Hearings on Military Posture and H.R. 13456* (Washington: U.S. Govt. Print. Off., 1966), p. 8075.
30. Although all subsequent U.S. aircraft carriers have been nuclear powered, time seems to bear out McNamara's instincts with respect to other types of nuclear-powered surface combatants. The large, expensive,

nuclear-powered cruisers built in the 1960s and 1970s are now being decommissioned, some well before their initially planned dates, being succeeded by conventionally (in fact, gas turbine) propelled cruisers.

31. For a summary of the IDA study and a transcript of testimony regarding it, see U.S. Congress, Senate, Subcommittee of the Committee on Appropriations, *Institute for Defense Analysis Study of V-22 Osprey*, Hearing 101-934 (Washington: U.S. Govt. Print. Off., 1990).

32. See, for example, William A. Niskanen, "Commentary," Anger, ed., p. 55.

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This Issue's Cover

The USS *Enterprise* (CV 6) was involved in almost every major battle in the Pacific during World War II, from Pearl Harbor through the kamikaze hit on 14 May 1945 while serving as Vice Admiral Marc Mitscher's flagship off Okinawa; she was completing repairs at the Puget Sound Naval Shipyard when World War II ended. Built by Newport News Shipbuilding and commissioned on 12 May 1938, *Enterprise* earned a Presidential Unit Citation, a Navy Unit Citation, and twenty battle stars, missing only the Coral Sea battle and Third Fleet operations against the Japanese home islands at the end of the war; the two next most-decorated ships, heavy cruiser *San Francisco* and destroyer *O'Bannon*, earned sixteen battle stars. *Enterprise* and her air wing shot down 911 enemy planes, sank 71 ships, and seriously damaged or destroyed another 192 ships. "Tokyo Rose" announced seven times that she had been sunk; Secretary of the Navy James V. Forrestal declared *Enterprise* "the one ship that most nearly symbolizes the history of the United States Navy in World War II." With this cover and a special section of reviews and notices of new books about that conflict, we honor the 373 men who died aboard the *Enterprise* or flying from her deck, the thousands of other Americans who never came home from World War II, and the millions who served in the victorious U.S. armed forces.

Thanks are owed to Dr. Steve Ewing, Senior Curator and Director of Exhibits for the Patriots Point Naval and Maritime Museum in Charleston, South Carolina, and to Captain R.L. Rasmussen, USN, Ret., and Mr. Jim Curry, the Director and the Visual Information Department Head respectively, of the National Museum of Naval Aviation in Pensacola, Florida, for their assistance and advice on our cover.