

CRS Report for Congress

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Imagery Intelligence: Issues for Congress

April 12, 2002

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Report Documentation Page

Form Approved
OMB No. 0704-0188

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1. REPORT DATE 12 APR 2002		2. REPORT TYPE N/A		3. DATES COVERED -	
4. TITLE AND SUBTITLE Imagery Intelligence: Issues for Congress				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Federation of American Scientists 1717 K St., NW Suite 209 Washington, DC 20036				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release, distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 35	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Imagery Intelligence: Issues for Congress

Summary

Intelligence derived from satellites has become an essential element of military operations and foreign policymaking. In particular, precise imagery from space-based collection systems makes possible the effective use of precision-guided munitions that is becoming the basis of U.S. defense planning. Imagery intelligence also provides the factual bases for addressing many foreign policy issues.

Imagery is collected by satellites acquired and operated by the National Reconnaissance Office (NRO), an organization with a record of enormous technological achievements since its creation in 1961. Imagery collected by the NRO is processed, analyzed, exploited, and disseminated by another organization, the National Imagery and Mapping Agency (NIMA). NIMA was established in 1996, incorporating the Defense Mapping Agency and various intelligence offices.

Congress has been concerned with satellite imagery because of its critical importance and its high costs. Independent commissions established by Congress to assess the state of the imagery intelligence effort have concluded that significant changes need to be made in the way the Nation's imagery effort is conducted. There is a consensus that greater emphasis should be placed on better collection targeting and improving processing, exploitation, and dissemination (the processes collectively termed TPED); that greater attention should be given to acquiring commercial imagery; and that the management of the imagery effort may need to be changed. Even before the events of September 11, 2001, there appeared to be a fairly widespread view within congressional committees that at least some additional funding should be directed towards imagery collection and TPED. Subsequent military campaigns have underscored the use of imagery in military operations and other counterterrorist efforts.

TPED encompasses the establishment of a "multi-int" database, *i.e.* an electronic file containing information from all intelligence sources, that will require the balancing of different needs of intelligence agencies and government consumers. Congress has encouraged NIMA's role in establishing this database, but obstacles include costs, inherent technical difficulties, and the administrative and security complications of placing one agency in charge of maintaining and editing data for a multitude of users.

Some observers advocate more fundamental changes. These include significantly greater reliance on commercial imagery and a reduction in coverage by Government satellites. In this approach, the NRO and NIMA would concentrate on developing cutting edge technologies and on meeting special requirements beyond the capabilities of the private sector. Some would reconsider the next generation of imagery-collecting satellites.

Satellite imagery is among the most important technological achievements of the Intelligence Community; maintaining a capability to support military operations that avoid inflicting vast civilian damages provides the underlying justification for a continuing effort.

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Imagery Intelligence: Issues for Congress

Introduction

The NATO campaign against Serbian forces in Kosovo undertaken in the spring of 1999 has been termed both a brilliant success and a harbinger of military operations in the twenty-first century. Among other things, it demonstrated the increasing importance of precise imagery intelligence that permitted NATO to attack and destroy crucial Serbian targets with minimal friendly losses or collateral damage. Over 9,300 strike sorties were flown with NATO losing no aircrews and only two aircraft. Without the need for a costly ground campaign, Serbian forces pulled out of Kosovo and Albanian refugees were able to return to their homes.

In the midst of this successful air campaign, however, occurred a significant blunder that was to have major repercussions on the other side of the globe and demonstrated significant weaknesses in the imagery analysis and dissemination process. On May 7, 1999, a U.S. B-2 bomber fired a 2000 lb. guided bomb and precisely destroyed a building believed to be the Headquarters of the Yugoslav Federal Directorate for Supply and Procurement (FDSP), a legitimate military target. The building was first designated by intelligence officers at the Central Intelligence Agency (CIA). Unfortunately, the building was not the FDSP headquarters, but the Embassy of China. As a result of the attack, three Chinese officials were killed and the United States had to apologize formally and pay restitution. Despite the apology and restitution, the mistaken bombing was deeply resented in Beijing and may have contributed to a general deterioration of Sino-American relations.

The misidentification of this Belgrade office building reflects both the crucial importance that intelligence has come to have in military operations and the serious consequences of what Director of Central Intelligence (DCI) George Tenet acknowledged as an intelligence failure. As Tenet later testified:

When cities were struck in past wars, none doubted that civilians, embassies, hospitals, and schools would be in harm's way. Today, our ability to strike precisely has created the impression that sensitive sites can be safe in the middle of a war zone. Our desire to protect innocents in the line of fire has added an enormous burden on all of us that we accept.

The incident demonstrated the crucial importance of integrating satellite imagery of major installations with other forms of intelligence that would identify what was going on inside them. Tenet also suggested the origins of the mistake—a failure to maintain accurate data bases. “We have diverted resources and attention away from

basic intelligence and data base maintenance to support current operations for too long.”¹

In the post-September 11, 2001 campaign against the Afghan Taliban and Al Qaeda terrorists, imagery intelligence has continued to be of great value. Aircraft based in the U.S. are able to attack ground (and underground) targets with precision weapons using imagery obtained by reconnaissance satellites. Imagery intelligence is also an important component of the global war against terrorism in which it is tied to information from other intelligence sources and from unclassified, open sources to locate terrorist facilities and activities. The additional funding becoming available for intelligence in the wake of September 11 is expected to alleviate some of the problems encountered in the Kosovo campaign, but the overarching challenges of aligning the agencies involved and maximizing the usability of their products by both policymakers and the operating forces remain to be resolved.

The Intelligence Community has emphasized the development and operation of satellites of great technical complexity, but exploitation and dissemination of the data collected have fared less well. Furthermore, the changing nature of warfare has required that information be transmitted to theater commanders immediately (in “real time”) not just forwarded to Washington agencies. These two requirements—the need for better analysis and the requirement to move the data rapidly to field commanders—underlie the challenges facing two agencies charged respectively with collecting and producing imagery intelligence from satellites, the National Reconnaissance Office (NRO) and the National Imagery and Mapping Agency (NIMA).² Background on the two agencies is provided in the appendices.

Imagery from satellites is used in conjunction with imagery from airborne systems—manned aircraft and unmanned aerial vehicles (UAVs). These much less expensive systems have been used extensively in recent combat operations but can be vulnerable to enemy attack and lack the technical capabilities possessed by satellites. In many cases aircraft and UAVs do not collect imagery for use by national intelligence agencies to build permanent databases.³

It is possible that reviews of intelligence organization underway since early in the current Bush Administration may result in recommendations to make major changes in the organization of the imagery effort by placing the NRO and NIMA directly under the DCI. Earlier, one influential study group proposed the abolition of the NRO and the transfer of its program offices to NIMA and NSA—the national

¹DCI Statement on the Belgrade Chinese Embassy Bombing, House Permanent Select Committee on Intelligence Open Hearing, 22 July 1999.

²The National Security Agency (NSA) is responsible for tasking and analyzing signals intelligence collected by satellites; its role is discussed in CRS Report RL30740, *National Security Agency: Issues for Congress*, updated January 6, 2001, by Richard A. Best, Jr.

³See CRS Report RL30727, *Airborne Intelligence, Surveillance, and Reconnaissance (ISR): the U-2 Aircraft and Global Hawk UAV Programs* by Richard A. Best, Jr. and Christopher Bolkom, updated December 1, 2000.

managers of the overall imagery and sigint efforts.⁴ While observers believe that such proposals would be likely to face substantial resistance, the technical, administrative, and budgetary challenges that have been identified by the NRO and NIMA Commissions will be central considerations for the future of the imagery effort under any circumstances.

The nature of these challenges involves billions of dollars which are required for satellite imagery collection and processing. Costs of intelligence programs are not made public (being authorized in the classified annexes to defense and intelligence authorization bills), but it is widely understood that satellite programs cost several billion dollars annually and absorb a large proportion of the budget of the National Foreign Intelligence Program.

Concerned with the future of imagery programs, in 1999 Congress created two commissions to assess space-based intelligence issues, one addressing the NRO and the other NIMA.⁵ Both have issued reports with a number of recommendations that are currently under consideration in the executive branch and Congress. Congress also mandated the establishment of a commission to assess national security space management and organization.⁶ The latter commission's concerns extended far beyond intelligence collection platforms, but it addressed organizational issues involving both the Defense Department and the Intelligence Community.

The establishment of these commissions reflected congressional concerns in particular about several aspects of the Nation's imagery intelligence effort:

⁴Walter Pincus, "Intelligence Shakeup Would Boost CIA," *Washington Post*, November 8, 2001, p. A1; National Institute for Public Policy, *Modernizing Intelligence: Structure and Change for the 21st Century*, September 1997. The chairman of the study group was Lt. Gen. William E. Odom, a former Director of NSA.

⁵The National Commission for the Review of the National Reconnaissance Office, established pursuant to Title VII of the Intelligence Authorization Act for FY2000 (P.L. 106-120) and the Independent Commission on the National Imagery and Mapping Agency, established pursuant to the classified annex to the Conference Report (H.Rept. 106-371) accompanying the Defense Appropriations Act for FY2000 (P.L. 106-79). The report of the former is *Report of the National Commission for the Review of the National Reconnaissance Office, The NRO at the Crossroads*, November 1, 2000, hereafter cited as NRO Commission Report. The report of the latter is *The Information Edge: Imagery Intelligence and Geospatial Information In an Evolving National Security Environment: Report of the Independent Commission on the National Imagery and Mapping Agency, 10 January 2001*, hereafter cited as NIMA Commission Report.

⁶The Commission to Assess National Security Space Management and Organization [Space Commission]; established pursuant to the Defense Authorization Act for FY2000 (P.L. 106-65). This commission was initially headed by Donald H. Rumsfeld, subsequently appointed Secretary of Defense. For further background, see Marcia S. Smith, *Military Space Activities: Highlights of the Rumsfeld Commission Report and Key Organization and Management Issues*, CRS Report RS20824, February 21, 2001.

- perceived imbalances between funds allocated to launching and operating satellites on one hand and that spent on tasking, processing, exploitation, and dissemination on the other;
- the decision to choose a new generation of satellites that was designed to meet established criteria rather than extend the envelope of technical capabilities;
- the possibility of making greater use of commercial imagery;
- ongoing, but disjointed, efforts by NIMA to create and maintain a worldwide geospatial grid.

Dealing with imagery issues is undertaken against an unstable geopolitical environment in which access to high-quality intelligence and communications equipment is becoming available to many other countries and even terrorist organizations. Some observers fear that hostile countries could leap-frog the technological capabilities that the United States has acquired after many years and end up with virtually comparable intelligence at a fraction of the investment made by this country.⁷

Given the growing importance of space-based intelligence and the sums of money involved, some analysts believe that evaluating, and possibly redefining the responsibilities of the NRO and NIMA will be among the most important challenges facing the Intelligence Community and congressional armed services and intelligence committees in the next decade. Imagery intelligence lies at the heart of efforts to transform the post-Cold War defense establishment, but it is costly. Balancing the opportunities with the costs is a crucial responsibility of both Congress and the executive branch.

Background

The need for space-based intelligence became evident in the earliest years of the Cold War long before the United States developed the capacity to launch and operate satellites. In the late 1940s and the 1950s, ignorance of the military capabilities of the Soviet Union was a source of profound concern given the pervasive fear of Soviet aggression. Overflights near and over Soviet territory were undertaken to collect aerial photography, but there were great risks involved, as demonstrated when a U-2 aircraft operated by the Central Intelligence Agency (CIA) was shot down over Soviet territory in May 1960 and the pilot, Francis Gary Powers, put on public trial in Moscow. The U-2 shutdown provided strong impetus for a satellite program already planned that could provide intelligence from space without risking either

⁷See *Report of the Commission to Assess United States National Security Space Management and Organization*, January 11, 2001, pp. 19-22, hereafter cited as Space Commission Report. A even greater concern expressed by some observers is the possibility that a foreign entity could find a way to “blind,” disrupt, or falsify a comprehensive intelligence database that had become an integral part of U.S. military operations. Ibid.

pilots' lives or diplomatic crises.⁸ The satellite reconnaissance program grew in importance throughout the remainder of the Cold War, providing the necessary intelligence foundation for U.S. defense programs, national security policies, and, especially, for arms control negotiations. Additional satellites provided different forms of intelligence—from electronic and communications transmissions, radar and telemetry. By the end of the Cold War, satellite programs provided an major portion of the intelligence needed to formulate national security policy and consumed a sizable percentage of the intelligence budget.⁹

Throughout the Cold War satellite reconnaissance data was primarily used by national-level policymakers and planners focused on the threat of strategic nuclear conflicts involving the West and major communist countries. Many of the collection targets were fixed installations—missile bases, shipyards, defense industry factories, etc. The data acquired was the basis for targeting aircraft and missiles and for arms control discussions, but it was not, for the most part, integrated directly into ongoing military operations.

The Persian Gulf War in 1990 against Iraq, however, saw extensive use of satellite-derived data in contemporaneous combat operations—a practice that was to have a profound influence on military planning for the post-Cold War environment. The much greater tactical use of satellite reconnaissance resulted in part from the fact that the flat desert terrain was ideally suited to overhead imaging (as compared, for instance, to the triple-canopy jungles of Southeast Asia). In part, it was made possible by the end of the Soviet threat that allowed the diversion of satellite coverage to non-Warsaw Pact targets. The potential value of satellite imagery was quickly grasped by military commanders, but there were many complaints that the ability to disseminate the product was woefully inadequate—in some cases, imagery had to be hand-carried to various Desert Storm commands. The use of satellite data in Desert Storm was a key part of a major technological breakthrough, in large measure unanticipated:

Yet what, in the end, largely predetermined the allied victory had never been tested before, least of all in the synergistic combination that roved so overwhelming against Iraq. The power of a few stealthy F-117s to operate with impunity and to substitute for mass by way of precision, the confident knowledge of the battlefield at any moment that air- and space-based information superiority gave the coalition's commanders, and the strategic effectiveness of round-th-clock bombing of Iraqi ground forces were all, to varying degrees, revelations whose extent of leverage became clear only as the war progressed.¹⁰

⁸The legality of space-based reconnaissance is recognized in international legal instruments including the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, and the United Nations General Assembly December 1986 document, Principles Relating to Remote Sensing of the Earth from Outer Space.

⁹For background, see CRS Issue Brief IB92011, *U.S. Space Programs: Civilian, Military, and Commercial*, by Marcia S. Smith.

¹⁰Benjamin S. Lambeth, *The Transformation of American Air Power* (Ithaca: Cornell (continued...))

In the 1990s, at the urging of military commanders and congressional committees, the Defense Department smoothed out dissemination problem to ensure that satellite-derived intelligence could be transmitted without delay to consumers. This required new communications links, equipment changes, and the development of new analytical and dissemination procedures, including the lifting of restrictions on disseminating information that had previously been strictly accessible only to users with certain special clearances. Much had been accomplished by the time of the NATO-led attack on Serbian forces in the spring of 1999 (Operation Allied Force). As a result, in part, of faster dissemination of satellite data, the Kosovo air campaign achieved most of its objectives. It did so with almost no loss of Allied life and minimal loss of civilian lives on the ground—despite the lamentable attack on the Chinese embassy in Belgrade.¹¹

In the post-Cold War environment, requirements for satellite data are closely tied to the growing use of precision-guided munitions (PGMs) that allow very specific targets to be destroyed while minimizing loss of civilian life and damage to civilian facilities. Targeting PGMs depends on very precise locating data that are acquired from satellite data supplemented by airborne reconnaissance. Current defense planning documents such as Joint Vision 2020 describe precision engagement as including more than the employment of PGMs, encompassing a vision of information superiority that “will enhance the capability of the joint force commander to understand the situation, determine the effects desired, select a course of action and the forces to execute it, accurately assess the effects of that action, and reengage as necessary while minimizing collateral damage.”¹² Growing reliance on information superiority by civilian policymakers as well as military leaders will result in increased requirements for space-based imagery—a major consideration for planning the future evolution of the Intelligence Community.

Issues for Congress

Satellites consume a major proportion of the intelligence budget and are thus a focus of congressional attention. In its oversight of the NRO and NIMA and in authorizing and appropriating funds, Congress will ultimately determine the shape of future imagery programs.¹³ It can augment or decrease funding for the NRO and

¹⁰(...continued)

University Press, 2000), p. 260.

¹¹The question of whether the air campaign by itself brought about the withdrawal of Serb forces from Kosovo is controversial and lies beyond the scope of this report.

¹²Joint Chiefs of Staff, *Joint Vision 2020* [<http://www.dtic.mil/jv2020>] .

¹³For the significance of congressional oversight of the NRO, see Clayton D. Laurie, *Congress and the National Reconnaissance Office* (Unpublished ms., Office of the Historian, National Reconnaissance Office, October 2000). Also, Jeffrey T. Richelson, “Out of the Black: the Disclosure and Declassification of the National Reconnaissance Office,” *International Journal of Intelligence and Counterintelligence*, Spring 1998. For congressional involvement in the creation of NIMA, see Anne Daugherty Miles, *The Creation* (continued...)

NIMA. It can budget for innovative but expensive research. It can realign agency roles and responsibilities. At the same time, Congress cannot direct Presidents to devote more of their personal time to satellite issues, nor can Congress mandate effective cooperation among agency heads within the executive branch.

Commissions and many observers have argued against the need for new legislative initiatives. Many believe the number of congressional committees involved and the separate legislative vehicles by which funds are authorized and appropriated for space collection, analysis, and dissemination complicate efforts to address space-based intelligence issues. Observers note in particular the potential for different priorities among armed services and intelligence committees as well as the budgetary pressures on space-related programs that have existed in recent years.

Another view, however, is that the evolution of space-based intelligence may have to be guided by new statutory authorities. Existing or potential overlap among the current authorities of DOD and the Intelligence Community, as well as funding changes and trade-offs that may be required among high-cost programs, may, according to this view, lead to a necessarily larger congressional role. Given the central role of space-based intelligence in future military planning and in intelligence effort, most observers expect a continued high level of congressional interest.

Tasking, Processing, Exploitation, and Dissemination (TPED)

TPED is the collective term used to describe the tasking of satellites to image a particular area at a particular time, downloading the “take,” analyzing it, and disseminating it within specified times to the officials or agencies who use it, the “consumers.” TPED is the core NIMA mission and it is at once a major technological challenge, a significant budgetary issue, and a matter of contention among intelligence agencies.

TPED is seen as encompassing a vast information system that includes inputs from various collection systems that are immediately accessible to users at many levels to use for their own information requirements. It is the foundation of the Defense Department’s determination to use information to secure decisive military results. *Joint Vision 2020* argues that:

The evolution of information technology will increasingly permit us to integrate the traditional forms of information operations with sophisticated all-source intelligence, surveillance, and reconnaissance in a fully synchronized information campaign. The development of a concept labeled the global information grid will provide the network-centric environment required to achieve this goal. The grid will be the globally interconnected, end-to-end set of information capabilities, associated processes, and people to manage and provide information on demand to warfighters, policy makers, and support personnel. It will enhance combat power and contribute to the success of noncombat military operations as well. Realization of the full potential of these changes requires not

¹³(...continued)

of the National Imagery and Mapping Agency: Congress’s Role as Overseer (Joint Military Intelligence College, Occasional Paper Number 9, April 2001).

only technological improvements, but the continued evolution of organizations and doctrine and the development of relevant training to sustain a comparative advantage in the information environment.¹⁴

Further discussion of the geospatial grid may be found in Appendix B, but, put simply, the goal is to provide a database built around a geographic display (essentially a map displayed on a computer screen); the user clicks a computer mouse on a specific point on the display to obtain information about geographic features such as rivers or hills, the location of manmade structures such as buildings, bridges or weapon emplacements, information about activities likely occurring within buildings, the presence or absence of personnel, etc. This information is intended to permit the recipients to take appropriate action with confidence that targets can be hit, refugees rescued, etc. Much of the discussion of the geospatial grid is focused on the needs of military commanders, but this type of information could be of great utility to government officials outside DOD. For instance, during the Kosovo conflict, NIMA made a daily presentation to the State Department that provided:

- A geospatial reference, including shaded terrain relief overlaid with towns and roads;
- Over this was layered census data showing the distribution percentage of ethnic Albanians;
- Over which was satellite and aircraft imagery of burning houses; added to which was:
- Imagery or graphics of the movements of Serbian paramilitary forces and the resulting flow of displaced Albanians.¹⁵

NIMA's role as the functional manager of the whole enterprise is a matter of significant concern. Managing the grid includes making many technical decisions regarding information reliability, communications systems, message formats, access controls, etc., all of which will be difficult to establish on a government-wide basis since, in practice, there may be different needs by different consumers—some with great clout—for specific types of data within different time constraints. Observers express concern that NIMA, as a new agency, will find it difficult to make final judgments resolving differences. Beyond bureaucratic concerns, observers consider that NIMA has far to go in being able to exploit the vast quantities of data collected. Nevertheless, most observers have reached the conclusion that NIMA should retain control of the geospatial grid.

The NIMA Commission concluded, “To whom should we entrust ...[the responsibility to fuse imagery and sigint]? Against all odds, the Commission feels the answer may well be NIMA.” According to the Commission, “the geospatial construct is the obvious foundation upon which fusion should take place.”¹⁶ However, the Commission expressed concern not just about NIMA's ability to manage the TPED process, but also about the agency's ability to manage the acquisition of TPED

¹⁴*Joint Vision 2020.*

¹⁵*Ibid*, p. 64.

¹⁶NIMA Commission Report, p. 48.

systems even for its own staff. “The current TPED acquisition effort lacks a clear baseline, which should tie clearly to overall strategy, requirements, and cost constraints. In addition to the lack of a common definition of TPED, there is similarly confusion as to the requirements that TPED must satisfy.”¹⁷ The Commission expressed concern about NIMA’s lack of plans to integrate imagery from airborne collectors—aircraft such as the U2 and UAVs—into TPED based on the FIA. According to the Commission current plans do not address either the integration of airborne imagery or multi-INT integration.

Similarly, the Defense Science Board Task Force concluded that NIMA, “as the government agency responsible as the functional manager for imagery and geospatial intelligence, will be at the center of the ‘information revolution’ as it affects individuals and organizations that contribute to national security.”¹⁸ According to the Task Force, NIMA should “have the clout to bring other communities to accept the architecture and the standards necessary to build an integrated TPED system.”¹⁹ More specifically, the Task Force argued that NIMA should act as the single functional manager for imagery and geospatial information, define future TPED architecture, products, and services; task (and make tradeoffs between) commercial and government collectors, and review budgets of agencies responsible for imagery and geospatial efforts.²⁰

The Senate Intelligence Committee has expressed concern that NIMA “does not exercise comprehensive functional management authority over U.S. imagery and geospatial programs.” The Committee noted in particular the NIMA’s absence of authority to set standards and review investment and RDT&E programs of tactical efforts of the military services.²¹

The conference report accompanying the FY2001 Defense Authorization Act also took note of the need for an integrated multi-int TPED architecture. NIMA was directed to undertake a review regarding means to achieve the development of such an architecture with “the direct and personal involvement by the Deputy Secretary of Defense and the Director of Central Intelligence.” The report anticipates the establishment of a universal architecture that would include information collection not only from overhead satellite systems, but also aircraft and unmanned aerial vehicles and all tasking, data, storage, processing, exploitation, analysis and disseminations

¹⁷NIMA Commission Report, p. 87.

¹⁸U.S. Department of Defense, Office of the Under Secretary of Defense for Acquisition, Technology & Logistics, *Report of the Defense Science Board Task Force on National Imagery and Mapping Agency* [hereafter cited as Defense Science Board], April 2000, p. 9.

¹⁹Defense Science Board, p. 26.

²⁰Ibid, p. 29.

²¹U.S. Congress, 106th Congress, 2d session, Senate, Select Committee on Intelligence, *Authorizing Appropriations for Fiscal Year 2001 for the Intelligence Activities of the United States Government and the Central Intelligence Agency Retirement and Disability System*, May 4, 2000, S.Rept. 106-279, p. 30.

systems. The report indicates that NIMA should aim for a 2005-era vision for the imagery TPED architecture and concept of operations.²²

NIMA may not be ready to accept such a broad role within the Intelligence Community. According to a media account, Robert Zitz, a senior NIMA official, has stated that for the present integrating imagery and geospatial data and imagery remains the agency's primary focus; "right now," according to Zitz, "we don't feel that we are ready to take on the challenge of doing imagery and signals intelligence both in one architecture."²³ NIMA officials undoubtedly recognize that such fusion would not only be technically challenging but it could involve conflicts with other, older, and larger agencies that could complicate NIMA's overall missions. Peter Marino, the chairman of the NIMA Commission, in April 3, 2001 testimony, indicated continuing concern that NIMA lacks adequate resources for such a task:

and I think what you're creating is a recipe for disaster for the day when [FIA] starts dropping down volumes of data that is considerably greater than the volumes of data that we're seeing today and expects an organization like NIMA to start processing and exploiting that data. That doesn't close at all right now with the budget that NIMA has to do TPED.²⁴

Beyond questions of resources, some observers express concern that the heavy responsibility of managing a multi-int geospatial grid would be assigned to a relatively new organization that is a DOD combat support agency. According to this view, developing and acquiring the necessary systems that manage the flow of imagery will be a daunting task that NIMA will probably be able to accomplish only with additional funding and by drawing upon outside assistance. They suggest that establishment of collection requirements—determining which targets should get the highest priorities—more appropriately should become the responsibility of the DCI who has, in any event, been assigned the responsibility by statute.²⁵ Nor do they believe would NIMA be a logical candidate to address the tasking of the sigint collection efforts of the National Security Agency (NSA) for which longstanding interagency procedures exist. Organizing a process by which analysts in various agencies can annotate data on an imagery base would be a logical NIMA responsibility, but attempting to become a "final authority" for validating such annotation would, at least in some cases, appear to be an overstretch that could cause prolonged interagency disagreements.

In addition to NIMA's apparent ambivalence, it should be noted that the NRO Commission recommended that imagery and signals intelligence requirements committees should be returned to the DCI instead of being left with NIMA and NSA

²²U.S. Congress, 106th Congress, 2d session, Committee of Conference, *Enactment of Provisions of H.R. 5408, Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001*, H. Rept. 106-945, October 6, 2000, pp. 713-715.

²³Amy Butler, "NIMA Official Says Agency Can't Yet Handle 'Multi-INT' Responsibilities," *Defense Information and Electronics Report*, February 16, 2001.

²⁴Testimony to the Senate Committee on Armed Services, Subcommittee on Strategic Forces, April 3, 2001, Federal Document Clearing House transcript.

²⁵50 USC 404f.

in order to ensure the balance and priority of requirements between military and national consumers is maintained.²⁶ It is possible that the DCI's staff has been reluctant to become overly involved in the operational activities of a DOD combat support agency, but many observers believe that to the extent that NIMA becomes responsible for managing the geospatial grid for a wide variety of Government consumers, inside and outside DOD, there will have to be a significant role for the DCI if for no other purpose than ensuring that NIMA decisions are acceptable to the entire Intelligence Community.

It cannot not of course be proven that different organizational arrangements for identifying geospatial data would have prevented the mistaken bombing of China's Embassy in Belgrade, but almost all observers agree that there needs to be better arrangements for bringing all forms of data—including human reporting—to bear on target selection and other functions. Establishing systematic collection and review procedures and fixing responsibilities would arguably serve to minimize blunders in the future.

Funding TPED. The question of NIMA's ability to manage the geospatial grid is closely related to the adequacy of funding for TPED. Reacting to the longstanding tendency to favor collection systems over analysis, Congress has expressed concern that planned investment in FIA has not been matched with a willingness to make the necessary investment in TPED, creating a potential for excessive collection of data that cannot be effectively used. In 1998 Congress authorized FIA but inserted provisions in the FY1999 Intelligence Authorization Act requiring that FIA funds be embargoed pending the identification of TPED requirements.²⁷ In 1999 the Senate Intelligence Committee noted that the FIA program "focuses on collection and pays relatively less attention to the tasking, processing, exploitation, and dissemination functions necessary to a coherent and comprehensive end-to-end architecture." As a result the Committee urged maintaining a cap on the FIA budget until all requirements, including TPED, were identified.²⁸

In floor debate prior to passage of the FY2000 Intelligence Authorization Act (P.L. 106-120), Representative Jerry Lewis (who also served as Chairman of the Appropriations Subcommittee on Defense), noted that while the FIA "will be the most expensive program in the history of the intelligence community," there had been "no plan to fund TPED and not even an understanding of how we ought to go about it." As a result the FY2000 Act included provisions that advised the executive branch that Congress would not fund FIA "unless there is a plan implemented that will process

²⁶NRO Commission, Report, p54.

²⁷This provision was criticized in floor debate for complicating the work of the NRO by Senator Thurmond, then chairman of the Armed Services Committee; he argued that some who were concerned about cost growth in FIA "also want to see FIA's capabilities to support military users reduced so that savings can be used to support other programs. . .that have a more 'national' orientation." *Congressional Record*, October 8, 1998, p. S11904.

²⁸U.S. Congress, 106th Congress, 1st session, Senate, Select Committee on Intelligence, *Authorizing Appropriations for Fiscal Year 2000 for the Intelligence Activities of the United States Government and the Central Intelligence Agency Retirement and Disability System and for Other Purposes*, S.Rept. 106-48, May 11, 1999, pp. 4-5.

the satellite data that FIA will collect.” “In English, it does not do any good to take pictures that no one will ever see.”²⁹

The Clinton Administration’s FY2001 Defense budget request included additional funding for TPED as a down payment on a \$1.5 billion multi-year TPED enhancement program. The Defense Science Board Task Force, however, concluded that TPED will actually require \$3 billion.³⁰ The report accompanying the House version of the FY2001 Intelligence Authorization bill noted that the “administration has, indeed, added funding ... in the fiscal year 2001 budget request. The Committee agrees that this figure represents a substantial investment. However, it is well short of the range of necessary investment reported to Congress by the administration both last year and in testimony this year.”³¹

The Senate Intelligence Committee, in reporting its bill the same month also asserted that funding for analysis “remains woefully inadequate” and discussed a NIMA report on TPED that described projected challenges and budgetary shortfalls related to FIA. The Committee noted that NIMA has proposed a three phase plan that would first (in 2001-2005) lay the infrastructure foundation for effective use of new space platforms, commercial imagery, and “minimal levels of modernization supporting airborne systems.” The second and subsequent phase (2002-2007) would see a transition to full support for using imagery from new satellite systems, provide greater support to airborne systems, and provide infrastructure “hooks” for all intelligence disciplines, including human intelligence (humint) and measurement and signature analysis (masint). The third phase (2004-2009) would see the establishment of a common operational picture including full support for all intelligence disciplines, full support for airborne systems, and integrate moving target data.³²

The Senate Committee expressed concern that the level of funding proposed by the Administration for the first year of the first phase was inadequate. “The Committee is concerned that the dramatic underfunding of Phase One TPED modernization in fiscal year 2001 is setting up a budgetary crunch wherein a disproportionate amount of funds will be required in subsequent years....”³³

The following October, in floor debate in the House on the intelligence conference report, the late Representative Dixon, then the Ranking Member of the House Intelligence Committee, noted that in the previous year Congress had made clear its expectation that FIA would encompass an adequate balance between

²⁹*Congressional Record*, November 9, 1999, p. H11758.

³⁰Defense Science Board, p. 32.

³¹U.S. Congress, 106th Congress, 2d session, House of Representatives, Permanent Select Committee on Intelligence, *Intelligence Authorization Act for Fiscal Year 2001*, H.Rept. 106-620, May 16, 2000, p. 19.

³²U.S. Congress, 106th Congress, 2d session, Senate, Select Committee on Intelligence, *Authorizing Appropriations for Fiscal Year 2001 for the Intelligence Activities of the United States Government and the Central Intelligence Agency Retirement and Disability System and for Other Purposes*, S. Rept. 106-279, May 4, 2000, pp. 7-8.

³³S.Rept. 106-279, pp. 7,9.

collection and TPED. “Congress was clear in the description of the consequences that would flow from an executive branch decision not to make TPED investments sufficient to utilize fully the collection capabilities of the FIA. As the classified annex to this conference report makes clear, the resolve of Congress has not changed.”³⁴ The report accompanying the House version of the FY2002 Intelligence Authorization bill (H.R. 2883), while noting “totally inadequate planning and investment,” indicated that the bill provided initial funding for NIMA’s modernization. “The funding will enable the initiation of acquisition reform, improved information management capabilities, new business processes to better produce innovative imagery and geo-spatial products, and greater access to all imagery sources.”³⁵ The Senate Armed Services Committee (SASC) similarly noted “serious deficiencies in the NIMA’s preparedness to task, receive, and exploit data from the Future Imagery Architecture (FIA) being developed by the National Reconnaissance Office (NRO).” SASC lamented the necessary transfer of millions of dollars from NIMA’s modernization budget mostly to modify legacy systems for tasking, workflow management, and data transfer.³⁶

The congressional power of the purse was dramatically demonstrated in August 2000 when funding for the Discoverer II radar satellite program was eliminated from the FY2001 Defense Appropriations Act (P.L. 106-259). Discoverer II would have tested new technology that would permit testing of movable antennae that could provide data on a 24-hour basis that is currently being collected by JSTARS aircraft and other systems. House appropriators criticized likely development costs and foresaw costs of a fully-deployed system reaching some \$25 billion. The House Appropriations Committee further noted that DOD “has conducted no trade-off analysis between Discoverer II and other systems and processes” that might accomplish the same tasks nor had DOD analyzed “the impact a Discoverer II constellation would have on an already overtaxed imagery processing, exploitation, and dissemination system.”³⁷ Although plans for alternative approaches were underway in early 2001,³⁸ the congressional willingness to cancel funds for Discoverer II to free up funding for TPED carried a clear and unmistakable message.

³⁴*Congressional Record*, October 12, 2000, p. H9854.

³⁵U.S. Congress, 107th Congress, 1st session, House of Representatives, Permanent Select Committee on Intelligence, *Intelligence Authorization Act for Fiscal Year 2002*, H.Rept. 107-219, September 26, 2001, p. 13.

³⁶U.S. Congress, 107th Congress, 1st session, Senate, Committee on Armed Services, *National Defense Authorization Act for Fiscal Year 2002*, S.Rept. 107-62, September 12, 2001, p. 115.

³⁷U.S. Congress, 106th Congress, 2d session, House of Representatives, Committee on Appropriations, *Department of Defense Appropriations Bill, 2001*, H.Rept. 106-644, June 1, 2000, p. 150. A different perspective is provided by Zachary Lum, “Congress, Not Air Force, Stymies Progress in Space,” *Defense News*, September 11, 2000, p. 15. On the desire to find funds for TPED, see also Amy Butler, “Space-based Radar Funds May be Used to pay TPED bills, Officials Say,” *Defense Information and Electronics Report*, December 17, 1999, p. 5.

³⁸Amy Butler, “AOA for Space-based Radar on the Horizon, Space Ops Chief Says,” *Inside the Air Force*, February 2, 2001.

While acknowledging that investment in collection efforts has not been matched by funding of TPED, some observers note that it may be technically appropriate in some cases to invest in systems before making the necessary arrangements for utilization of the data collected. Furthermore, there may be sound reasons to maintain an extensive imagery database that can be exploited in the event of unanticipated military operations.³⁹

Commercial Imagery

A second major issue is commercial imagery which some believe can reduce the need for massive investment in government satellite reconnaissance systems. Commercial imagery is increasingly available to customers, government and private, throughout the world.⁴⁰ It is expected that the quality of resolution available, the extent of coverage, and timeliness of delivery of the finished product will be enhanced by more commercial satellites that are anticipated to be orbited in the coming decade. At some point, observers predict, continuous global coverage will become available on the open market. Although there are obvious security concerns about high-quality imagery becoming available to other governments (and terrorist groups), the large inventory of commercial images that can be purchased will be of significant potential interest to intelligence agencies.

NIMA is currently purchasing commercial imagery annually, but many observers argue that much larger amounts of commercial imagery could be purchased. Although cost data on government imagery is not public, a given amount of imagery purchased from commercial firms could, in some circumstances, cost considerably less than comparable government imagery. Thus, heavier reliance on acquiring commercial imagery could represent important cost savings, given the potential cost of FIA. The Space Commission argued that, with the currently available half-meter imagery, approximately half of NIMA's requirements for information on the locations of objects on the Earth could be met.⁴¹ In particular, commercial imagery could

³⁹See the conclusions of conferees on the FY2002 Defense Authorization bill; U.S. Congress, 107th Congress, 1st session, House of Representatives, *National Defense Authorization Act for Fiscal Year 2002*, H.Rept. 107-333, December 12, 2001, p. 507. See also remarks by NIMA Director Clapper quoted by Joanne Sperber, *Military Information Technology*, Vol. 6, No. 1 (2002): "There is the proverbial, perpetual metaphor that the intelligence community collects far more than we can possibly process and exploit. To a certain extent, that's true; but that's not all bad. The U.S. intelligence community has a global responsibility, so to the extent that we can collect and archive material that we can refer to later, it's not all bad."

⁴⁰See Yahya A. Dehqanzada and Ann M. Florini, *Secrets for Sale: How Commercial Satellite Imagery Will Change the World* (Washington: Carnegie Endowment for International Peace, 2000). A principal advocate of greater reliance on commercial imagery and other open source information is Robert David Steele, *On Intelligence: Spies and Secrecy in an Open World* (Fairfax, VA: AFCEA International Press, 2000).

⁴¹In December 2000 the Clinton Administration licensed two U.S. firms to sell half-meter resolution imagery to customers worldwide. See Vernon Loeb, "U.S. Is Relaxing Rules on Sale of Satellite Photos," *Washington Post*, December 16, 2000, p. A3.

provide coverage of wide-area surveillance and government satellites could be targeted on more challenging and more sensitive point-target reconnaissance.⁴²

The NRO Commission also took note of the increasing availability of commercial satellite imagery and the absence of a systematic plan to take advantage of its availability at less cost than acquiring the imagery with new NRO systems. The Commission argued that there is a need for an outside assessment, independent of the NRO, of the utility of commercial technologies to supplement traditional NRO missions.

A Defense Science Board Task Force on NIMA concluded that commercial and international systems could meet many government needs in terms of image quality if not quantity and noted that “Measured in availability and in resolution, commercial capacity will increase [by] a factor of 5 to 10 times over just the next five years.”⁴³ The NIMA Commission argues that the design of the FIA fails to take into consideration the potential integration of commercial imagery (and imagery from aircraft) into the larger imagery/geospatial information system and is, accordingly, “suboptimal.”⁴⁴

It is uncertain whether the increasing availability of commercial imagery will have any effect on the multi-year process of FIA acquisition that has been underway since the passage of the FY1998 Intelligence Authorization Act (P.L. 105-107).⁴⁵ Even with FIA satellites coming on line, however, observers believe that commercial imagery will usefully supplement data acquired by government satellites. Many observers believe, however, that NIMA is purchasing far less of the available commercial imagery than could be productively used. The DSB Task Force argued that the budget for commercial imagery, in early 2000 about \$400 million for the next several years, was at too low a level.⁴⁶ The NIMA Commission was especially critical of budgeting for commercial imagery:

The Congress showed keen insight in designating NIMA the DoD and Intelligence Community sole focal point for commercial imagery. Not to be outdone by itself, however, the Congress, one year, denied NIMA the funds necessary for purchasing that imagery. The administration topped that, in successive years, by failing to request sufficient funds, a move that the Congress then trumped by authorizing and appropriating funds that were not requested. Most recently, the NRO announced

⁴²Space Commission Report, p. 35.

⁴³Department of Defense, Office of the Under Secretary of Defense for Acquisition, Technology & Logistics, Report of the Defense Science Board Task Force on National Imagery and Mapping Agency, (Washington: April 2000) [hereafter cited as Defense Science Board], p. 14.

⁴⁴Ibid, p. 50.

⁴⁵See remarks of Rep. Lewis, *Congressional Record*, November 7, 1997, p. H10178.

⁴⁶Ibid, p. 28.

an on-again, off-again, Billion Dollar Buy. The Commission observes this hot-potato approach with wry amusement; if it weren't serious it would be funny.⁴⁷

The NRO Commission noted that, despite the provisions of PDD-49 in September 1996 relating to Commercial Space Guidelines that encourage government agencies to purchase commercial imagery to the fullest extent “feasible,” there have been “relatively insignificant” purchases of commercial imagery by NIMA. Such purchases would allow government imagery collectors to be used for specialized collection and would also help create a “stable and predictable” government market for commercial imagery firms as was recommended by PDD-49.⁴⁸ The NRO Commission cited “managerial problems that have emerged in NIMA’s Commercial Imagery Program. There is no continuity in the Program and the program manager has been changed frequently.”⁴⁹

NIMA, the DSB Task Force argued, should execute a balanced, strategic plan to exploit fully commercial capabilities; most importantly NIMA should “restrict government collection by tasking national systems to collect only on that which cannot be procured competitively from U.S. commercial sources.”⁵⁰

The commercial satellite industry remains in its infancy. There have been several launch failures and commercial markets are not well developed. One concern about increasing use of commercial imagery is the possibility that the private firms producing it might not remain in business and that, if they fail, restarting government satellite programs would be difficult and lengthy, especially if large numbers of skilled technicians were no longer employed by government agencies.⁵¹

Both the NIMA and NRO Commissions suggested that an account be established by DOD that agencies could use only for the procurement of commercial imagery (along the lines of an existing account used to determine whether to use commercial or military airlift capabilities). At present government agencies, including the military services, receive government imagery as a “free good” and may thus be disinclined to expend their own funds for purchasing imagery from commercial firms. Under the proposed approach, agencies would have access to an account managed by the Office of the Secretary of Defense whose funds could be used only for purchasing commercial imagery; thus, there would be administrative machinery in place to encourage use of imagery from commercial sources that does not exist at present. Advocates argue that a key advantage of establishing such a fund would be to provide a predictable market for commercial firms that would serve to strengthen the U.S. satellite reconnaissance industry. According to the NRO Commission:

Through an approach to imagery analogous to DoD’s military/civilian airlift practice, Government systems would be focused on targets where their unique

⁴⁷NIMA Commission Report, p. 55.

⁴⁸NRO Commission Report, p. 68.

⁴⁹NRO Commission Report, p. 70.

⁵⁰Ibid, p. 31.

⁵¹See Smith, CRS Issue Brief IB92011.

capabilities in resolution and revisit times are important, while commercial systems would be used to provide processed “commodity” images.⁵²

Media accounts indicate that NIMA did not request substantial increases in funding for the purchase of commercial imagery in its FY2002 budget submission. There may be a conviction that higher priority should be given to modernizing its own infrastructure than to the larger purchases of commercial imagery. Nor was there a request for a budget augmentation to support such purchases.⁵³ Two staff members of the House Intelligence Committee have expressed their perception that little support currently exists for purchasing additional amounts of commercial imagery at the expense of sacrificing government program funds.⁵⁴

In the aftermath of the September 11, 2001 attacks, NIMA has publicly described more extensive purchases of commercial imagery. NIMA’s director, retired General Clapper, argued that unclassified commercial imagery can be readily shared with coalition partners whereas imagery acquired by U.S. satellites would have to be put through a lengthy declassification process. In addition, commercial images of large geographic areas can be used in conjunction with more specialized intelligence products. Especially important, according to Clapper, are multispectral–color–images of which commercial systems are the primary source.⁵⁵

Government procurement of commercial imagery undoubtedly has important implications for the viability of the industry and NIMA’s reported aversion to purchasing larger amounts will be disappointing to industry officials anticipating larger government purchases. However, some observers argue that the imagery companies remain in a weak position as a result of their own inherent problems; as two congressional staffers noted: “after more than six years, this commercial industry has few actual commercial customers.”⁵⁶

Management and Personnel Issues

A third major issue for the Intelligence Community is the management of the satellite intelligence effort. Specific management issues affecting the NRO and NIMA are discussed in the appendixes, but there are overarching concerns regarding the entire imagery intelligence effort. A key question is whether the emphasis should be on continuing to push the technological envelope in order to acquire even more sophisticated imagery capabilities or to design systems based on essentially existing technologies to meet current needs. In the past, much basic research on satellite

⁵²NRO Commission Report, p. 71.

⁵³Catherine MacRae, “Updated Commercial Imagery Strategy Cites a Need to Back Industry,” *Defense Information and Electronics Report*, July 27, 2001, p. 12.

⁵⁴Beth Larson and Kirk McConnell, “Commercial Stumbles: Sat. Imagery Still Needs Federal Crutch,” *Defense News*, July 23-29, 2001, p. 13.

⁵⁵“Clear Vision for NIMA,” *Military Information Technology*, Vol. 6, No. 1 (2002).

⁵⁶Larson and McConnell, p. 13.

technology did not necessarily have immediate practical applications, but it contributed enormously to the overall capabilities of the U.S. satellite programs. This research was expensive, but most observers believe that the payoff easily justified the investment. As satellite programs moved out of their earlier highly secret environment, they became more susceptible to the pressures and constraints of ordinary budgeting processes. Some argue that there is a danger that the U.S. will lose its technological edge with the potential to allow other countries to make technological leaps and to reduce the technological spinoff into the civilian space industry.

Both the NRO and NIMA Commissions addressed the question of managing innovation in satellite reconnaissance programs. As discussed in further detail in Appendix A, the NRO Commission, in particular, noted that in earlier decades the NRO, operating in almost total secrecy, was able to accomplish important technological triumphs in designing and fielding the world's first and most successful satellite reconnaissance program. In large measure these accomplishments have been attributed to the fact a relatively small group of scientists and engineers were permitted to work in secrecy without micro-management and "excessive" oversight from the Defense Department's layers of acquisitions offices. In more recent years, however, the NRO has had a higher public visibility and has adhered more closely to routine acquisitions regulations. In earlier years, NRO engineers reportedly were given greater latitude in designing systems to take advantage of newly available technologies and other intelligence agencies were able to take advantage of the NRO's innovations once they were in place. More recently, NRO satellites have been designed to fulfill the specified requirements of other agencies and there has been a tendency to downplay innovation for innovation's sake.

Some observers suggest that the shift away from attempting to take full advantage of cutting-edge technologies has begun to jeopardize the NRO's roles and missions. Electing less technically sophisticated approaches, they argue, will require an approach different from that currently followed. Specifically, the NRO Commission recommended that with the NRO a separate mini-organization be established to develop and acquire cutting edge technologies:

The Secretary of Defense and the Director of Central Intelligence should establish a new Office of Space Reconnaissance under the direction of the Director of the NRO. The Office should have special acquisition authorities, be staffed by experienced military and CIA personnel, have a budget separate from other agencies and activities within the National Foreign Intelligence Program, be protected by a special security compartment, and operate under the personal direction of the President, Secretary of Defense and Director of Central Intelligence.⁵⁷

As discussed in Appendix B, a major problem for NIMA has been inadequate numbers of personnel with highly sophisticated skills to deal with the technical challenges involved in creating the geospatial grid. The NIMA Commission recommended the creation of an Extraordinary Program Office (EPO)

⁵⁷NRO Commission Report, p. 78.

armed with special authorities of the Director of Central Intelligence and the Secretary of Defense, augmented by Congress, and staffed beyond ceiling and above “cap” through an heroic partnership between industry, NIMA, and the NRO. The EPO, to be constituted within NIMA from the best national talent, shall be charged with and resourced for all preacquisition, systems engineering, and acquisition of imagery TPED—from end to end, from “national” to “tactical”. The first milestone shall be completion of a comprehensive, understandable, modern-day “architecture” for imagery TPED. Other provisions of law notwithstanding, the Congress shall empower the Director of the EPO to commingle any and all funds duly authorized and appropriated for the purpose of the “TPED enterprise,” as defined jointly by the Secretary of Defense and the Director of Central Intelligence.⁵⁸

Such entities would be able to employ scientists and engineers without being bound by civil service pay scales and procure equipment unfettered by the usual government acquisitions regulations. Secretary of Defense Rumsfeld indicated in his May 8, 2001 press conference that he had requested a study of how an Office of Space Reconnaissance might be established within the NRO, but no details of his immediate intentions have been made public.

There are pros and cons to attempts to provide such exceptional authorities in government agencies. There is no question that seeking out the most creative personnel can be facilitated by avoiding rules and regulations that apply across the length and breadth of the federal government and were not designed for the purpose of engaging a relatively small, technological elite of systems engineers and systems acquisitions people at a time of high demand within the civilian sector. Nor were the promotion regulations and merit system protections designed with the culture of computer engineering in mind. Arguments can be made that the NRO and NIMA both need to be able to attract the most innovative thinkers at least for a period to move both agencies into an intelligence world unlike that which has ever existed before. Again, these moves cannot necessarily be made by strict application of the procurement regulations as they currently exist. There is arguably a much greater need to accept risks inherent in innovation in the area of space-based intelligence in order not to jeopardize the possibility of revolutionary gains.

On the other hand, there are significant and substantial risks involved in setting up specially compartmented research and development efforts with unique personnel and procurement authorities. Most obviously, there is a risk of failure. There is also a potential for excessive costs when usual regulations for competitive bids and standardized salaries are not in place. There is a danger that interest in pushing the technological envelope will result in equipment and software that, while conceptually brilliant, is not optimized for operational use. Extraordinary entities do not necessarily coordinate well with other government organizations. Instead of authorizing exceptional authorities for small offices, some observers suggest that Congress could provide more comprehensive authorities for the entire organizations based on a consensus surrounding the nature of the tasks required.

⁵⁸NIMA Commission Report, p. 90.

Another challenge is the different perspectives of the Director of Central Intelligence and the Defense Department. The DCI has broad statutory authority over all national intelligence activities, but DOD has control over much of the resource base of both the NRO and NIMA. There is a possibility that either the various agencies will go their own ways with minimal coordination or that there will constant struggles over resources and responsibilities. In the case of space-based imagery and sigint collection, there have been periods of inter-agency conflict in the past, but in more recent years some observers have noted a tendency for DOD concerns to dominate a process that was supposed to serve national as well as defense needs. There are also concerns that effective inter-agency coordination has not been achieved among the NRO, NIMA, and NSA.

Both the NRO Commission and the Space Commission urged greater direct personal involvement of high-level officials, especially the President, the Secretary of Defense, and the DCI in coordinating the space programs, including those of the NRO. This recommendation undoubtedly reflects the difficulties involved in coordinating the information requirements of military commanders and those of national-level policymakers. Competition between military and national consumers for intelligence resources has existed for decades and can be expected to continue.⁵⁹ The solution would be effective coordinative mechanisms to establish priorities and involvement and acceptance of responsibility by senior officials. Observers note, however, that it may be unrealistic to expect the degree of presidential involvement in such issues that existed during Cold War administrations. In discussing DOD's initiatives on space operations, Secretary of Defense Rumsfeld indicated on May 8, 2001 that he and the DCI meet regularly and have established an executive committee that they both co-chair to review intelligence issues of joint concern.

Proposals to place the NRO and NIMA (along with NSA) under the direct control of the DCI would, according to proponents, enable tighter control of their activities and avoid counterproductive rivalries. Skeptics argue, however, that such a shift would impede the close links that must exist between these combat support agencies and DOD's operating forces.

The Space Commission also recommended the establishment within the Defense Department of an Under Secretary of Defense for Space, Intelligence and Information. This position would serve as the principal advocate for space within DOD and would incorporate the responsibilities of the current Assistant Secretary of Defense for Command, Control, Communications and Intelligence (C3I). The Commission's apparent goal would be to provide greater visibility to space-related issues, including both policy and satellite acquisition issues, within the Pentagon. This recommendation was not accepted by Defense Secretary Rumsfeld in announcing DOD's responses to the recommendations. Rather, he indicated that the responsibilities of the current Assistant Secretary for C3I would be reviewed.

⁵⁹It has been suggested that U.S. surprise at the Indian nuclear test in May 1998 resulted from the diversion of satellite resources to monitoring the Persian Gulf area in support of U.S. forces stationed there. See CRS Report 98-672F, *U.S. Intelligence and India's Nuclear Tests: Lessons Learned*, August 11, 1998, by Richard A. Best, Jr..

The Space Commission stated that the DCI's Community Management Staff (CMS) is not well structured to coordinate with OSD on broad intelligence policy, long-term space strategy and other issues requiring intelligence support. In particular, the Space Commission noted that the DCI does not have authority to reprogram in-year money within components, an authority that would enhance its direction of Intelligence Community affairs. Rumsfeld did not comment on this recommendation that has faced opposition not only in DOD but also within congressional armed services committees.

The Space Committee also took note and made recommendations relating to congressional oversight, arguing that:

Congressional oversight of the authorization and appropriation of national security space funding routinely involves no fewer than six committees.

Generally, each committee mirrors the priorities of the executive branch interests it oversees. The intelligence committees focus on issues concerning "sources and methods" and on the ability of the Intelligence Community to provide intelligence to the National Command Authorities. The Armed Services committees contend with competing space requirements of the three Services, the military intelligence agencies and the CINCs, and tend to see national intelligence primarily as support for combat forces. The appropriations committees' subcommittees on defense oversee all defense and intelligence space programs and are one place where national security space programs are viewed together. However, they focus primarily on budgets.

Executive branch officials must expend considerable time and energy interacting with a large number of committees and subcommittees that, on some matters, have overlapping jurisdiction. To the extent that this process can be streamlined, it would likely benefit the nation, Congress and the executive branch. It would also help if there were an environment in which national security space matters could be addressed as an integrated program—on that includes consideration for commercial and civil capabilities that are often overlooked today.⁶⁰

Related to managerial difficulties is the challenge of taking advantage of the dynamic changes in computer and communications technologies. Observers note the difficulties involved in employing persons possessing acquisitions and systems engineering technical skills. It has been argued that strong competition from private industry and limits on government pay and allowances affect the ability of intelligence agencies to employ persons with the sophisticated skills required for the next generation of satellites and associated TPED. There are various approaches currently under consideration to make use of expertise in the private sector through contracts and consultancies, but it has been indicated that the problem will require high-level Administration attention.⁶¹

⁶⁰Space Commission Report, pp. 60-62.

⁶¹See, for instance, Catherine MacRae, "NIMA Wants to Rope In Young Minds with Undergraduate Training Plan," *Defense Information and Electronics Report*, July 27, 2001, p. 15.

Conclusion

Congress is expected to consider imagery intelligence programs in the context of efforts to transform the entire defense structure. The parameters of the transformation effort remain as yet unknown, but almost all observers believe that the effort to obtain “dominant battlefield awareness” and growing reliance on precision guided munitions will characterize the transformation effort regardless of the other initiatives and defense budget levels. Success in any transformation effort will depend on the availability of detailed imagery within required times, ensuring that imagery products incorporate accurate data from all intelligence disciplines, and that budgets for the NRO and NIMA can be adequately funded.

Imagery intelligence has been around for several decades, but its importance has been growing significantly in recent years. The challenge is to design organizations to obtain, analyze, and disseminate the result of new technologies to support an evolving defense and national security structure while remaining within budgetary constraints. The mixture of cutting-edge technologies, complex organizational structures, and budgetary limitations complicate decision-making. Nevertheless, the accomplishments of the Intelligence Community in imagery intelligence represent one of its greatest successes. Maintaining a capability to conduct military operations without inflicting vast civilian damage provides its underlying justification.

Appendix A. National Reconnaissance Organization (NRO)

Pursuant to the National Security Act⁶² the Defense Department is responsible for developing, acquiring, and operating satellites and processing raw data that are provided to other intelligence agencies for analysis and dissemination to government consumers. The NRO was established in 1961 but its existence has been acknowledged publicly only since 1992. It was created within DOD, but has always had a reporting responsibility to the Director of Central Intelligence (DCI). The contours of DOD-DCI responsibilities for NRO operations have varied over time, but currently both the DCI and DOD retain important roles. The NRO remains part of DOD, but the concurrence of the DCI is required in the appointment of the head of the NRO.⁶³ The DCI develops and approves the annual National Foreign Intelligence Program (NFIP) budget that includes funding for the NRO. Although the DCI also has statutory authority to approve reprogramming of NFIP funds, he does not have authority to be involved in the execution of the NRO budget after funds are appropriated.

The NRO developed highly innovative technology and displayed a willingness to take risks and endure multiple failures before successful launches were accomplished. Initially, satellite photography was parachuted back to Earth in canisters that had to be netted in mid-air; processing and analysis could take days or weeks. In the 1970s, in a major technological breakthrough, the NRO developed electro-optical capabilities that allowed real-time electronic transmission of imagery to ground stations from whence it could be relayed to authorized consumers. In more recent years capabilities have been created to permit satellite data to be transmitted directly to “shooters”—ships, attack aircraft, and other military units.

The significant progress that the NRO achieved resulted from a number of factors. The effort was conducted in tight secrecy by a relatively small group of highly qualified scientists and engineers. It had strong backing from the White House and adequate funding by Congress with limited oversight. The emphasis was on innovative technological approaches rather than meeting carefully specified and coordinated requirements. Funds were available for cutting-edge technologies without immediate practical applications. Overriding all else was a pervasive, and unquestioned, determination to identify threats, especially from the Soviet Union, that could destroy the United States or its allies.

In the mid-1990s, the NRO began work on the Future Imagery Architecture, which will be based on a larger number of smaller satellites that can provide more frequent coverage than is currently possible. Unlike their larger predecessors, however, these satellites are not designed to push the envelope of satellite technologies, but rather to meet stated needs of potential customers. Observers also

⁶²50 USC 403-5(b)(3).

⁶³Although recommendations can be sent to the President without the DCI’s concurrence, the absence of concurrence must be noted.

note that the sheer quantity of imagery collected and requiring exploitation and analysis will grow exponentially once FIA satellites are operational.

According to media accounts, the NRO received \$1.5 billion in a FY1998 supplemental appropriation (P.L. 105-277).⁶⁴ With the project expected to involve up to \$25 billion over twenty years, a contract to develop, launch, and operate the FIA satellites was awarded to the Boeing Company in September 1999 with initial launches expected around 2005.⁶⁵ In the FY2000 Intelligence Authorization Act (P.L. 106-120), however, Congress placed caps on the FIA program as a result of concerns that its cost could draw funds from other intelligence programs and that the costs of analyzing and disseminating the acquired data had not been included in DOD's budget submissions.⁶⁶

The NRO is not an analytical organization, but it has to undertake a certain amount of data processing prior to delivering its products to other agencies. According to the NRO Commission it has also "rendered extremely valuable non-space-related services over the years by providing terrestrial communications systems, visualization tools, imagery exploitation systems, and technical problem-solving skills to U.S. combatant commands and military departments when no other entity was willing, capable, or agile enough to do so."⁶⁷ The NRO Commission implies that there may be an element of duplication of effort with other agencies (the National Security Agency, NIMA, and the office responsible for measurement and signatures analysis (masint)) and urges that there needs to be careful delineation of the responsibilities of different agencies for tasking, processing, exploitation, and dissemination.⁶⁸

The NRO Commission praised the overall record of the NRO, but took note of a number of managerial problems that it felt need to be addressed. It argued that the management of the NRO requires greater personal attention by the President, the Secretary of Defense, and the DCI, but did not recommend a legislative solution. The Commission noted:

No matter what form the Secretary of Defense-DCI relationship regarding the NRO should take, it is not self-executing and requires that active participation of both in order to best effect the basic mission of the NRO. This basic point was made again and again to the Commission by past and present senior officials.⁶⁹

The Commission also noted that:

⁶⁴See Walter Pincus, "Much of Intelligence Funding Will Go to Satellites," *Washington Post*, October 23, 1998, p. A16.

⁶⁵See Peter Pae, "Massive Spy-Satellite Program to Cost Billions," *Los Angeles Times*, March 18, 2001.

⁶⁶Remarks of Rep. Jerry Lewis, *Congressional Record*, November 9, 1999, p. H11758.

⁶⁷NRO Commission Report, p. 27.

⁶⁸Ibid, p 31.

⁶⁹Ibid, p. 113.

Because it responds to both the Secretary of Defense and the DCI, the NRO frequently is caught between the competing requirements of the both DOD and non-DOD customers, all of whom expect to be satisfied by NRO systems. With its systems over-taxed and unable to answer all demands, yet attempting to be ‘all things to all agencies,’ the NRO often bears the brunt of criticism from all sides.⁷⁰

The Commission recommended that attention be given to achieving the proper balance between strategic and tactical requirements for NRO systems, present and future. It noted also that funding limitations of recent years, in conjunction with expanded support for military operations, have limited NRO’s ability to satisfy strategic, longer-term intelligence needs.⁷¹ Congress in the report accompanying the FY2001 Defense Authorization Act, took note of the fact that recent years have witnessed the increase of NRO support to military commanders at the same time as DOD has been less involved in budgeting of the NRO through the Defense Space Reconnaissance Program (DSRP). The Conference Committee directed an assessment by the Secretary of Defense to analyze whether funds and responsibilities for NRO’s support of military operations and exercises should be consolidated and whether the DSRP should be revitalized.⁷² The NRO Commission went further, recommending that the DSRP be reestablished.

The NRO Commission noted that current innovation programs are designed to meet existing requirements within established cost controls. The Commission, however, suggested that this approach will not necessarily provide the type of technological breakthroughs that the NRO achieved in the past and, accordingly, recommended the establishment of a small office that “would focus narrowly on high technology solutions to the most difficult intelligence problems based on the requirement to gain frequent, assured, global access to denied areas.”⁷³ The Commission envisions the office operating separately from the rest of the NRO with a small, highly skilled staff, and with considerable budgetary independence and high-level direction by the President, Secretary of Defense, and the DCI.

The NRO Commission noted the importance of coordination of space-based collection with that obtained by airborne platforms, manned aircraft and unmanned airborne vehicles (UAVs). Satellites of course do not put pilots at risk and, in general, are much less at risk to hostile attack than airborne platforms (especially from Third World states or terrorist groups). Airborne platforms can nevertheless supply immediate, long-term, multi-INT coverage of a limited area of interest. The Commission and other observers consider that there has been inadequate coordination of space and airborne programs especially since the space programs are “national” and much of the airborne effort is service-specific. The NRO Commission argued that the NRO should supply system engineering capabilities to the airborne programs and promote common technologies.

⁷⁰Ibid., p. 12.

⁷¹Ibid, p. 51.

⁷²H. Rept. 106-945, p. 712.

⁷³Ibid, p. 40.

At the same time, the Commission indicated its concern about the NRO's mission to support national policymakers and recommended that the DCI should have greater latitude in transferring funds "to respond most effectively to the specific types of issues that arise in NRO programs." Giving the DCI authority over the execution of the budgets of DOD agencies has long been controversial and this recommendation has not been endorsed by Secretary of Defense Rumsfeld.

The NRO Commission noted that the NRO is currently developing new satellites that will be launched by new launch vehicles and that significant technical and administrative risks are involved. "Today, the fragility of the satellite and launch architectures offers no margins for error."⁷⁴ The Commission noted that in the 1980s, the *Challenger* disaster and the suspension of space shuttle flights required the reconfiguration of NRO satellites for other launch vehicles. "This cost billions of dollars and placed U.S. national security at risk during the period when replacement satellites could not have been launched if circumstances had so required."⁷⁵

The Commission also addressed NRO's personnel policies, taking exception to what is viewed as overly rapid turnover among military personnel assigned to the space reconnaissance effort:

The Commission believes there is a compelling need for a separate NRO career path and assignment policy that provides an opportunity for selected highly trained engineers, acquisition professionals and operations specialists to be assigned to the NRO on a long-term basis and progress through a broad range of NRO positions. The technical complexity of NRO systems is unique, and it requires the continuity of a dedicated cadre.⁷⁶

Most observers would concur with the conclusion that the management of the NRO and its relationships with other intelligence agencies could be usefully improved by greater attention from the President, the Secretary of Defense, and the DCI and that better coordination needs to be established between the NRO and other intelligence agencies and a better balance achieved between the strategic and tactical requirements levied on the NRO.

Whereas improvements in coordination could readily be implemented by the executive branch, the Commission also considered, but did not recommend, the enactment of legislation to provide additional statutory authorities to the NRO, although some observers believe that legislation could enhance the NRO's legal charter more effectively than an informal working relationship among one set of incumbents that might not outlast the initiating Administration.

The Commission's recommendations reflect the continuing important role of the NRO in the Intelligence Community and the extensive budgetary resources that such a role entails. In stressing issues of coordination, the Commission acknowledged that the Nation's intelligence effort no longer consists of stand-alone agencies each

⁷⁴NRO Commission Report, p. 64.

⁷⁵Ibid, p. 66.

⁷⁶Ibid, p. 16.

performing specific functions or serving different consumers. Many agencies and military commands depend on data derived from space reconnaissance; providing the funding and tasking priorities to the NRO is a challenging problem.

The Space Commission also took note of the NRO's current tendency to eschew major emphasis on technological innovation and concentrate instead on managing "legacy" systems in order to meet established requirements and avoid disruption of service to consumers. The Space Commission concluded:

...the U.S. Government—in particular, the Department of Defense and the Intelligence Community—is not yet arranged or focused to meet the national security needs of the 21st century. Our growing dependence on space, our vulnerabilities in space and the burgeoning opportunities from space are simply not reflected in the present institutional arrangements. After examining a variety of organizational approaches, the Commission concluded that a number of disparate space activities should promptly be merged, chains of command adjusted, lines of communication opened and policies modified to achieve greater responsibility and accountability. Only then can the necessary trade-offs be made, the appropriate priorities be established and the opportunities for improving U.S. military and intelligence capabilities be realized. Only with senior-level leadership, when properly managed and with the right priorities, will U.S. space programs both deserve and attract the funding that is required.⁷⁷

⁷⁷Space Commission Report, p. 99.

Appendix B. The National Imagery and Mapping Agency (NIMA)

The NRO's primary customer is the National Imagery and Mapping Agency. Currently estimated to have some 7,600 employees, NIMA was established in October 1996, combining elements of the CIA's National Photographic Interpretation Center (NPIC), the Central Imagery Office, Defense Intelligence Agency (DIA), and the Defense Mapping Agency (DMA), and other offices in the Defense Department.

Much of the impetus for the creation of NIMA was unsatisfactory experience during the Persian Gulf War when maps, charts, and geospatial data proved hard to acquire and difficult to disseminate to military commanders with pressing needs for precise locating data. In congressional testimony, one Marine general recalled his experience in Desert Storm in locating imagery needed for breaching Iraqi defenses. DOD had forwarded 1 ½ million imagery products to the theater, but there was no index. As a result,

Our solution as surprising as it might seem was to take one officer from each of the divisions in their desert camouflage utilities, put them on a commercial aircraft, fly them back here to Washington, DC, have them go to DIA, CIA, and ... six [other] agencies..., try to find photos, wrap them up, get back on commercial aircraft, and fly back to Saudi Arabia and distribute them. Our ground commanders got those photos 2 nights before the ground war began.⁷⁸

The difficulty illustrates the crucial importance of dissemination; precise imagery is useless if it does not reach the decisionmaker when it is needed.

NIMA was established in the FY1997 Defense Authorization Act (P.L. 104-201) despite reservations among some Members that the designation as a combat support agency would limit its ability to support non-DOD policymakers.⁷⁹ The Conference Report that accompanied that Act stated that, "NIMA must be under the clear authority, direction, and control of the Secretary of Defense. But the charter also provides for a clear and prominent role for the DCI to task imagery systems and exploit imagery products in support of the national mission."⁸⁰ Current law provides that the DCI "shall establish requirements and priorities governing the collection of national intelligence by NIMA ..."⁸¹

⁷⁸Testimony of Lt. Gen. Paul Van Riper, USMC, in U.S. Congress, 104th Congress, 2d session, House of Representatives, Committee on National Security, *H.R. 3237—the Intelligence Community Act*, Hearings [H.N.S.C. No. 104-9], July 11, 1996, p. 60.

⁷⁹See remarks of Senator Kerrey, *Congressional Record*, June 26, 1996, pp. 15476-15477; also, U.S. Congress, 104th Congress, 2d session, Senate, Committee on Armed Services, *To Authorize Appropriations for Fiscal Year 1997 for Intelligence and Intelligence-Related Activities of the United States Government*, S.Rept. 104-277, June 6, 1996, pp. 5-6.

⁸⁰U.S. Congress, 104th Congress, 2d session, Committee of Conference, *National Defense Authorization Act for Fiscal Year 1997*, July 30, 1996, H.Rept. 104-724, p. 803.

⁸¹50 USC 404e(b).

Much of the attention of NIMA's leadership in the five years of its existence has been expended on the need to create a single new agency out of the offices formerly associated with other agencies. The unique and disparate cultures of imagery analysts and cartographers have been difficult to combine. The fact that the Defense Mapping Agency was never part of the Intelligence Community presented other administrative and cultural challenges.

Observers credit NIMA with significant progress. Maps and other forms of geospatial data are made available in a wide variety of formats to consumers throughout the government. The NIMA Commission concluded that "while NIMA's transformation is still incomplete, and progress against some of the goals mixed, the Commission observes progress in virtually every area."⁸² NIMA has acquired a global terrain elevation set that provided a foundation display of the Earth's terrain heights within some 30 meters. Although greater accuracy is required for targeting Precision Guided Munitions (PGMs), this database reportedly will ensure a much more accurate geographic dataset than previously available.⁸³

Much of NIMA's current efforts are directed at making maps available to the rest of the Defense Department and other agencies (according to one report NIMA produced 29 million maps for thousands of users in 1999 alone⁸⁴), but a major emphasis is the creation of the "geospatial grid." As currently envisioned, the grid would include a vast database of information collected from all parts of the Intelligence Community and from open sources. The data would be organized around geographic datapoints and would provide a common operating picture to the user, hopefully reconciling information from a variety of sources and reducing the possibility of mistaken attacks on embassies and other unintended targets. Thus, a consumer would be able to view a particular geographic location on a computerized map, note terrain characteristics and manmade features, and then have access to a database with current intelligence regarding further information such as activities within a factory or office, ethnic compositions of specific areas, etc.⁸⁵

Even if administrative and technological barriers can be successfully overcome by NIMA, there will still be limitations to the information available through geospatial

⁸²NIMA Commission Report, p. 6.

⁸³Craig Covault, "NIMA Infotech Retools U.S. Space Recon Ops," *Aviation Week & Space Technology*, August 7, 2000, p. 63.

⁸⁴Ibid.

⁸⁵NIMA uses the term geospatial information which is defined as "information that identifies the geographic location and characteristics of natural and constructed features and boundaries on the Earth, including: statistical data; information derived from, among other things, remote sensing, mapping, and surveying technologies; and mapping, charting and geodetic data, including 'geodetic products.' Thus, 'geospatial information' is information about any object—natural or man-made—that can be referenced to a specific location on the Earth." Lt. Gen. James C. King, Director, NIMA, Address to the American Society for Photogrammetry and Remote Sensing, [<http://www.asprs.org>], August, 23, 2000. King subsequently described "a digitized and extremely accurate map of the actual environment—including man-made structures—that represents 'ground truth.'" "King: 'Geospatial Reference Data' Crucial for Info Superiority," *Defense Information and Electronics Report*, November 2, 2001.

reference points. First, there will always be classification limitations. If, for instance, there is one human source who can identify a factory producing weapons of mass destruction within an especially brutal dictatorship, placing that information in a database accessible to many people could be overly risky and there would need to be some way either to compartment that piece of information so only some users can access it with a special codeword or handle it in separate channels. Secondly, some observers believe that a geospatial basis may be more useful for intelligence of concern to military commanders than to civilian policymakers. There may be no advantages and even significant disadvantages to tying certain types of information to a geospatial grid. Political, social, or religious movements that may be of great concern to policymakers may not be tied to a single geographic point. For example, Russian decisionmaking may be of enormous interest, but tying it to an office building in the Kremlin would not be especially informative.

Most observers believe that there will be a continuing need for paper maps even as NIMA works on a computer-based grid. Media reports indicate that NIMA plans envision eventually phasing out the production of paper maps. Some observers, however, maintain that paper maps will continue to be required in many situations, including special operations. They believe that NIMA will have to ensure that paper maps remain available even if they are produced commercially.⁸⁶

For the NIMA Commission, the goal is to provide TPED through an integrated data architecture, not a collection of systems, products, or processes. Seeking the “mother of all databases,” the Commission conceived of all information with some form of georeference and widely and easily shared among users to include mapping and imagery in a seamless packaged whole. Third parties would be able to add additional information in a process that would be termed “annotation.” “The database should be structured to be independent of client or application, fully distributed, and capable of accepting successive value-additions and user annotations.”⁸⁷ The Commission sees NIMA as the appropriate agency to achieve multi-INT integration and thus break down the intelligence stovepipe.

Collection systems, once in place, can produce mountains of data at regular intervals and much undoubtedly goes unanalyzed. There may be quantities of data left “on the cutting room floor” (in actuality, the data would be stored in a retrievable form) and, arguably, a failure to provide decisionmakers with all information that has already been collected. On the other hand, government officials are not always equally interested in every corner of the world and in some cases data collected can be stored for future reference should interests change. While it may not be expedient constantly to analyze certain targets, it is important to retain coverage in files.

The NIMA Commission also made a number of specific recommendations that would in some cases require congressional authorization.

⁸⁶See Frank Tiboni, “NIMA Takes Monumental Step Toward Digital Maps,” *Defense News*, May 21, 2001, p. 18.

⁸⁷NIMA Commission Report, p. 103.

- The establishment of an “Extraordinary Program Office” (EPO) to acquire state-of-the-art TPED and related communications. The Commission concluded that NIMA lacks the necessary expertise, that it is not readily available in other agencies, and that it is needed to accomplish the necessary goals within the next five years. The proposal would provide for non-government experts to be hired without the constraints of federal hiring restrictions or salary levels. The EPO would possess the special acquisition authorities of the DCI. The emphasis would be on maximal use of commercial off the shelf products while avoiding proprietary systems that face more rapid obsolescence.
- The nominal tour length of the Director of NIMA should be five years. One of the ongoing challenges facing NIMA is the establishment of a common culture for employees with backgrounds in several different agencies and greater longevity for senior leadership is needed.⁸⁸
- NIMA should be authorized additional Senior Executive Service (SES) and Senior Intelligence Service (SIS) positions in order to promote and retain the caliber of personnel required to undertake the necessary transformation.
- NIMA is “severely under resourced given the expanding mission and the need to modernize.”
- Augmentation of NIMA’s research and development budget.
- NIMA should develop a new strategy to integrate commercial imagery with information from intelligence sources on an urgent basis.
- OSD should establish a commercial imagery fund through which Defense elements can charge purchases of commercial imagery.

A larger question is whether the FIA satellite program is justified given the availability of commercial imagery. According to media accounts, NIMA has taken a number of reforms to deal with concerns identified by the Commission. Efforts have been made to seek advice from industry experts, to get a clearer view of foreseeable technologies, and to improve acquisition and delivery efforts.⁸⁹ It is impossible to make conclusive judgments on this issue without reference to classified materials, but congressional committees are reviewing the program.

NIMA’s mission is to provide a global database to provide current, basic geographic products to its customers. Many observers question whether NIMA is capable of taking charge of maintaining multi-int database at this point. Building a new single agency out of several components must overcome differences based on previous organizational ties and separate bureaucratic cultures. As this is being accomplished, NIMA must also establish a reputation for accuracy, completeness, and

⁸⁸On August 8, 2001, DCI Tenet and Secretary of Defense Rumsfeld announced the appointment of retired Lt. General James R. Clapper, Jr. as NIMA’s next Director. Clapper had previously served as Director of the Defense Intelligence Agency from 1991 to 1995.

⁸⁹Catherine MacRae, “Imagery and Mapping Agency Reports Steady Progress at Reforms,” *Defense Information and Electronics Report*, July 27, 2001, pp. 13-14.

responsiveness that extends throughout the national security community. Achieving such a reputation will require not only effective leadership, but also the development and acquisition of an innovative and highly complex technical infrastructure.