

**The Coast Guard Model:
A Third Organizational Option For International
SSA Data Sharing and Other US Space Responsibilities**

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I. Characteristics and Requirements.

Recent events have underscored the reality that current means of achieving space situational awareness (SSA) and acting upon that information are inadequate; that inadequacy has incurred real costs on international space operations and threatens to have increasing costs to operators and the world in general. This is the case both in terms of space-to-space losses and space-to-ground losses, the latter potentially threatening populated areas at random. One of the principal problems that must be addressed is the fact that data are generated, acquired, and assessed principally on a national basis, and are not fully shared or reported on a global basis, thus degrading the ability of individual space operators to predict, avoid, or mitigate problems. The most practical solution realistically achievable in the short term may be an international cooperative system in which national sources contribute data on their own space objects, and some subset of the sensing data as acquired, in both cases "stripped" of specific characteristics that may be considered sensitive by operators or states of registry. Instituting such a system would require understanding among the various national and institutional actors regarding what data are to be reported and what data may be retained as sensitive; a common reporting format; and an institutional mechanism for interacting, clarifying ambiguous data, and for improving coordination and reporting as the system evolves. As is typical in such multilateral cooperative systems, each national participant would typically designate an institutional actor as its interlocutor in such a system. As the US is probably the largest and most significant individual actor in such a system, whether measured by number of actions to be reported, or capabilities for sensing, its choice of participant organization will likely have a substantial effect upon the chances for success of such a system, and will shape the nature of the system as it evolves. Candidates for such a system include:

1. USAF. This is the path-of-least-resistance choice of institution, as it already is the primary SSA actor for the US. In fact, it is currently the designated entity for all international SSA matters, as the JSpOC has already been deemed the international SSA entity for the US by giving it responsibility for the Commercial and Foreign Entities (CFE) program.

Institutionalizing its function in an international SSA entity would merely be a matter of creating the reporting systems between the appropriate analysis centers and the international entity. The negative aspects arise from the requirement that sharing information into an open, international system would require that a determination be made of what data are to be contributed, what are to be held back, and whether some data can be effectively edited to remove certain sensitive characteristics, and thus

become publishable. This may not be a quick or easy process. Additionally, this would require that multiple disclosure levels will exist on all space data produced; although this is already the case regarding internal handling of data, the problem would be more severe in that any error would likely result in data being released publicly and irretrievably. As a military organization, its bias would always be toward secrecy and against disclosure, (and properly so) which could hinder its ability to be an effective actor for US interests in an SSA organization. On the other hand, having this editing function performed by the USAF would give national defense and security authorities more confidence that their interests would be protected, than if that were to be the responsibility of a civil agency.

Furthermore, the USAF's status as a major armed service means that space sensing and analysis would always remain a minor and secondary mission within the service, and would be disadvantaged in terms of access of resources and personnel relative to the primary war-fighting mission of the service. This carries the related problem that the SSA-related parts of the organization would be disadvantaged in attracting the best managers and analysts, as it would always be an unpromising choice for those interested in advancement within the service. Finally, its nature as a military organization would tend to be a disadvantage with other national actors, who will more likely be civilian organizations, and some of who would be distrustful of the USAF as a collaborative partner.

2. NASA. The National Aeronautics and Space Administration is the civil agency of the US Government with the best apparent claim to the function. It unquestionably can demonstrate capabilities and background in SSA, as it performs various SSA tasks already for its own purposes. It would not raise among international partners the sorts of concerns that a military organization such as the USAF might. It is also the US participant in a number of international activities and can claim substantial interface experience with foreign space actors. Negative aspects include the fact that NASA, which began its existence as a research and development organization, and fundamentally remains such, has problems with organizational focus and internal management practice. Its organizational culture, in which largely autonomous field centers with their own direct lines to political influence battle each other for turf, insures that the SSA role would become a political football within the agency. The SSA role would be a minor one relative to large, prestigious, and resource-consuming activities such as vehicle development and space operations, but could become significant in the future. Small peripheral tasks have the same issues within NASA as mentioned with the USAF previously; they tend to be starved of resources, quality personnel, and management attention.

Finally, the agency's corporate culture, organization, and history suggest that an ongoing operational support mission such as SSA is not the sort of task that NASA ever did well, or would do well today. It is also the case that the USAF and other national-security interests might be unhappy with the idea of NASA handling the interface

between USAF-gathered sensitive information and foreign institutions. This will be a tension in any solution; the characteristics that make a proposed entity more acceptable to international parties will tend to make it less acceptable to USAF and other national-security players, and vice versa. This is an inherent conflict with no universally happy solution.

3. A US Space Guard (USSG). Several commentators have proposed the creation of a space support service on the model of the US Coast Guard, notionally termed the "US Space Guard". Cynthia McKinley, then Lt. Col., USAF, most notably set this forth in her 2000 article *The Guardians of Space*.¹ McKinley argued that space support functions, which included the fundamentals of SSA, were ultimately distinct from the warfighting identity and principal mission of the USAF, and suffered as a result. She saw a distinct parallel to the navigation support functions that form the heart of the US Coast Guard's mission. In that situation, both the USCG and US Navy are happy with the division of tasks. It is unlikely the Navy would want to take on lighthouse tending or vessel inspection in the foreseeable future, and the Navy is legally precluded by the Posse Comitatus Act from assuming the USCG's constabulary functions. If the USAF were to accept the fundamental premise of a Navy/Coast Guard model of division of duties, it would probably see the advantages of shedding the budget drains and personnel issues of space support tasks as well. A Space Guard on that model might also incorporate various functions now carried out by NASA, FAA/AST, and NOAA. The Coast Guard model constitutes, in essence, a third organizational model for US Government activities, spanning the gap between purely military and purely civil entities. Such characteristics may provide a useful solution to a number of organizational issues in the US Government's space establishment.

A consideration of specific current issues in international SSA makes McKinley's proposal more relevant today, rather than less. As Brian Weeden pointed out in *Space Review*², the Air Force suffers from a shortage of sufficiently well trained analysts to properly track the growing number of space objects. Organizational culture issues contribute substantially to this shortage. The Air Force, as a military service, has a strong institutional bias toward warfighting (and quite properly so), and a consequent bias toward officers as managers and leaders rather than analysts. Of course, modern military organizations necessarily must devote a substantial part of their resources to support of warfighting, and it makes sense for those support people to be in uniform and under military discipline as well. The problem arises when a support function begins to serve non-military customers and their requirements as much or more than military ones. Such a situation is where the Navy/Coast Guard division of responsibilities begins to make sense. The reality is that space has gone from being a desert in which only a handful of objects operate, and those mostly military, to a sea with a robust mix of traffic of all types. Yet the organizational arrangements have not evolved to match.

The organizational culture of the Air Force also is biased toward rotation of officers through tasks and areas, leading to the phenomenon of the "migrating military manager"

ceding power by default to resident civil servants in support functions. All of these trends militate against what is needed in SSA roles -- a premium on analysis, permanence in the position in order to acquire rich local knowledge and judgment, and an organization built around continuity of peacetime function rather than preparation for a war that may or may not come. A young officer in an SSA analysis slot knows that as an Air Force officer he is in a dead end, and cannot progress toward a high position unless he changes areas and specialties; he would know as a Space Guard officer that excellence in his position would be perfectly supportive of an ultimate goal of becoming Commandant of the Space Guard.

II. The US Space Sector Today: Its Evolution and Particular Characteristics.

In considering these issues, it should be recognized that the organization of the USG's space activities is peculiar, and that peculiarity reflects the specific history of the agencies involved. Space activity in the US was almost entirely military in origin, which reflects the fact that for much of the history of spaceflight (1946-80) almost all payloads were launched on launch vehicles that were spinoff products of military missiles, and for the initial period the bulk of actual space launch activity was primarily military in nature, initially reconnaissance satellites, and subsequently weather and communications support systems. NASA was created in 1958 by expanding the prior-existing National Advisory Committee for Aeronautics, a small research organization that produced solid academically sound results, but whose managers were "academics barely competent to procure a box of pencils", in the words of a major systems-house founder who had dealt with them extensively.³ When NASA was created by the Eisenhower administration, it was envisioned primarily as an overtly civilian shell created to take selected spinoffs of military programs and operate them as a visible civilian program for prestige and demonstration purposes. The real, i.e., military, space program being implemented in secret since its 1954 authorization would continue out of the limelight.⁴ NACA's administrative structure was deemed adequate to that minimal task.

NASA was repurposed in 1961-2 by the Kennedy-Johnson administration to take on a substantial development task in creating the Apollo system for lunar exploration, and secondarily to conduct unmanned planetary exploration, prototype commercial functions (particularly satellite communications) and a variety of ancillary aeronautical and space functions, including launching the emerging class of privately-funded commercial satellites on legacy military-derived launch vehicles on a "reimbursable" -- i.e., commercial -- basis. More or less by default, NASA also became a space transportation utility, de-facto regulator, and de-facto American interlocutor in any international space activity.

A third institutional transformation took place in the 1970s, after the cancellation of the Apollo program halfway through its intended course. In this transition the previous era's priorities and corporate culture were once again overturned. Apollo-era NASA was effectively a emergency governmental mass-mobilization effort similar to the wartime

German V-2 program, the Manhattan Project, and the Cold War Missile Race effort, (and one in which veterans of the first and third of those examples played prominent roles) in which the primary driver was a head-of-state level commitment, efforts were constrained primarily by time rather than resources, and feedback from success or failure was quickly felt. In the post-Apollo era of NASA, the functions of which were centered on the Space Shuttle program, the primary driver was institutional self-preservation and the iron triangle pressures for job preservation. Resource constraints consistently trumped schedule and performance, and shifting goals and pressures made clear accountability difficult to attain.

The cumulative legacy of these transformations was to create an agency that dominated its sphere in a manner unlike any other in the executive branch. It also created peculiar lacunae in its management capabilities, with its span of responsibilities being so wide that it always outmatched its span of attention and control, even when resources were not a constraint. Ultimately these lacunae evidenced themselves in its technical capabilities as well, with very powerful entrenched internal empires having their own external political patrons giving them effective vetoes over administrative decisions, and a strong sense of privileged authority over large areas of national space activity. Small and essentially unwanted portions of the US Government's space responsibilities ended up in, or were devolved to other agencies -- communication satellite regulation to the FCC; operational weather and remote sensing satellites to Commerce; regulatory oversight of private space launch to Transportation. These agencies contain small nexes of capability regarding aspects of space operations, but none so large that they actually constitute a counterbalance to NASA on the civil side. Collectively, they do not account for even one percent of NASA's manpower or budget. Effectively, space in the US Government is the Air Force and the National Reconnaissance Office on the defense/intelligence side, and on the civil side, NASA.

III. The Maritime Sector Analogy: Organization, Structures, and Incentives.

Over the past decade a number of alternative models for organization of the US's space sector have been proposed and several well-known ones have referenced organizational solutions from the US's maritime sector. These have included the idea of a US Space Guard on the model of the US Coast Guard, as discussed previously at I.3. Other proposals have called for a separate Space Corps relating to the Air Force as the Marine Corps relates to the Navy; autonomous, but under the control of the Secretary of the Navy, and relying on the Navy for various functions such as legal and medical services. Yet another model is that of naval aviation within the Navy as a whole, integrated, but with distinct internal institutions and leadership development paths. A fourth option discussed is on the model of the historical Army Air Corps or the later US Army Air Forces; a quasi-autonomous service within the parent service. In addition to these analogy to maritime and other sectoral models, a less radical change that has been proposed is the restoration of a Space Command as one of the US's combined commands, breaking out elements currently folded into USSTRATCOM -- a proposal

that might be easier to achieve but that does not address the underlying issues of development of a genuinely space-oriented culture and doctrine. Each of these options, along with the option of the status quo, can be assessed for their applicability to the space activities of the US Government, and, more broadly, the nation's needs in space.

The following discussion will focus primarily on the Space Guard model, as it has certain unique characteristics that may make it a particularly appropriate model for a US participant in an international SSA data sharing system. That end is the focus of this discussion. Other proposals for reorganization of the US military space establishment -- the establishment of a Space Force as an independent space warfighting service, or less comprehensive solutions such as an embedded, autonomous Space Corps within the Air Force -- are essentially neutral to that end. The advantages and disadvantages of a Space Force as the US interlocutor for ISSA data sharing are similar to those of the Air Force. A Space Guard solution is similarly neutral regarding the organization of space warfighting capabilities; the establishment of a Space Guard neither precludes nor requires the establishment of a Space Force or any other less comprehensive solution.

The US Government's maritime establishment includes a Navy, an internally distinct Naval Aviation component of the Navy, an autonomous Marine Corps within the Naval Service and under the Navy Secretary, a Coast Guard outside of the Navy Department, the ships and uniformed men of the National Oceanic and Atmospheric Administration, (the equivalent of NASA's space science function), the Merchant Marine Academy, and VISA, the Voluntary Intermodal Sealift Agreement (the maritime equivalent of the Civil Reserve Air Fleet). The US Government's science establishment (NSF, etc.) procures transportation for its researchers from commercial providers whenever possible. However, the Coast Guard also maintains a fleet of vessels for specialized, extreme environments -- e.g., icebreakers -- for which commercial providers do not provide service, and the NSF relies on the Coast Guard primarily (and the Navy secondarily) for transportation in that circumstance. Although this is not to argue that the smaller space sector should have a one-to-one equivalent of every institution in the maritime sector, it does demonstrate that different tasks can benefit from different types of organizations with different structures, statuses, and personnel practices. In rethinking the structure of the US Governmental space sector, we should not exclude a wider variety of such organizational solutions than presently exists.

The import of this is that neither the Air Force nor NASA provide an appropriate organizational home for the substantial amount of activity that would be in other spheres the bread and butter of civil government -- the maintenance of routine technological and administrative competences in that sphere, the operation of routine infrastructure that is deemed to be a public good, and the regulation of non-governmental activity for public safety and compliance with international obligations. Additionally, the subsidiary civil government functions of encouragement of private activity through supportive research, development, and education is performed only incidentally by NASA, and in a manner

than benefits private activity more by coincidence than by design. To the extent that either the Air Force or NASA performs any of these functions, they are seen as more of a burden than a role. They are not carried out in the most cost-effective or useful manner, and most unfortunately, are often given the lowest priority in resources, personnel, and attention. When resources become further constrained they are typically the first area chosen for sacrifice. This is generally understood in regard to NASA, but it is also true in regard to the Air Force.

Part of this is due to issues of organizational culture. The issues that Weeden identified, as discussed above at I.1, have led to the situation in which the Air Force's SSA functions perennially suffer from both a shortage of skilled analysts at its SSA functions, and the fact that Air Force personnel policies and attitudes discourage both the accumulation of analytical competence in officers (as opposed to managerial skills) and the long tours of duty needed to fully hone those skills. In the NORAD case, historically, that organization uniquely made up for these problems to some extent by its nature as a binational command, and the fact that Canadian Forces policies differ in both respects -- Canadians at NORAD are encouraged to acquire analytical skills and are given long tours of duty in which to hone them. This solution has not been generally available outside NORAD. However, it would be poor public policy to explicitly rely on an allied partner's skills to the detriment of acquiring such in-country; better perhaps to look for a domestic model of a service that similarly rewards the needed skill sets and organizational attitudes. Here is where the Coast Guard model finds its rationale.

Col. McKinley's article⁵ addressed the concept of a Space Guard primarily in terms of Air Force functions, needs, and force structures. She proposed to move the space functions of the Air Force that were not primarily or directly related to warfighting into a new uniformed and armed service that, although, like the USCG, armed and under military discipline, would be viewed as a "guardian" function -- to use the terminology proposed by Jane Jacobs⁶ -- on watch equally in peace and war. A warfighting service spends peacetime training for and (hopefully) deterring war because of its capabilities. A guardian service in peace is not waiting for anything -- its daily activities are its justification, and in that respect is more like the average civil government agency. Yet it is also expected to be able to carry out its functions under battle conditions in wartime, and its members understand that being sent into the possibility or even the probability of death is part of what the uniform means. In that sense they are like military agencies and first responders. This attitude is well represented by the informal motto of the USCG's lifeboat service: "You have to go out; you don't have to come back". As will be discussed, this particular mix of military/first responder and civil characteristics may be particularly appropriate for the space infrastructure mission.

Although Col. McKinley proposed including non-Air Force functions in her Space Guard proposal, she did not discuss that side in detail. Therefore, in assessing the viability and utility of Space Guard, it is also useful to expand the discussion of non-Air Force functions and examine more closely the problems of NASA created by its peculiar

history, organizational culture and mix of functions. These problems might be mitigated by transferring some into a Space Guard, to the benefit of both organizations. Furthermore, the other space functions of the US Government, particularly the remote sensing and weather functions of NOAA and the commercial-space regulatory functions of the FAA should be considered for inclusion. They are close analogues of the maritime infrastructure and maritime weather functions of the USCG, and maritime regulatory functions of that service. Section IV is a brief sketch of what such a "broad scope" model of a Space Guard might look like.

IV. A Space Guard for USG Civil Space Infrastructure and Regulatory Responsibilities.

1. A US Space Guard, in this model, would be an agency of the US Government at the subcabinet level, consisting of a uniformed armed service along with its civilian employees and auxiliary organizations. It would be attached to a civilian Cabinet department (probably Transportation but possibly Commerce) and would be established by act of Congress. It would be headed by a uniformed Commandant appointed by the President and confirmed by the Senate, reporting to the Secretary of its Department. During time of war or specified national emergency it would report to the Secretary of the Air Force and be integrated into the command structure of that service, on the model of the Coast Guard's operations with the Navy during the Second World War.

Its uniformed personnel would be subject to the Uniform Code of Military Justice (UCMJ). This status would permit USSG personnel to serve in the field alongside USAF with minimal adjustments, just as Coast Guard men and ships have historically been used interchangeably with the Navy whenever needed. Civilian employees of the USSG would be treated as normal Civil Service, although consideration should be given to granting it certain exemptions on hiring and firing similar to those originally granted to NASA. The ranks, grades, and pay scales would use standard DOD practices as a point of departure, but if a different policy toward promotion, retention, and length of tour is adopted, then it might be desirable to define pay structures that permitted Space Guard personnel to pursue a technical excellence path and receive additional compensation for mastery of skills while remaining in lower ranks. Canadian practices in this regard should be studied. The retirement and pension provisions of the USSG would be those of the other armed services.

2. Several components of the Air Force, some components of NASA, the AST component of FAA, and possibly the space components of Commerce would be transferred and combined. These components might be transferred simultaneously, or gradually over time. Exactly which components of the Air Force and NASA would be a matter of substantial study, but the criteria for such assignments would be along the following lines:

a. Air Force components, facilities, personnel, and functions that are i) primarily space

related; and ii) not directly related to war-fighting; nor iii) ones whose customer is solely or primarily warfighting components of the USAF. Some functions (e.g., SSA functions) might remain formal responsibilities of the USAF while using substantial numbers of USSG personnel integrated into operations in the same manner that Canadian Forces personnel historically have been. The name "Space Guard" is used partly to keep the parallel to the Coast Guard and its relation to the Navy explicit: The Space Guard is not intended to serve as a Space Force in the sense of a DOD branch bearing primary responsibility for national defense in space. It would, however, would serve as an auxiliary to the Department of the Air Force in wartime. There is a question as to what degree a new Space Guard would be trusted to possess the highly classified national security information involved with many SSA inputs; this issue might be resolved by a model in which a USSG gradually acquires a greater SSA role as its capabilities are demonstrated.

b. NASA operations that are primarily routine space operations or infrastructure supporting operations would be transferred to the USSG. NASA would retain functions that are primarily concerned with R&D, exploration, or space science. The McKinley article, written before the loss of *Columbia*, and the setting of a termination date for the Shuttle program, anticipated transferring that program to the Space Guard. NASA programs such as the Space Transportation System and the International Space Station might remain at NASA for their duration, given the short remaining life of those projects. A general rule of thumb would be that operations (including crewed operations) to Earth orbit would be Space Guard functions; operations beyond would be deemed "exploration" and would remain NASA functions until considered reduced to routine. Such a division would be consistent with the current Administration policy mandate that LEO operations, including crewed missions, be primarily contracted from commercial operators. The Corps of Astronauts and their training would become a Space Guard operation, but NASA would retain a Test Astronaut Office and training facilities subsequently for flying test flights of X-vehicles, crews for deep-space exploration, and other retained NASA functions. Another rule of thumb would be that NASA would subsequently be focused on a small number of large projects, while the Space Guard would focus on taking on a wide variety of relatively small projects that tend to become short-changed for attention and resources at NASA.

c. The space regulatory functions of the Department of Transportation under the Commercial Space Launch Act and successive Acts, currently embedded in FAA/AST, will be transferred to the USSG. Unlike the current FAA/AST, it would have the in-house expertise to review technology-related questions, and generate its own SSA inputs. In the latter case, it would resolve the potential issues currently raised by relying on opaque military-generated inputs for a civil regulatory process. As space commerce grows, this anomaly in regulatory practice, one that violates the spirit if not the letter of the Posse Comitatus Act, will continue to be a sore point. In general, this function has been searching for an organizational home since the *DOT* (note: not the FAA per se) was assigned the role by Presidential action in 1983, and by statute in 1984. It has

been too small to merit a separate subcabinet agency by itself, but has suffered from inattention at FAA, and also the anomaly of trying to administer a regulatory regime founded on one philosophy and approach specified in one series of statutes, while being embedded in a much larger agency founded on quite different statutory regulatory mandates.

d. Other routine USG space operations (e.g., weather satellites) could be transferred to the USSG. This would be subject to a review of the Department of Commerce's space operations to determine to what degree functions other than the actual launch, control, and procurement of weather satellites would be better run in DOC or Space Guard. It should be noted that DOC is an alternate option for a Cabinet department home for a USSG, in which case the transfer of function would be an internal matter.

3. In addition to these transferred functions, the USSG would use its competencies to serve the following functions not previously called out in the USG's space establishments:

a. It would serve as the routine transportation purchasing and contracting agent for all USG space transportation requirements other than active warfighting capabilities. This function would exclude test flights of research and development items developed by NASA, but would, for example, include launch of NASA-developed scientific research payloads, and exploration flights for which the launch requirements are not exotic. (E.g., a Pluto Express research probe would be developed by NASA as an exploration project, since the environment to which it is being launched is exotic, but its launch from Earth and acceleration to velocity for its transit to Pluto would be deemed routine tasks, since they can be accomplished with a variety of existing systems. NASA might propose that its research and development centers develop a new launch vehicle for launch missions but it would be treated only as one source of capabilities and it would have to compete against other options with the USSG making the decision. It would also bear primary responsibility for search, rescue, and recovery operations in space.

b. In conjunction with the previous point, it would maintain an in-house space transportation engineering competency capable of evaluating specific systems, overseeing development of systems needed for USG use where the market did not provide adequate capability, and serving as an independent external reviewer of NASA and USAF projects.

c. It would serve as the responsible agency for non-military space situational awareness capabilities and the US's international participant in international SSA cooperative efforts that are not primarily military in nature. Its status as an armed service would render it more acceptable as an interface with the USAF-run military side of SSA; its status as a non-DOD agency with a civil regulatory function would render it more acceptable as an international interface with civil agencies.

d. Given its combination of engineering and infrastructure capabilities, SSA capabilities, and regulatory authority it would provide a natural lead agency for space debris reduction and mitigation, and ultimately for protection of the Earth against other potentially hazardous space objects. This would be a natural analogue to the Coast Guard's responsibility for hazards to navigation.

e. A USSG, developing close ties to the US space transportation and orbital operations industry as described in 4a below, would be the natural administrator and interface with industry for a program equivalent to the Civil Reserve Air Fleet in aviation, or the Voluntary Intermodal Sealift Agreement in maritime transport.

f. Finally, it is worth pointing out that USSG officers would be, like Coast Guardsmen, officers of the US Government (unlike NASA personnel, who are only employees) capable of operating as a constabulary. Thus they could exercise police powers over civilians without (unlike DOD personnel) violating the Posse Comitatus Act. To date, there have been no instances of needing to exercise police powers on space objects. However, as numbers and duration of missions increase, this will ultimately change. At that point, having constabulary officers with civil authority and training available will be useful. The USSG could also provide its own physical security at launch sites and other ground infrastructure.

4. Modeling itself upon the USCG permits substantial flexibility in operation that neither a regular DOD service, nor a purely civilian agency provide. A small service along USCG lines might use some of the following organizational tools:

a. A small service academy along the lines of the USGC Academy or the Merchant Marine Academy, King's Point would develop *esprit de corps* and a sense of organizational identity. It would offer an aerospace engineering curriculum as its core, but also have tracks for management and administration, and possibly pre-law including a familiarization with space law. It might be desirable to combine the Coast Guard and Merchant Marine academy functions, with the expectation that some graduates, after serving out their obligation, would go into space-related businesses. It might also be worth copying the "co-op" study program of universities like Rensselaer Polytechnic Institute, in which students spend part of their upper-class years as interns in related industries. One of the strengths of the USCG as a regulatory agency is that its graduates are familiar with the sea, with seafaring, and with the realities of the maritime world. As is inevitable in regulation, those it regulates do not always love the Coast Guard but there is a sense of "mariners regulating mariners". Similarly, the Academy should strive to leave a sense of "spacefarers regulating spacefarers". Small crewed suborbital or near-space vehicles (e.g., the XCOR Lynx) are rapidly falling in price and it might even be feasible for an Academy to maintain several such vehicles, in order to insure that its cadets be familiar with spaceflight and spacecraft operations.

b. A USSG Reserve and USSG Auxiliary organizations would permit a wide range of

flexible arrangements to retain organizational knowledge even after uniformed personnel leave active, full-time service. The USAF has been using the Air Force Reserve increasingly for space functions, with success; this example could serve as a model for the USSG. NASA in particular has suffered from the dispersal of trained personnel due to stop-and-start funding; a Reserve program could, among other things, preserve access to specific operational knowledge of systems or environments by retaining team members on reserve status and bringing them together periodically. It would also allow for rapid expansion of capability in times of need. An Auxiliary program, including organizations analogous to the popular and effective US Power Squadrons and the Civil Air Patrol, could take advantage of the ability of space to generate enthusiasm and participation, particularly among students. Some possible activities would be an Auxiliary involvement in amateur rocketry operations, or an Asteroid Watch of amateur astronomers participating in the tracking and cataloguing of potentially hazardous asteroids.

c. Beyond reserve and auxiliary organizations, a USSG would also likely produce the penumbra of civil-society organizations, not officially affiliated, that would connect it to both the political system and to wider emerging space industrial and commercial field. One example, which might actually predate the formation of the service, would be an organization analogous to the Navy League or the Air Force Association -- an advocacy and support organization dedicated to making the case for the service and its role in national life. Other organizations might include retirees' associations and an alumni organization for Academy graduates.

d. Throughout the early days of aviation, there was a network of mutually supporting connections between the predecessors of the Air Force and the aviation industry, including both aircraft manufacturers and the airline operators. All parts of the aviation world generally supported each other. Due to NASA's peculiar status as the sole civil government space organization for the majority of its life, NASA on the one hand has tightly controlled its contractors and discouraged robust discussion of means and ends when such collided with perceived NASA organizational goals. Meanwhile it viewed the emergence of private entities providing service directly to customers with hostility, or at a minimum an awkward uncertainty as to how such efforts should interact with the agencies. A USSG would be able to start with a clean slate and strive for a more balanced relationship with an industry whose existence and prosperity is part of its charter and rationale. A USSG might better be able to have comfortable and useful interactions with the Air Force, NASA, and the commercial space sector.

V. Political Feasibility of a Space Guard.

1. Creation of a Space Guard on this model would be a substantial change in the structure and organization of the US Government and in particular the Department of Defense. Change of any nature requires expenditure of political capital. Such capital is rarely spent merely because some idea seems logical or desirable. Additionally, both

the US Air Force and NASA would likely resist the loss of functions, personnel, and budget to a new organization. The McKinley paper, for example, elicited substantial negative response from parties related to the Air Force. Therefore, in proposing such a change, the questions arise: what problem does this change solve, and for whom and what political actor benefits sufficiently to justify the expenditure of their capital? Following are some possible forces that might affect the emergence of a pro-Space Guard constituency:

a. Budget stress. The manner in which Congress and Administrations allocate budget resources reflects the larger political preferences of the parties and factions controlling both bodies. In times when factions favoring defense expenditure over social expenditure control one or both branches, budget supplicants seek to find defense rationales for projects; thus both the Interstate Highway System and the national student loan program initially had the word "Defense" in their titles. Later, these terms were dropped to stress the civil aspect of their applications more strongly. The word "Defense" has appeared and disappeared from the title of the (Defense) Advanced Research Projects Agency with the change of administrations. The current Administration and Congress tend to favor civil over defense expenditure. A Space Guard in (for purposes of discussion) the Department of Transportation would move a substantial bloc of funding from DOD to a civil agency, which would allow DOD to represent it as a "defense cut" while still enjoying access to the functionalities it would provide. As McKinley pointed out, space support currently represents a substantial portion of inflexible, "must fund" resource commitments of the USAF that do not contribute directly to warfighting operations. The Navy has been comfortable with the Coast Guard and its predecessors from the beginning. It has found it useful to be able to draw on Coast Guard capabilities whenever they were needed, and having the luxury of ignoring it when they weren't. If the Air Force could be convinced that a similar relationship would be equally useful, they might switch from reflexive opposition to support.

b. Congressional-district budget neutrality. Congressional powers are actually somewhat indifferent to precisely which organizational entity the funds flow to their district. When the Von Braun team at the US Army's Redstone Arsenal in Huntsville, Alabama was transferred from the Army to NASA, it did not cause Federal dollars to leave Huntsville: quite the opposite. Similarly, NASA functions "moved" to the USSG would remain physically present in the same location, probably as tenants in the same NASA facilities. Although NASA headquarters will certainly fight to keep current NASA functions in house, their Congressional patrons cannot automatically be counted on to back them.

c. Professional interests of current Air Force and NASA personnel. The issues with the status quo identified by McKinley and Weeden in their articles, a decade apart, can serve as a demonstration that some members of the current space personnel in the Air Force might find a separate service a better place in which to pursue their ambitions for

a professional life dedicated to space. How many would be difficult to determine, but even a small number of intelligent, vocal, and dedicated people can make a difference in politics. Similarly, the functions in NASA currently getting short-changed on resources (and professional advancement opportunities) might equally generate support for the idea. Another constituency might be found in private space enterprises that do not find the current regulatory role to be optimally, or even adequately, performed by FAA/AST. All of these constituencies have incentives to not be vocal (at least those still working for or regulated by those agencies) but they might still be able to provide support to congressional or other targets.

d. One countervailing pressure might be the ambitions of an aggressive Cabinet secretary in a department that might become the peacetime home of the Space Guard. In 1983 the space regulatory role, although very nascent and insignificant in terms of budget or personnel, was strongly contested by the secretaries of Transportation and Commerce, each of who were ambitious and influential within the Administration. A Space Guard would have a high profile and substantial allure for such a political figure, and a much larger budget than the space regulatory role. Such a dynamic might well help overcome the objections of NASA and the Air Force, particularly if the considerations of point a above are strong.

2. Formation Scenarios.

a. Broadly speaking, scenarios for the actual emergence of a Space Guard fall into two categories: One might be dubbed the "Big Bang", in which the service is formed in a single action taking the several major components from other agencies and combining them in a new command structure. The formation of the Department of Homeland Security is a recent example of this approach. The actual formation process would be detailed by enabling legislation; the Homeland Security example would be studied for lessons learned, positive and negative. The alternative approach would be termed the "gradual accretion" model: In this model, a small entity with some space responsibilities is identified or formed within a Cabinet department. It would have as its end goal the formation of a Space Guard along the lines described in this discussion. However, it would only gradually expand its scope, as described below. The actual formation of the Coast Guard was a hybrid of these models -- it began with the 1915 merger of the existing Revenue Cutter Service and the Life-Saving Service into a Coast Guard. This combined the constabulary function and the maritime service function into a single organization. The new Coast Guard then continued to accrete functions, most noticeably with the acquisition of the Lighthouse Service (1939), which gave it the navigational aids role, and the Bureau of Marine Inspection and Navigation (1942), giving it the maritime regulatory role.

b. Initially former Air Force uniformed personnel would probably constitute the uniformed part of the USSG, and former NASA and DOT personnel would remain civilian employees, but over time those allocations would change, particularly as new

personnel enlisted or commissioned into the uniformed USSG began to be assigned to the civilian-legacy areas. Serving Air Force personnel in units transferred to the USSG would be given the opportunity to elect either USAF or USSG affiliation without penalty; USAF personnel in other units would be permitted to apply for transfer to the USSG, but such transfer would be granted by USSG on criteria of the needs of the service.

c. A Gradual Accretion Model. This discussion has roughly followed the scenario envisioned in the McKinley paper, of a "big bang" formation strategy forming a substantial agency from parts of the USAF and (in this discussion) other agencies. This follows more or less the model of the USAF's own formation from the US Army, and is a model often followed by Air Force officers discussing various strategies for dealing with organizational homes for space activity. However, if the political problems of achieving such a big bang formation event were too large to overcome, the gradual accretion model would be an alternative. It would seek to acquire responsibilities that are unwanted or conspicuously underserved within existing agencies, following the path of least resistance. It would look for situations in which a small function was being deprived of resources at a large agency to help sustain a large, central project of that agency. As it acquired capabilities, it would position itself to acquire further responsibilities. It might seek to become initially a small non-military commissioned and uniformed service, along the lines of the Public Health Service or the Commissioned Officer Corps of NOAA. It would thus become the nucleus of something that could be combined with other functions and agencies when the political basis supported such. This strategy would benefit from the support of a Cabinet secretary (as per point d. above) who would see this as a means of increasing his Department's scope.

d. In the long run, political change usually results from a response to a crisis and/or a perception of an opportunity. If a Space Guard concept is defined, studied, and circulated, preferably by a group organized to advocate the idea, among those would benefit from it, and those who would have the power to make it happen, it would become a part of the conceptual toolkit to which resort would be made in crisis.

VI. Implications for International SSA Data Sharing.

An organizational home for non-military SSA data functions and participation in international structures for SSA data sharing must seek to compromise varieties of requirements that can probably never be entirely reconciled. The civil side of SSA is becoming more important as the amount of nonmilitary civil assets in space grows, as privately-conducted launch operations increase, and as the SSA product is used more and more for commercial purposes and as a civil regulatory input. Thus, it is likely that pressure will grow for a formal civil actor in SSA. It is unlikely that the US will create or maintain two entirely separate sensor systems for SSA, one military and the other civilian. Therefore, some products of the existing military sensor system must be stripped of sensitive data and transmitted to a civil actor. A civil actor will thus need to be regarded as trustworthy by the USAF and other actors in the military and intelligence

communities, as even with a theoretically optimal stripping function the civil actor will inevitably acquire knowledge about US space activities that these communities will not wish to disclose.

At the same time, the need for cooperative action in data sharing between the US and other spacefaring nations will grow as actual collision and near-miss situations increase with the proliferation of space activity. The US participant in such a system will need to be an entity with which foreign actors can achieve mutual trust and a productive working relationship. Although the US military has been quite successful in building and maintaining military-to-military relationships with allied militaries, it would be regarded with suspicion by some civil actors in some of the nations that would have to be included in an effective ISSA data sharing system. This is not due to any fault of the US military, but it is a political reality that must be taken into account. Therefore, a civil actor would be the best interface.

No existing entity within the US Government is ideally suited to be such a civil actor. As discussed previously in section I part 2, NASA is probably not well suited to such a task. Additionally, it is not clear that the Air Force or DOD would be entirely comfortable with NASA in that role. Other civil agencies with space responsibilities are possible homes, for example FAA/AST, which has at least an arguable claim to jurisdiction in the matter. However, they do not currently have the technical capabilities to perform the task, and also share the issue of trustworthiness from the viewpoint of the defense/intelligence community.

A US Space Guard on the Coast Guard model has the major disadvantage of not actually existing, but as a theoretical possibility it has a number of uniquely attractive features. As a uniformed, armed service formed partly from the USAF, it would be considered trust worthier than other options by the defense and intelligence communities. It would have experience in handling classified space data and would understand the defense and intelligence communities' concerns in the matter. Its personnel would be subject to the UCMJ, which would also be a factor in trustworthiness. At the same time, it would be familiar with the civil space users community and interact with them continuously, and be sensitive to their concerns. It would be seen as a non-DOD agency by other international partners and thus avoid some of the potential for antagonism that a DOD agency might have.¹ (Offline discussions with a foreign diplomatic representative familiar with these issues concurred with this judgment.) The USCG interacts with foreign parties extensively and has little problem in doing so. And being a regulatory agency, it would have within itself the multiple competencies needed to be the point agency on the US's whole range of space debris and mitigation, which is an argument for giving it the civil side of the SSA function.

Although the political issues of forming a US Space Guard are non-trivial, its potential

advantages in the role of US civil participant in an international SSA data sharing system are substantial. Combined with the other attractive features such an agency might provide, it suggests that further discussion and study of this concept is merited.

¹ McKinley, Cynthia A. *The Guardians of Space: Organizing America's Space Assets for the Twenty-first Century*. *Aerospace Power Journal* - [Spring 2000](#)

² Weeden, Brian. *Billiards in Space* (<http://www.thespacereview.com/article/1314/1>)

³ Personal communication with Stuart A. Kreiger

⁴ *Project Feed Back Report*, The RAND Corporation, Santa Monica, CA 1954.

⁵ McKinley, op. cit.

⁶ Jacobs, Jane *Systems of Survival: A Dialogue on the Moral Foundations of Commerce and Politics*: Vintage, New York, 1992