

The Guardians of Space

Organizing America's Space Assets for the Twenty-First Century

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WHEN IT COMES TO exploiting space for national security and economic prosperity, the United States is without peer. For over four decades, this nation has led the opening of the space frontier and has achieved unprecedented successes. We have developed new technologies; launched spacecraft into Earth orbit and beyond; and learned how to

use spacecraft to better understand our planet, quickly communicate, disseminate information, warn of attack, and locate people and infrastructure on Earth. We have walked on the Moon and peered in awe at the surface of Mars and newly discovered solar systems.

But these past successes do not guarantee future successes. Maintaining our historical level of achievement demands that we consolidate current and future space services

*This essay owes its existence to Col Evan J. Hoapili's constant prodding and to our numerous discussions in 1998. Were it not for his encouragement (and insistence) that I set pen to paper, the Space Guard concept would still await illumination.

functions in one organization.¹ This article unveils the recommended organizational structure for our nation's space assets by examining the changed frontier and the imperatives that demand change, and by using the already successful historical model of the US Coast Guard as a springboard for future success. The recommended organizational structure promises to free the Air Force to pursue its aerospace power vision and allow this nation to use space assets most effectively and exploit space successfully in the coming decades.

The Changed Frontier

As is the case with the opening of any frontier, once opened, both the participants and the frontier are forever changed. Only four decades after its opening, the space frontier is already noticeably different.

Whereas space operations were once highly specialized and infrequent, many are now normalized and routine. Space services that initially supported an insular set of users are blossoming into global utilities. By opening the space frontier and ushering in the information age, we are connecting our daily lives to spacecraft orbiting far overhead. As barriers to entry fall left and right, the original US space team—the National Aeronautics and Space Administration (NASA), the military services, and the National Reconnaissance Organization—continues to be joined by an ever-increasing number of worldwide commercial space start-ups and civil entities exploring their own newfound space equities. In short, the nascent frontier—the once restricted domain of space characterized by high costs, low experience, and uncertain technologies—has already become the “common ground.”

Imperatives for Change

This environment creates three kinds of tension in the three space sectors (i.e., national security, civil, and commercial sectors). Cultural and funding tensions are creating pressures within each sector, and organiza-

tional tensions are causing strife among organizations.

Cultural Tensions

Organizations are created to accomplish a unique set of missions. As its members embrace those responsibilities, a culture that epitomizes the organization's sense of identity forms around those core missions. When the organization begins to extend itself beyond this *raison d'être*, cultural tensions quickly emerge.

The Air Force, for example, was formed to “fly and fight,” and the words *global reach*, *global power* best convey its sense of identity. With its fly-and-fight self-image, a degree of friction has always existed between the Air Force's air and space cultures. At the heart of this discord lies the fact that today's space capabilities remain outside the Air Force's sense of identity.

During the past decade and a half, this discord has been thrust into the spotlight each time the service's leadership has attempted to erase the cultural gap by force-fitting space operations into the Air Force's sense of identity. The Air Force's methods have included attempts to operationalize, normalize, and, of late, integrate space operations. The first two did not bridge the gap, and the last, despite its far more aggressive execution, will have the same result—but for reasons that bear explication.

First, a fundamental cultural dichotomy separates today's air and space communities: the difference between war fighting and support—between war-fighting and non-war-fighting cultures. Both war fighting and support are essential for national security, but the world in which each operates has different demands and expectations. At the most basic level, air warriors think in airpower war-fighting terms: operating and sustaining aircraft at bases, flying to targets, accomplishing a mission, and returning to base. They think in terms of campaign planning, operational art, and tactical success. Today's space operators think in terms of space services support: placing a satellite on orbit, continuously exploit-

ing its data, and sending its critical data to people who need it. These characteristics represent two equally important yet distinct cultures: one based upon a war-fighter mind-set and the other upon a support mind-set. Like trying to mix oil and water, it is, quite simply, unrealistic to expect the two to become one.

The drive to merge these two distinct cultures through integration has its roots in the fall 1996 Corona meeting of the Air Force's senior leaders. Although they originally viewed integration as a method by which to guarantee continued Air Force stewardship of space, within months of the meeting, integration was being interpreted as the necessary and sufficient condition by which the Air Force could seize the opportunity to call itself an aerospace force.

At the outset, it's important to note that the Air Force is the premier military organization for exploiting the aerospace. No other service can claim to have a war-fighting culture or vision that so fully embraces aerospace power. From day one, the Air Force's culture, core competencies, and sense of identity have been wrapped in its ability to provide global reach and power on behalf of our national interests. Indeed, the Air Force's transformation into an aerospace force should occur sooner rather than later, but to effect this transformation, the Air Force must grasp the true meaning and indicators of being an aerospace power. In addition to its inability to bridge the chasm between war-fighting and non-war-fighting cultures—regardless of the level of commitment and awareness—integration will not transform the Air Force into an aerospace power for at least two reasons.

Integrating space capabilities and personnel into mainstream Air Force operations and staffs neither equates to nor creates aerospace power in its most visionary sense. We will achieve aerospace power when we take the revolutionary leaps to foster new ways of employing forces and new ways of conducting warfare. We will achieve it when we directly employ space-warfare platforms to achieve military objectives.

In addition, the Air Force isn't alone in its quest to better integrate space capabilities. All of the military services face similar integration challenges and opportunities, the end state of which is spelled out in *Joint Vision 2010*.² To say that using space services to improve airpower makes the Air Force an aerospace force means that using space to improve land or sea power makes the Army a land-space force and the Navy a maritime-space force. Providing only space services and integrating those services into mainstream air operations will not create aerospace power. Again, the key to becoming an aerospace power lies in the operational use of space as a war-fighting medium.

The Air Force will achieve its vision of becoming an aerospace force, but it must first have aerospace power capabilities—that is, the attainment of aerospace power must precede the service's claims of being an aerospace force. Throughout our nation's use of orbital space for national security, the Air Force's war-fighting operations have been restricted to atmospheric war fighting. This will change early in the first half of the twenty-first century. The capabilities that will allow operational exploitation of the entire aerospace medium, create aerospace power, and allow the Air Force to change its moniker to Aerospace Force are already on the drawing board.

The most obvious example is the Space Operations Vehicle (SOV).³ Within two decades, this vehicle will allow the United States to project power, not in the several hours it does today but in minutes. It will allow the United States to project power, not just within the atmosphere but in orbital space, in the atmosphere, and to the surface of the planet. This, along with other future capabilities, will naturally extend the war-fighting responsibilities of airmen into the entire aerospace medium. In short, in the next couple of decades, the Air Force's core competencies and visionary concepts will transform it from an air force into an aerospace force that operationally employs both air and space platforms to achieve our nation's military objectives.

But we are speaking of the future—not the present. Despite valiant efforts to force the Air Force's air and space cultures to merge, the gap between the service's sense of identity and its current space responsibilities remains. For the Air Force to achieve its vision of becoming an Aerospace Force, it must focus its space efforts on those systems that fit within its global reach, global power identity. Furthermore, it must relinquish its non-core, non-war-fighting responsibilities for providing space services.

Although the Air Force's leadership has not realized this fact or the magnitude of its implications, evidence exists that some senior leaders are beginning to discover it. During the past couple of years, the Air Force's senior leadership has found itself concurrently defending its space stewardship role while questioning, for example, its primary management of launch ranges—especially now that commercial activity outpaces government launches. It is becoming increasingly obvious that few of today's space-related activities fall within the Air Force's core competency of providing global reach and power.

Similar cultural tensions are apparent in other sectors of the space community. NASA faces internal struggles when it contemplates routine shuttle services, continuous replenishment of the international space station, astronaut rescue, and satellite repair instead of sticking to its science, research, and exploration charter. NASA questions how providing routine space shuttle operations—especially to the international space station—fits with its traditional focus on exploration. Similarly, the Federal Aviation Administration (FAA) questions its potential role as provider of both air- and space-traffic control.

These cultural stresses are natural. When organizations extend themselves beyond their sense of identity, cultural frictions inevitably arise. These tensions do not lessen the relative value of the missions in question. Quite the contrary, the missions remain vital and essential. Conducting shuttle flights and managing launch ranges are clear examples. But as the missions extend beyond the orga-

nization's *raison d'être*, cultural tensions will and must emerge.

Funding Tensions

This cultural stress is exacerbated by a second area of tension—funding. Today's zero-sum budget environment does not provide enough money for organizations to support both their core competencies and other essential, though ancillary, functions. Resentment over these extra responsibilities can arise because often they are “must-pay” bills. For example, NASA cannot ground the shuttle, and the Air Force cannot close its launch ranges without causing widespread outcry. Indeed, in many cases, the majority of users of space services resides outside the organization paying the bills.

A prime example is the Global Positioning System (GPS). The more we use GPS for human safety measures, the closer it approaches the status of a utility that the world population daily relies upon and that the United States finds itself obliged to provide. In the end, must-pay ancillary functions consume funds that otherwise would have been invested in an organization's core competencies.

This tension is particularly acute for the Air Force. A popular complaint against the service is that when it comes to choosing between air and space programs, air always gets 51 percent of the vote. This implies that the Air Force is parochial in its choices between air operations and space operations. It is not. Nor is it even close to being in a position that allows it to do so. The Air Force is not yet “comparing apples to apples” and will not get to that point of the debate until we stop rigging the game in favor of space services—until we do something about the must-pay ancillary bills.

In other words, the Air Force is not at the point at which it can debate the pros and cons of air war-fighting platforms versus space war-fighting platforms. It is not at the point at which it can debate the relative value of F-22s versus SOVs and airborne lasers versus space-based lasers. It is still pitting war-fighting platforms against support platforms—and those

support platforms, those space services such as launch ranges, navigation, surveillance, and so forth, comprise the largest of the must-pay bills.

This debate is fundamentally different from the traditional ops-support or tooth-to-tail decisions of the past. With space services, one cannot use the familiar models and processes that work so well with systems such as tankers and transports. This is true for at least two reasons.

First, space services are absolute. In the air business, aircraft need support from tankers. The size of the tanker force depends upon many factors: estimated operations tempo, employment strategies, projected threats, size of the supported fighter and bomber fleets, and so forth. Trade-offs with any of these variables can increase or decrease the number of tankers needed. This is not the case with space services.

Because space services provide a global, ubiquitous service, once a decision is made to provide a capability, the infrastructure requirements quickly become immutable. For example, regardless of the number of GPS receivers—one or one million—the satellite constellation must be a certain size in order to provide navigation services. Regardless of whether we expect a detection system to report on one missile launch or a multitude, if the nation wants to use space-based warning systems, it must procure and maintain a certain minimum number of satellites and processing stations.

Second, space services tend to be more open systems. Tankers, for example, can support only certain types of aircraft. GPS, weather, communications, and other satellites support any user who possesses the equipment to receive the signals. Consequently, many space services have become or are becoming global utilities, adding an external layer of pressure during internal funding trade-off deliberations.

For example, the Air Force may decide to take a calculated risk by limiting the number of tankers it buys. It can do so because its decision affects mostly itself or other military

forces. The same situation does not apply to space services. The Air Force cannot take a similar calculated risk with launch ranges, navigation satellites, warning systems, and similar services because they support so many non-Air Force, nonmilitary, and even non-US users.

Under today's configuration, the Air Force is expected to equally prioritize funding opportunities for its own direct war-fighting capabilities as well as its own and its customers' support needs. These space services represent non-core, non-war-fighting services that carry some of our nation's largest must-pay bills. Responsibility for these space services keeps the Air Force from pursuing its aerospace vision. Functioning as a premier power projection force while at the same time functioning as the provider of space services to a multitude of customers pulls the service in opposite directions. To achieve aerospace power and become an aerospace force, the Air



Continued tensions among private space-launch contractors, the Air Force, and NASA are causing America to fall behind in space access.

Force must be allowed to carve out the space services portion of its current responsibilities.

Organizational Tensions

The third tension occurs among organizations. Organizational frictions arise as the domain draws more players and competing interests. As they go about their business, the players define niches and defend equities. For the space arena, the number of players and their linkages depict a tangled undergrowth. It is often difficult to know whom to consult to resolve policy issues, answer questions, or get help. The flip side is equally difficult. The organization receiving the call often does not know how to (or even whether it should) respond. For example, is it an Air Force responsibility to provide orbital collision avoidance data or analysis of satellite malfunctions to commercial interests? If not, to whom should these companies turn?

With the maturing of space exploitation, these three tensions are creating a universal sense of frustration. Commercial organizations feel hindered by government organizations that are not keeping pace with their rush to market. Civil organizations feel overburdened by essential operations that lie beyond their equities. And military visionaries who see future space operations as key enablers of a revolution in warfare feel tethered by a seemingly unsupportive infrastructure.

Organizing for Future Success

The path our nation should follow for successful space exploitation must strike a balance between mission requirements, core competencies, visions, and government responsibilities. It must account for the "common ground" space environment; reduce inherent tensions; resolve competing civil, military, and commercial interests; increase opportunities; allow the Air Force to achieve its vision to become an aerospace force; and continue to provide the space services upon which our nation depends. Arriving at the optimal organizational structure requires analy-

sis of the space functions of today and the near future (table 1).

Table 1
Space Services Functions

- Range Management
- Navigation
- Spaceport Security
- Orbital Slot Protection
- Spectrum Use Monitoring
- Dealing with Piracy
- Dealing with Interference
- Space Surveillance
- Collision Avoidance
- Debris Mitigation and Cleanup
- Space Environment Research
- Terrestrial Weather
- Solar Research
- Astronaut Rescue
- Satellite Repair

These functions are currently performed by a variety of organizations throughout the three space sectors. As a result, no unifying organizational structure exists, and there is no possibility of these functions working seamlessly toward a national-level space exploitation objective. Interestingly, for another environmental medium, our nation has pulled similar functions together under the rubric of one organizational structure. This past success offers a notional organizational guide for our space future.

The United States Coast Guard

Between 1915 and 1942, the United States government consolidated the functional responsibilities of five separate government services to form the United States Coast Guard. It combined the "sea services" types of functions under one organization to provide better service to the nation and to ensure that the Navy was not encumbered by responsibilities that lay beyond its core competency of prosecuting campaigns and defeating other navies.

The Coast Guard's roots reach back to 1789 with the formation of the Lighthouse Service. Although all seafarers depended upon its support, the service was not assigned to the Navy. Instead, a separate federal service had the re-

sponsibility for guiding seafarers through the dark of night and fog of day. During the course of the next one hundred years, the Treasury and Justice Departments organized four other sea-related federal services—the Revenue Cutter Service, Steamboat Inspection Service, Life-Saving Service, and Bureau of Navigation—to satisfy the pressing needs of our nation. Consolidation of these five federal services began in 1915, when the Revenue Cutter Service and Life-Saving Service combined to form the Coast Guard. The final consolidations occurred between 1939 and 1942, when the Coast Guard assumed responsibility for the Lighthouse Service, Steamboat Inspection Service, and Bureau of Navigation.

Throughout its history, the Coast Guard has flexed with the needs of the nation. In times of peace, it attached to the Department of the Treasury (from 1915 until 1967) or the Department of Transportation (DOT) (from 1967 to the present); when the nation was at war during those spans of time, it served under the command of the Navy. During each war from the War of 1812 to the Persian Gulf War of 1991, Coast Guardsmen stood shoulder-to-shoulder with the Navy’s sailors to fight for our nation’s interests. Each time, they complemented the Navy’s capabilities to provide the full array of sea-related military tools needed by our nation.

Just as important as the observation that the Navy and Coast Guard can complement each other within the same medium (the sea) is the parallel between Coast Guard missions and current or emerging space missions. The evolution and formation of the Coast Guard’s missions reflect the importance of sea-based trade to the economy, of access to the sea by private citizens, and of the sea itself to national security. Orbital space now has that same level of importance to America’s economy, standard of living, and national security. A quick comparison of traditional Coast Guard responsibilities and space requirements provides a telling story (table 2).

Table 2
Coast Guard Responsibilities and Space Requirements

<i>Today's Coast Guard Provides</i>	<i>Space Exploitation Requires</i>
<ul style="list-style-type: none"> • Waterways Management • Aids to Navigation • Seaport Security • Fishing Protection • Treaty Enforcement 	<ul style="list-style-type: none"> • Range Management • GPS • Spaceport Security • Orbital Slot Protection • Spectrum Use Monitoring
<ul style="list-style-type: none"> • Dealing with Piracy 	<ul style="list-style-type: none"> • Dealing with Piracy • Dealing with Interference
<ul style="list-style-type: none"> • Boating Safety 	<ul style="list-style-type: none"> • Space Surveillance • Collision Avoidance
<ul style="list-style-type: none"> • Environmental and Pollution Control • Ice Operations, Science, and Weather 	<ul style="list-style-type: none"> • Debris Mitigation and Cleanup • Space Environment Research • Terrestrial Weather • Solar Research
<ul style="list-style-type: none"> • Boater Rescue 	<ul style="list-style-type: none"> • Astronaut Rescue • Satellite Repair

What jumps out isn’t just the similarity in functions, but also the realization that the Coast Guard model represents the best organizational structure to accomplish these tasks. It provides services to several departments of government and sectors of the economy. Its mission responsibilities represent public goods. At all times, the government retains the option to designate the Coast Guard as a war-fighting component when it needs to do so for national security. Of particular note, the Guard bridges the tenuous area created when it becomes necessary to employ military forces in a zone designated for peaceful exploits. For example, no one seriously considers that a Coast Guard presence “militarizes” the Great Lakes. Finally, the Coast Guard’s ability to shift between DOT and the Department of Defense (DOD) shows that no seam exists on the water, despite having two sea-faring services.

Looking at the above list of Coast Guard missions, one might ask whether it would make sense to place those missions in the Navy if we were to start today with a clean slate. The answer is no—because of the same core competency, war fighting versus must-

pay support, and organizational tensions outlined earlier.

The United States Space Guard

Looking at the space side of that list, we must ask the inevitable question, Should these existing and emerging space functions reside separately across several departments? The answer is no—there must be a better way.



The GPS is a space service similar to maritime navigation managed by the US Coast Guard.



What follows is a suggested organizational structure for the nation's space assets. The proposal offers the potential of satisfying and resolving the competing civil, military, and commercial interests and inherent tensions. It frees the Air Force to realize its vision to become a fully capable aerospace force, and it goes well beyond the "divest a program here, outsource a program there" methods currently under consideration.

The recommended organizational structure for space services is the United States Space Guard (USSG), a fusion of civil, commercial, and military space personnel and missions. Although an armed service and a ready instrument of national policy, the USSG would remain an operating administration of the DOT for day-to-day operations. In times of crisis, it may be designated as an arm of the United States Air Force. The Space Guard's funding should come not only from DOD coffers, but also from all military, civil, and commercial enterprises that benefit from its services.

In the near term, the Space Guard's responsibilities should include all space operations currently tracked under the national space policy's mission areas of space support, force enhancement, and space control. It should work existing issues such as spaceport safety and security, satellite design, debris minimization, and more. Like the historical evolution of its coastal counterpart, the USSG should soon assume responsibility for missions such as fixing disabled satellites, resupplying stations, refueling satellites, eliminating space debris, conducting astronaut search and rescue, monitoring treaties and sovereignty issues, arbitrating spectrum interference, and controlling space lanes.

Its personnel should come from existing space structures such as those found within the military, NASA, DOT, FAA, and others. Regarding the career progression of USSG personnel, they will have space services opportunities ranging from space launch and range operations, to satellite tracking and commanding, to on-orbit mission specialties. The Space Guard will at all times be com-

manded by general officers schooled, trained, and experienced in space specialties. Space professionals will have a clear and broadened career path, and other space specialists will lead them.

Pursuing the above recommendation results in an organization dedicated to civil space concerns, acceptable to many space stakeholders, and involved in national security—all the while allowing other organizations to focus on their core competencies.

Implementing the proposed model and preparing our nation's space forces for the future require the Air Force to return to its roots, to refocus its attention on its core war-fighting responsibilities, and to accept the fact that it must let everything lying outside the framework of global reach and global power find a new home. In short, it means that the Air Force must accept the imperative for a fundamental divestiture of all space services. By divesting space services, the Air Force will be free to focus on its core war-fighting responsibilities. It will be unencumbered by the enormous financial responsibilities of administering the nation's space services. Its culture will encompass the flying and fighting corps that has served it so well throughout its history. And it will be able to dedicate its space efforts to developing the future space force application systems that will finally allow it to claim the aerospace title. On a larger scale, the nation will have reduced the size of its force structure while improving its ability to exploit space for national benefit.

Conclusion

Space systems affect each of us daily. We learn of world events, communicate, and con-

duct business via satellite links; view distant galaxies via space-based telescopes; and consider it inevitable that we will eventually mine asteroids and planets to improve life on Earth. More than ever before, space is connecting the far reaches of our planet, exponentially increasing the rate of learning, and becoming the gateway to world economic growth.

The imperative for our original space team to divest is inescapable. We must do this smartly and in a manner that supports the needs of our nation and the space sectors. The only remaining decision entails finding the model that offers the best hope for success. The common ground of space is an internationally exploited domain, and our nation needs a multiagency organization to oversee its interests there.

The strength of the Space Guard concept lies in the fact that it takes space services in the same direction as space exploitation, resolves long-standing challenges, and frees the Air Force and others to refocus on organizational core competencies. It solidifies our space effort, clarifies organizational responsibilities, and unifies the many, disparate drumbeats demanding change.

The time for action is now. The USSG is the right organization for successful exploitation of space in the twenty-first century. As the exploitation of space changes, so must our space forces change. The government must retain oversight of the space services that both enable warfare and can be viewed as public goods. The commercial sector must stay ahead of its international competitors. A civil-military space service—the Space Guard—is our best hope for satisfying the competing interests of all government and commercial sectors. □

Notes

1. *Space services* refers to space-related support activities including, but not limited to, launching satellites, operating spacecraft, and providing or exploiting space capabilities such as communications links, navigation signals, weather information, and environmental sensing data. See also table 1.

2. *Joint Vision 2010* (Washington, D.C.: Joint Chiefs of Staff, 1995).

3. The SOV has also been called the Transatmospheric Vehicle and Military Space Plane.