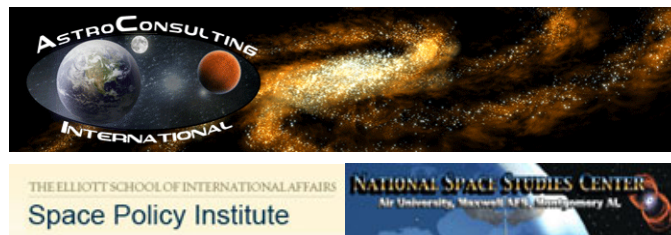


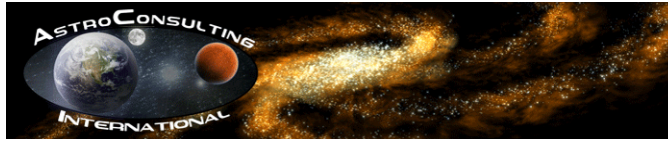
# Towards a National Space Strategy

## Executive Summary

### National Space Strategy Project

Astroconsulting International  
Secure World Foundation  
Space Policy Institute  
National Space Studies Center





#### **ABOUT ASTROCONSULTING INTERNATIONAL**

**We empower Space, Defense and Environmental programs and projects with the critical skills to Optimize Outcomes.**

**We address challenges facing Security, Civil and Commercial space by providing Organizational Consulting, Research of Best Practices and Professional Education.**

**We are committed to Innovation, Integrity, Excellence and International Collaboration to serve clients and partners worldwide.**

**Astroconsulting International LLC**

**830 E Cache La Poudre**

**Colorado Springs, Colorado 80903**

**[Info@AstroConsultingInternational.com](mailto:Info@AstroConsultingInternational.com)**

**[www.astroconsultinginternational.com](http://www.astroconsultinginternational.com)**

**719.393.5294**

## **Principal Investigator and Editor**

**Eligar Sadeh**

*Astroconsulting International*

## **Cooperating Investigators**

**Ray Williamson**

*Secure World Foundation*

**Brian Weeden**

*Secure World Foundation*

**Victoria Samson**

*Secure World Foundation*

**Scott Pace**

*Space Policy Institute*

**John Sheldon**

*National Space Studies Center*

**Tom James**

*National Space Studies Center*

## Project Overview

This Executive Summary provides an overview of the discussions and initial thoughts on developing a National Space Strategy for the United States generated by a group of experts who attended a workshop held 4-5 February, 2010, at the Space Policy Institute in Washington, DC, as part of the National Space Strategy Project. A full report of the workshop is available at:

<http://www.astroconsultinginternational.com>

The National Space Strategy Project is an effort led by Astroconsulting International, Secure World Foundation, The Space Policy Institute and the National Space Studies Center to identify and assess issues surrounding the development of a space strategy relevant to the United States Government (USG). The project is intended to establish the intellectual foundations and concepts that will enable an eventual strategy to be developed.

Over the last several years, multiple “blue ribbon panels” and commissions concluded that the United States needs a national space strategy. The purpose of strategy is to coordinate, integrate and prioritize the space activities of the USG across all sectors. Without strategy space activities continue to provide great value, but remain removed from the overall strategic picture of the United States, and it is increasingly difficult to identify and execute long-term projects and goals. Optimizing the use of space is essential, as dependence on and use of space is accelerating and space is increasingly integrated in the fabric of activities across security, commercial and civil sectors.

The project identified a number of separate topics critical to development of a national space strategy, which are divided into three parts: intellectual foundations, political challenges and specific issues that crosscut security, commercial and civil space. The end products of the National Space Strategy Project will be a series of articles to be published in the journal *Astropolitics* in fall 2010 and in a book in the Routledge series on *Space Power and Politics* in 2011.

### **1** Towards a National Space Strategy

# Executive Summary

## Working assumptions

1. National space strategy can either be formulated as an overarching grand strategy or as a limited strategy covering specific areas of concern and common problems that crosscut the space sectors. Both of these approaches have their advantages and disadvantages, and in either case, strategy provides guidance for USG agencies and the USG can use strategy to evaluate and hold accountable the various agencies that implement space programs and projects.

2. The USG does not suffer from a lack of National Space Policy, which has been fairly consistent and robust since the beginning of the space age. National space strategy provides a roadmap for connecting ways and means to achieve ends established by the national space policy. Strategy is the link between policy and programs.

3. National space strategy development must proceed on the basis that resource constraints and flat budgets for space programs and projects will be the norm in the near- and mid-term. Within this context, space strategy development should account for how best to deal with gaps between policy, programs and projects and budgets. For a national space strategy to be effective, it must serve as a guide to allow for decisions on requirements, budgets and operations, and guide major decisions, actions and trade-offs that are necessary given resource constraints.

4. National space strategy development should take a “whole-of-government” approach. In addition to a focus on hardware development, capabilities and operations, this approach should address issues across security, civil and commercial space sectors and consider regulatory, diplomatic and legislative factors.

5. Space users share a set of basic strategic goals: to secure the space domain for everyone’s peaceful use; to protect legitimate space assets from various types of threats; and to derive value from space assets for security, economic, civil and environmental ends.

## Intellectual Foundations

Strategy links power to purposes, serves and fulfills policy and provides a means by which to prioritize the uses of space for maintaining advantages for the United States. Clearly, the formulation of strategy would be beneficial to the USG, yet as strategy is established the United States needs to address a number of challenges.

- Develop consensus around a common theme – strategy must serve multiple and diverse constituencies.
- Strategy is about the future, which is unknowable and unpredictable.
- Strategy should account for all doctrinal options – from dominance to institution-building – and apply whatever is appropriate at the time.
- Strategy is counterintuitive and paradoxical, e.g., in order to maintain our technological edge, we need to increase competition and reform export controls.
- Strategy is only as good as the strategists. The development of strategy must be accompanied by the development of people who will implement strategy and will make strategic choices.
- Strategy needs to account for the reactions of other space actors and spacefaring states.
- Strategy should mitigate resource constraints by prioritizing space within the USG and by stimulating private sector development.
- Strategy should provide for sustainable uses of space and effective space governance of common problems, such as orbital debris, spectrum and orbital slot allocations .

*“Strategy links power to purpose and fulfills policy...it is about the future, which is unknowable and unpredictable”*

## Political Challenges

It is vital to focus on the processes of formulating and implementing strategy and the attendant policy, planning and budgeting issues. It is an issue of practicality and feasibility to avoid overreaching with strategy formulation and underperforming with implementation. Prioritization and trade-offs that are needed given resource constraints are impediments to successful implementation, especially in light of entrenched interests among agencies and bureaucracies that implement programs and projects. Budgeting is at the heart of implementing a strategy. In

*“Budgeting is at the heart of implementing a strategy. In addition, there is the challenge of meeting the interests of the many stakeholders in the space arena.”*

addition, there is the challenge of meeting the interests of the many stakeholders in the space arena. The tendency is to either overreach with the complexity of the system under development or to adopt approaches that seek the lowest common denominator approach, both of which lead to underperformance and poten-

tial failure.

Without top-level commitment, direction and common interests that crosscut the implementing agencies and the space sectors, year-to-year budget battles will dominate implementation. A strategic framework is essential to guide top-level decision-makers and to maximize mutual benefit to agencies so that their interests are to work together.

There are issues with the process that leads to strategy. Ideally, there should first be policy formulation, then strategy directed at how to fulfill policy, followed by plans and budgetary allocations to implement plans. In practice, all this is reversed – i.e., the budget is first, then strategy is developed usually at the agency-level and finally a policy is put forward. This leads to strategies that are not as effective and that fall short in providing top-level guidance and commitments that are essential.

## Security, Commercial and Civil Space

Strategy should address the fact that the traditional boundaries between security, commercial and civil space are no longer applicable for many space activities that crosscut these sectors. The organizational structure of U.S. space activities that operates by distinct sectors – security, commercial and civil – is a legacy of U.S. history in space, and does not currently reflect the current operational realities across many space assets and services. Strategy and unity of effort is needed to best make use of multi-use capabilities as well as to best protect space assets.

An essential component to develop strategy and unity of effort in space is to secure the attention and commitment from senior decision-makers, such as the President and key members in the Administration and Congress. In many ways, space is seldom a stand-alone policy area for the USG and is usually a subfield of some other foreign policy or national interest. Given this, interest among senior decision-makers can be developed when space is used as a means for some other policy end rather than a goal in-and-of-itself.

Since U.S. space activities exist among security, commercial and civil space, it is worth considering the set of common issues and concerns that can provide for strategy and unity of effort among the sectors. At issue for greater cooperation and unity of effort among the three space sectors, is to identify and emphasize the mutual and common benefits that each sector can derive from space and to work to lessen the barriers between the sectors that disrupt cooperation.

*“Strategy should address the fact that the traditional boundaries between security, commercial and civil space are no longer applicable for many space activities that crosscut these sectors.”*

## Space Launch Capabilities

A key implication for the consideration of space launch strategy is that most space launch customer groups do not view cost to orbit as the driving issue. The essential requirements for most customer groups - and the ones that dominate the customer base today - are high-reliability, assured access and schedule assurance.

There are a number of questions a space strategy would need to address in relation to space launch. Since the historical single-minded focus on cost has not really produced lower launch costs, what happens if a significantly cheaper launcher does come along? What is the role of government in space launch and how much support is required for commercial space launch? What incentives can the government provide? How much demand is needed to sustain multiple launch systems?

*“The essential requirements for most [launch] customer groups...are high-reliability, assured access and schedule assurance.”*

The issue of the space launch workforce is critical to take into account for strategy, including the cross-functions of commercial, military and private workforce issues. Other key factors for strategy are the issues of a government role and out-sourcing space launch on a commercial basis. There also exists a newfound USG reliance on foreign launchers for human spaceflight in light of the forthcoming Space Shuttle termination. Clearly, export controls and International Traffic in Arms Regulations (ITAR) gets brought into play when you consider space launch strategy.

## Space Program and Project Development

A national space strategy should integrate the needs of national security, civil government and commercial customers when it comes to developing space assets, capabilities and infrastructure. However, there are a number of challenges to overcome in meeting these ends, including conflicting requirements and priorities; a wide range of conventional and unconventional threats; cyber security moving to a higher priority; contractors that can successfully execute on programs and assume some of the research and development (R&D) and financial risks to allow current and developing technologies to be delivered; cost and schedule overruns; delivering less than we promised or failing to meet our commitments; and high-end capabilities at too high of a price.

National space strategy needs to be sufficiently enduring and compelling in the face of these challenges. But moving toward the long-term view on space would be one step. Space programs are difficult to execute and easy to derail. Even if we do not have a strategy, we need to restore the lost art of programming – making hard choices up front with regard to what requirements are truly needed and committing the resources to make them work. In addition to continuing the “back to basics” approach rooted in systems engineering practices, we need a highly-qualified workforce.

There are a set of specific program and project issues that strategy can address:

- The reconciliation of requirements with stakeholders and budget realities.
- More consistent acquisition planning.
- Government block buys to not incur breaks in production lines, which carry great consequences for smaller subcontractors and sometimes force them out of business leading to the erosion of the space industrial base.
- Reform of USG export policies and laws that can make it extremely difficult to make international sales, while strengthening international competitors .

## Strategic Management and Capabilities

One important theme to keep in mind as we consider the development of strategy is to build upon the current set of capabilities that exist within the parameters of cost and risk that are acceptable. Within the context of program and project management, strategic management approaches should inform space strategy. An essential part of this is to assess how capabilities and the associated development of technology drive management, which helps to implement strategy.

One key function of strategic management is to optimize the use of scarce resources to achieve organizational goals and outcomes. In strategic management, the task of organizational leaders is to assess and anticipate environmental threats as well as understand and develop organizational capabilities. Leadership then formulates and implements strategies that achieve the goals and objectives of the organization. These strategic formulations and implementation plans guide key decisions that span multiple organizational units over the years of program and project development.

Strategic management and its relationship to the development and implementation of innovative technology is an integral part of any discussion of national space strategy. In essence, the call to optimize space assets for the national interest of the United States is a call for the strategic management of space related resources and capabilities. Therefore, elements of strategic management, innovation and technology management are important in a discussion of processes supporting a national space strategy. Specifically, if a national space strategy is capabilities-based, it will remain focused on building and executing space capabilities that support national priorities, including space policy and doctrine.

*“Strategic management and its relationship to development and implementation of innovative technology is an integral part of any discussion of national space strategy.”*

## Space Industrial Base

The key strategic question to address is to what degree will we enable or constrain the space industrial base that forms the basis for what we want to do in space? Will our space industrial base be one to remain dependent on USG contracts? Will a true market economy across all space sectors develop? The emergent strategy to date is for the USG to essentially serve as the space industrial base, at least in terms of government contractors, rather than real and truly privatized commercial entities. Yet, can the commercial sector continue to rely on the USG given flat to declining budgets over the mid-term future?

There are both strengths and weaknesses to the space industrial base. The U.S. industrial base is very capable in the development of complex, technical and state-of-the-art space systems, and the United States has a high degree of operational autonomy. At the prime contractor level, there has been consolidation to a number of large, diversified and strong companies. Consolidation, while a strength, such as with large-scale systems integration work, may also be limiting competition. The industrial base is weak on optimization in terms of resources allocated by the USG relative to the numbers of spacecraft developed and launched. Research and development spending by the USG and industry is declining. This is compounded by dramatic declines in the aerospace workforce. Further, management and technical performance on key, large-scale space systems is a problem within and across agencies leading to a high degree of duplication and overlap on space programs and projects. Weaknesses are further compounded by inefficient procurement and acquisition systems. The supplier base is also much weaker as they cannot shift resources around as much to cope with disruptions in demand.

Given these weaknesses, what are opportunities for fixing the problems? One opportunity lies with more of a consolidated effort to eliminate the duplication and overlap that exists. New procurement and acquisition models are also needed to provide other opportunities, such as buying services and capability in large batches from government contractors and the commercial sector. The USG does need a coherent and explicit space industrial base strategy to maintain the U.S. lead in space worldwide and to mitigate the potential for a “perfect storm” of weak human capital, weak supplier base and declines in budget, which seriously erode the space industrial base and the lead of the U.S. in the world.

## 9

### Towards a National Space Strategy

## Earth Observations

The U.S. and global approach to observing the Earth from space has not been strategic. Earth observations are driven by scientific interests and by the systems and technologies that are developed. Moreover, there is debate about whether Earth observations should be an element of national space strategy and whether it is complementary or a distraction. Earth observations provide critical information that affects national and economic security, but the scientists that set goals for Earth observations have goals that are

*“Earth observations provide critical information which affects national and economic security.”*

not centered around national security.

The effective management of Earth observations data as strategic information - how to collect, analyze and disseminate and whether and how much to cooperate internationally - is an issue that links this area to national and economic security. There are a number of questions that strategy should address: whose information authoritatively “rules” when Earth observations data exhibit discrepancies; whose job is it to “speak” for the value of Earth observations in military and economic security; who pays for the information as Earth observations assets are not cheap at present; and is international cooperation desirable or even workable in Earth observations if the information is considered of strategic or intelligence value?

The key issue is how to structure the Earth observations enterprise to fit into a national space strategy. If we begin to think of Earth observations as strategic, we will need to change some things in the process, such as taking a long-term strategic view to set the agenda and priorities, and making sure bureaucracies and agencies implement from that agenda. This will require changes in Earth observation funding, organization, implementation and use.

## Space Assurance

The United States is more dependent on space across all sectors than any other State. National security space capabilities enable the United States and its allies to exert global reach and power. Space capabilities are important enablers for successful 21<sup>st</sup> century global economies, information transfer, diplomatic communication and collaboration.

Recognizing the importance of protecting satellites as strategic assets, the United States employs a comprehensive strategy to preserve access to their capabilities. But this protection strategy is largely rooted in the Cold War mindset, which has not evolved to protect against the diverse threats that exist in the current space security regime. These threats include: non-adversary problems, such as orbital debris, spectrum management and space weather; and irresponsible actions or unsafe behavior by any one of the increasing number of space actors.

The new threats serve as a catalyst for reappraisal of the political, diplomatic, economic and technical means the United States must utilize to protect against and defeat threats to space assets. Space assurance should be the strategic goal for the United State. Space deterrence and protection, global engagement, space situational awareness and responsive infrastructure are mutually reinforcing key components of a space assurance strategy.

*“The United States is more dependent on space than any other State across all sectors...New threats serve as a catalyst for reappraisal of the political, economic, diplomatic, economic and technical means to protect...space assets”*

## Space Governance

The nature of the space environment mandates high levels of interdependence among actors, strong incentives for both cooperation and competition, and major spill-over effects from one issue domain to another. National space strategy should not be thought of as an independent national choice, but as an interdependent choice with global effects. When developing a U.S. national space strategy, serious thought should be given to not only to what the United States wants to accomplish, but also to what other states and non-state actors want and where those interests overlap.

*“National space strategy should consider some form of governance to manage the global commons of*

*the U.S. says and does in space affects the choices and actions of other actors, and the ability of all space actors to use and benefit from space over the long-term.*

National space strategy should consider some form of governance to manage the global commons of space. The most plausible approach is one based on governance without government” – different kinds of arrangements for organizing states and other actors so that they can solve shared problems and achieve collective goals without the need for an overarching political authority. A key part of the equation in space governance is how international space situational awareness can help manage and shape global commons problems in space.

Concomitantly, the priority placed on security concerns can work against a global commons approach to space governance. Hence, a strategy dealing with space governance needs to be based as well on a set of shared strategic goals and objectives. A national space strategy should explain why the central problem for the U.S. is strategic reassurance.

*“National space strategy should not be thought of as an independent national choice, but as an interdependent choice with global effects.”*



## Project and Workshop Participants

**Andrew Aldrin**

*Director of Business Development, United Launch Alliance*

**James B. Armor, Jr., USAF (Ret.)**

*Vice President, ATK Spacecraft Systems & Services*

**Isaac Ben-Israel**

*Professor, Tel-Aviv University and former Director of Israeli Space Agency*

**David Chen**

*Principal Research Analyst, Centra Technology, Inc.*

**Damon Coletta**

*Professor of Political Science, United States Air Force Academy*

**Richard DalBello**

*Vice-President, Intelsat Global*

**Daniel Dant, USAF**

*Director of Space Policy, Deputy Assistant Secretary of Defense*

**Shen Dingli**

*Professor of International Relations, Fudan University, China*

**Jeff Foust**

*Senior Analyst and Project Manager, Futron Corporation*

**Joan Johnson-Freese**

*Chair, National Security Decision Making Department, Naval War College*

**Joanne Irene Gabrynowicz**

*Director, National Center for Remote Sensing, Air, and Space Law*

**Nancy Gallagher**

*Asst. Director, Center for Int'l & Security Studies, Univ. of Maryland*

**Steve G. Green**

*Professor of Management, United States Air Force Academy*

**Michael A. Hamel, USAF (Ret.)**

*Senior Vice President, Orbital Sciences Corporation*

**Peter L. Hays, USAF (Ret.)**

*SAIC, supporting National Security Space Office and the Eisenhower Center*

**Kurt A. Heppard**

*Professor of Management, United States Air Force Academy*

**Henry R. Hertzfeld**

*Research Professor, Space Policy Institute, George Washington University*

**Dana J. Johnson**

*Senior Advisor, United States Department of State*

**Alan Ladwig**  
*Senior Advisor, Office of Administrator, NASA Headquarters*

**David Livingston**  
*Founder and Host, The Space Show*

**Molly K. Macauley**  
*Senior Fellow, Resources for the Future*

**Joanne Maguire**  
*Executive Vice President, Lockheed Martin Space Systems Company*

**James Clay Moltz**  
*Asst. Professor, Dept. of Nat'l Security Affairs, Naval Postgraduate School*

**Clayton Mowry**  
*President of Arianespace, Inc.*

**Karl P. Mueller**  
*Senior Political Scientist, RAND Corporation*

**Deganit Paikowsky**  
*Research Fellow at the University of Tel-Aviv*

**James D. Rendleman, USAF (Ret.)**  
*Space Lead, ITT supporting United States Strategic Command*

**Joseph Rouge**  
*Director, National Security Space Office*

**Robie I. Samanta Roy**  
*Senior Advisor for Program Analysis and Evaluation, NASA*

**G. S. Sachdeva**  
*Faculty, Jawaharlal Nehru Univ. and Centre of Air and Space Law, India*

**Kai-Uwe Schrogel**  
*Director, European Space Policy Institute*

**Marcia S. Smith**  
*President, Space and Technology Policy Group, LLC*

**James A. Vedda**  
*Senior Policy Analyst, Aerospace Corp. Center for Space Policy and Strategy*

**Christophe Venet**  
*Associate Fellow, European Space Policy Institute*

**Hiroataka Watanabe**  
*Associate Professor, Osaka University, Japan*

**James J. Wirtz**  
*Professor, Dept. of National Security Affairs, Naval Postgraduate School*

**Victor Zaborskiy**  
*Export Control Consultant, Special Trade Operations Consulting*



## About Secure World Foundation

*Secure World Foundation is a private operating foundation dedicated to maintaining the secure and sustainable use of space for the benefit of Earth and all its peoples.*



*Promoting Cooperative Solutions for Space Security*

Colorado HQ  
314 West Charles Street  
Superior, CO 80027  
United States of America

*tel* +1.303.554.1560

*fax* +1.303.554.1562

Washington Office  
1779 Massachusetts Ave. NW  
Washington, DC 20036  
United States of America

*tel* +1.202.462.1842

*fax* +1.202.462.1843

Vienna Office  
c/o European Space Policy Institute  
Schwarzenbergplatz 6  
A-1030 Vienna, Austria

*tel* +43 1 718 11 18 35

*fax* +43 1 718 11 18 99

[www.SecureWorldFoundation.org](http://www.SecureWorldFoundation.org)