Commercial Space: Confidence Built on a Framework of Law and Policy[1]

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The various space programs of the world have their genesis in the national defense activities of the 1950's and 1960's. Forged in the midst of the Cold War, they were intended, first, as indications of systemic supremacy. Only after the defense imperatives faded could the glimmers of commercial activity become visible. Starting around 1980, commercial space interests began to be heard above the surrounding roar of activity. The 1990's have seen the ascendancy of commercial space over other space activity. In 1997, for the first time, the United States' and worldwide levels of commercial space activity exceeded those of defense and other governmental space programs. Thus, commercial space has come into its own as a multi-national industry, one which builds confidence in the future by the large scale of its operations, partnerships and dependencies.

This result is not a product of pure chance. Instead, it was based on incremental experience (both good and bad), forward thinking policy and legal changes, and the fortuitous timing of the end of the Cold War. This paper will describe some of the major legal changes that took place in the United States from 1980 to the present and analyze the effects they had on the development of commercial space. It will attempt to show that while narrowly focused initiatives often did not achieve the results intended, commercial space activities flourished under broader and ultimately more ambitious policy initiatives. The global nature of the resulting space systems that now exist or are in planning offers the possibility that, over time, the benefits from commercial space systems will be recognized as too valuable to risk by systemic misuse. Such reliance could ease the concern that national security may be threatened by

[2] The views expressed herein are those of the author and may not reflect the views of the National Aeronautics and Space Administration or of the United States.

the development of or reliance on extra-national systems.

While the space program began in the clash of ideologies that underlay the Cold War, there always was a hopeful and inspirational aspect about it. Clearly, there was a strong nationalistic imperative in the first years, when the United States labored to close the "Space Gap" and catch up to the early accomplishments of the then Soviet Union. But even in the early days, there were some indications of a higher purpose; a recognition that activity in space was extraterritorial to such an extent that it could be larger than the nationalistic concerns that were its immediate foundation. Recognition of this can be seen in the preamble to the Outer Space Treaty[3], which bases the treaty, in part, on the belief "that such cooperation will contribute to the development of mutual understanding and to the strengthening of friendly relations between States and peoples."

While the concrete terms and conditions of the Outer Space Treaty are primarily aimed at precluding the use of space and celestial bodies for military purposes and preventing the national appropriation of space, the concept of the peaceful use of outer space is firmly entrenched in the treaty. These uses, however, are not further identified other than to state they should be "carried out for the benefits and in the interests of all countries..."[4] Thus, the early documents, while recognizing that peaceful uses of space are to be encouraged, specifically address national, not commercial uses. No doubt this single-mindedness was a reflection of the high cost and novelty of space activity. Hardly any countries could afford such expensive and exotic endeavors. It was simply not within the range of normal contemplation to consider private, commercial, or for-profit uses of outer space.

The concepts of the Outer Space Treaty dominated the thinking about space in the decade or so after it was signed. Three more treaties were widely signed and ratified[5], but they generally expanded upon concepts that were already present in the Outer Space Treaty. By the end of the 1970s, however, the concept of commercial space activity was recognized and its proponents were multiplying. While planning, execution and launch activity occurred within national boundaries, the inherently global aspects of space operations seamlessly passed over terrestrial boundaries, making it imperative to have international agreements supporting the activity.

[3] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (1967)

[4] Outer Space Treaty, Article 1

[5] They were the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (1968), The Convention on International Liability for Damage Caused by Space Objects (1972), and the Convention on Registration of Objects Launched into Outer Space (1972).

Thus, the Brussels Convention[6], the Intelsat Agreement[7], the ESA Convention[8], and the Inmarsat Convention[9], along with several other international agreements with smaller numbers of parties, were all produced, forming the skeleton upon which the body of today's international space activities could be built.

Within the United States, the concept of space activity separate from national security matters was coming into being. In 1979, NASA issued its first set of guidelines concerning commercial uses of space.[10] In these guidelines, the then-Administrator, Dr. Robert Frosch, linked commercial uses of space to the National Aeronautics and Space Act's[11] (hereinafter referred to as the Space Act) direction that NASA's activities be conducted to preserve "the role of the United States as a leader in aeronautical and space science and technology and in the application thereof..."[12] Dr. Frosch stated that "[s]ince substantial portions of the U.S. technological base and motivation reside in the U.S. private sector, NASA will enter into transactions and take necessary and proper actions to achieve the objective of national technological superiority through joint action with United States domestic concerns." Thus, though the concept of commercial space was introduced into the equation, it was done in a manner consistent with the nationalistic need to prove systemic superiority that was a major underpinning of the Cold War.

By the early 1980's, the concept of a separate "commercial sector" of space activity was forming. In 1982, then-President Reagan issued a new space policy intended to "set the direction of U.S. efforts in space for the next decade."[13] In this document, it became the official policy of the United States to encourage "domestic commercial exploitation of space capabilities, technology and systems for national economic benefit." While the U.S. space policy envisioned a space program with only two components, the civil and national security space programs, the civil program had a specific goal to "provide a climate conducive to expanded private sector investment and involvement in space activities..."[14] Thus, while commercial space activities were not recognized as a separate area of activity, they were, for the first time, explicitly recognized in official U.S. Government policy.

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[6] Convention Relating to the Distribution of Programme-Carrying Signals Transmitted by Satellite (1974)

[7] Agreement Relating to the International Telecommunications Satellite Organization (1971).

[8] Convention for the Establishment of a European Space Agency (1975)

[9] Convention on the International Maritime Satellite Organization (1976)

[10] NASA Guidelines Regarding Early Usage of Space for Industrial Purposes, June 25, 1979

[11] 42 U.S.C. § 2451 *et seq.*

[12] 42 U.S.C. §2451 (d)(5)

[13] White House Fact Sheet, National Space Policy, July 4, 1982

[14] *Id.*

From that point in the early 1980's, the concept of commercial space evolved rapidly. By 1984, commercial space had reached a point where it was mentioned explicitly in President Reagan's State of the Union Address.[15] While this was the same address in which the President directed NASA to develop a permanently manned space station, he also noted that "[c]ompanies interested in putting payloads into space must have ready access to private-sector launch services." And he directed the Department of Transportation to "help an expendable launch services industry get off the ground."[16] Thus, the outlines of a space-based industry of private payloads launched by private launch vehicles was seen as an explicit goal of the United States.

While a viable commercial space industry may have been a goal, it was clear that it would not develop without some help. The Department of Transportation was mentioned in the State of the Union Address as the focal point for commercial space transportation. For NASA, legal direction to participate in the birth of commercial space came via a change to NASA's organic statute. In July 1984, Congress added a new provision to the Space Act, stating "The Congress declares that the general welfare of the United States requires that the National Aeronautics and Space Administration seek and encourage to the maximum extent possible, the fullest commercial uses of space."[17] At essentially the same time, the White House issued a new National Policy on the Commercial Use of Space[18], expanding greatly on the limited mention of commercial space in the overall space policy of just two years earlier. In this new policy, a much more detailed discussion of commercial space is presented and policy support for the commercial sector is expressed in four general categories; economic initiatives, legal and regulatory initiatives, research and development initiatives, and initiatives to implement the National Policy on Commercial Use of Space.

Although there was not a great deal of detail in the new policy, the combined effect of the policy and the change to the Space Act gave impetus to NASA to develop a detailed space policy of its own, and one was issued on October 29, 1984 by then-Administrator James Beggs.[19] In this document, a fuller description of the evolving concept of commercial space appears. Generally, this vision was formed by five guidelines which have appeared in whole or in part in all later space policies. Specifically, the five guidelines were: (1) the Government should reach out to and

[15] State of the Union, January 25, 1984
[16] *Id.*

[17] Section 110(a), Public Law 98-361, July 16, 1984
[18] The White House, Fact Sheet, National Policy on the Commercial Use of Space, July 20, 1984
[19] NASA Commercial Space Policy, October 1984

establish new links with the private sector, (2) the Government should not impede private sector efforts to undertake commercial space ventures, (3) if the private sector can operate a space venture more efficiently than the Government, then such commercialization should be encouraged, (4) the Government should invest in high leverage research and facilities...[but] should not expend tax dollars for endeavors the private sector is willing to underwrite, and (5) to get a significant Government contribution to a commercial endeavor, two requirements must be met; there must be significant private capital at risk and there must be significant potential benefits to the nation.[20]

By the end of 1984, the ideal of a vigorous private, commercial space sector was becoming entrenched, and a general set of ground rules for its development was known. At the same time, real success stories were few and far between. Space communications were becoming a true success, and the need for expanded capacity was driving both satellite technology and launch capacity. Other successes were not obvious, and those looking to obtain launch services in the western world were essentially limited to the Space Shuttle and the Ariane. Although there was some discussion of and attempt to convert some previously U.S. Government-owned expendable launch vehicles into commercial expendable launch vehicles (ELV's), the presence of the Space Shuttle as the launch vehicle of choice in the United States, acted as a serious disincentive to their development. Then, in January 1986, the Space Shuttle Challenger was lost and the rules changed.

One of the first and most obvious manifestations of the change appeared on August 15, 1986. On that date, then-President Reagan issued a formal statement announcing that a replacement orbiter would be built, but stating flatly that "NASA will no longer be in the business of launching private satellites."[21] With the Space Shuttle out of commission and a series of losses of ELV's as well, a total reassessment of space policy was required. By 1988, this was complete and, with the shuttle fleet out of the commercial launch business, a commercial launch industry was rapidly forming in the United States. In February 1988, a new National Space Policy was issued[22] dividing space policy, for the first time, into three sectors: civil, commercial and national security. The commercial space sector

[20] *Id.*, Section III

[21] The White House, Statement of the President, August 15, 1986. The President in his statement also expressed for the first time, the new paradigm for space launch. "Free enterprise corporations will become a highly competitive method of launching commercial satellites and doing those things which do not require a manned presence in space."

[22] The White House, Fact Sheet, Presidential Directive on National Space Policy, February 11, 1988

guidelines borrowed from and expanded upon prior policies and guidelines and specifically set a goal to "[i]dentify and eliminate, or propose for elimination, applicable portions of United States laws and regulations that unnecessarily impede commercial space sector activities."[23] With this, the broad foundation for current commercial space activity was largely complete.

Concurrently with the issuance of the new space policy, a separate, complementary commercial space initiative was also issued by the White House.[24] This document described a three part program "to assure United States space leadership." The three parts were: (1) to establish a long-range goal to expand human presence beyond Earth orbit into the solar system; (2) to create opportunities for U.S. commerce in space; and (3) to continue the commitment to the space station.

Unlike the space policy itself, the commercial space initiative was very specific, not general in nature. The initiative provided explicit support to several efforts that were being discussed and promoted within the fledgling commercial space industry. Among the most notable proposals for "promoting a strong U.S. commercial presence in space" was the direction to support a "Private Sector Space Facility," by having the Federal Government enter an anchor tenant agreement for "an orbiting space facility suitable for research and commercial manufacturing that is financed, constructed, and operated by the private sector."[25] In addition, the commercial space initiative made a specific commitment to launch the Spacehab module, on the Shuttle, manifested as required to meet "customer demand." Finally, the initiative required NASA to make an open, public offer of expended shuttle external tanks in orbit. These tanks would be provided "at no cost to all feasible U.S. commercial and nonprofit endeavors for uses such as research, storage, or manufacturing in space. This commercial initiative was by far, the most specific attempt by the U.S. Government to jump-start a vigorous commercial space industry. The subsequent history of these three efforts tells an eloquent story of the difficulty encountered by Governments attempting to assist specific commercial activities.

NASA was directed to implement the first of the initiatives, the privately developed space facility, later renamed the commercially developed space facility (CDSF). This facility was to complement, not replace, the more capable, permanently manned space station under development by NASA. The CDSF was to be "suitable for research and commercial manufacturing

[23] *Id.*, Commercial Space Sector Guidelines

[24] The White House, Fact Sheet, The President's Space Policy and Commercial Space Initiative to Begin the Next Century, February 11, 1988

[25] *Id.* Section II.1. Private Sector Space Facility.

that is financed, constructed and operated by the private sector." Beyond that, however, the concept of the CDSF was unclear as to size, capability, power and the like. To attempt to narrow the focus of the discussion, NASA issued a draft Request For Proposals (RFP) for the CDSF in early 1988. This RFP generated a great deal of interest and more questions than there were answers. Particular issues related to financing, liability, foreign participation and the like were raised. As a result, in late 1988, Congress passed legislation directing NASA to obtain reviews of the technical and financial aspects of the CDSF, with the reviews to be done by the National Research Council and the National Academy of Public Administration, respectively.[26] These studies were done and concluded, essentially, that the concept of a CDSF had merit after a space station was manned and operating, but was currently premature.[27] It also would have required several billions of dollars to complete, with no firm customer base in sight.[28] With these observations in hand, the concept of a CDSF quietly died.

The second of the three initiatives was Spacehab. The direction in the Presidential document was not for NASA or anyone else to use the Spacehab module. Instead, NASA was directed only "to make best efforts to launch within the Shuttle payload bay, in the early 1990's, the commercially developed, owned and managed Shuttle middeck module: Spacehab."[29] NASA accommodated this direction by entering a Space Systems Development Agreement (SSDA) with Spacehab. Under this agreement, NASA would launch the Spacehab module, containing commercial customers' experiments, and would be paid for the launch out of the revenue stream obtained by Spacehab. While this SSDA did assist in the construction of the Spacehab module, significant nongovernmental, commercial customers did not appear and no commercial flights took place using the SSDA. Later, NASA opted to utilize the module, through use of the Commercial Middeck Augmentation Module (CMAM) contract. This contract permitted Spacehab to co-manifest commercial payloads on flights where NASA was not utilizing the entire module capacity. However, commercial

[26] Public Law 100-685, November 17, 1988, Section 208

[27] In its report on U.S. Commercial Space Activities, the Congressional Research Service characterized the NRC report, saying, "In April 1989 a report by the National Research Council flatly concluded that the Nation had no real need for a separate, commercially developed space facility prior to building space station Freedom." CRS Report 92-125 SPR, February 1, 1992.

[28] Report of the Committee on a Commercially Developed Space Facility, National Academy Press, 1989; A Study of the Cost and Financing of a Commercially Developed Space Facility (CDSF), National Academy of Public Administration, April 1989.

[29] The President's Space Policy and Commercial Space Initiative, February 11, 1988, Section II (2).

customers did not appear and the SSDA was allowed to lapse as unnecessary.[30]

The final commercial initiative specified in the 1988 policy document was "the making available for five years the expended external tanks of the Shuttle fleet at no cost to all feasible U.S. commercial and nonprofit endeavors..." As a result of this direction, NASA announced the availability of expended external tanks.[31] Subsequently, two Memoranda of Understanding concerning the potential use of these tanks were signed[32], but the prerequisite showings of technical feasibility and safety were never met and no tanks were ever actually requested under this program.

Thus, the experience of 1988's specific initiatives was not good. The CDSF was seen as premature and never defined well enough to become a commercially viable endeavor; the Spacehab SSDA was not a springboard to widespread, non-governmental use of the commercial module, although the module has been and continues to be a very useful adjunct to the governmental utilization of the Space Shuttle; and no external tanks were ever put to commercial uses. Nevertheless, despite the relatively poor track record of these initiatives, they did mark a new way of thinking about commercial space and set the stage for other activities. People within and without the U.S. Government began to realize the possibilities of commercial space and to examine with a more critical eye the claims of those who wished to offer new goods or services. Perhaps more than anything, the failure of these efforts led to a reevaluation of the requirements for success in commercial space. This resulted in the next wave of policy and legal changes, now more general in scope, aimed at encouraging commercial space activity in the aggregate.

One of the first indications that lessons had been learned was the next version of National Space Policy.[33] In this policy, the separate existence and importance of the commercial space sector was reaffirmed.[34] In addition, the new policy made clear that the proper goal of Governmental activity in this area was to get out of the way of commercial activity

[30] While the SSDA was not successful as the customer demand and revenue stream envisioned by the commercial initiative did not develop, the Spacehab module has proven to be a useful and successful adjunct to the space shuttle program. As operations of the International Space Station approach, Spacehab, Inc. was ranked as the Best Managed Small Company by Aviation Week and Space Technology magazine in its annual Aerospace Performance Rankings. Aviation Week, August 10, 1998, pg. 44. Thus, though the specific 1988 initiative was not successful, a beneficial result was obtained.

[31] Commerce Business Daily, June 1, 1988, Special Notices, pg. 32, issue PSA-9602

[32] The two Agreements were between NASA and the University Corporation for Atmospheric Research (UCAR) and Global Outpost, Inc., respectively.

[33] National Space Policy, November 2, 1989; The White House, Fact Sheet, U.S. National Space Policy, November 16, 1989

[34] "United States space activities are conducted by three separate and distinct sectors: two strongly interacting governmental sectors (Civil and National Security) and a separate, non-governmental Commercial Sector."

to the greatest extent possible, consistent with national obligations. Specifically, the Commercial Space Policy provided:

> The United States government shall not preclude or deter the continuing development of a separate non-governmental Commercial Space Sector....Governmental Space Sectors shall purchase commercially available space goods and services to the fullest extent feasible and shall not conduct activities with potential commercial applications that preclude or deter Commercial Sector space activities except for national security or public safety reasons. Commercial Sector space activities shall be supervised or regulated only to the extent required by law, national security, international obligations, and public safety. [35]

In this statement, the broadest expression of policy is given. This policy limits governmental involvement in commercial decisions to those few areas where international obligations, public safety, or other legal requirements exist. In short, this policy is explicitly intended to give the commercial sector room to make the economic and technical tradeoffs necessary to decide which space goods or services are commercially viable and to attempt to implement those business decisions as free of governmental meddling as is reasonably possible.

The Space Policy of 1989 is not the only indication that the lessons of the failed 1988 commercial initiatives had been learned. In 1990, Congress passed three provisions, all aimed at NASA, which were intended to distance NASA decision makers from the critical path of commercial space activities. In the first, NASA was prohibited from using appropriated funds in any multiyear agreement "when a primary effect of it is to provide a guaranteed customer base for or establish an anchor tenancy in new commercial space hardware or services..."[36] This statute followed not only the CDSF activity, but also the experience NASA had with its own unsuccessful anchor tenancy program, the Commercial Experiment Transporter (COMET)[37]. Basically, Congress had observed the inability of the Government to accurately evaluate, select and support proposed commercial space projects, and stepped in to stop what it felt was

[35] National Space Policy, Commercial Space Policy, November 2, 1989

[36] 42 U.S.C. §2459d (1990)

[37] COMET was an attempt by NASA to support, through the use of grants, the development of a low cost commercial transportation system that would have the capability to do experiments in orbit and return materials produced in space to the earth's surface. Cost growth exceeded the funds available, cutting the program from three launches to one. The program, renamed METEOR to reflect its more modest objective of demonstrating a single flight of a new commercial launch vehicle, ended when the vehicle failed to reach orbit.

tampering with the free market system. If a commercial space endeavor was to succeed, it would have to do so under reasonably normal commercial constraints and practices.

The second statute which affected NASA in 1990 was the Launch Services Purchase Act.[38] This statute, which with respect to launch services put into law the admonition of the 1989 Space Policy to purchase commercially available goods and services, required NASA, with a few specific exceptions, to "purchase launch services for its primary payloads from commercial providers whenever such services are required..."[39] By this statute, NASA was legally required to buy launch services whenever they were available. But, unlike some of the earlier initiatives, no requirement was imposed until the commercial sector had actually produced a cost effective launch service meeting mission requirements.

The third and final statute passed in 1990 was a change to NASA's organic statute, the Space Act,[40] to require NASA to "seek and encourage, to the maximum extent possible, the fullest commercial use of space; and...encourage and provide for Federal Government use of commercially provided space services and hardware, consistent with the requirements of the Federal Government."[41] This, too, was a statutory reaffirmation of the policy language made specific in 1989. In effect, to protect against the vagaries of the policy process, the U.S. Congress gave permanent legal status to the executive policies with which it was in absolute agreement. With the passage of those laws, the United States Code reflected the view that commercial space activity was possible, was happening, but could only survive if it could live by the same economic rules that applied to the rest of the economy.

One final piece of legislation, this one passed in 1992, needs to be discussed to complete the basic statutory framework for commercial space.[42] In that year, the Congress had the opportunity to readdress the topic of anchor tenancy in commercial space goods and services. But instead of a blanket prohibition or acceptance of the concept, by this time objective criteria for the use of such an

[38] 42 U.S.C. §2465d (1990)

[39] 42 U.S.C. §2465d(a) The exceptions were when the payload required the unique capabilities of the shuttle, cost effective commercial launch services were not available, commercial launch services would pose an unacceptable risk, or the payload served national security or foreign policy purposes. 42 U.S.C. §2465d(b)

[40] 42 U.S.C. § 2451 *et seq.*

[41] Section 107, Public Law 101-611, November 16, 1990

[42] The author recognizes that there are several other statutes relating to commercial space that are important parts of the overall statutory framework. The Commercial Space Launch Act of 1984, as amended, 49 U.S.C. §§ 70101, *et seq.*, is a prime example. While these statutes, being under the purview of agencies other than NASA, were beyond the scope of this paper, the author is unaware of any aspect of these other statutes or their histories which is inconsistent with or would suggest significant modification to the basic observations made or conclusions reached in this paper.

economic device had been developed. The application of the concept to space activity, first used in support of the CDSF and refined by the experience with COMET, was now fairly well developed. Thus, in the Space Competitiveness Act,[43] Congress gave the Administrators of NASA and NOAA authority to enter multiyear anchor tenancy contracts if five requirements are met: (1) the good or service meets mission requirements, (2) the commercially procured good or service is cost effective, (3) a competitive process is used, (4) existing or potential non-governmental customers have been specifically identified, and (5) private capital is at risk.[44] These requirements reflect a much more sophisticated understanding of the difficulties encountered by earlier attempts at supporting a new commercial good or service, along with a recognition that under the appropriate conditions, such an unusual step could be justified. Thus, in just a bit over four and a half years, from February 1988 to November 1992, the governmental approach to new commercial space activities had matured greatly, moving the philosophical basis of the space program away from the early emphasis on national security and toward commerce.

Since 1992, the broad based policy encouraging reliance on commercial space goods and services and emphasizing the trade aspects of space commerce has been reiterated and strengthened. On August 5, 1994, the Clinton Administration issued its new National Space Transportation Policy.[45] In the fullest discussion of space transportation policy to date, this document specifically states that "The United States Government is committed to encouraging a viable commercial U.S. space transportation industry."[46] It echoes the earlier policies that the Government will not preclude or deter commercial space activities and will rely on commercially available products and services, but it also goes beyond that and lists specific ways to involve the private sector in governmental space transportation decisions.[47] Further, for the first time, the policy explicitly addresses the trade aspects of space transportation policy and states, "[a] long term goal of the United States is to achieve free and fair trade,"[48] and that the U.S. Government will seek to negotiate and implement international agreements "that define principles of free

[43] 15 U.S.C. §§ 5801- 5808, Title V, Public Law 102-588 (November 4, 1992)
[44] 15 U.S.C. § 5806(a)

[45] Presidential Decision Directive/NSTC-4, August 5, 1994
[46] PDD/NSTC-4, Section IV(1)
[47] PDD/NSTC-4, Section IV(2). "U.S. Government agencies...will...(a) involve the private sector in the design and development of space transportation capabilities..., (b) emphasize procurement strategies that are based on the use of commercial U.S. space transportation..., (c) provide for private sector retention of technical data rights...., (d) encourage private sector and State and local government investment...in...U.S. launch systems..."
[48] *Id.*.at Section V(1)

and fair trade for commercial space launch services."[49]

For a final demonstration of the evolution of U.S. civil space policy to be commercially based, it is only necessary to look at the current U.S. Space Policy. This policy, issued on September 16, 1996[50], assumes the existence of a vibrant and separate commercial space sector and expands upon the provisions of the earlier space transportation policy to further emphasize the need to encourage and utilize the commercial space industry. In short, the policies now in place concerning commercial space have been steadily evolving for the past ten years or so. From a period in which the national space policy made no explicit mention of a commercial space sector, until today when the commercial space sector has official priority as a source of civil space goods and services, the policy process has been evolving on a straight track. Further, this trend has no choice but to continue, since the consistency in policy over the past decade can be traced to the bipartisan approval of the underlying concepts developed under then-President Reagan, adopted and expanded upon by his successor, President Bush, continued and further explicated by President Clinton, and passed into law by a supportive Congress. This uniformity and consistency has, I believe, contributed greatly to the explosive growth in U.S. commercial space activity over the past few years.[51]

While the policy basis underlying the civil space program has evolved from the need to demonstrate systemic superiority to an economic and trade rationale, there still are strong national security undertones that must be recognized and accommodated. This is not unique to the space business and it occurs in many other areas such as computer hardware and software, and most potentially dual-use technologies. However, the subject of space commercialization's impact on national security is currently the area in the greatest flux. Initially, the focus was on the products of satellite imagery that could impact security. The widespread debate on the resolution of remote sensing images and the need to strictly limit image resolution and to have "shutter control" eventually gave way to a realization that U.S. systems and industry would be at a disadvantage if they could not provide imagery that is at least as good as that provided by a competitive system. As a result, a new policy was issued concerning access to remote sensing images.

[49] *Id.*

[50] The White House, Fact Sheet, National Space Policy, September 16, 1996

[51] Published reports state that in 1997, for the first time, commercial space spending equaled that of governments at approximately $37 billion, each. The commercial sector is also projected to grow to almost $180 billion per year by 2005. Aviation Daily, July 31, 1998, Lockheed Martin sees commercial space market doubling by '05

This remote sensing policy recognized the need for a balance of national security and commercial interests, stating "[t]he fundamental goal of our policy is to support and to enhance US industrial competitiveness while at the same time protecting US national security and foreign policy interests."[52] The method for implementing this compromise was the creation of a presumption that license requests for "remote sensing space systems whose performance capabilities and image quality are available or are planned for availability in the world marketplace...will be favorably considered.[53] This presumption, of course, does not change the fact that remotely sensed scenes with high resolution may have a significantly deleterious impact on the nation's ability to prepare for conflict in secrecy. But, impact or not, if the technology exists and is available in the world market, there is no benefit to security from plain denial.

At the current time, the most contentious issue has to do with launch vehicles. It is no secret that launch vehicles can also serve as missiles. Finally, it is also no secret that U.S. satellites are launched on foreign vehicles, including those from Russia and China, after those satellites are exported, with appropriate licenses, to those countries for launch. Current space policy specifically recognizes this and states:

> [f]ree and fair trade in commercial space launch services is a goal of the United States. In support of this goal, the United States will implement, at the expiration of current space launch agreements, a strategy for transitioning from negotiated trade in launch services towards a trade environment characterized by the free and open interaction of market economies.[54]

In short, space launch services are fast becoming a commodity in international trade. This does not mean that there are no national security concerns about trade in launch services, as anyone who has followed the issues presented by the 1996 failure review of a Chinese Long March launch vehicle can attest.[55] But it may mean that national security concerns may need to be adjusted to reflect the state of the international marketplace, as they were with remote sensing. The issues surrounding the Boeing license to perform work on the uniquely international Sea Launch program is illustrative. For those not familiar with the Sea Launch project, the idea is to launch international commercial payloads using a Ukrainian rocket with a Russian

[52] PDD-23, US Policy on Foreign Access to Remote Sensing Space Capabilities, March 9. 1994, Policy Goal.
[53] *Id,* Licensing and Operation of Private Remote Sensing Systems

[54] The White House, Fact Sheet, National Space Policy, September 19, 1996, Commercial Space Guidelines, paragraph 5.
[55] *See, e.g.,* Aviation Week, August 3, 1998, Senators Scold Hughes, Ponder China Options, pg. 27

upper stage and a U.S. payload fairing, taking off from a floating Norwegian launch platform and control ship, home based in the United States, after sailing to international waters on the Equator for launch. One would be hard pressed to imagine a commercial system farther from the contemplation of those who created the Outer Space Treaty in 1969.

The Boeing license, in the form of a Technical Assistance Agreement (TAA) permitting Boeing to discuss launch technologies and integration matters with its foreign partners, was suspended for want of procedures to protect against inappropriate technology transfer.[56] But while the suspension is significant, from the public reports I've seen, it appears to threaten the schedule, but not the existence of the Sea Launch system.[57] Once the specific issue is resolved, this new and unique launch system will proceed. Whether this particular effort succeeds or not, the fact is that numerous commercial space activities are occurring both within and without the United States, and their number is increasing rapidly. In the six months from October 1, 1997 to March 31, 1998 there was a worldwide total of 50 space launches, involving 93 separate spacecraft, the majority of which were commercial communications satellites.[58] These launches took place from five different countries and, when seen in the context of a satellite communications industry that is itself projected to grow from $38.8 billion in 1997 to $171 billion in 2007,[59] shows that the pressure to let this growth occur will become intense and will challenge any attempts to limit it. Thus, governments will be faced with the choice of participating in the explosive growth and worldwide impact of commercial space systems or being left behind in this hugely profitable endeavor. In such circumstances, history shows that other concerns usually yield to the benefits of participation.

The current space policy implicitly recognizes this fact and states in its introduction, "[t]he United States will pursue greater levels of partnership and cooperation in national and international space activities and work with other nations to ensure the continued exploration and use of outer space for peaceful purposes."[60] In short, by enabling the creation and growth of an active and truly international space industry, the global economic pie grows and the commercial benefits of space use will flow to all participants. The fact that orbits and spacecraft are not limited in passage or coverage by the national

[56] *See, e.g.*, Space News, August 17-24, 1998, Trade Interests Take Back Seat to U.S. Security, pg. 1

[57] *See, e.g.*, Washington Post, August 8, 1998, U.S. Suspends Boeing-Ukraine Rocket Launch, pg. A14, Aviation Daily, August 11, 1998, U.S. suspends Boeing's Sea Launch license pending review.

[58] Aviation Daily, January 16, 1998, April 15, 1998.

[59] International Space Industry Report, Vol. 2, No. 13, August 3, 1998, pg. 30.

[60] The White House, Fact Sheet, National Space Policy, September 19, 1996, Introduction, paragraph 1.

boundaries below, gives an inherently global perspective to the activity and can create a common global interest in space systems. If the existence of these systems means that new methods must be used to give confidence that the space activities that bring the benefits pose no threat to the countries below, then so be it. Perhaps the way to raise the confidence level is to encourage, not discourage, a great amount of international activity. If all who wish can share in the benefits obtained, the mutual reliance on common space systems, products and services should reassure everyone that the countries with systems sophisticated enough to develop, produce or utilize space assets depend upon them too much to jeopardize them by using them to the detriment of the security of any other country. I believe and hope that the legitimate security issues now being raised will be resolved without great damage to the growth trends we are experiencing in commercial space. We are at a point where the global benefits from space activity have the potential to revolutionize many aspects of the lives of most of the people on earth. That is too big a prize to let go unclaimed. So let all of us who are interested in commercial space activity work toward finding the solutions to any problems that could, in the words of the 1989 Space Policy, "preclude or hinder the continuing development of a . . . commercial space sector."