

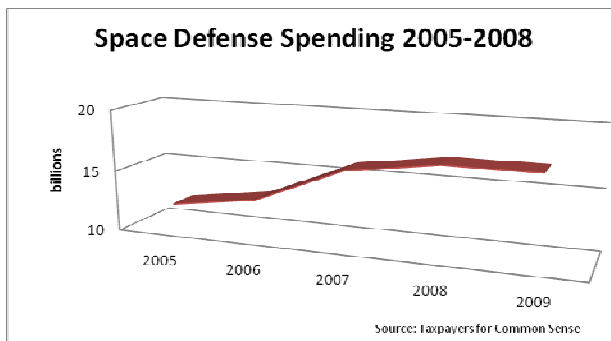
## Loss in Space: Space Security Spending 2009

The Defense Department (DOD) spent an estimated \$22 billion on space programs in fiscal year 2008,<sup>1</sup> more than any other nation on earth. Yet DOD does not comprehensively track the space dollars spread throughout three military services plus numerous offices, organizations and sub-agencies, all with their own account ledgers. Neither does it account for billions spent by other federal agencies on weather-tracking satellites and other programs that our military depends on to navigate space.

Without this birds-eye view on spending, those who determine our space and national security policy—in the White House, on Capitol Hill, and at the Pentagon—do not have a crucial tool for setting spending priorities. Clear priorities are necessary to make sure our men and women in uniform are supported and taxpayers' dollars well spent. A transparent, accountable budget is particularly vital in light of the troubled history of space acquisitions, which has resulted in major programs running so far over budget and behind schedule that many of them still have not deployed after many years and billions of dollars.

### Budgetary Nether Regions

The crucial role that space assets such as communications satellites played in Operation Desert Storm lent that conflict the nickname “the first space war.” Since then, the U.S. has invested increasing amounts of research time and dollars into civil, military,



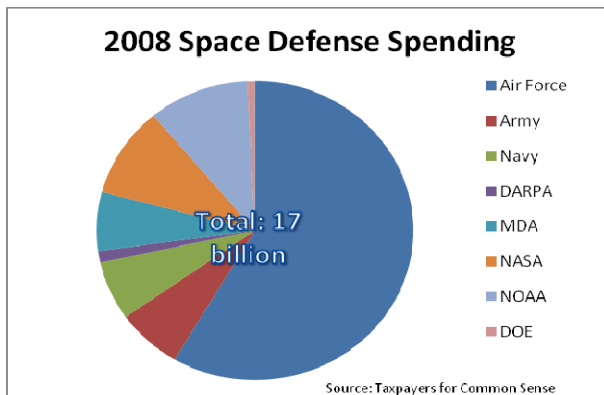
commercial and intelligence-related space programs. Military space investment, including NASA and NOAA programs used by the military, increased more than 40 percent in the past five years, climbing from \$12 billion in Fiscal Year 2005 to just under \$17 billion in FY 2009. In addition, an estimated \$10 billion goes to classified intelligence programs managed by organizations including the National

Reconnaissance Office. And the Defense Department spends billions each year to buy communication capabilities from the commercial sector.

But who is following the money? U.S. space policy is crowded with actors, including the Air Force, designated the U.S. Executive Agent for Space by the Secretary of Defense; the National Security Space Office; and the Director of Space Policy at the Pentagon, just to name a few. A 2007 report from a Congressionally mandated panel convened to discuss DOD's space organization found "no one's in charge" of national security space,

<sup>1</sup> <http://www.gao.gov/new.items/d08516.pdf>

and no effective mechanism exists to arrive at decisions that affect both DOD and the intelligence community.<sup>2</sup> In 2003, Congress ordered DOD to establish a major force program (MFP) for space, which would track related programs across DOD’s agencies and services and establish spending limitations. Instead, then-Defense Secretary Donald Rumsfeld created a “virtual” MFP that changes from year to year and leaves out important sources of space-related spending such as the Missile Defense Agency and Defense Advanced Research Programs Agency (DARPA).<sup>3</sup>



The growth in space spending is partially driven by the increased presence of countries such as China, which called attention to its capabilities in 2007 when it shot down one of its satellites. That event spurred a spending spree on “space control” programs, which are tasked with protecting U.S. space assets from enemies as well as space debris. Unclassified space control programs increased more than 37 percent over the past five years to nearly

\$1 billion in fiscal year 2009, and space situational awareness programs jumped by 35 percent to nearly \$560 million. This rapid growth is also notable because of the Defense Department’s recent empowerment of space control programs to destroy enemy assets.<sup>4</sup>

Much of this increase resulted from Congressional initiative: Congress added \$100 million to the Bush administration’s funding request for space situational awareness programs in fiscal year 2008, reportedly in response to the Chinese antisatellite test. But history has shown that when Congress throws money at a problem, much of it lands in their districts. In 2008, Rep. Chet Edwards (D-TX) sponsored a \$1.2 million earmark for an Air Force “Space Situational Awareness” program at Texas A&M University; Sen. Daniel Inouye (D-HI) sponsored a \$4 million earmark for the Multi-mission Deployable Optical System, a space control program developed on Maui; and Rep. Robert Aderholt (R-AL) joined Sens. Jeff Sessions (R-AL) and Richard Shelby (R-AL) in sponsoring a \$4 million earmark for a Space Control Test Capabilities program in their state.

This growth is largely occurring in a policy vacuum. The Defense Department has not issued a National Security Space Strategy, which provides DOD guidance on how to meet space policy goals laid out by the Executive Branch, since 1999. Various commissions and panels convened over the past decade to study U.S. military space policy agreed that such a strategy is crucial to measuring the progress and effectiveness of space programs. A recent report by Economists for Peace and Security noted that recently earmarked space control programs “do not reflect a long-term or integrated

<sup>2</sup> “New Space Commission Report Recommends Abolishing NRO, SMC,” Inside Missile Defense, August 27, 2008

<sup>3</sup> “Space, Security and the Economy,” Economists for Peace and Security, September 2008

<sup>4</sup> <http://www.cdi.org/pdfs/2009JointPubSpaceOps.pdf>

strategy to protect space systems.”<sup>5</sup> And a 2008 Government Accountability Office (GAO) report agreed that without a strategy “defense and intelligence agencies may continue to make independent decisions and use resources that are not necessarily based on national priorities, which could lead to gaps in some areas of space operations and redundancies in others.”<sup>6</sup>

Space programs mirror many of the systemic problems in the way that DOD procures weapons, such as starting more programs than it can afford by accepting low cost estimates and optimistic schedules. These problems are exacerbated by the technological complexity of satellites and other space projects. A 2008 GAO report found that space programs suffered from, among other problems, a reluctance to compare the costs of ground-based systems to space systems; not defining a system’s requirements at the outset, then changing them over the course of the program; pushing programs ahead before their complex technologies are proven; and a lack of competition for contracts compounded by poor contract management.<sup>7</sup>

The result is that space programs are problem children even in DOD’s troubled house. “The present national security space acquisition system is replete with cost overruns and schedule delays to the point that some observers have described space acquisition as broken,” states the Congressional report accompanying the 2008 defense appropriations bill. Some of these programs are so far behind in the game that the Defense Department has requested money for programs not yet fielded while at the same time asking to fund programs meant to ultimately replace the lagging systems.

Following are profiles of some of the worst offenders in the military space portfolio. All but one have breached the Nunn-McCurdy amendment, which cancels any weapons program that runs more than 25% over its initial cost estimate unless DOD certifies its importance to national security. Most are massive satellite programs that could likely be replaced by smaller, cheaper satellites if they weren’t entrenched in the Defense Department’s procurement bureaucracy. All of them demonstrate the dangers of abandoning clear priorities, realistic expectations and consistent requirements when buying technologically complex defense programs.

---

<sup>5</sup> “Space, Security and the Economy,” Economists for Peace and Security, September 2008

<sup>6</sup> <http://www.gao.gov/products/GAO-08-431R>

<sup>7</sup> <http://www.gao.gov/new.items/d08552t.pdf>

## 1) Space Based Infrared System (SBIRS)

<b>Contractor</b>	Lockheed Martin
<b>% Cost Increase</b>	175
<b>Years Behind Schedule</b>	Seven

SBIRS was infamously dubbed “a case study for how not to execute a space program” by DOD’s Defense Science Review Board.<sup>8</sup> Intended to replace DOD’s decades-old system of infrared surveillance

sensors that warn of incoming missiles, SBIRS was supposed to consist of four operational satellites in Geosynchronous Earth Orbit (GEO), sensors on two classified DOD satellites in Highly Elliptical Orbit (HEO), and a ground-based relay station to track missile launches. The Air Force conceived the program in 1994, and it began in earnest with a \$2.16 billion contract to Lockheed-Martin in 1996. The next 12 years saw numerous program restructurings, four Nunn-McCurdy breaches and a 175% cost jump. The program is now seven years behind schedule, and the first satellite has yet to launch.

One of two independent panels drawn from the public and private sector said the program was pushed into development before the technology was even understood, much less ready, and that requirements were constantly changing. Delayed delivery of key parts also caused delays and increased costs: The late delivery of the first HEO sensor delayed the entire program over a year and caused budget shortfalls for later segments.<sup>9</sup> The program is such a mess that DOD actually launched a parallel program, the Alternative Infrared Satellite System, that would in theory spur SBIRS along through competition while providing a backup in the event of its failure.



The most recent challenge arose in 2006 when Lockheed Martin’s software to control and monitor the satellite failed, necessitating a total redesign at more than \$400 million. A 2007 assessment by a second independent panel blamed the problems on Lockheed Martin’s poor “program process discipline;” the “adversarial relationship” between Lockheed Martin and the Air Force; and disorganization resulting from the government’s separation of cost and schedule responsibilities, among other factors.<sup>10</sup> The problems compelled DOD to push back the first satellite’s launch date yet again to December 2009, but the GAO has called even that date “optimistic.”<sup>11</sup>

<sup>8</sup> <http://www.acq.osd.mil/dsb/reports/space.pdf>

<sup>9</sup> <http://www.gao.gov/new.items/d04448.pdf>

<sup>10</sup> <http://www.gao.gov/new.items/d081073.pdf>

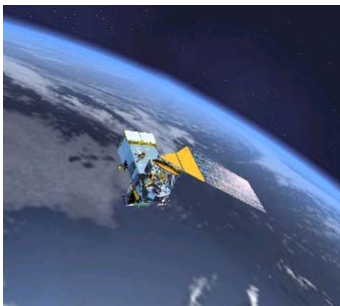
<sup>11</sup> <http://www.gao.gov/new.items/d081073.pdf>

## 2) National Polar Orbiting Environmental Satellite System (NPOESS)

<b>Contractor</b>	Northrop Grumman
<b>% Cost Increase</b>	69
<b>Years Behind Schedule</b>	Three

A joint project between the Defense Department, NASA and the National Oceanic and Atmospheric Administration (NOAA), NPOESS will

circle the globe picking up weather and climate data with an array of sensors carried on its chassis. NPOESS was intended to save money by replacing two similar systems operated separately by the Air Force and NOAA. Unfortunately, construction and testing bungles slowed development so significantly that 14 years later, the cost of the program has doubled from \$6.5 to \$13.5 billion for four instead of six satellites and the initial launch has moved back 39 months to 2013.<sup>12</sup>



The satellite's technologies were woefully immature when the program moved into development and committed to production in 2002. As a result, half of its data-gathering sensors and other components were cut when the program was restructured in 2007 following a Nunn-McCurdy breach. The move reduced the satellite's capabilities to such a degree that the military will have to rely on a European satellite to provide partial coverage.

Part of the \$400 million in stimulus money slated for NASA and \$600 million for NOAA would put back a sensor that tracks radiation from the sun and measures its impact on climate change. Not a bad thing, but the Government Accountability Office worried in a recent report about a lack of consensus between the agencies on whether NPOESS—rather than one of the many other satellites the government fields—is the most cost-effective vehicle. This lack of consensus is not helped by the fact that DOD delayed signing off on the program's cost baseline, making it hard to measure whether the satellite's costs are still spinning into the stratosphere.

## 3) Advanced Extremely High Frequency (AEHF) Satellites

<b>Contractor</b>	Lockheed Martin
<b>% Cost Increase</b>	67
<b>Years Behind Schedule</b>	Three

The AEHF satellite system was intended to upgrade the Air Force's Milstar II satellite communications system, ramping up speed and preventing enemies from jamming its

signals. AEHF will itself be replaced by the Transformational Satellite Communications System (TSAT) currently under development, although how and when is still an open question.

The program was originally comprised of five satellites, but the fourth and fifth were cut in December 2002 under the assumption that the first TSAT satellite would be ready early enough to make the system work (see below). When



<sup>12</sup> <http://www.gao.gov/new.items/d08552t.pdf>

TSAT’s schedule began to slip, Congress asked the Air Force to fund a fourth satellite in 2009. Unfortunately, it turns out the fourth satellite will likely cost more than twice as much as the third because of the four-year gap in production and the fact that some of the components are no longer manufactured.<sup>13</sup>

Problems associated with the simultaneous development of critical components such as cryptology equipment added expense to the program, which suffered a Nunn-McCurdy breach in September 2008. The launch of the first satellite is now scheduled for September 2010, two years behind schedule, delaying operational capability three years in total.<sup>14</sup> These schedule delays, combined with the cost of the fourth satellite, has swollen the average procurement unit cost by 130 percent.<sup>15</sup>

#### 4) Evolved Expendable Launch Vehicle (EELV)

<b>Contractors</b>	Lockheed Martin, Boeing
<b>% Cost Increase</b>	95
<b>Years Behind Schedule</b>	N/A

The EELV program began in December of 1996 as an industry partnership aimed at replacing current families of launch vehicles with a newer, more economical launch program. The Air

Force contracted with Lockheed Martin and Boeing, who developed the Atlas V and Delta IV expendable launch vehicles, respectively. The two companies gave the Air Force overly optimistic cost estimates based on assumed growth in the commercial launch sector. But the ironic combination of a global recession with the extended life span of successful satellite designs caused a steep dive in launches in the late nineties, and the Air Force paid.

With such contractor troubles, it comes as no surprise that the EELV program has a history of launch delays and massive cost increases. Per-unit costs rose 77 percent between 2002 and 2003 alone, triggering a Nunn-McCurdy breach in 2004.<sup>16</sup> The program’s total cost is now estimated at \$32.2 billion, nearly double the 1998 cost estimate of \$16.5 billion, while the number of launches has been cut from 181 to 138.<sup>17</sup> The Pentagon established a new cost estimate that increased the per-unit costs by nearly 30 percent for 43 fewer launches.



The following year, Boeing and Lockheed Martin announced they would join forces in the United Launch Alliance. Under this new corporation, the two companies would combine all of the production, engineering, and other work associated with government contracts for the Delta and Atlas vehicles in Boeing’s Alabama plant. This would seem to

<sup>13</sup> <http://www.gao.gov/new.items/d09326sp.pdf>

<sup>14</sup> <http://www.gao.gov/new.items/d09326sp.pdf>

<sup>15</sup> <http://www.gao.gov/new.items/d09326sp.pdf>

<sup>16</sup> <http://www.gao.gov/new.items/d081039.pdf>

<sup>17</sup> GAO Assessments of Selected Weapons Programs, March 2009: <http://www.gao.gov/new.items/d08467sp.pdf>

counteract the goal of maintaining two separate launch vehicles in order to ensure access to space. The companies argued that the new venture would save the government up to \$150 million.<sup>18</sup>

ULA fended off opposition from the Federal Trade Commission and an antitrust lawsuit with help from the Pentagon, which, while agreeing the merger would adversely affect competition, innovation, and long-term costs, said the need for a backup plan for launching satellites into space outweighed these concerns. The FTC finally approved the alliance with the caveat that the Pentagon made sure the two companies didn't shut out competitors' satellite and launch programs, among other conditions.<sup>19</sup> Observers have raised doubts about the ULA's purported benefits, however. A recent GAO report pointed out that the relocation to Alabama could reduce the reliability of the vehicles while further increasing costs and delays. And since the Air Force figured the projected cost savings into its EELV program budget, the cost growth could spiral even higher.

### 5) Transformational Satellite Communications System (TSAT)

<b>Contractor</b>	Boeing/Lockheed Martin
<b>Total Cost % Increase</b>	30
<b>Years Behind Schedule</b>	Nine

The Air Force's Transformational Satellite Communications System (TSAT) is slated to become the single most expensive DOD space program over the next decade.<sup>20</sup> TSAT will replace the AEHF

system currently under development with five satellites intended to provide the military with vastly expanded communications capabilities with enough bandwidth and data to allow soldiers to view videos and pictures of activity within seconds.<sup>21</sup> The system hasn't yet formally entered the development phase and has already seen a nine-year slip in the launch of its first satellite to 2019.<sup>22</sup>

The program generated skepticism from Congress and even military brass for promising too much too soon. In program restructurings, the Pentagon dropped the revolutionary laser communications capability TSAT was originally supposed to provide and scaled back the number of users and data volume the system can handle.<sup>23</sup> Still, each satellite is projected to weigh 20,000 pounds, twice as much as the Milstar satellites currently performing the military's communications duties.<sup>24</sup>

The program is also a lesson in DOD's tendency to rob Peter to pay Paul when program costs start closing in. In December 2002, the AEHF program dropped satellites four and five in order to make room for TSAT development, but subsequent revelations of TSAT's

<sup>18</sup> [http://www.boeing.com/news/releases/2005/q2/nr\\_050502b.html](http://www.boeing.com/news/releases/2005/q2/nr_050502b.html)

<sup>19</sup> Ratnam, Gopal: "For DoD, Merger Decisions Get Tougher." Defense News, 9 October 2006

<sup>20</sup> Erwin, Sandra: "Multibillion-Dollar 'Internet in the Sky' Could Help Ease Bandwidth Burden," National Defense, June 2005; <http://www.gao.gov/new.items/d08552t.pdf>

<sup>21</sup> <http://www.gao.gov/new.items/d071029r.pdf>

<sup>22</sup> <http://www.gao.gov/new.items/d0471r.pdf>

<sup>23</sup> Butler, Amy: "Young Gives Nod to TSAT Without Laser Links," Aerospace Daily & Defense Report, December 9 2008; Holmes, Erik: "Air Force Details TSAT Plan," Defense News, January 19 2009

<sup>24</sup> Holmes, Erik: "Air Force Details TSAT Plan," Defense News, January 19 2009

risks caused cuts by Congress and calls by some senior military commanders to scrap TSAT in favor of AEHF.<sup>25</sup> The program was again restructured in December 2008, prior to a battle for the development contract between Boeing and Lockheed Martin. The Air Force recently asked the companies to include plans for alternatives to the program in their bids. TSAT's cost estimates rose and fell with each restructuring and Congressional adjustment, but the Air Force currently estimates the total program cost at \$15-\$20 billion, around 30% above initial estimates of \$11 -\$16 billion.<sup>26</sup>

\*\*\*\*\*

*For more information about the cost of defense-related space programs, see the [TCS Space Security Database](#) and [methodology](#).*

*TCS President: Ms. Ryan Alexander*

*Project Manager: Laura Peterson*

*Researchers: James Madden, Lillian Cheng, and Jacob Shelly*

---

<sup>25</sup> <http://www.gao.gov/new.items/d0471r.pdf>

<sup>26</sup> <http://www.gao.gov/new.items/d071029r.pdf>