



Promoting Cooperative Solutions for Space Sustainability

US National Security Space Policy and Strategy: From Sanctuary to Space Force

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- History of US national security space policy and strategy
 - Lupton’s four schools of thought
 - Eventual dominance of the sanctuary school
 - Case study: Ford/Carter ASAT decision
- The “End of Sanctuary”
 - Increased US reliance on space to support conventional military operations
 - Vulnerability of existing architectures
 - Rise of “Great Power” competitors
- Current issues
 - Resilience / deterrence
 - Offensive counterspace
 - Space Force / US Space Command
 - How best to leverage commercial (or not?)



Promoting Cooperative Solutions for Space Sustainability

SCHOOLS OF THOUGHT ON MILITARY SPACE

Lupton's schools of thought on space power

- Space Sanctuary
 - Focus is on use of space is providing strategic information to decision-makers
 - Strategic reconnaissance, intelligence, and warning, treaty verification
- Space Control
 - Focus is on use of space is for enhancing military power on Earth
 - PNT, satellite communications, operational/tactical ISR,
 - Offensive/defensive counterspace to defend own capabilities and attack adversary's
- The High Ground
 - Focus is on using space for projecting force to and dominating in engagements on Earth
 - Space-to-Earth weapons, space-based missile defense, military space stations & bases
- Survivability
 - Space is fundamentally vulnerable and at a disadvantage to terrestrial attacks
 - Focus is on minimizing reliance and increasing resilience of space systems, developing ground/air/sea alternatives

- From the beginning of the Space Age, the sanctuary school has largely dominated US thinking on national security space
- Original political rationale for military space capabilities was surveillance and intelligence of the Soviet Union
 - Intelligence collection of Soviet Union was one of the highest US national priorities
 - Eisenhower Administration saw satellite reconnaissance as better alternative to U-2 overflights
 - Pushed to develop international regime that legitimized satellite overflight and reconnaissance as part of “peaceful uses of outer space”
- As the nuclear arms race progressed, many of the same capabilities were leveraged for arms control verification
 - Precision satellite imaging was a pre-requisite for binding arms control treaties
- Satellites also proved essential to nuclear warnings and command and control
 - Infrared missile warning satellites in geostationary orbit enabled maximum decision-making window for launch-on-warning posture
 - Helped deter attacks on satellites (might lead to nuclear war)

The President has established the following programs as having the highest priority above all others for research and development and for achieving operational capability; scope of the operational capability to be approved by the President:

(Order of listing does not indicate priority of one program over another)

- (1) ATLAS (ICBM) Weapon System
- (2) TITAN (ICBM) Weapon System
- (3) POLARIS (FBM) Weapon System
- (4) MINUTE MAN (ICBM) Weapon System
- (5) Ballistic Missile Early Warning System (BMEWS) Phase I, including Project DEW DROP
- (6) NIKE-ZEUS Weapon System (research and development only)
- (7) Space programs determined by the President on advice of the National Aeronautics and Space Council to have objectives having key political, scientific, psychological or military import.

The President has designated the following projects under the category specified in (7) above:

SAMOS (satellite-borne visual and ferret reconnaissance system)
DISCOVERER (satellite guidance and recovery)
MERCURY (manned satellite)
SATURN (1,500,000 pound-thrust, clustered rocket engine)*

NSC 6108 "Certain aspects of missile and space programs", January 18, 1961.

- In the 1970s, space control started to gain prominence, in part due to thinking about how space could provide a military edge in a conventional conflict with the Soviets
- US military began or refocused several major programs to develop space capabilities that provided operational capabilities to the warfighter including:
 - Global Positioning System (timing and navigation)
 - Defense Satellite Communications System (communications)
 - Defense Meteorological Satellite Program (weather)
- These programs demonstrated the potential power of space control during the 1991 Persian Gulf War
 - First major operational use of space capabilities to directly support major terrestrial military operations
- Space control capabilities were (and remain) critical to the post-9/11 wars and all current military operations

The vocal minority of the high ground

- Early military space proponents advocated for a high ground approach, based largely on the strategic air bombing “success” during WWII
 - Space is an extension of air
 - Strategic bombing helped create airpower doctrine
 - X-20 Dyna-Soar manned orbital spaceplane
 - Manned Orbiting Laboratory
- High ground programs ultimately lost out to the sanctuary school
 - Reconnaissance/intelligence programs had stronger White House support
 - Robotic spacecraft more effective and cheaper than manned spacecraft
 - Budget competition with the air power programs
 - Concern that overt “weaponization” of space would jeopardize ability to collect intelligence from space
- Brief resurgences in the 1980s and 2000s but failed to gain traction
 - Reagan Administration and “Star Wars”

Don't forget about survivability!

- Survivability school has always been present, and occasionally highlighted, but largely failed to achieve significant prominence
 - Periodic surge of interest in making satellites more survivable against attacks
 - Occasional questioning of why the U.S. should “put all its eggs in one basket”
 - Even when these issues were embraced by presidential policy, they largely failed to create change
- Established space constituencies actively resist
 - Organizations have set patterns and do not want to change
 - Existing entities fight creation of new entities because it means reductions in their budgets/bureaucratic power
- Incentives also favored more complex/capable satellites
 - High cost of launch created incentives to maximize the value/capability of each satellite
 - Relatively low threat (and risk of nuclear war) decreased value of adding defenses/survivability
 - Strong demand from users (the President and intelligence community) for always-greater “exquisite” capability

Mixed feelings on offensive counterspace

- Not new, been around since the beginning of space
 - U.S. began development of Bold Orion and High Virgo air-launched ASAT programs in 1958
 - U.S. fielded operational Program 505 and Program 437 ground-launched ASATs in early 1960s
- What implications are there for space sanctuary?
 - U.S. priority is still to use space for strategic reconnaissance and intelligence
 - Do not want to incentivize Soviets to find ways to disrupt those missions
 - What about the creation of long-lived space debris?
- What is the rationale for why the US should have offensive counterspace capabilities?
 - To deter attacks on US satellites by threat of retaliation?
 - To counter adversary military space capabilities during a conflict?
- Historical debate largely settled on the latter option
 - ASM-135 was the last acknowledged destructive ASAT developed by the U.S.

CASE STUDY: THE FORD/CARTER ASAT DECISION

Case Study: Ford/Card decision on ASM-135

- During the Ford Administration, there was increased concern over vulnerability of U.S. satellites to Soviet anti-satellite weapons & lack of US capability to counter Soviet space capabilities in a conflict
- Soviets had renewed testing of their own ASAT system, leading to questions if U.S. needed to reciprocate
- In 1975 the National Security Council launched a study on possible options

As you, George Bush and I have discussed, the United States has no anti-satellite capability at the present time and only a minimal R&D program for the development of such a program.

We also discussed the fact that current studies are under way in this area. Under NSC auspices, a team of civilian experts is examining the situation. CIA is doing a supporting study in connection with this NSC effort.

The NSC study is examining three major areas:

- (1) Near-term measures (3-5 years) which can be taken to decrease the vulnerability of our satellites;
- (2) Projection of the military use of space over the next 15 years, including analysis of the problems of satellite survivability; and
- (3) The most feasible options for development of a U. S. anti-satellite capability.

While this is a very extensive study, I anticipate receiving a preliminary report by the end of April, including a description of alternates for reducing satellite vulnerability over the near-term. Completion of the final study is planned for September.

Scowcroft memo to President Ford, "Follow-up on Satellite Vulnerability", March 15, 1976

Need for more survivability...

- In April 1976 the study concluded that developing a new US offensive counterspace capability would not be a credible deterrent to Soviet attacks on US satellites

There are a number of near-term countermeasures the U. S. could employ to minimize the impact of the Soviet anti-satellite program. The technology is in hand to provide these capabilities as soon as a decision is made to give increased protection to our satellites.

Development of a U. S. anti-satellite interceptor, while technically feasible, will not contribute to the survivability of U. S. space assets. Other U. S. responses are available to deter the Soviets from offensive actions in space.

Scowcroft memo to President Ford, "Soviet Anti-Satellite Capability", April 26, 1976

- This led to President Ford signing NSDM-33 which directed measures to improve survivability of US space assets (several of which are still struggles today!)

..but also policy on offensive capabilities

- NSC also issued a second memo starting a new study on need for a new US offensive counterspace capability

At present the U. S. anti-satellite program is not receiving emphasis because, in part, there is no national policy to develop an anti-satellite capability. The lack of a policy decision has been related to:

- Our perception (now seen as incorrect) that the Soviets were not aggressively pursuing an anti-satellite system;
- a concern that preparation for satellite interception would be contrary to the spirit if not the letter of the SALT protection of "national technical means," and;
- a view that it would not be in our interest to stimulate satellite interception since we are more dependent on intelligence from space sources and would have more to lose.

The fact of the Soviet intercept tests alters these perceptions and the strategic and political policies connected with the possible development and deployment of a U. S. anti-satellite capability need to be reexamined.

Scowcroft memo to President Ford, "U.S. Anti-Satellite Capability", July 24 1976

- In November 1976 the study concluded that there was a need for a new US offensive counterspace capability to deny the Soviets a sanctuary in space
 - US should develop the capability to “selectively neutralize militarily important Soviet space capabilities”
 - Electronic or physical attack
 - Priority is on countering Soviet ocean surveillance satellites in low Earth orbit used to target U.S. surface combatants
- In January 1977, President Ford issued NSDM-345
 - Formally established a US policy on ASAT capabilities, and directed the creation of a limited offensive capability
 - Also directed a study of arms control initiatives that could complement the new ASAT capabilities
- President Carter continued the policy push
 - Carter signed NSC-33 in March 1978 that removed restrictions on US ASAT testing and began a formal review of US space policy
 - In May 1978 Carter signed a new national space policy which included the creation of a new US ASAT program and directed parallel space arms control efforts

d. Anti-Satellite Capability. In accordance with applicable executive directives, the United States shall seek a verifiable ban on anti-satellite capabilities, excluding electronic warfare. DoD shall vigorously pursue development of an anti-satellite capability, but will not carry to production those elements which are included in any treaty with the Soviets. Beyond that, some R&D should be continued as a hedge against Soviet breakout. The progress of ASAT arms control negotiations will be reviewed annually to determine if negotiations with the Soviet Union continue to be fruitful relative to the threat posed by Soviet actions in space, and consequently to determine if the U.S. ASAT efforts are still adequate. The space defense program shall include an integrated attack warning, notification, verification, and contingency reaction capability which can effectively detect and react to threats to U.S. space systems. (TS)

PD/NSC-37, "National Space Policy", May 11, 1978

- Program became the ASM-135 air-launched direct ascent anti-satellite (DA-ASAT) missile
- Tested five times, including destruction of the US Solwind satellite in 1985
- Eventually canceled by Reagan Administration over costs & pressure from Congress





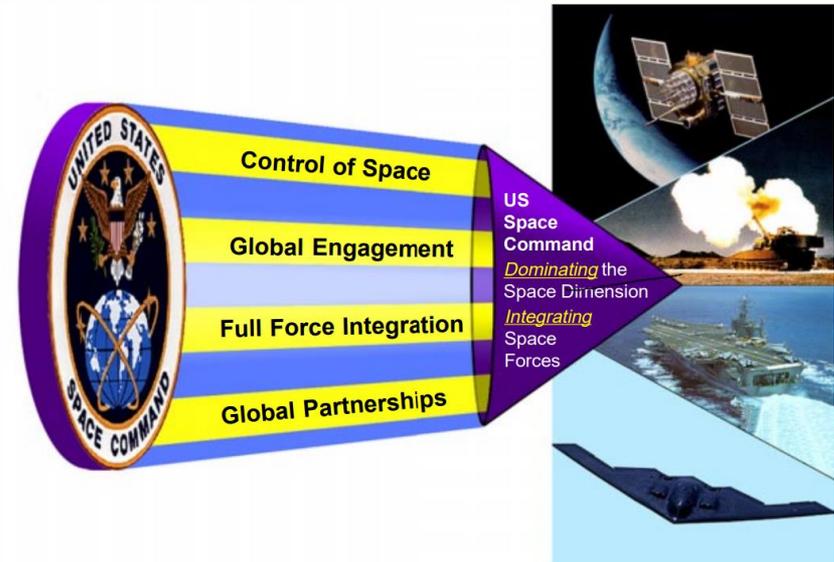
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THE END OF SANCTUARY

A brief moment of supremacy

- Following the end of the Cold War, some in the U.S. envisioned a new era where the U.S. would be the sole superpower
 - For space, this was envisioned as the ability for the U.S. to “dominate” and “control” space for its own ends
 - U.S. Space Command Vision for Space 2020

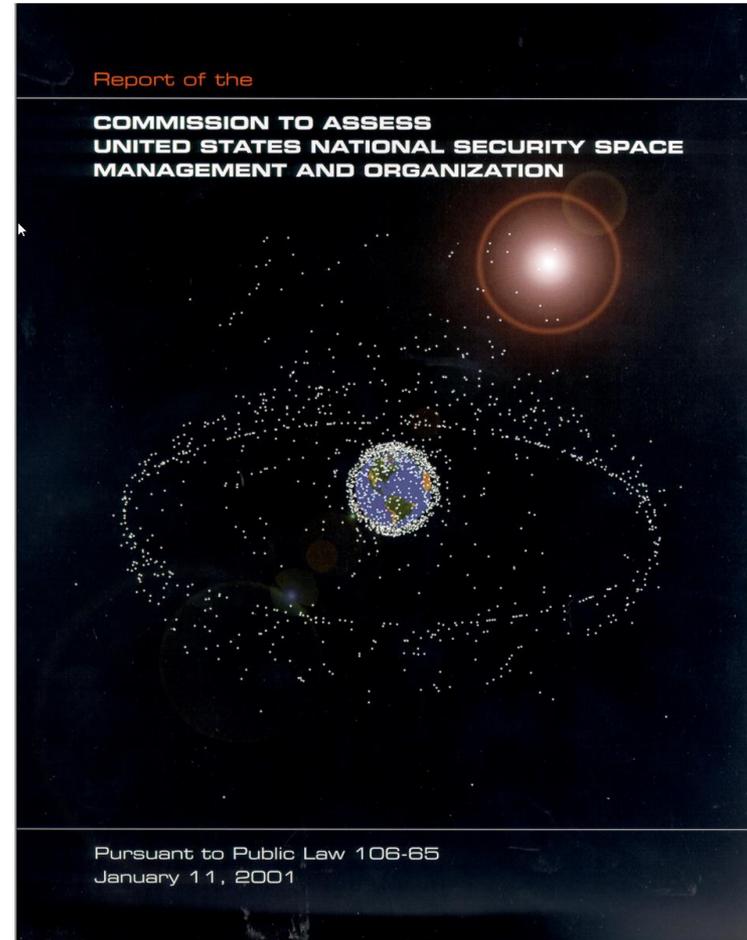
USSPACECOM Vision



US Space Command - Dominating the space dimension of military operations to protect US national interests and investment. Integrating Space Forces into warfighting capabilities across the full spectrum of conflict.

... and ignored warnings of future challenges

- Rumsfeld Commission report (issued Jan 2001) warned of future challenges
 - U.S. space capabilities are becoming exceptionally vulnerable
 - Space does not have high enough priority
 - National security space community not effectively organized to meet challenges
- However, the Bush Administration failed to implement many of the recommendations (despite Rumsfeld becoming Secretary of Defense)
 - 9/11
 - Operation Enduring Freedom (Afghanistan)
 - Operation Iraqi Freedom



- 2002-2003 Afghanistan/Iraq are the first real “space wars”
 - U.S. realizes space is the key to (and weakness of) future warfare
 - U.S. adversaries realize it as well, and increase efforts to develop counterspace capabilities
- 2007 Chinese DA-ASAT test
 - Destroyed defunct Chinese weather satellite with ground-based ASAT weapon, created ~3,000 pieces of trackable debris @850 km altitude
 - Same system was previously tested in 2005 and 2006 (but did not create any debris)
- 2009 Iridium-Cosmos Collision
 - Destroyed active U.S. commercial communications satellite and dead Russian military communications satellite
 - Created ~2,000 pieces of trackable debris @850 km

- Recognized that the long-term sustainability of the space environment is critical for civil, commercial and national security space
- U.S. needs to prepare for *environmental and hostile space threats* and foster norms of behavior in space
 - Take steps to prevent mishaps, misperceptions, and mistrust
- Assurance and Resilience of Mission-Essential Functions
 - Maintain continuity of national security space functions
 - Increase protection and resilience of key space assets
 - Develop ability to detect, warn, characterize, and attribute incidents in space
 - Prepare to operate in a degraded, disrupted, or denied space environment
 - Pursue bilateral and multilateral transparency and confidence-building measures (TCBMs)
 - Consider arms control measures that are equitable, verifiable, and enhance U.S. national security

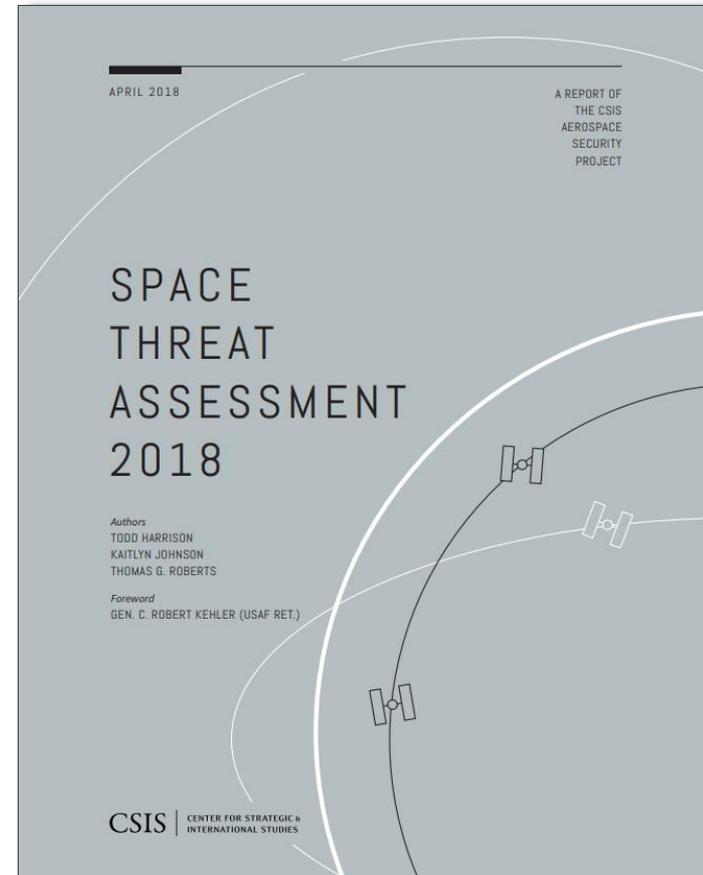
- 2011 National Security Space Strategy (NSSS)
 - Promote peaceful & sustainable uses of space
 - Improve US space capabilities
 - Partner with international and commercial entities
 - Prevent and deter aggression
 - Prepare to defeat attacks and operate in degraded environment
- 2012 DoD Space Policy
 - Support development of norms of responsible behavior
 - Build coalitions
 - Improve resilience of US national security space capabilities
 - Develop capabilities to respond to an attack

- China continued to test the SC-19 DA-ASAT in 2010, 2013, 2014, 2015, 2017, and 2018
- Chinese test of potential new DA-ASAT that could reach GEO in May 2013
- Chinese robotic rendezvous and proximity ops (RPO) in LEO in 2010, 2013, and 2014, and in GEO in 2016 and 2018
- Russia conducts robotic RPO demonstrations in LEO in 2013, 2014, 2015, 2016, and 2017
- Russian satellite shows mysterious pattern of movements in GEO, including parking next to US commercial satellites, from 2014 to today
- Russian testing of the Nudol DA-ASAT in 2014, 2015, 2016, and 2018
- Russian operational use of electronic warfare against space capabilities (SATCOM, PNT) during Ukraine and Syria

Proliferation of counterspace threats



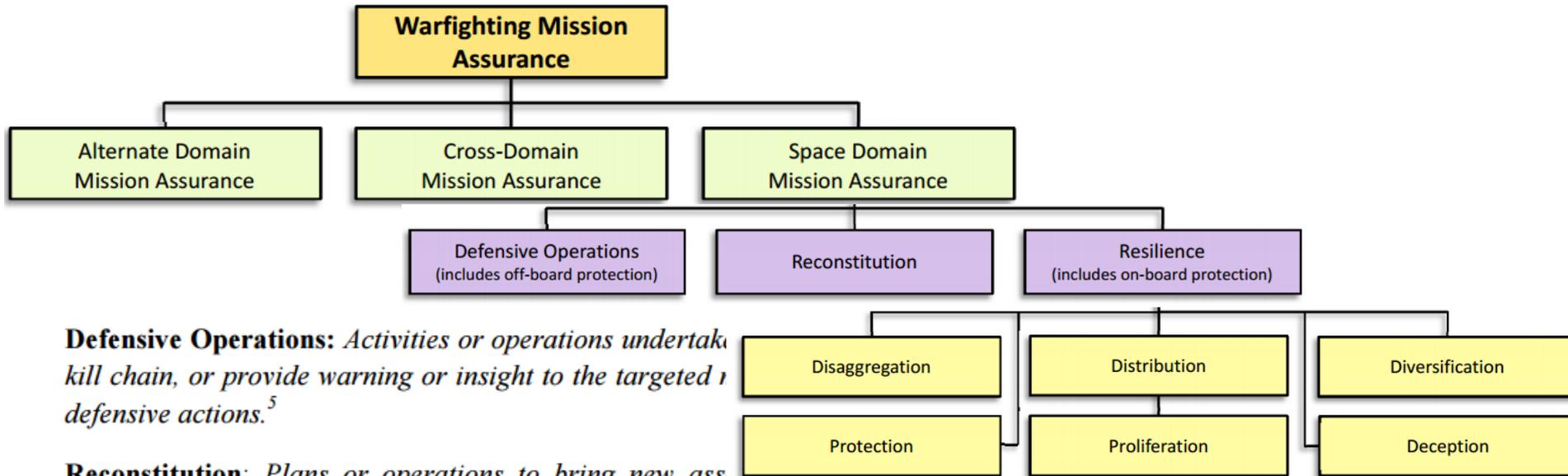
<https://swfound.org/counterspace>



<https://www.csis.org/analysis/space-threat-assessment-2018>

Urgency for real reform and action

- DOD initiates Space Portfolio Review (SPR) in May 2014
 - Assess national security space investments in light of counterspace threats
 - Need to better identify threats in space
 - Need to be able to withstand aggressive counterspace programs
 - Need to counter adversary space capabilities
- Change in tone of public statements by senior military leadership
 - “Need to prepare to fight a war and defend ourselves in space”
 - “Space will become a battlefield like air, land, and sea”
- Congressional action
 - Directed several studies on space defense and deterrence and role of offensive counterspace
 - \$5-8 billion in “reallocated” spending across FY16-FY20 for “space protection”



Defensive Operations: *Activities or operations undertaken to disrupt an adversary's kill chain, or provide warning or insight to the targeted party to enable defensive actions.*⁵

Reconstitution: *Plans or operations to bring new assets (e.g., replacement satellites or activating new ground stations) in order to replenish lost or diminished functions to an acceptable level for a particular mission, operation, or contingency after an attack or catastrophic event.*⁵

Resilience: *The ability of an architecture to support the functions necessary for mission success with higher probability, shorter periods of reduced capability, and across a wider range of scenarios, conditions, and threats, in spite of hostile action or adverse conditions [...].*⁶

Source: [Office of the Secretary of Defense](#)

Shift towards a “warfighting” culture

- Stronger integration between military and IC on space
 - Joint Space Doctrine and Tactics Forum (JSDTF)
 - Improve collaboration and coordination on space operations
 - Develop tactics, techniques, and procedures (TTPs) for responding to attacks on space capabilities
- Renewed focus on operating in a contested environment
 - Creation of the Joint Interagency and Combined Space Operations Center (JICSpOC) at Schriever AFB, CO
 - “Experiment” with scenarios
 - Renamed the National Space Defense Center (NSDC) in 2017
 - Transitioned to 24/7 operations in January 2018

“I hope to never fight a war in space. It’s bad for the world. Kinetic [anti-satellite weaponry] is horrible for the world. But if war does extend into space, we have to have offensive and defensive capabilities to respond with, and Congress has asked us to explore what those capabilities would be.

- General John Hyten

- Participation in the Group of Governmental Experts (GGE) on Transparency and Confidence-building Measures (TCBMs) in Outer Space Activities
- Participation in consultations on the International Code of Conduct for Outer Space Security
- Engaging in a series of bilateral dialogues on space security with several countries
- Helped lead the Working Group on Long-Term Sustainability of Space Activities (LTS) within the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS)
 - Reached international consensus on 21 voluntary guidelines in June 2018
- Created the Combined Space Operations (CSpO) Initiative to enhance space operations planning and coordination
 - Formally brought U.S. allies into space operations and planning
 - Recently renamed the JSpOC to the CSpOC to signal stronger integration of allies and commercial partners

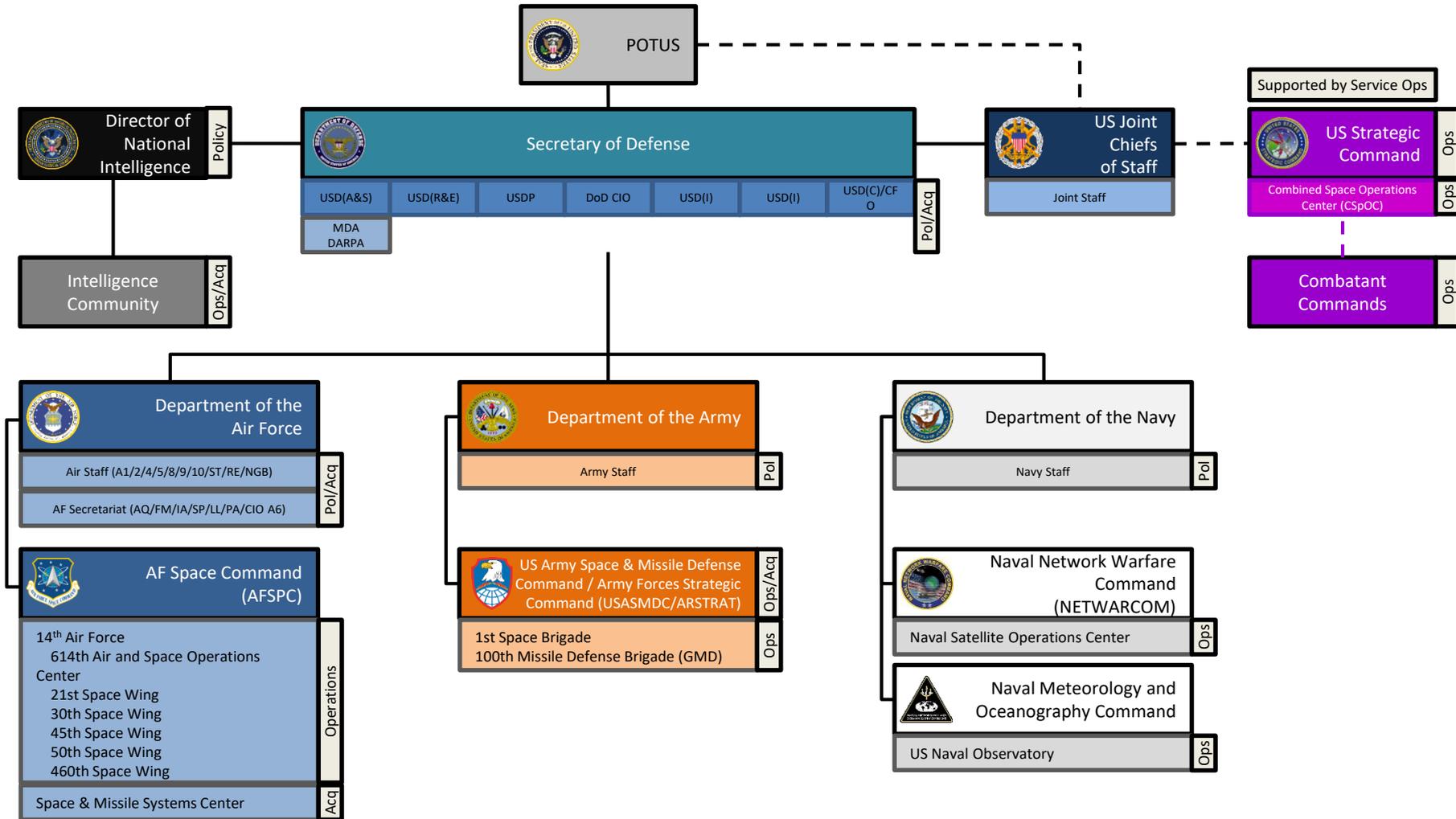
- At the end of the Obama Administration, there was already a major national security space policy review underway
- Trump Administration leveraged that review to create the National Space Strategy
 - The substance of the National Space Strategy is in-line with many of the approaches already started by the Obama Administration
- Four pillars
 - Transform to more resilient space architectures
 - Strengthen deterrence and warfighting options
 - Improve foundational capabilities and process (including Space Situational Awareness)
 - Foster conducive domestic and international environments
- Main tenets are very similar to what the Obama Administration was working on, but the rhetoric is different
 - Trump Administration more willing to talk about threats, dominance, and warfighting in space

Reorganization of military space forces

- Long-running debate over most effective way to organize military space forces
 - U.S. Air Force currently responsible for “operate, train, equip” functions
 - U.S. Strategic Command currently responsible for space warfighting functions
- In 2016, Congress renewed efforts to create a Space Corps within the Department of the Air Force
 - Led by Rep. Mike Rogers (R-AL) but with significant support from House Democrats
 - Bipartisan reluctance from the Senate to move fast, but concerned about the same problems
- Air Force tried to show it had things under control but failed to satisfy Congress
 - Renamed the Secretary of the Air Force from Executive Agent for Space to Principal DoD Space Advisor (PDSA)
 - Created A11 staff organization within the Air Force Headquarters to focus on space
- Congress directed two studies on options for reorganizing national security space
 - One led by DepSecDef Shanahan
 - One led by an independent think tank, the Center for Naval Analyses

- On June 18 , 2018 President Trump announced the Space Force
 - Was speaking at an event to announce the release of Space Policy Directive 3 on Space Traffic Management
 - Directed GEN Dunford, Chairman of the Joint Chiefs, to develop plans for a “separate but equal, sixth branch of the U.S. military’
 - Likely that Trump had been briefed on the potential outcomes of the Shanahan report and decided to make a decision
- This was a surprising, but legal, order
 - President has the power to direct the DOD to do this study
- But implementation requires Congress
 - Changes to statues authorizing military departments and services
 - Budget increases and authorities
- Exact structure and mission is still unknown

Current Org Chart



Space Force still small relative to other services

	Army	Navy	Marine Corps	Air Force ¹⁶	Coast Guard	Space Corps	Space Force-Lite	Space Force-Heavy
Discretionary Budget Authority (FY 2019)	\$182.1B	\$164.9B	\$29.2B	\$156.3B	\$11.7B	\$11.3B	\$13.4B	\$21.5B
Active Military	487,500	335,400	186,100	329,100	41,382	12,100	16,700	18,300
Guard / Reserve	543,000	59,100	38,500	177,100	-	1,600	1,900	2,800
Civilian ¹⁷	194,803	190,642	21,553	175,771	8,759	13,600*	17,200*	27,400*
Total Workforce (FY 2019)	1,225,303	585,142	246,153	681,971	50,141	27,300	35,800	48,500

* Includes headquarters/secretariat staff and civilian personnel

Todd Harrison “How much will the Space Force cost”? CSIS Press Briefing
<https://www.csis.org/analysis/how-much-will-space-force-cost>

- Shanahan Report recommended five steps that together were called the “Space Force”
 - Establish Space Development Agency (SDA) to rapidly develop and field next-gen space capabilities
 - Establish a Space Operations Force of career space experts to develop tactics, techniques and procedures
 - Create governance and support functions of the Space Force
 - Re-establish U.S. Space Command to take over space warfighting functions from USSTRATCOM
- On December 18, 2018 Trump signed memo directing the re-establishment of U.S. Space Command
- Remaining recommendations will be packaged together in a legislative proposal to accompany the FY20 President Budget request
 - Usually sent to Congress in early February
- Early signs are that it will actually end up being a Space Corps within the Department of the Air Force
 - But call it a “Space Force”?

- What will the primary mission of the Space Force / Space Corps be?
 - Space control (delivering space capabilities that support U.S. terrestrial warfighting) OR
 - High ground (dominance of space and conducting in-space activities)
- Will Space Force/Corps be able to successfully increase its budget?
 - Defense budget not expected to increase in FY20 and 21, meaning space increases will need to come at the expense of other services
- Will the Space Force/Corps be able to overcome bureaucratic inertia on space resilience?
- Will the U.S. develop a new slate of offensive counterspace capabilities?
- How does the globalizing/commercializing space domain impact U.S. response to space threats?



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**THANK YOU.
QUESTIONS?**

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Comparison of the four schools

	Primary Value and Functions of Military Space Forces	Space System Characteristics and Employment Strategies	Conflict Missions of Space Forces
Sanctuary	<ul style="list-style-type: none"> • Enhance Strategic Stability • Facilitate Arms Control 	<ul style="list-style-type: none"> • Limited Numbers • Fragile Systems • Vulnerable Orbits • Optimized for NTMV 	<ul style="list-style-type: none"> • Limited
Survivability	<p>Above Functions Plus:</p> <ul style="list-style-type: none"> • Force Enhancement 	<ul style="list-style-type: none"> • Terrestrial Backups • Commercial and International Augmentation • Autonomous Control • Attack Warning Sensors • Less Vulnerable Orbits • Hardening • Redundancy • Crosslinks • Maneuver • Space Mission Assurance <ul style="list-style-type: none"> • Defensive Operations • Resilience <ul style="list-style-type: none"> • Disaggregation • Protection • Distribution • Proliferation • Diversification • Deception • Reconstitution • On-Orbit Spares • 5Ds: <ul style="list-style-type: none"> • Deception • Disruption • Denial • Degradation • Destruction • Bodyguards and Convoys 	<ul style="list-style-type: none"> • Force Enhancement • Degrade Gracefully
Control	<ul style="list-style-type: none"> • Control Space • Significant Force Enhancement 		<ul style="list-style-type: none"> • Control Space • Significant Force Enhancement • Surveillance, Offensive and Defensive Counterspace
High Ground	<p>Above Functions Plus:</p> <ul style="list-style-type: none"> • Decisive Impact on Terrestrial Conflict • BMD 		<p>Above Functions Plus:</p> <ul style="list-style-type: none"> • Decisive Space-to-Space and Space-to-Earth Force Application • BMD

Chart courtesy of Dr. Peter Hays