The Case for CASR: Applying Lessons from Strategic Airlift and Sealift Contracts to Build a Commercial Augmentation Space Reserve Program for the Space Force

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> Look again at that dot. That's here. That's home. That's us. . . . The Earth is a very small stage in a vast cosmic arena. Think of the rivers of blood spilled by all those generals and emperors so that, in glory and triumph, they could become the momentary masters of a fraction of a dot.[1]

Introduction

Satellites and the space-based services they provide are integral to daily life. Civil society depends upon every day services like weather, television, credit card processing, maps, and the Global Positioning System (GPS).[2] The U.S. military is even more reliant on space-based capabilities.[3] However, space assets are gravely vulnerable to attack. Several world powers have demonstrated anti-satellite weapons capable of targeting and destroying satellites.[4] A capable adversary can easily take out swaths of satellites via a variety of means, whether kinetic, electronic, or through cyberspace.[5] For instance, on the eve of Russia's invasion of Ukraine, hackers launched cyberattacks to disable satellite internet service across Ukraine.[6]

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1. Carl Sagan, Pale Blue Dot: A Vision of the Human Future in Space *8-9 (1994). See also* Carl Sagan, *Carl Sagan - Pale Blue Dot*, 0:09–0:17, 1:12–1:36, YouTube (Mar 24, 2009), https://perma.cc/HW6M-89EV; Carl Sagan, *The Pale Blue Dot: Short Recording*, at 1:26–1:32, 2:26–2:48, held by the Library of Congress, https://perma.cc/T3VJ-ZEQM.

2. See *infra* Part III.A.

3. Charles Pope, *30 Years Later, Desert Storm Remains a Powerful Influence on Air, Space Forces*, Air Force, (Feb. 23, 2021), https://perma.cc/LCQ5-MNHZ (statement of General Jay Raymond) ("We are more reliant on space today than ever before. And unlike at the time of Desert Storm, today, access to space is not a given, and we need to maintain superiority in the domain to protect our nation's security and our way of life. . .").

4. See *infra* Part I.

5. See *infra* Parts I, II.

6. See *infra* Part II.

This raises an important question: in a crisis, if the government's satellites become inoperable or insufficient, how would the military obtain more space capabilities? The answer is the private sector. Commercial space companies in the United States own eleven times as many satellites as the U.S. government.[7] Worldwide, commercial expenditure on space activities outpaces government expenditures nearly four-to-one.[8]

This article will detail the potential for the United States Space Force (USSF) to implement a Commercial Augmentation Space Reserve (CASR) by assessing the policy justifications, analyzing the statutory and regulatory considerations, and drawing lessons from other commercial reserve programs. The goal of CASR is to "ensure that the USSF can leverage the capabilities of the commercial sector to enhance the resilience, capacity, and effectiveness of its national security space architecture."[9] In other words, CASR would incentivize private companies to stay ready to replenish, replace, or supplement the military's space launches and space services. In 2023, the USSF proposed a draft CASR framework modeled after the Civil Reserve Air Fleet (CRAF).[10] The CRAF is part of the national airlift mobility system which bolsters the domestic airline industry that, in turn, supports military operations in a crisis.[11] Similarly, the Voluntary Intermodal Sealift Agreement (VISA) is part of the U.S. Merchant which bolsters the sea cargo shipping industry.[12] Despite discussions of a commercial space reserve since at least 2022,[13] the threat of Russian aggression already realized,[14] and risk of war with China looming within the next half decade,[15] the U.S. military has not yet executed such a program for the space industry. The U.S. military intends to award contracts for CASR starting in 2025.[16]

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7. *USC Satellite Database*, UNION OF CONCERNED SCIENTISTS (May 1, 2023), https://perma.cc/L4ND-TEMD (4,741 U.S. commercial satellites compared to 167 U.S. government and 246 U.S. military).

8. Space Found. Ed. Team, *Space Foundation Announces $570B Space Economy in 2023, Driven by Steady Private and Public Sector Growth*, SPACE FOUND. (Jul. 18, 2024), https://perma.cc/DRY9-BZ23 [hereinafter *Space Report 2024 Q2*] ($125 billion in world governments' spending on space compared to $445 billion commercial spending, together totaling as a $570 billion space economy).

9. U.S. SPACE FORCE, COMMERCIAL SPACE STRATEGY 14 (Apr. 8, 2024), https://perma.cc/4AFV-UPW4.

10. See discussion *infra* Part IV.

11. JOINT CHIEFS OF STAFF, JOINT PUB. 4-01, DEF. TRANSP. SYS., at III-4 to III-7 (2017), https://perma.cc/S9RA-XRCZ [hereinafter JOINT PUB. 4-01].

12. *Id*.

13. Courtney Albon, *US Has Planes, Boats on Call for Emergencies, Why Not Satellites?*, C4ISRNET (Apr. 11, 2023), https://perma.cc/8QA9-DBK8.

14. See *infra* Part II.

15. *U.S. Four-Star General Warns of War with China in 2025*, REUTERS (Jan. 29, 2023), https://perma.cc/QB7B-H3PD. *See* Sam Lagrone, *Milley: China Wants Capability to Take Taiwan by 2027, Sees No Near-Term Intent to Invade*, U.S. NAVAL INST.: USNI NEWS (Jun. 23, 2021), https://perma.cc/6ACU-76WT; Naveed Jamali, Alex Rouhandeh & Tom O'Connor, *Marine Commandant Warns U.S. Lacking in Key Capability for War with China*, NEWSWEEK (Mar. 30, 2023), https://perma.cc/RW7J-Z95N.

16. Courtney Albon, *Space Force Plans to Award 20 Contracts for Commercial Reserve by 2026*, DEFENSE NEWS (Nov. 22, 2024), https://perma.cc/2JVV-M69V.

The CASR Framework is an effective solution to bolster the U.S. military's space capabilities during a contingency, but its implementation will be far more complicated than its predecessor airlift and sealift programs. These previous commercial reserve programs were mired in problems that took decades to solve or are still untested; for example, during the Gulf War, the U.S. government struggled with obtaining adequate manning of reserve ships and the negative impact an activation would impose on the profitable summer travel season.[17] Achieving success for CASR may require significant regulation and planning to succeed. However, the U.S. government has broad discretion and flexibility in how the Department of Defense (DoD) and other federal agencies impose obligations and incentives for commercial space vendors.

In assessing how to implement CASR, this article will take a systematic view. Part I of the article will discuss the role of the space domain in military operations. Part II of the article will address the need for the surge capacity in the space domain, through a case study of Ukraine's reliance on Starlink satellite communications in the Russo-Ukrainian war. Part III will orient the reader to the broad array of current space activities and space-based services. Following that, the article will take a close look at some impressive data illustrating how the commercial space industry is rapidly outpacing government space activities. Part IV will dissect the proposed draft framework for CASR, which the U.S. Space Force published for industry comment. Part V will first discuss existing authorities, namely the Defense Production Act (DPA), and assess recent presidential actions that bode favorably for broad federal powers to influence the industrial base. That will segue into an analysis of the history, statutes, and regulations of the other U.S. military commercial reserve programs, CRAF and VISA. The article will then contrast the commercial reserve programs against government-owned reserve fleets that have seen only limited success. Finally, Part VI of the article will analyze the new authorities and flexible incentives needed to implement a commercial space reserve.

I. SPACE AS A MILITARY DOMAIN

Space, the final frontier, is booming with activity. While large states such as the United States, India, and China are major players in space,[18] even states as small as Monaco now own satellites in orbit.[19] Fifty-four nations are now invested in space technology.[20] The private space industry is even more prolific, with SpaceX leading as the industry's dominant player. Nearly half of all launches in 2023 were

17. See *infra* Parts V.C. & VI.A.

18. *See* Edouard Mathieu & Max Roser, *Data Page: Cumulative Number of Objects Launched into Space*, OUR WORLD IN DATA: SPACE EXPLORATION AND SATELLITES (2024), https://perma.cc/S32F-YWRC (processing data from United Nations Office for Outer Space Affairs).

19. *Monaco Sets Its Sights on Space*, MONACO NOW, https://perma.cc/D6Q8-EL4J.

20. *Space Report 2024 Q2*, *supra* note 8.

from SpaceX.[21] SpaceX's Starlink satellite constellation system provides internet and communications around the world via 5,000 active commercial satellites.[22] Starlink makes up the preponderance of the United States' 9,632 total satellites and the plurality of the world's 17,263 satellites.[23] An industry report shows commercial space ventures in 2023 spent $445 billion while the world's governments spent only $125 billion.[24] This means the space private sector is nearly four times larger than the public sector.[25]

The U.S. government conducts more space activities than any other government, but still only spent less than $70 billion in 2022.[26] That includes departments and agencies such as the National Aerospace Agency (NASA), National Oceanic and Atmospheric Administration,[27] and the DoD. In 2023, the U.S. military, specifically, spent less than $46 billion on space.[28]

Various arms of the DoD carry out space activities. Additionally, some DoD agencies, such as the National Geospatial-Intelligence Agency (NGA) and the National Reconnaissance Office, rely on their own satellites and purchase satellite imagery to accomplish their specific intelligence missions.[29] The U.S. Space Force (USSF) "is responsible for organizing, training, and equipping troops [(Guardians)] during peace time in order to present them to the combatant commands (i.e., U.S. Space Command) during a time of space conflict or war."[30] U.S. Space Command (USPACECOM) "is responsible for conducting operations in, from, and to space in order to deter conflict and, if necessary, defeat aggression, and defend U.S. vital interests."[31] In other words, USSPACECOM is the warfighting component of the U.S. military that utilizes the people and assets readied

21. Stephen Clark, *With Another Record Broken, the World's Spaceports are Busier Than Ever*, ARS TECHNICA (Nov. 29, 2023, 6:18 PM), https://perma.cc/RN8V-Y5MX.

22. *Compare* William Harwood, *SpaceX Launches 76 Satellites in Back-to-Back Launches from Both Coasts*, CBS NEWS (Mar. 4, 2024), https://perma.cc/XAZ8-8FSF (5,942 satellites), *with* Elizabeth Howell & Tereza Pultarova, *Starlink Satellites: Facts, Tracking and Impact on Astronomy*, SPACE.COM (Feb. 24, 2024), https://perma.cc/WM6M-F3RP (5,442 satellites).

23. Mathieu & Roser, *supra* note 18.

24. *Space Report 2024 Q2*, *supra* note 8.

25. See *infra* Part III.B for more discussion on the growing commercial sector.

26. Space Found. Ed. Team, *Space Foundation Releases the Space Report 2023 Q2, Showing Annual Growth of Global Space Economy to $546B*, SPACE FOUND. (July 25, 2023), https://perma.cc/9M9U-L86L [hereinafter *Space Report 2023 Q2*]. For comparison, U.S. federal spending on highways in 2022 was $52 billion. Chad Shirley, *Testimony on The Status of the Highway Trust Fund: 2023 Update*, Congressional Budget Office (2023), https://perma.cc/JF5W-6LMA. The total budget of the United States in 2022 was $6.75 trillion. The Federal Budget in Fiscal Year 2022: An Infographic, Congressional Budget Office (2023), https://perma.cc/FTA7-RU4U (last visited Nov 25, 2024).

27. Space Found. Ed. Team, *Civil Space Agencies*, SPACE FOUND., https://perma.cc/3LHC-D4H7 (last visited Mar. 24, 2024).

28. *Space Report 2024 Q2*, *supra* note 8.

29. U.S. DEP'T OF DEF., NGA-U-2023-01846, COMMERCIAL SPACE PROTECTION TRI-SEAL STRATEGIC FRAMEWORK: EXECUTIVE SUMMARY (July 12, 2023), https://perma.cc/6MXK-X5HZ.

30. STEPHEN M. MCCALL, CONG. RSCH. SERV., IF11895, SPACE AS A WARFIGHTING DOMAIN: ISSUES FOR CONGRESS 1 (2021), https://perma.cc/6Q4R-R6VD

31. *Id.*

by the USSF. The USSF provides space-based, i.e. satellite, capabilities[32] to all the combatant commands through its satellites.[33]

The majority of the USSF's procurements fall within the portfolio of Space Systems Command near Los Angeles, California.[34] The proposed CASR[35] falls within the portfolio of the USSF's Commercial Space Office (COMSO),[36] which is an office within Space Systems Command.[37] However, in addition to Space Systems Command, other bodies that procure commercial space capabilities include the Space Development Agency[38] and the General Services Administration (GSA).[39] The USSF is reliant on private vendors for much of its mission, including space launches and construction of satellite constellations.[40]

Although the USSF is a still relatively new branch of the military,[41] the United States has been fighting space wars since 1991.[42] The first Gulf War was the first "space war," where GPS "played a critical role in the Coalition's rapid dismantling of Saddam Hussein's military."[43] The Coalition forces utilized GPS to navigate, track the enemy through a sandstorm, and guide munitions onto their targets. Satellite communications also comprised half of all command-and-control networks.[44]

Now these space assets are under threat. Satellites are notoriously fragile. Even a grain of space dust, hurtling at high speeds, can pierce a satellite's protective

32. See *infra* Part III for discussion of space-based services.

33. U.S. SPACE FORCE, SPACE DOCTRINE PUB. 3-0, OPERATIONS (July 2023) https://perma.cc/FN6K-RXRF.

34. Media Release, Space Sys. Command, Space Systems Command Facilitates Multiple Contract Awards for Proliferated Low Earth Orbit Satellite-Based Services (July 24, 2023), https://perma.cc/DY9N-HDML ("SSC manages a $15 billion space acquisition budget for the Department of Defense. . .") [hereinafter *Space Systems Command Contract Awards*].

35. *See infra* Part IV.

36. The Commercial Space Office had been renamed from the Commercial Services Office, retaining the same acronym of COMSO. *See* Sandra Erwin, *Space Force Procurement Command Rebrands Commercial Space Office*, SPACENEWS (Apr. 20, 2023), https://perma.cc/Q83Q-S223.

37. COMSO FACT SHEET, SPACE SYS. COMMAND, https://perma.cc/A77M-TX3C (last visited Feb. 26, 2024).

38. Rachel Zisk, The National Defense Space Architecture (NDSA): An Explainer, SPACE DEV. AGENCY, https://perma.cc/8HRU-T7AZ.

39. *How to Order Satellite Communications*, U.S. GEN. SERV. ADMIN. (Apr. 29, 2024), https://perma.cc/UG9N-SPJ4; *Satellite Communications Products and Services*, U.S. GEN. SERV. ADMIN., https://perma.cc/ST5R-YCAR (last visited June 21, 2024).

40. *See Space Systems Command Contract Awards*, *supra* note 34. *See, e.g.*, Sandra Erwin, *SpaceX Launches U.S. Missile-Defense Satellites*, SPACENEWS (Feb. 14, 2024), https://perma.cc/CVX4-RLUD.

41. National Defense Authorization Act for Fiscal Year 2020, Pub. L. No. 116-92 § 952 (United States Space Force Act); 10 U.S.C. § 9081; Jim Garamone, *Trump Signs Law Establishing U.S. Space Force*, U.S. DEP'T OF DEF.: DOD NEWS (Dec. 20, 2019), https://perma.cc/7AG4-J7HB.

42. Larry Greenemeier, *GPS and the World's First "Space War,"* SCI. AM. (Feb. 8, 2016), https://perma.cc/P7HR-B5PQ.

43. *Id.*

44. *Id.*; David Vergun, *Space Domain Critical to Combat Operations Since Desert Storm*, U.S. DEP'T OF DEF.: DOD NEWS (Mar. 19, 2021), https://perma.cc/W6UQ-WQ63.

shielding and leave it vulnerable to further damage.[45] A matter of persistent concern for scientists and government agencies is the Kessler Effect or Kessler Syndrome, a predicted doomsday scenario in which the orbit around Earth is so crowded that a collision between satellites or debris will result in a self-sustaining perpetual cascade of collisions.[46] Despite this, the United States, Russia, China, and India have all successfully destroyed satellites with anti-satellite missiles.[47] China's 2007 anti-satellite test, for example, egregiously produced over 3,000 pieces of debris.[48] Most recently, in 2024, the U.S. government confirmed that Russia may be developing a co-orbital nuclear weapon, in violation of the Outer Space Treaty, which would generate an electromagnetic pulse able to neutralize swaths of satellites.[49] U.S. officials later confirmed that Russia launched a non-nuclear research satellite that is designed to test the capability to carry nuclear weapons in 2022.[50] Then, in May of 2024, the United States determined that Russia launched a satellite that is "likely a counter space weapon" into low earth orbit.[51] Rounding out this rather alarming picture, by contrast, many modern militaries employ more innocuous anti-satellite capabilities such as signal spoofing and signal jamming.[52] Given the evolving state of the art, modern militaries appear to be in a space arms race.

II. THE NEED FOR RESERVES: A CASE STUDY OF UKRAINE, SATELLITES, AND BIG PERSONALITIES

On the eve of the Russo-Ukrainian War, Russia launched a devastating cyber-attack that wiped Viasat-brand modems, rendering them inoperable and cutting off Viasat users from the satellite internet service.[53] "[T]he United States, United Kingdom, and European Union publicly attributed the cyber attack" to Russian armed forces.[54] As a result, the Ukrainian government requested that SpaceX

45. *Double Trouble: Gaia Hit by Micrometeoroid and Solar Storm*, EUR. SPACE AGENCY (July 17, 2024), https://perma.cc/6NWQ-J3H2; *see* Neil Dymoke, *This is the Damage a Tiny Speck of Space Debris Can Do at 15,000mph*, BIG THINK (Feb. 11, 2018), https://perma.cc/J8L3-JL5T.

46. *See generally* Donald J Kessler et al., *The Kessler Syndrome Implications to Future Space Operations*, 137 ADVANCES IN THE ASTRONAUTICAL SCI. (2010); *The Kessler Effect and How To Stop It*, EUR. SPACE AGENCY, https://perma.cc/E94G-96XZ (last visited Mar. 1, 2024); Heather F. Riley, *Micrometeoroids and Orbital Debris (MMOD)*, NASA (June 14, 2016), https://perma.cc/R5AP-XJD6.

47. SECURE WORLD FOUND., GLOBAL COUNTERSPACE CAPABILITIES at 01-01 to 04-07 (Brian Weeden & Victoria Samson, eds., Apr. 2024), https://perma.cc/X6N4-7GEJ.

48. *Id*. at 05-01; Greg Hadley, *Saltzman: China's ASAT Test Was 'Pivot Point' in Space Operations*, AIR & SPACE FORCES MAGAZINE (Jan. 13, 2023), https://perma.cc/4ST6-R8K6.

49. SECURE WORLD FOUND., *supra* note 47 at 2-15; Dustin Volz & Gordon Lubold, *White House Confirms Russia Is Developing Antisatellite Weapon*, WALL ST. J. (Feb. 15, 2024), https://perma.cc/NG5S-KT9G.

50. Warren P. Strobel et al., *Russia Launched Research Spacecraft for Antisatellite Nuclear Weapon Two Years Ago, U.S. Officials Say*, WALL ST. J. (May 16, 2024), https://perma.cc/P4ET-444F.

51. Jaroslav Lukiv, *US Says Russia Likely Launched Anti-Satellite Weapon*, BBC (May 22, 2024), https://perma.cc/WW6N-C86V.

52. SECURE WORLD FOUND., *supra* note 47 at 01-19.

53. *Case Study: Viasat*, CYBERPEACE INST. (June 2022), https://perma.cc/J7SS-QDY6.

54. SECURE WORLD FOUND., *supra* note 47 at 14-06.

provide terminals for its commercial satellite internet service; SpaceX responded by sending thousands.[55]

By 2022, about 150,000 Ukrainians were relying on SpaceX's Starlink.[56] That included the Ukrainian government, military, and civilians.[57] Ukraine was expected to lose communications and internet access in the first days of the war, but internet access persisted thanks, in part, due to satellite broadband internet.[58] NGOs operating in the area relied on Starlink.[59] Ukrainian civilians used Starlink for basic internet access. Ukrainian activity on the internet played a key role in public relations, garnering positive support from the world community.[60] The internet also played a significant role in enabling civilians to participate in intelligence reporting.[61] The Ukrainian government used Starlink to upload government functions to the cloud and to shield them from disruption due to cyber and kinetic attacks on their servers.[62] Meanwhile, the Ukrainian military relied on Starlink internet connections for battlefield communications[63] and to coordinate drone strikes.[64]

Then about a year into the war, SpaceX made an about-face, asserting the company never intended for the Ukrainian military to use Starlink for "offensive purposes."[65] In the midst of planning a submarine drone strike operation on a Russian naval fleet,[66] Ukraine requested that SpaceX extend its geofenced service

55. *Id*.

56. Michael Sheetz, *About 150,000 People in Ukraine Are Using SpaceX's Starlink Internet Service Daily, Government Official Says*, CNBC (May 2, 2022), https://perma.cc/RJF7-CFKE. Starlink's systems proved more robust, capable of adapting and mitigating Russian cyber-attacks. *See* Michael Kan, *Pentagon Impressed by Starlink's Fast Signal-Jamming Workaround in Ukraine*, PCMAG (Apr. 21, 2022), https://perma.cc/5NHQ-NZHA; Sandra Erwin, *Space Force General: Commercial Satellite Internet in Ukraine Showing Power of Megaconstellations*, SPACENEWS (May 11, 2022), https://perma.cc/NNR4-6LZQ.

57. Sheetz, *supra* note 56.

58. Erwin, *supra* note 56.

59. *Id*.

60. Megan Specia, *'Like a Weapon': Ukrainians Use Social Media to Stir Resistance*, N.Y. TIMES (Mar. 25, 2022); Magdalene Karalis, *The Information War: Russia-Ukraine War Through the Eyes of Social Media*, GEO. J. INT'L AFF. (Feb. 2, 2024), https://perma.cc/M8FA-4YSK.

61. Andrew Salerno-Garthwaite, *OSINT in Ukraine: Civilians in the Kill Chain and the Information Space*, GLOB. DEF. TECH., https://perma.cc/7E2A-244F.

62. Ryan White, *How the Cloud Saved Ukraine's Data from Russian Attacks*, C4ISRNET (June 22, 2022), https://perma.cc/N4PN-DN34; Frank Konkel, *How a Push to the Cloud Helped a Ukrainian Bank Keep Faith with Customers amid War*, NEXTGOV.COM (Nov. 30, 2023), https://perma.cc/J24K-RZ3N.

63. Mike Stone & Joey Roulette, *SpaceX's Starlink Wins Pentagon Contract for Satellite Services to Ukraine*, REUTERS (June 1, 2023), https://perma.cc/JY3J-YVEB.

64. Alex Horton & Serhii Korolchuk, *Whatever the Fuss over Elon Musk, Starlink Is Utterly Essential in Ukraine*, WASH. POST (Sep. 18, 2023), https://perma.cc/GU7J-WUVY.

65. Joey Roulette, *SpaceX Curbed Ukraine's Use of Starlink Internet for Drones-Company President*, REUTERS (Feb. 9, 2023), https://perma.cc/3D3Z-F96D.

66. William Skipworth, *Elon Musk Cut Off Ukraine's Starlink Access During Drone Attack, According To His Biographer*, FORBES (Sep. 7, 2023), https://perma.cc/GZC6-6XBM.

area[67] to allow Starlink connections in the Russian controlled territory of Crimea.[68] Those requests were denied.[69] The CEO of SpaceX, Elon Musk, provided his perplexing rationale for denying the request,[70] explaining he did not want Ukraine to engage in "conflict escalation,"[71] resulting in a "mini-Pearl Harbor"[72] and nuclear war.

SpaceX, also made an about-face on funding. The company reportedly sent a letter to the Pentagon in September 2022,[73] demanding payment for continued Starlink service in Ukraine.[74] Although SpaceX initially led the public to believe the company had donated Starlink terminals and subscriptions to Ukraine as charity, this was far from the truth. In reality, the U.S. Agency for International Development[75] and other foreign government agencies had been footing a substantial portion of Ukraine's bill, paying for eighty-five percent of the terminals and thirty percent of the internet connectivity.[76] SpaceX seemingly distorted their costs, possibly as a tactic for public relations and to inflate their position in procurement negotiations. The majority of users in Ukraine only sought the $500 tier of Starlink service but SpaceX opted to provide all users in Ukraine the $4,500 tier; SpaceX then based its complaints on having to bankroll seventy percent of that cost.[77] Thus, SpaceX projected costs exceeded $100 million[78] for its support of Ukraine in 2022,[79] instead of a much more conservative figure based on what was actually requested by users. While SpaceX at least initially did provide support to Ukraine ahead[80] of securing

67. Frank Bajak, *Musk Deputy's Words on Starlink "Weaponization" Vex Ukraine*, AP NEWS (Feb. 9, 2023), https://perma.cc/AG5E-PAXP.

68. Horton, *supra* note 64.

69. Sean Lyngaas, '*How Am I in This War?': New Musk Biography Offers Fresh Details about the Billionaire's Ukraine Dilemma*, CNN (Sept. 11, 2023), https://perma.cc/RCD9-JBJW.

70. Mr. Musk's biographer incorrectly reported that Mr. Musk had ordered the shutdown of active Starlink connections so as to disable Ukrainian submarine drones already underway. The biographer later clarified that Mr. Musk had denied a request to extend Starlink service out to Crimea for the offensive operation. Elizabeth Lopatto, *How the Elon Musk Biography Exposes Walter Isaacson*, THE VERGE (Oct. 1, 2023), https://perma.cc/UM5A-UJAV; Walter Isaacson (@WalterIsaacson), X (formerly TWITTER) (Sept. 8, 2023, 10:55 PM), https://perma.cc/3EY7-GAUN.

71. Lopatto, *supra* note 70.

72. Skipworth, *supra* note 66.

73. Alex Marquardt, *Exclusive: Musk's SpaceX Says It Can No Longer Pay for Critical Satellite Services in Ukraine, Asks Pentagon to Pick up the Tab*, CNN (Oct. 14, 2022), https://perma.cc/92MC-52ZW.

74. Transcript, U.S. Dep't of Defense, Sabrina Singh, Deputy Pentagon Press Secretary, Holds a Press Briefing (Oct. 14, 2022), https://perma.cc/VNZ3-PUNJ.

75. Press Release, U.S. Agency for Int'l Dev., USAID Safeguards Internet Access in Ukraine through Public-Private-Partnership with SpaceX (Apr. 5, 2022), https://perma.cc/HVU4-GHUU.

76. Marquardt, *supra* note 73.

77. *Id.*

78. *Id.*

79. In 2023, Mr. Musk stated that maintaining Starlink in Ukraine costs $20 million per month, which amounts to $240 million annually. Stone & Roulette, *supra* note 63.

80. Michael Sheetz, *Viasat Believes "Cyber Event" Is Disrupting Its Satellite-Internet Service in Ukraine*, CNBC (Feb. 28, 2022), https://perma.cc/W7A2-W5E4.

government contracts, [81] the company's true motives, whether profiteering or altruistic, remain unclear.

SpaceX's actions, including threats of terminating the vital Starlink connections in Ukraine and publicly bemoaning of the costs of its service, are widely interpreted as negotiation tactics to obtain a more lucrative contract with the U.S. government. Some have speculated that Mr. Musk's grandstanding and initial charity served to raise SpaceX's public profile and showcase their technology prior to another investment funding round.[82] Ultimately, the DoD and SpaceX reached a deal, announcing a contract on June 1, 2023.[83] The specifics are not publicly available.[84] If the number of subscriptions in Ukraine remained consistent between 2022 and 2023, the contract may have been worth approximately $145 million, according to off-hand exclamations by the president of SpaceX after the previous year's negotiations.[85] If SpaceX's belief about the DoD's willingness to pay was true, that indicates the DoD seemingly agreed with SpaceX's inflated cost figures.[86]

This episode "highlights the pitfalls of being beholden to a single commercial company for such critical communication infrastructure during conflict."[87] Essentially, a single private actor wielded outsized influence on international armed conflict and public policy. [88] This private actor, namely Elon Musk, was

81. Rishi Iyengar, *Why Ukraine Is Stuck With Elon (For Now)*, FOREIGN POLICY (November 22, 2022, 5:07 PM), https://perma.cc/3YLU-RZPR (statement of retired Adm. Michael Rogers, former head of U.S. Cyber Command and director of the National Security Agency) ("We often go to the commercial sector to get additional spaceborne communications access. We have literally done that in every significant conflict. . . . What made this unusual was, in this case, the commercial provider entered the field directly.").

82. Amritha Jayanti, *Starlink and the Russia-Ukraine War: A Case of Commercial Technology and Public Purpose?*, HARV. KENNEDY SCH.: BELFER CENTER FOR SCI. AND INT'L AFF. (Mar. 9, 2023), https://perma.cc/BHE7-WFQ8.

83. Stone & Roulette, *supra* note 63.

84. "The Pentagon did not disclose the terms of the contract . . . 'for operational security reasons and due to the critical nature of these systems.'" *Id*.

85. After SpaceX's demand for payment was widely reported in the news in October 2022, Mr. Musk briefly retracted the demand, tweeting "the hell with it . . . we'll just keep funding Ukraine govt for free." In reaction, the President of SpaceX was quoted expressing frustration because "[t]he Pentagon had a $145 million check ready to hand to me, literally." Lyngaas, *supra* note 69.

86. Similar to consumer cellular data and some home internet plans, Starlink's plans are tiered not only by service features but also by a cap on monthly data consumption. *See Service Plans*, STARLINK, https://perma.cc/6P5E-R72C (last visited Feb. 25, 2024). A more expensive plan may offer no additional benefit if users do not exceed the data allowance of a lower-cost plan. Thus, by defaulting to the premium priced plans, SpaceX may be inflating their costs.

87. Jayanti, *supra* note 82.

88. Regardless of whether Mr. Musk's opinions on international affairs are taken seriously, his opinions are intertwined with his motives and business decisions in the public's eyes; his comments and social media posts could signal unwillingness to cooperate with U.S. interests. *See, e.g.*, Lolita C. Baldor et al., *Elon Musk Asks Defense Department to Fund Starlink Satellite System in Ukraine,* PBS NEWSHOUR (Oct. 14, 2022, 3:11 PM), https://perma.cc/P3Z5-NGME; Bloomberg Originals (@bbgoriginals), *Elon Musk Is Under Fire for Tweeting a Ukraine "Peace" Plan Which Cedes Crimea to Russia*, X (formerly TWITTER) (Oct. 4, 2022) https://perma.cc/TC8R-JJX2; Tara Copp, *Elon Musk's Refusal to Have Starlink Support Ukraine Attack in Crimea Raises Questions for Pentagon*, AP NEWS (Sep. 11, 2023, 6:42 PM), https://perma.cc/65XG-4ET4; Jeremy Dirac, *Musk's Tweet Criticizing Ukraine's Counteroffensive Sparks Outrage*, KYIV POST (Sep. 18, 2023, 3:43), https://perma.cc/XFE5-RBGN.

able to, at least as far as public perception goes, strong arm the U.S. government into a lucrative contract. The situation drew criticism and national security concerns from U.S. senators.[89] If the Pentagon had called SpaceX's bluff, declining to fund Starlink, Ukraine could have been left without the satellite communications that it relies on in its asymmetric defense against Russia. Air Force Secretary Frank Kendall said on the matter:

> If we're going to rely upon commercial architectures or commercial systems for operational use, then we have to have some assurances that they're going to be available. We have to have that. Otherwise[,] they are a convenience and maybe an economy in peacetime, but they're not something we can rely upon in wartime.[90]

The alternatives to leveraging current commercial capabilities would be to build up the DoD's organic space capabilities in advance or build additional DoD space systems on the fly during crisis. The former strategy is inherently limited by budget constraints and, as discussed later in this article, the maintenance and manning requirements for any such idle reserves are likely to fall by the wayside.[91] The latter strategy is not feasible, given the long timelines for space acquisitions. The average time needed to put a space vehicle to use is 7.5 years from authorization to launch, with a range from 3.5 years to 14.5 years.[92] Even after the design and development phase, during the production phase, space vehicles take an average of 3.3 years from assembly to launch, with a range of 1.5 to 6 years.[93] Even the most optimistic production timelines will not meet the needs of a current military operation. Satellites are much easier to knock out than to replace.[94] Therefore, developing a reserve of commercial capabilities is essential to the United States' readiness in responding to a crisis and fighting a war in the space domain.

III. UNDERSTANDING THE SPACE INDUSTRY

A. Space Activities

Before one can dive into understanding the USSF's need for commercial space vendors, one must understand what exactly the space domain entails and what types of activities governments and commercial industry are conducting in space.

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89. Sandra Erwin, *Senate Armed Services Committee to Probe Starlink Operations in Ukraine,* SPACENEWS (Sept. 14, 2023), https://perma.cc/MDJ9-8KYB.

90. Copp, *supra* note 88.

91. *See* discussion *infra* Part V.D.

92. Lorrie A. Davis & Lucien Filip, Aerospace, HOW LONG DOES IT TAKE TO DEVELOP AND LAUNCH GOVERNMENT SATELLITE SYSTEMS? 1 (Aerospace Report No. ATR-2015-00535, 2015), https://perma.cc/7UA8-FNQQ.

93. *Id*. at 4.

94. *See*, *e.g*., Katie Bo Lillis et al., *Exclusive: Russia Attempting to Develop Nuclear Space Weapon to Destroy Satellites with Massive Energy Wave, Sources Familiar with Intel Say*, CNN (Feb. 17, 2024), https://perma.cc/KK79-DWR2; Jaroslav Lukiv, *US Says Russia Likely Launched Space Weapon*, BBC NEWS (May 22, 2024), https://perma.cc/Z7AQ-9TQU.

Space has become essential to our security and prosperity. Space systems are woven into the fabric of our way of life and is fundamental to our economic system. These include the satellites that power the GPS technology that we use every day, or allow us to surf the web and call our friends, or enable first responders to communicate with each other in times of crisis, or orchestrate transactions in the world financial market, or even allow us to use credit cards at gas pumps.[95]

Satellites vary significantly in their design and orbit. As of July 2023, there are 8,400 operational payloads in Earth's orbit, among about 45,000 total objects.[96] Satellites consist of two main parts: a mission payload and a bus, a support platform. [97] "The mission payloads perform their primary mission functions, including: making measurements, providing communications, providing navigation, and special military operations. The bus transports the mission payload around in its orbit."[98]

Major types of satellites include: astronomical, communications, navigation, earth observation, space station, and scientific satellites.[99] Scientific satellites are designed to carry out experiments in space. [100] As implied, astronomical satellites look outward while earth observation satellites look inward. [101] Communications satellites include services for television, radio, telephone, data and internet.[102] Navigation includes, for example, GPS.[103] More precisely, this category of satellite capability is known as Position, Navigation, and Timing (PNT).[104] Earth observation satellites have uses in environmental monitoring, meteorology, topology, as well as Intelligence, Surveillance, and Reconnaissance (ISR).[105] The outputs can range from optical photography to imagery across the electromagnetic spectrum, such as infrared.[106] This category also includes radar as well as early warning systems to track ballistic missiles.[107]

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95. *U.S. Space Force*, OFFICE OF THE DIR. OF NAT'L INTEL.: INTEL.GOV, https://perma.cc/XKW9-AZ2E (last visited Jan. 19, 2024).

96. U.S. SPACE FORCE, SPACE DOCTRINE PUB. 3-100, SPACE DOMAIN AWARENESS 6 (Nov. 2023). However, estimates of the number of space objects varies depending on source.

97. C. ROBERT WELTI, SATELLITE BASICS FOR EVERYONE 1 (2012).

98. *Id.*

99. *Id.*

100. *Id.* at 19.

101. *See id.* at 13.

102. *Id.* at 32.

103. *Id.* at 17.

104. *What is Positioning, Navigation and Timing (PNT)?*, U.S. DEP'T OF TRANSP. (Jun. 13, 2017), https://perma.cc/7U4A-8GZ8.

105. WELTI, *supra* note 97 at 16-17; *10 things to know about Earth observation satellites*, viasat.com (June 10, 2022).

106. *Three Types of Satellite Imagery*, NAT'L OCEANIC AND ATMOSPHERIC ADMIN.: NAT'L WEATHER SERV., https://perma.cc/V5B3-WC9X; Anastasia Sarelli, *Guide to the Different Types of Satellite Data*, CLOUDEO (Nov. 10, 2023), https://perma.cc/BH8E-CEJU.

107. Christopher Stone, *Enhanced Space-Based Missile Tracking*, AIR & SPACE FORCES MAG. (Oct. 7, 2022), https://perma.cc/98XR-DWGK; *Defense Support Program Satellites*, U.S. SPACE FORCE (Oct., 2020), https://perma.cc/WN5B-5DWN.

Satellites take up various orbits around the Earth, defined by their distance from the earth's surface as well as their path circling around the Earth. Geosynchronous Earth orbit (GEO), the highest type of Earth orbit, is commonly used for weather and communications that require the satellite to be at a fixed point relative to the Earth.[108] Medium earth orbit is used for GPS.[109] Low Earth Orbit (LEO) is commonly used for weather, science,[110] imagery, and satellite constellations.[111] Many satellites in LEO are in sun-synchronous or heliosynchronous orbit, meaning they travel over spots of the earth's surface at the same time every day.[112]

Satellites, and other spacecraft,[113] are launched into space.[114] Launch refers to powered flight that uses a rocket to propel a vehicle above the Earth's atmosphere and accelerate to a sufficient velocity to either enter orbit or escape orbit.[115] After launch, the rocket burns out.[116] Then, the spacecraft separates from the rocket and either continues in freefall orbit around the Earth or escapes the Earth's gravity.[117] Historically, rockets were expendable, but at least partially reusable rockets, such as the SpaceX Falcon 9,[118] are now in use.[119] In addition to these large rockets used for ground launches, air-launched rockets are smaller rockets that take off from a traditional airplane. For example, in 1985, the United States demonstrated an anti-satellite missile launched from an F-15.[120] In 1990, the Pegasus

108. *Types of Orbits*, SPACE FOUND., https://perma.cc/2RK8-XNFV (last visited Aug. 28, 2024); *Types of Orbits*, EUR. SPACE AGENCY (Mar. 30, 2020), https://perma.cc/KT45-YWKC [hereinafter *Types of Orbits* (ESA)].

109. Holli Riebeek, *Catalog of Earth Satellite Orbits*, NAT'L AERONAUTICS AND SPACE AGENCY: EARTH OBSERVATORY (Sep. 4, 2009), https://perma.cc/9KYJ-Y69T.

110. *Id.*

111. *Id.*

112. *Types of Orbits* (ESA), *supra* note 108.

113. *Chapter 9: Spacecraft Classification*, NAT'L AERONAUTICS AND SPACE AGENCY: NASA SCIENCE, https://perma.cc/K2N6-5E3R (last visited Jan. 20, 2024).

114. *How Do We Launch Things Into Space?*, NAT'L AERONAUTICS AND SPACE AGENCY: NASA SPACE PLACE, https://perma.cc/A622-VV75 (last visited Jan. 20, 2024).

115. *Chapter 14: Launch*, NAT'L AERONAUTICS AND SPACE AGENCY: NASA SCIENCE, https://perma.cc/2JWQ-3ZGJ (last visited Jan. 20, 2024).

116. *Id.*

117. *Id.*

118. *See* Eric Brown, *Boosting Rocket Reliability at the Material Level*, MASS. INST. TECH.: MIT NEWS (Nov. 28, 2023), https://perma.cc/ZH2F-88H6.

119. Another U.S.-based private company, Blue Origin, has long been rumored to be developing a reusable rocket. Eric Berger, *Blue Origin Has a Secret Project Named "Jarvis" to Compete with SpaceX*, ARS TECHNICA (July 27, 2021, 9:00 AM), https://perma.cc/S2W6-JJHW. Private companies in other nations, such as Spain and China, have also developed or tested them. *See* Betsy Reed, *Spanish Company Launches Reusable Rocket in Breakthrough for European Space Ambitions*, GUARDIAN (Oct. 6, 2023, 11:24 PM), https://perma.cc/MH74-YXQD; Andrew Jones, *China's Reusable Rocket Race Heats up with New Hop Test*, SPACENEWS (Dec. 11, 2023), https://perma.cc/A649-6QSD. Other nations, such as Japan and India, have also announced their intent to develop such rockets. *See* Stephen Clark, *Japan Is Studying a Reusable Rocket, but It Won't Fly before 2030*, ARS TECHNICA (Oct. 4, 2023, 8:13 PM), https://perma.cc/5VEP-APGC (last visited Feb. 23, 2024); *RLV-TD*, INDIAN SPACE RSCH. ORG., DEP'T OF SPACE, https://perma.cc/LM7R-DKY8 (last visited Feb. 23, 2024).

120. Raymond L. Puffer, *The Death of a Satellite: Edwards Air Force Base*, AIR FORCE TEST FLIGHT CTR.: MOMENTS IN FLIGHT TEST HISTORY (Dec. 18, 2003), https://perma.cc/ZJ6K-D5P9.

rocket launched from a NASA-owned B-52[121] (a type of large military bomber plane manufactured by Boeing) and, in recent years, Virgin Orbit's[122] LauncherOne rockets have taken off from the Boeing 747.[123] China, too, is commercially developing an air-launched rocket for small satellites.[124]

In addition to satellites, there are re-usable military space planes, particularly the Boeing X-37B, which enter orbit for a few years or less, land back on earth, and eventually are launched for a subsequent mission.[125] Some would describe the X-37B space plane as a small space shuttle. Many of the details and missions for the X-37B are classified.[126] The current publicly known payload size and use of these space planes is for scientific experiments, without human occupants,[127] but expanded application of the technology is inevitable. China responded to the X-37B by developing its own space plane,[128] drawing comment from the USSF Chief of Space Operations that "these are two of the most watched objects on orbit while they're on orbit."[129] India's own space plane is also well into testing.[130]

Space activities are not constrained to the sky; they also involve ground components. Satellite operations require ground systems, "series of antennas, communications networks, and processing facilities that command and control the satellites, bring their data down to Earth, route data to processing facilities, create data products and distribute them."[131] Additionally, ground-based sensors can monitor space activity.[132]

The monitoring of space activity is known as Space Domain Awareness (SDA).[133] SDA is "[t]he timely, relevant, and actionable understanding of the

121. *Pegasus Rocket*, NORTHROP GRUMMAN, https://perma.cc/NE4C-93E5 (last visited Jan. 20, 2024).

122. Virgin Orbit filed for bankruptcy in 2023 and sold assets to other space ventures. Ed Browne, *Virgin Orbit: The Private Space Company That Aims to Launch Small Satellites*, SPACE.COM (Jun. 3, 2023), https://perma.cc/XS3S-WE7C.

123. Anna Cooban et al., *Virgin Orbit's LauncherOne Rocket Suffers Failure on First Launch Attempt from the UK*, CNN (Jan. 9, 2023), https://perma.cc/4MS4-TLWQ.

124. Andrew Jones, *China Is Working on a Design for a Reusable Air-Launched Orbital Rocket*, SPACENEWS (Nov. 30, 2023), https://perma.cc/B3QQ-ES8Z.

125. Brandi Vincent, *What We Know About the Pentagon's Mysterious X-37B Spaceplane and Its Record-Setting Mission*, DEFENSESCOOP (Nov. 15, 2022), https://perma.cc/KD5L-XEAE.

126. *Id.*

127. *Id.*

128. Huaxia, *China's Reusable Experimental Spacecraft Back to Landing Site*, XINHUA (Sept. 6, 2020, 3:13 PM), https://perma.cc/3VET-JCW2.

129. Brett Tingley, *China Launches Secret Space Plane on 3rd-Ever Mission*, SPACE.COM (Dec. 14, 2023).

130. Sharmila Kuthunur, *India Successfully Lands Reusable Space Plane Prototype for 1st Time (Video)*, SPACE.COM (Apr. 5, 2023), https://perma.cc/BA22-BRB8.

131. *Satellite Ground Systems*, DEP'T OF COMM.: NAT'L ENV'T SATELLITE, DATA, AND INFO. SERV., https://perma.cc/6Z8P-H4US (last visited Jan. 19, 2024).

132. U.S. GOV'T ACCOUNTABILITY OFF., GAO-23-105565, SPACE SITUATIONAL AWARENESS: DOD SHOULD EVALUATE HOW IT CAN USE COMMERCIAL DATA 2 (Apr. 2023), https://perma.cc/ZA2Q-B2MW.

133. On October 4, 2019, the USSF changed the term Space Situational Awareness (SSA) to Space Domain Awareness (SDA). Sandra Erwin, *Air Force: SSA Is No More; It's 'Space Domain Awareness'*,

operational environment that allows military forces to plan, integrate, execute, and assess space operations."[134] In simpler terms, SDA involves the capability to detect, track, identify and characterize space objects.[135] This, in itself, is a significant task. The commander of U.S. Space Command said SDA is the command's "Number one need."[136] As orbital space becomes increasingly congested, this need is likely to only increase.

B. Commercial space

"Space was originally dominated by governments, but lower costs and reduced barriers for launch and licensing have made the commercial space sector one of the fastest growing industries in the world."[137] Revenue for the commercial space industry was $396.2 billion in 2021 and grew to $427.6 billion in 2022.[138] One-third of the revenue was infrastructure and support for activities in space, such as ground stations. The remaining two thirds were space-based products, meaning satellites. PNT data made up thirty-nine percent of all commercial revenue. Contrast that revenue with the separate spending by the world's governments on space programs, which was only $119 billion in 2022.[139] For the year 2022, commercial revenue constituted seventy-eight percent of the space economy.[140]

The U.S. government's total budget for civil and military space programs in 2022 was $69.5 billion, accounting for nearly sixty percent of global government space spending.[141]

In the decade prior to 2022, the space economy grew ninety-one percent.[142] By some predictions, the commercial space industry is expected to grow forty-one percent by 2028[143] and may reach $1 trillion by 2030.[144] Sales of "space-as-a-

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SpaceNews (Nov. 14, 2019), https://perma.cc/7V5D-D8B5. In non-military contexts, the term SSA is still in use to some extent. *See id.*

134. SPACE DOCTRINE PUB. 3-100, SPACE DOMAIN AWARENESS, *supra* note 96, at 18 (citing JOINT CHIEFS OF STAFF, JOINT PUB. 3-14, JOINT SPACE OPERATIONS (not publicly available)). The USSF previously gave SDA a slightly more palpable definition, as "identification, characterization and understanding of any factor, passive or active, associated with the space domain that could affect space operations and thereby impact the security, safety, economy or environment of our nation." Erwin, *supra* note 133.

135. Alessio Di Mare, *The Role of Space Domain Awareness: Space Asset Resilience thru Protection in* JOINT AIR & SPACE POWER COMPETENCE CONF. 2021 READ AHEAD (Joint Air Power Competence Center ed., 2021), https://perma.cc/LPX4-KA2E; *Why is Space Domain Awareness Important?*, NSTXL (May 18, 2023), https://perma.cc/V3HP-M92Y.

136. Sandra Erwin, *Space Domain Awareness: A Secret Weapon Against Shadowy Threats in Orbit*, SPACENEWS (Apr. 14, 2022), https://perma.cc/WE6X-6QQ7.

137. U.S. SPACE COMMAND, COMMANDER'S STRATEGIC VISION 5 (Jan. 2021), https://perma.cc/5FEV-DDW6.

138. Loren Grush et al., *The Commercial Space Industry, Led by Elon Musk's SpaceX, is Expected to Blast Off with 41% Growth Over the Next 5 Years*, FORTUNE (July 24, 2023, 5:04 PM), https://perma.cc/ZYE8-QDCY.

139. *Space Report 2024 Q2*, *supra* note 8.

140. *Id.*

141. *Id.*

142. *Id.*

143. *Id.*

144. *A Giant Leap for the Space Industry*, MCKINSEY & COMPANY: THE WEEK IN CHARTS (Jan. 19, 2023), https://perma.cc/S3XN-ADAR.

service"[145] applications, alone, are predicted to reach $17 billion by 2040.[146] Here is another way to slice the industry growth in one product segment, to drive the point home:

> As the commercial imagery marketplace has grown, the number of U.S. national security assets has stayed relatively flat. From 2005 to 2010 commercial satellites nearly tripled; from 2010 to 2015, they quadrupled; and from 2015 to 2022 they nearly quintupled. As a result, "remote sensing" has evolved from being something only nation states could provide to now, where 40 percent of the remote sensing satellites in orbit are privately owned—and less than 10 percent are owned by the U.S. government. Today, more than 60 companies are pursuing space-based data collection and some 50 countries own space-based collection assets.[147]

For space launches, private companies are leading the way, and the number of launches are on the rise. From 2008 to 2017, the average number of space launches annually was eighty-two.[148] Between 2021 and 2023, the number of successful orbital launches annually grew from 135 to 179 to 183.[149] SpaceX owned the majority of those in 2023, with eighty-seven orbital launches.[150] Two-thirds of those launches were for the Starlink satellite constellation.[151] "The [SpaceX] Falcon rocket is already NASA's primary launch vehicle for orbital missions and SpaceX has been tasked with designing the space vehicle for NASA's Artemis 3 mission to the moon"[152] Thus, SpaceX is the dominant commercial company in both private launches and government-funded launches.

IV. THE PROPOSED COMMERCIAL AUGMENTATION SPACE RESERVE (CASR) FRAMEWORK

In spring 2022 or earlier, the USSF acknowledged it was in the early phases of conceptualizing its own commercial reserve, already named Commercial

145. This terminology may be gaining traction in the industry but is tongue-in-cheek play on the software-as-a-service subscription model of Silicon Valley companies, a model in which the customer does not own a license for software installed on their computers but instead rents up-to-date software from the vendor. *See* Debra Werner, *Software-as-a-Service Model Takes the Space Sector by Storm*, SPACENEWS (June 24, 2021), https://perma.cc/NGD3-LRV5. This space-as-a-service is not to be confused with the short-term office space leasing industry. Lital Marom, *What 'Space-As-A-Service' Could Mean For The Future Of Real Estate*, FORBES (Jan. 30, 2019, 8:00 AM), https://perma.cc/K3EB-9KG9.

146. Space Found. Ed. Team, *Space Industry Growth: Where Are the Opportunities in 2022?*, SPACE FOUND.: CTR. FOR INNOVATION AND EDUC., https://perma.cc/JN9R-U7MH.

147. Thomas D. Taverney, *The Evolution of Space-Based ISR*, AIR & SPACE FORCES MAG. (Aug. 10, 2022), https://perma.cc/6W78-J7YB.

148. Mitch Semanik & Patrick Crotty, *U.S. Private Space Launch Industry Is Out of This World*, U.S. INT'L TRADE COMM'N: EXEC. BRIEFINGS ON TRADE (Nov. 2023), https://perma.cc/3587-3YYC.

149. Clark, *With Another Record Broken*, *supra* note 21.

150. *Id.*

151. *Id.*

152. Semanik & Crotty, *supra* note 148.

Augmentation Space Reserve (CASR).[153] However, the USSF was still formulating the actual mechanics of policy, contracts, and the law.[154] Early on, the USSF identified "mission areas within the service where a commercial reserve could play a role, including space domain awareness, satellite communications and intelligence, surveillance and reconnaissance"[155] in addition to missile warning.[156] Commenters at the time already recognized that a space reserve would not look like the Civil Reserve Air Fleet (CRAF) nor the National Defense Reserve Fleet (NDRF) because of the possibility that satellites could instantaneously switch or simultaneously take on capacity for civilian and military use.[157] Commenters analogized this surge capability to having satellites on "retainer."[158]

In summer 2023, the USSF published a draft CASR Framework along with a request for information (RFI) and sources sought notice, "seeking industry feedback, recommendations, and best practices during the market intelligence phase of this effort."[159] This 2023 draft CASR Framework was a twenty-slide presentation deck.[160] The RFI posed nine questions requesting feedback on the draft framework, requirements for U.S.-owned and FOCI-mitigated,[161] risk insurance and protection, contractual incentives, commercial due diligence to mitigate risk, and industry incentives.[162] That industry feedback has not been published,[163] except the USSF published the feedback about risk mitigation in a second RFI in August of 2024.[164]

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153. Albon, *supra* note 13.

154. *Id.*

155. *Id.*

156. Courtney Albon, *Space Force May Seek Commercial Fleet to Augment Wartime Needs*, C4ISRNET (Oct. 19, 2022), https://perma.cc/ST6W-KEXK.

157. Albon, *supra* note 13.

158. *Id.*

159. SPACE SYS. COMMAND COM. SPACE OFF., FA254123_CASR_RFI, RFI/SOURCES SOUGHT COMMERCIAL AUGMENTATION SPACE RESERVE (CASR) FRAMEWORK (updated Aug. 2, 2023), https://perma.cc/6JKL-T73N (includes two attachments).

160. RICH KNISELEY, SPACE SYS. COMMAND, COMMERCIAL AUGMENTATION SPACE RESERVE (CASR) FRAMEWORK (July 24, 2023) (published PowerPoint presentation) https://perma.cc/H5UW-CMCJ.

161. *See generally*, 32 C.F.R. §117.11 (Foreign Ownership, Control, or Influence) (2024); *Mitigation Process*, DEFENSE COUNTERINTELLIGENCE AND SECURITY AGENCY, https://perma.cc/4LGE-W8LT.

162. Space Sys. Command Com. Space Off., RFI/Sources Sought Commercial Augmentation Space Reserve (CASR) Framework 1-4, (updated Aug. 1, 2023), https://perma.cc/HNB2-EY6W (hereinafter "2023 RFI").

163. E-mail from Brian Gamble, Strategy Consultant, Space Sys. Command Com. Space Off. (COMSO), to Hank D. Nguyen, Student, Judge Advoc. Gen. Legal Ctr. and Sch., U.S. Army, (Feb. 26, 2024, 10:12 EST) (on file with author). However, in September 2022, the U.S. Chamber of Commerce did publish its response to an unrelated feedback solicitation from the Office of the Director of National Intelligence; their feedback was that the government is slow to leverage the U.S. space industry's existing capabilities. "Despite repeated recognition by senior leaders within the U.S. Intelligence Community and the Department of Defense of the value provided by the U.S. space industry in terms of remote sensing data and analytical services for national security, disaster response, diplomatic missions, and legislative directives, the government has been slow to establish programs, mechanisms, and processes to leverage this existing capability." Sandra Erwin, *Space Force Challenged to Define Commercial Services*, SPACENEWS (Oct. 12, 2023), https://perma.cc/93CZ-P8S8.

164. SPACE SYS. COMMAND COM. SPACE OFF., COMMERCIAL SPACE OFFICE - COMMERCIAL AUGMENTATION SPACE RESERVE (CASR) READINESS PLAN 7-8 (Aug. 4, 2023); SPACE SYS. COMMAND COM. SPACE OFF., FA2541-CASR-082024, RFI/SOURCES SOUGHT - COMMERCIAL AUGMENTATION SPACE RESERVE (CASR) FRAMEWORK (updated Aug. 21, 2024), https://perma.cc/YJ4K-HWWT (hereinafter "2024 RFI").

The follow-up RFI posted in August 2024 sought additional industry feedback with some specific questions about draft documents attached to the RFI.[165] The posting included a new CASR overview slide deck and other documents expounding on the concepts set out in the previous 2023 posting.[166]

The 2023 draft CASR Framework defines the CASR end state as "a contractually managed framework that ensures USG has access to commercial capabilities throughout the spectrum of conflict."[167] In other words, the intent is for the USSF to call upon additional assistance from commercial vendors to surge beyond the USSF's own organic capabilities whenever the need arises. Such augmentation goes beyond procuring contracts *ad hoc*; the framework proposes having these contracts already signed, ready to be called upon when needed.[168] "The CASR framework is designed to ensure that the USSF can leverage the capabilities of the commercial space industry to enhance the resilience, capacity, and effectiveness of its national security space architecture."[169] The language in this draft framework is very much an initial concept. However, the draft framework does serve the intended purpose of laying the groundwork to begin conceptualizing commercial space reserves.

The 2023 draft CASR Framework proposed three levels, or states of operations.[170] The three levels are placed on a spectrum of conflict, with the DoD activating more reserve support as the levels progress: CASR Level 1 is day-to-day operations; CASR Level 2 is priority operations; and CASR Level 3 is full CASR Execution.[171]

CASR Level 1, which covers day-to-day operations, contemplates a steady state.[172] Commercial vendors participating in CASR would regularly compete and perform non-emergency contracts for the U.S. government.[173] The USSF would further collaborate with the CASR participants in peacetime to integrate operations.[174]

CASR Level 2 would be triggered by regional conflict or significant crisis, with the decision to escalate driven by the U.S. military or other government agency requirements.[175] CASR Level 2, priority operations, would add on execution of pre-negotiated services and pricing for increased commercial capacity.[176]

165. 2024 RFI, *supra* note 164.
166. *Id*.
167. KNISELEY, *supra* note 160 at 3.
168. *Id*. at 3.
169. *Id*. at 4.
170. KNISELEY, *supra* note 160 at 3.
171. *Id*.
172. *See id*.
173. *Id*.
174. *Id*.
175. *Id*.
176. *Id*.

Level 2 would also consist of varying echelons, increasing with threat-based needs or requirements.[177]

CASR Level 3, Full CASR Execution, would grant the U.S. government top priority or exclusive access to the contracted capabilities.[178] This includes permitting the United States to deny service to other customers.[179] The DoD will also limit on a case-by-case basis the participation of U.S.-owned subsidiaries of foreign companies.[180] Escalation to CASR Level 3 would require authorization from the Secretary of Defense (SECDEF) or the President of the United States (POTUS), typically prompted by war, major conflict, or a national or international emergency.[181]

The overview slide deck from the 2024 RFI consolidated the three CASR levels into only two stages.[182] CASR Levels 1 and 2 were combined into the new CASR Commercial Baseline.[183] CASR Level 3 is still Full CASR Execution.[184]

The proposed CASR Framework consists of nine identified "elements,"[185] or planning considerations: (1) CONOPS & Decision Authority;[186] (2) Policy, Regulatory & Legal; (3) Contractual; (4) Interoperability & Integration; (5) Risk Mitigation; (6) Cost-effectiveness & Speed; (7) Commercial Partnerships; (8) Cybersecurity; and (9) Budget Integration. Discussion here will focus on Elements 1, 2, 3, and 7.

Regarding Element 1, CONOPS & Decision Authority, the relationship between the commercial companies and the U.S. military will be contractual.[187] These contracts are voluntary, although they will have incentives for participation. The U.S. government will set minimum requirements for participating companies during peacetime, including readiness and availability, as well as a minimum commitment of capability or capacity. Participating companies retain their civil status while the USSPACECOM exercises mission control.[188]

On Element 2, Policy, Regulatory & Legal, the draft framework proposes two mechanisms: contracting and Defense Production Act.[189] The draft framework

177. *Id*.

178. *Id*.

179. For satellite image collection, the term for such black outs is "shutter control." Theresa Hitchens, *EXCLUSIVE: NRO Space "Civil Reserve" Includes Shutter Control Option*, BREAKING DEFENSE (July 30, 2021), https://perma.cc/3CQW-GGAU.

180. KNISELEY, *supra* note 160 at 3.

181. *Id*.

182. SPACE SYS. COMMAND COM. SSPACE OFF., COMMERCIAL AUGMENTATION SPACE RESERVE (CASR) 7 (Aug. 2023) (published PowerPoint presentation), https://perma.cc/YJ4K-HWWT (hereinafter "2024 CASR OVERVIEW SLIDE DECK").

183. KNISELEY, *supra* note 160 at 3.

184. *Id*.

185. *Id*. at 4-5.

186. "CONOPS & Decision Authority" refers to the basics of who and how players within the U.S. military will actually use and make decisions with the commercial reserve assets and personnel. *See id*. at 4 (CONOPS is an abbreviation of Concept of Operations).

187. *Id*. at 6.

188. *Id*.

189. *Id*. at 7.

analogizes to CRAF as executed contractually.[190] However, that is only partly accurate, as use of CRAF services is backed by the Defense Production Act as its source of authority.[191] The draft CASR Framework itself addresses the Defense Production Act as a "backstop for CASR."[192] Element 2 of the draft framework also considers financial risk mitigation and contemplates seeking statutory authority for U.S. government-provided statutory war-risk insurance, which is already available in the aviation and maritime domains, under Titles 49 and 46 respectively.[193] While the 2023 draft framework posited that commercial insurance may already be adequate,[194] the CASR Incentive Strategy document posted with the 2024 RFI states that the DoD is currently evaluating the matter.[195]

For Element 3, Contractual, the draft framework reiterates that incentives will vary based on the level of CASR support.[196] The draft framework does not set out any discrete contractual terms for the incentives.[197] It proposes that CASR participants will have preference in being awarded ordinary peacetime contracts and task orders.[198] Certain categories of contracts or whole programs will only be awarded to firms who have certified that they are CASR participants.[199] The draft framework does not provide the language for such a proposed contract clause, but it would likely mirror the clause currently used for offerors to certify they are CRAF participants.[200]

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190. *Id*.

191. *Civil Reserve Airfleet*, US DEP'T OF TRANSP. (February 23, 2024), https://perma.cc/CQ6M-KDV4. See discussion of the DPA *infra* Part V.A.

192. KNISELEY, *supra* note 160 at 7. The discussion of the supporting policy for Element 2 goes on to cite the National Defense Strategy 2022, U.S. Space Priorities Framework 2021, National Space Policy 2020, and National Security Presidential Directive 27: U.S. Commercial Remote Sensing Policy 2003, for the impetus to leverage commercial space capabilities. *Id*.

193. *Id*. at 8.

194. *Id*. On the matter of risk, participation in CASR would increase the likelihood that the participating civilian assets become valid military targets under the Law of Armed Conflict. Not only are satellites and launch vehicles at risk, but so would all ground station elements, the equipment operators, and potentially business offices in, say, Silicon Valley or Huntsville, if such offices were determined to be directly participating in hostilities or under other theories of the Law of Armed Conflict. The incentives for CASR would have to be sufficiently compelling to overcome these barriers. Further analysis of the Law of Armed Conflict, risk, indemnity, and insurance are beyond the scope of this paper. For analysis of a commercial reserve as a counterspace strategy and the effects of disclosure and nondisclosure terms in these contracts, see Sara Schmitt & Robert A Bettinger, *The Potentiality of Space Enterprise Force Reconstitution*, 33 AIR & SPACE POWER J. 61-72 (2019).

195. SPACE SYS. COMMAND COM. SPACE OFF., COMMERCIAL AUGMENTATION SPACE RESERVE (CASR) INCENTIVE STRATEGY, https://perma.cc/yj4k-hwwt; 6 *see also* Courtney Albon, *Space Force Plans to Award 20 Contracts for Commercial Reserve by 2026*, DEFENSE NEWS (Nov. 22, 2024), https://perma.cc/KY7A-QAZJ.

196. *See generally* COMMERCIAL AUGMENTATION SPACE RESERVE (CASR) INCENTIVE STRATEGY, *supra* note 195.

197. *See generally id*.

198. *Id*.

199. CASR INCENTIVE STRATEGY, *supra* note 195 at 5.

200. Requirement for Carriers to Participate in the Civil Reserve Air Fleet (CRAF) and Maintain Good Standing, TRANSFARS 5552.247-9003 (2020). Refer to FAR 1.101, 1.102, 1.105-1, and 1.105-2 for an explanation of the Federal Acquisition Regulation (FAR) System and the department and agency supplements to the FAR. Since non-practitioners of government procurement may find the FAR presents

The draft framework's discussion of Element 3 explicitly indicates that companies will be required to provide capacity or exclusive access to the U.S. government in times of crisis.[201] This would include pre-planned operations and exercises in addition to actual contingencies and emergencies. This preferential access in exchange for contingency support is similar to the schemes for CRAF and VISA.[202] CASR Level 3 includes the option for national level authorities to dictate exclusive access to a vendor's capacity and withhold all service from other customers.[203] Such a dictate could be absolute or could be localized to a certain designated geographic area.[204] The United States also could invoke CASR as an alternate authority to deny an adversary data and communications over a contested territory[205] or deny the public from purchasing images over an area where the United States is conducting classified operations.

While not explicit, it is implied that CASR Levels 2 and 3 could require vendors to give the U.S. government a higher priority lane at times of crisis as well. The United States might not need all of a vendor's capacity but would seek to have its data processed first or to stagger and delay the access of other parties. Of course, with regard to spacelift—physically transporting payloads—any priority access by the United States would exclude other parties from using that portion of spacelift capacity.

The 2024 RFI included draft contract clauses for industry members to comment on.[206] Under the draft surge support (Level 2) clause, the government invokes surge support simply by unilateral modification, up to a pre-negotiated limit.[207] Under the various alternate versions of the Full CASR Execution (Level 3) clause, the government also invokes by unilateral modification; this clause authorizes surge support and denial of service to other customers, without limit.[208]

The 2023 draft framework separated out commitments to Levels 1 and 2 from Level 3.[209] Commercial companies could take on contracts that require their voluntary participation in only Level 2 without participation in Level 3. The draft framework asserted that this flexibility allows USSF to "quickly on-ramp new

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a steep learning curve, the Appendix to this article contains excerpts of most FAR and FAR supplement provisions cited in this article. FAR 1.101, 1.102, 1.105-1, and 1.105-2 (2024).

201. KNISELEY, *supra* note 160 at 11.

202. See *infra* Parts V.B and V.C.

203. KNISELEY, *supra* note 160 at 11.

204. See *id*.

205. The Russian military also made use of Starlink by obtaining terminals on the black market; SpaceX is cooperating with the U.S. government in shutting those terminals down whenever identified. Sandra Erwin, *Pentagon Working with SpaceX to Cut off Russian Military's Illicit Use of Starlink Internet*, SPACENEWS (May 21, 2024), https://perma.cc/NY52-AY3S. However, a foreseeable situation in the future would be an adversary using Starlink terminals it had previously legally acquired, not prohibited by export restrictions and sanctions. CASR may provide an easy legal solution to denying that adversary SATCOM access.

206. *See generally* SPACE SYS. COMMAND COM. SPACE OFF., COMMERCIAL AUGMENTATION SPACE RESERVE (CASR) H CLAUSES, https://perma.cc/yj4k-hwwt.

207. *Id*. at 1.

208. *Id*. at 1-2.

209. *See id*.

providers."[210] The 2024 CASR overview slide deck is still consistent with that approach in that it combines Levels 1 and 2 into a single baseline stage.[211]

Interestingly, some Level 3 participants could participate in only Level 3 while opting out of Levels 1 and 2.[212] This arrangement would pose additional complexity in tiering incentives. The government might also determine that some surge space capabilities are not needed in certain levels. Perhaps there are some companies uninterested in the more frequent commitments involved in Levels 1 and 2, but the United States would deem critical to include in CASR for its space readiness at Level 3. In such circumstances, the incentives would have to be quite lucrative to entice those holdout companies to participate.

Element 7, Commercial Partnerships, contains many parts.[213] A few notable parts are discussed below: threat information access, certification and accreditation, and market access.

For threat information access, USSF intends to provide classified threat briefings to CASR participants to help align or integrate participants into their role.[214] The briefings would include national security risks, emerging threats, and intelligence assessments.[215]

In addition to briefings, a "key component of CASR" is wargaming.[216] The USSF intends to give participants additional funding to "integrate and test CASR solutions."[217] That funding applies to exercises and wargames too, which the USSF touts as opportunities for CASR participants to receive end user feedback and operational insights, and boosts their market exposure.[218] Essentially, the government will be paying CASR participants to improve their own products and services. For certification and accreditation, USSF will vet each participant to validate their "capabilities and reliability."[219] The draft framework pitches this as a boon to participants.[220] The draft framework, asserts the certification and accreditation "can enhance the credibility and marketability of their services, instilling confidence in potential customers."[221] This does not seem to be the strongest selling point for CASR. However, DoD requirements for Position, Navigation, and Timing (PNT)[222] and satellite communications (SATCOM) generally demand stronger resilience to signal jamming and cyber-attacks than the commercial

210. *Id.*
211. 2024 CASR overview slide deck, *supra* note 182 at 7.
212. KNISELEY, *supra* note 160 at 11.
213. *See id.* at 16-18.
214. *Id.* at 16
215. *Id.*
216. CASR INCENTIVE STRATEGY, *supra* note 195 at 5.
217. *Id.*
218. *Id.* at 4-5.
219. *Id.*
220. *See id.*
221. *Id.*
222. An example of PNT is Global Position System (GPS). *See supra* Part III.A.

industry norm.[223] Therefore, a USSF seal of quality may actually be a desirable draw for vendors and meaningful distinguisher for their customers.

Element 7 defines "market access" as "consideration in the best value tradeoff for 'preferential' access to contracts and tasks orders for companies that volunteer to participate in CASR (based on the City Pair program in the legacy CRAF model)."[224] In other words, during government procurements, the U.S. government will give some favorable weight to companies that are CASR participants, even when the CASR participants submit prices that are perhaps slightly higher than prices from non-CASR participants. The U.S. government already regularly contracts for commercial space services. In further shaping the market and incentivizing CASR participants, the USSF can draw lessons from existing government programs and authorities, such as the Defense Production Act of 1950, CRAF, VISA, and government-owned reserve fleets.

V. LESSONS FROM EXISTING COMMERCIAL RESERVE AND AUGMENTATION PROGRAMS

A. Defense Production Act

The Defense Production Act of 1950, as amended, (DPA) provides the President authorities over domestic private industry in support of national security.[225] Although the DPA is a temporary authority, and it is next set to expire in 2025, Congress has reauthorized parts of the DPA over fifty times, most recently in 2018.[226] Three authorities, or titles, of the DPA are still in force today.[227] Under Title I, the President may require businesses to prioritize and accept contracts for certain "critical and strategic" materials or services as well as "allocate materials, services, and facilities."[228] This includes the power to restrict hoarding and price gouging of critical materials.[229] Under Title III, the President can "provide appropriate incentives to develop, maintain, modernize, restore, and expand the productive capacities" for critical goods.[230] Under Title VII, the President can reorganize and make "voluntary agreements" with the private industry.[231]

The DPA provides the President an "array of authorities to shape *national defense* preparedness programs and to take appropriate steps to maintain and enhance the domestic industrial base."[232] The domestic industrial base is defined

223. *See* JONATHAN P. WONG ET AL., LEVERAGING COMMERCIAL SPACE SERVICES: OPPORTUNITIES AND RISKS FOR THE DEPARTMENT OF THE AIR FORCE, 15–18 (RAND, Corp., 2023), https://perma.cc/GT55-KWBZ.

224. *Id.*

225. Defense Production Act of 1950, 50 U.S.C. §§ 4501-4568 (2018); ALEXANDRA G. NEENAN & LUKE A. NICASTRO, CONG. RSCH. SERV., R43767, THE DEFENSE PRODUCTION ACT OF 1950: HISTORY, AUTHORITIES, AND CONSIDERATIONS FOR CONGRESS (2023), https://perma.cc/JBT3-4EHH.

226. NEENAN, *supra* note 225 at 1.

227. Congress allowed four of the seven titles to lapse in 1953. *Id.* at 2.

228. Defense Production Act of 1950 § 101, 50 U.S.C. § 4511.

229. Defense Production Act of 1950 § 102, 50 U.S.C. § 4512.

230. Defense Production Act of 1950 § 117, 50 U.S.C. § 4517.

231. Defense Production Act of 1950 § 708, 50 U.S.C. § 4558; 44 C.F.R. §§ 332.1-332.5 (2024).

232. Defense Production Act of 1950 § 2(a)(4), 50 U.S.C. § 4502(a)(4).

as "domestic sources which are providing, or which would be reasonably expected to provide, materials or services to meet national defense requirements during peacetime, national emergency, or war."[233] Domestic sources include both the United States and Canada.[234] National defense is defined in the statute as:

> programs for military and energy production or construction, military or critical infrastructure assistance to any foreign nation, homeland security, stockpiling, space, and any directly related activity. Such term includes emergency preparedness activities conducted pursuant to title VI of The Robert T. Stafford Disaster Relief and Emergency Assistance Act[[235]] and critical infrastructure protection and restoration.[236]

Notably, Title I cannot be used for wage or price controls, unless authorized by Congress.[237] However, the Executive can issue loans to private companies: "[s]ections 301 and 302 of Title III of the DPA authorize the President to issue loan guarantees and direct loans to reduce current or projected shortfalls of industrial resources, critical technology items, or essential materials needed for national defense purposes."[238]

For recent examples, the DPA was utilized extensively during the Coronavirus disease 2019 (COVID-19) pandemic. In 2020, President Donald Trump signed an Executive Order (EO) invoking Section 101(b) of the DPA to authorize the Secretary of Health and Human Services (HHS) to compel General Motors (GM) to accept, perform, and prioritize contracts to produce medical ventilators.[239] However, GM had already been preparing with a partner medical company to produce them.[240] The first Trump Administration invoked the DPA because it felt "GM was wasting time."[241] Ford, another Detroit automaker, also teamed up with other companies to produce ventilators,[242] but neither Ford nor the rest of the auto industry were included[243] in the Executive Order. Seemingly, the administration

233. Defense Production Act of 1950 § 702(6), 50 U.S.C. § 4552(6).

234. Defense Production Act of 1950 § 702(8), 50 U.S.C. § 4552 (8).

235. 42 U.S.C. § 5195(a)(3).

236. Defense Production Act § 702(14), 50 U.S.C. § 4552(14).

237. Defense Production Act § 104, 50 U.S.C. § 4514; NEENAN, *supra* note 225 at 6.

238. NEENAN, *supra* note 225 at 9, citing 50 U.S.C. § 4531(a)(1) and 50 U.S.C. § 4532(a).

239. Memorandum from the Admin. of Donald J. Trump to the Sec'y of Health and Hum. Services on an Order Under the Defense Production Act of 1950 Regarding General Motors Company, DCPD-202000197 (Mar. 27, 2020) https://perma.cc/8ATD-RQUZ.

240. Maegan Vazquez et al., *Trump Invokes Defense Production Act to Require GM to Make Ventilators*, CNN (Mar. 27, 2020), https://perma.cc/EZ2B-XBVK.

241. *Id.*

242. Sean O'Kane, *How GM and Ford Switched out Pickup Trucks for Breathing Machines*, THE VERGE (Apr. 15, 2020), https://perma.cc/YCN3-N4QW.

243. A few days prior, President Donald Trump already signed an executive order delegating Title I, section 101 authorities to the Secretary of Health and Human Services (HHS) and designating personal protective equipment and ventilators scarce and critical materials. Exec. Order No. 13,909, 3 C.F.R. 16227 (2020). He signed another executive order to combat hoarding and control the distribution of those materials. Exec. Order No. 13,911, 3 C.F.R. 18403 (2020). So, HHS already had authority to assign ventilator contract irrespective of the president's memo targeting GM.

at the time did not take further noticeable efforts to push GM to ready its factories any faster than GM had already been preparing to do.[244] Regardless, any such push would have been unlikely to speed up production since GM still had to obtain the expertise from its partner, Ventec, and retool its factories.[245]

Strangely, the President targeted just GM, a single company, by name. Some legal commentators assessed this *ad hoc* targeting of GM was unusual and counter to the legislative intent; the intent of the DPA is to centralize and mobilize whole sectors of the economy.[246] However, such singling out does not seem to violate the DPA, and could be done again, for example, if there is a singularly capable space company whose SATCOM products are already heavily relied upon in a conflict.

Under the DPA, the HHS ultimately issued several contracts for ventilator production.[247] However, an Inspector General audit found that HHS failed to monitor contract performance and did not document nor address any contract modifications for vendor delays in delivery.[248] Although the Inspector General report does not detail the root cause of the vendor delays nor the HHS' failure to monitor the contracts, one can speculate that a government agency in the midst of managing a national crisis lacked the resources or capacity to conduct oversight over the sudden expansion of its procurement program.

The subsequent Biden Administration invoked the DPA in several sectors.[249] In 2022, President Joseph Biden gave the DPA Title III authorities to the DoD to increase domestic mining and processing of critical materials for the large-capacity battery supply chain.[250] The Biden Administration found:

> The United States depends on unreliable foreign sources for many of the strategic and critical materials necessary for the clean energy transition, such as lithium, nickel, cobalt, graphite, and manganese used in large-capacity batteries. Demand for such materials is projected to increase exponentially as the world transitions to a clean energy economy.

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244. Gavin Bade & Megan Cassella, *Days after Ventilator DPA Order, White House Has Done Little to Push GM*, POLITICO (Apr. 2, 2020), https://perma.cc/24R3-4W6P. *See generally* DEPUTY INSPECTOR GEN. FOR AUDIT SERV., DEP'T OF HEALTH AND HUM. SERV., A-02-20-02002, HHS DID NOT FULLY COMPLY WITH FEDERAL REQUIREMENTS AND HHS POLICIES AND PROCEDURES WHEN AWARDING AND MONITORING CONTRACTS FOR VENTILATORS 16 (2022), https://perma.cc/6PB2-U2UA (listing awarded contracts, on which GM is absent).

245. Vazquez, *supra* note 240.

246. Bade & Cassella, *supra* note 244. Some speculated that singling out GM was for political gain. *See id*.

247. *Defense Production Act,* FED. EMERGENCY MGMT. AGENCY (APR. 19, 2023), https://perma.cc/QSE2-HPGV.

248. DEPUTY INSPECTOR GEN. FOR AUDIT SERV., *supra* note 244.

249. *E.g*., Press Release, The White House, President Biden Announces First Two Infant Formula Defense Production Act Authorizations (May 22, 2022) (giving priority to infant formula manufacturers as buyers of raw materials).

250. Press Release, U.S. Dep't of Def., Defense Production Act Title III Presidential Determination for Critical Materials in Large-Capacity Batteries (Apr. 5, 2022), https://perma.cc/9VW6-2YNS.

> The DPA Title III authorities enables DoD to undertake actions, including but not limited to, feasibility studies and modernization projects for mature mining, benefication [sic], and value-added processing projects to increase productivity, environmental sustainability, and workforce safety. It also allows for by-product and co-product production at existing mining, mine waste reclamation, and other industrial facilities.[251]

Notable here is the executive's use of DPA authorities not for an apparently immediate crisis, but for protecting long term[252] national security interests. Another such instance of this long-term sustained use of the DPA is in the realm of artificial intelligence. In 2023, President Biden signed a sweeping Executive Order on Safe, Secure, and Trustworthy Artificial Intelligence (AI), which set forth a range of federal regulatory principles, priorities, and guidelines.[253] The EO targeted private companies developing AI that poses serious risk to national security, national economic security, or national public health and safety.[254] The EO required those companies to notify the federal government when training their AI model and mandates red-team safety tests[255] within guidelines set by the National Institute of Standards and Technology.[256] Until its revocation, there was no indication yet of any litigation challenging these requirements. These applications of the DPA to bolster long-term strategic interests prove promising for U.S. efforts to keep up in the modern space race with near-peer competitors such as China and India, as well as space threats from such nations as Russia.

Also furthering long term security interests, back in 2020, as part of the COVID-19 response, the Trump Administration invoked the DPA Title III to support the space defense industrial base.[257] The DoD awarded contracts for semiconductor production and solar array panels. A $12.45 million contract went to the "sole domestic source of critical semiconductor technologies for space

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251. *Id.*

252. Presidents also periodically issue updated executive orders granting broad standing delegations of DPA authorities to various department secretaries for the purpose of national defense and emergency preparedness. *E.g.*, Exec. Order No. 13,603, 77 Fed. Reg. 16651 (Mar. 2012); Exec. Order No. 12,919, 59 Fed. Reg. 29525 (June 3, 1994).

253. *President Biden Signs Sweeping Artificial Intelligence Executive Order*, SIDLEY AUSTIN LLP (Nov. 6, 2023), https://perma.cc/A2WP-VZ3R. This executive order was subsequently revoked by President Trump upon the start of his second administration. Exec. Order No. 14148, 90 Fed. Reg. 8237 (Jan. 20, 2025).

254. *Id.*

255. The President may "by regulation, subpoena, or otherwise obtain such information from . . . any person as may be necessary or appropriate, in his discretion, to the enforcement or the administration of this Act [the DPA]." Defense Production Act § 705(a), 50 U.S.C. § 4555(a).

256. Press Release, The White House, FACT SHEET: President Biden Issues Executive Order on Safe, Secure, and Trustworthy Artificial Intelligence (Oct. 30, 2023); Sorelle Friedler et al., *How the AI Executive Order and OMB Memo Introduce Accountability for Artificial Intelligence*, BROOKINGS (Nov. 16, 2023), https://perma.cc/6A3Z-GRGS.

257. Press Release, U.S. Dep't of Def., DOD Announces Two Defense Production Act Title 3 COVID-19 Projects to Support the Space Defense Industrial Base: $12.45 Million Investment to Improve Domestic Semiconductor Production and $6 Million to Expand Domestic Production of Satellite Solar Array Panels (May 29, 2020), https://perma.cc/E75R-7DB3.

programs."[258] A $6 million contract went to a domestic company to expand its "production capability and capacity for advanced satellite solar cells and panels."[259] Both projects used funds authorized and appropriated under a COVID-19-pandemic-era stimulus bill.[260]

While Title III incentives and Title VII voluntary agreements are generally a boon to domestic firms, Title I requisitions may not be. The requisitioning[261] of U.S.-flag ships is generally avoided because of the costs incurred from lost business.[262] Requisitions affect more than the single asset at issue and can disrupt the firm's overall schedule, ripple through their logistics chain, and ultimately cause delays in service to other customers, including other military customers.[263]

B. Civil Reserve Air Fleet (CRAF)

After the United States announced its withdrawal from Afghanistan in 2021, a significant effort was required to evacuate U.S. personnel and other persons from the country. Secretary of Defense Lloyd J. Austin III ordered activation of the Civil Reserve Air Fleet (CRAF) to do so.[264] Organic military airlift was focused on transporting people out of Kabul.[265] From there, commercial aircraft under CRAF were used for the "onward movement of passengers from temporary safe havens and interim staging bases."[266]

Created in 1951, "CRAF is a cooperative emergency airlift program involving U.S. civil air carriers, DOD, and the Department of Transportation (DOT)."[267] The program operates under the Defense Production Act's (DPA) Title I allocations authority and is a pool of commercial airliners readily available to respond to national defense needs or other contingencies.[268] The program is one of the puzzle pieces of the overall national airlift mobility system.[269]

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258. *Id.*

259. *Id.*

260. *Id.*; Coronavirus Aid, Relief, and Economic Security Act, Pub. L. 116–136, 134 Stat. 281 (2020).

261. Separate from the authorities under DPA Title I, the DoT also has the authority to requisition purchase, or charter any U.S.-owned or U.S.-registered vessel, when under a Presidential proclamation of national emergency. 46 U.S.C. § 56301 (2020). The payment rates are the same as those for VISA. Voluntary Intermodal Sealift Agreement, 79 Fed. Reg. 64462, 6447 (Oct. 29, 2014) [hereinafter Voluntary Intermodal Sealift Agreement].

262. Shane P. Daniels, Analysis and Evolution of the Ability of the Voluntary Intermodal Sealift Agreement to Support U.S. Sealift Requirements During Nearly Simultaneous Major Regional Conflicts (Mar. 1999) (M.S. thesis, Naval Postgraduate School) (available at https://perma.cc/A3W6-6PLB).

263. *See id.* at 50-51.

264. Press Release, U.S. Dep't of Def., Department of Defense Activates Civil Reserve Air Fleet to Assist With Afghanistan Efforts (Aug. 22, 2021), https://perma.cc/QVC6-98VG.

265. *Id.*

266. *Id.*

267. HEIDI M. PETER, CONG. RSCH. SERV., IN11731, AFGHANISTAN EVACUATION: THE CIVIL RESERVE AIR FLEET (CRAF) AND THE DEFENSE PRODUCT ACT (DPA) (2021), https://perma.cc/FD5V-PND4.

268. *Id.* 10 U.S.C. § 9511-9517.

269. *See generally* JOINT PUB. 4-01, *supra* note 11 at III-4 to III-7.

The program has three stages of emergency activation that incrementally make more civilian-operated airlift capacity available to meet defense requirements.[270] Stage I is for expanded peacetime airlift: minor regional crises, humanitarian assistance and disaster relief efforts, or small-scale contingencies.[271] Stage II is defense airlift emergency for major theater war or major regional conflicts.[272] Stage III is national emergency, for periods of national mobilization and multiple theaters of war.[273] The program is divided into two segments: domestic, which services only Stages II and III, and international.[274] The commander, U.S. Transportation Command (TRANSCOM), with approval of the Secretary of Defense, is the activation authority for all three stages of CRAF.[275] The air carriers continue to operate and maintain the aircraft with their resources; however, DoD controls the aircraft mission.[276]

The Afghanistan evacuation was the third CRAF activation in the history of the program. The first occurred in support of Operations Desert Shield/Storm (August 1990 to May 1991) where Stage 1 and 2 were activated,[277] and the second was for Operation Iraqi Freedom (February 2002 to June 2003).[278] In the Afghanistan evacuation, the Secretary of Defense only activated Stage 1 of CRAF.[279]

CRAF participation is required in order for airlines to participate in a number of government procurement programs.[280] Notably, CRAF participation is required for the GSA City Pair program.[281] Personnel traveling on official business for the DoD and/or for a few other federal agencies are required to book their airfare through the City Pair program, which gives the benefit to the government of fully refundable tickets and pre-negotiated rates between common travel terminals.[282] Airfare rates are negotiated annually with offeror airlines through the

270. (REDACTED), (REDACTED), CONG. RSCH. SERV., RL33692, CIVIL RESERVE AIR FLEET (CRAF) (2008), https://perma.cc/Z6KA-XUEA.

271. JOINT PUB. 4-01, *supra* note 11 at III-5.

272. *Id.*

273. *Id.*

274. JOINT PUB. 4-01, *supra* note 11 at III-4.

275. *Civil Reserve Air Fleet*, AIR FORCE (July 2014).

276. *Id.* at III-4 to III-5.

277. Ira Lewis & Daniel Y. Coulter, *The Voluntary Intermodal Sealift Agreement: Strategic Transportation for National Defense,* 40 TRANSP. J. 26, 29 (2000). For further detailed analysis of strategic mobility during Desert Storm and Desert Shield, see JAMES K. MATTHEWS & CORA J. HOLT, SO MANY, SO MUCH, SO FAR, SO FAST: U.S. TRANS. COMMAND AND STRATEGIC DEPLOYMENT FOR OPERATION DESERT SHIELD/DESERT STORM (Aug. 2002).

278. Department of Defense Activates Civil Reserve Air Fleet to Assist With Afghanistan Efforts, *supra* note 264.

279. *Id.*

280. U.S. GOV'T ACCOUNTABILITY OFF., GAO-03-278, MILITARY READINESS: CIVIL RESERVE AIR FLEET CAN RESPOND AS PLANNED, BUT INCENTIVES MAY NEED REVAMPING (2002), https://perma.cc/QX88-BJ5A [hereinafter GAO-03-278].

281. *FAQs for City Pair Program*, U.S. GEN. SERVS. ADMIN. (Aug 15, 2024), https://perma.cc/WVZ9-XEQ3.

282. *Id.*

City Pair contract solicitation.[283] This participation is enforced through a contract clause which requires companies to certify they are satisfactorily participating in the CRAF.[284] Airlines are not otherwise compensated for their participation in the CRAF when not activated.

Participating airlines bid on a percentage of government air passenger and cargo contracts in direct proportion to their commitment to the program: "Participants earn mobilization value points, which are based on the number and type of committed aircraft."[285] Participant companies can form teams to pool their points together.[286]

The DoD imposes strict citizenship requirements on CRAF participants—the CRAF airlines must be U.S.-owned.[287] CRAF participants must allocate a crew of U.S. citizens for each aircraft in its fleet allocated as available to the CRAF. [288]

CRAF participants are compensated for their activations—air carriers are paid for missions they fly at predetermined rates based on a weighted average of their costs plus a return on investment.[289] These rates are set through regulated negotiations between U.S. Transportation Command (USTRANSCOM) and the industry.[290]

C. Voluntary Intermodal Sealift Agreement (VISA)

Similar to the CRAF, Voluntary Intermodal[291] Sealift Agreement (VISA) is an interagency agreement between DoD and the Department of Transportation (DoT)[292] backed by the DPA. VISA started as a DoD program in 1997 and then the Maritime Security Act of 2003 codified it into law.[293] The program is similar in design to CRAF: "qualified U.S.-flag merchant vessels agree to volunteer their

283. U.S. GEN. SERV. ADMIN., FY24 CITY PAIR PROGRAM (CPP) PRE-SOLICITATION CONFERENCE (Jan. 19, 2023) (video teleconference), https://perma.cc/4XT7-XBCV. Note as an observation that the negotiated rates for different routes are often higher but sometimes lower than the rates that airlines charge at retail to the public.

284. TRANSFARS 5552.247-9003 (2020). *See supra* note 200 for explanation of the FAR.

285. GAO-03-278, *supra* note 280.

286. U.S. GOV'T ACCOUNTABILITY OFF., GAO-09-625, DOD SHOULD TAKE STEPS TO STRENGTHEN MANAGEMENT OF THE CIVIL RESERVE AIR FLEET PROGRAM 9 (2009), https://perma.cc/HT2D-H926 [hereinafter GAO-09-625].

287. 32 C.F.R. § 243.3.

288. GAO-03-278, *supra* note 280, at 5.

289. GAO-03-278, *supra* note 280, at 1.

290. 32 C.F.R. §§ 243.1–243.12 (Department of Defense Ratemaking Procedures for Civil Reserve Air Fleet Contracts); 10 U.S.C. § 9512.

291. Intermodal means between multiple modes of transportation. JOINT PUB. 4-01, *supra* note 11 at III-19. This signifies a shift from 'contracts-for-ships' mentality to a 'contracts-for-logistics' approach, or a complete delivery between locations, not just ports. Lewis & Coulter, *supra* note 277, at 27–28. This focus on capacity means that carriers for VISA, unlike CRAF, can combine military and civilian traffic. *Id*. at 29.

292. *See generally* Daniels, *supra* note 262.

293. *Voluntary Intermodal Sealift Agreement (VISA)*, U.S. DEP'T OF TRANSP.: MAR. ADMIN. (Oct. 20, 2020), https://perma.cc/ZLD9-DRKC; 46 U.S.C. §§ 53101–53111 (Maritime Security Fleet); 46 C.F.R. §§ 296.1–296.50 (Maritime Security Program); National Defense Authorization Act for Fiscal Year 2004, Pub. L. No. 108-136, §§ 3501–3517 (Maritime Security Act of 2003).

time and intermodal capacity during wartime in exchange for priority access to DoD cargoes during peacetime."[294] Such capacity is used to move ammunition and sustainment cargo.[295] The highest priority in government cargo contracts goes to U.S.-flag vessels and U.S.-flag vessel sharing agreements operated by VISA participants, ahead of non-VISA participants.[296] Additionally, some VISA participants may enroll in an additional stipend program.[297]

Participants awarded an agreement under the Maritime Security Program (MSP) are paid an annual stipend[298] as a form of financial assistance to commit their fleet to VISA.[299] Under MSP, operators use the stipend to upgrade and replace older ships in their fleet.[300] The United States initially established the MSP under the Maritime Security Act of 1996,[301] and after a lapse, reauthorized it under the Maritime Security Act of 2003.[302] Current law authorizes the DoT to extend MSP agreements through 2035.[303] Congress currently authorizes funds for a maximum of 60 vessels under MSP;[304] all 60 slots are filled.[305] The DoD is required to renew these agreements annually until funding lapses.[306] DoT awards any new MSP agreements based on priority of vessel types established by DoD.[307] Historically, MSP vessels constituted about 80% of VISA capacity.[308] In 2000, not long after the program's 1996 inception, more than 80% of U.S. flag commercial shipping capacity was enrolled in VISA Stage III.[309] Today, all major U.S. flag carriers are enrolled in VISA.[310]

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294. Voluntary Intermodal Sealift Agreement, *supra* note 296.

295. *Maritime Administration Fact Sheet: Maritime Security Program (MSP) Voluntary Intermodal Sealift Agreement (VISA)*, U.S. DEP'T OF TRANSP.: MAR. ADMIN., https://perma.cc/U5DM-858L (last visited Mar. 10, 2024).

296. Voluntary Intermodal Sealift Agreement Open Season, 81 Fed. Reg. 50052, 50053 (July 29, 2016). The priority levels below U.S.-flag vessels further stratify based on all possible combinations of U.S. and/or foreign-flag, U.S. and/or foreign-operated, U.S. and/or foreign-owned, and VISA (non-) participation. *See id.*

297. Each vessel under agreement is currently authorized $5.3 million per fiscal year, with the amount gradually increasing to $6.8 million by FY2035. National Defense Authorization Act for Fiscal Year 2020, Pub. L. No. 116-92 § 3502(c).

298. *Id.*

299. *Maritime Administration Fact Sheet*, *supra* note 295; *see* 46 U.S.C. § 53107.

300. *Maritime Administration Fact Sheet*, *supra* note 295.

301. *Maritime Security Program Fleet as of January 2024*, U.S. DEP'T OF TRANSP.: MAR. ADMIN., https://perma.cc/BN4J-QZPU.

302. National Defense Authorization Act for Fiscal Year 2004, Pub. L. No. 108-136, §§ 3501–3517 (Maritime Security Act of 2003).

303. National Defense Authorization Act for Fiscal Year 2020, Pub. L. 116-92, § 3502(c).

304. 46 U.S.C. § 53103(d).

305. *Maritime Security Program Fleet as of January 2024*, *supra* note 301.

306. 46 U.S.C. §§ 53103, 53104(d).

307. *Id.*

308. *Compare Maritime Administration Fact Sheet*, *supra* note 295 (seventy-seven percent), *with Maritime Administration Fact Sheet*, U.S. DEP'T OF TRANSP.: MAR. ADMIN (2017), https://perma.cc/4N8L-DXUL.

309. Lewis & Coulter, *supra* note 277 at 31.

310. JOINT PUB. 4-01, *supra* note 11 at III-6.

Preceding VISA was a much older program, Sealift Readiness Program (SRP).[311] SRP was focused on ships, not capacity.[312] Specific ships were predesignated, resulting in the potential for those ships to just not be available when needed. DoD also did not set rates that encompassed all the predictable costs of operation.[313] Additionally, prior to requesting activation, the U.S. Department of Transportation Maritime Administration (MARAD) was required to produce a report on the impact to the commercial shipping industry.[314] SRP did not have full agreements ironed out in advance, requiring the DoD to negotiate access to each ship after SRP activation.[315] During the First Gulf War, USTRANSCOM found the process too slow to respond to the needs of military operations.[316] Ultimately, the lessons from the First Gulf War led to creating VISA, which is modeled after CRAF.[317]

Like CRAF, VISA is also activated in three stages. The commitments for Stage I and II are fifteen percent and forty percent of capacity, respectively.[318] Ordinary VISA participants are required to allocate fifty percent of their fleet during Stage III.[319] MSP participants are required to allocate 100%.[320] Decision thresholds between the stages are based on capacity.[321] USTRANSCOM activates Stage I when requirements exceed voluntary capacity.[322] USTRANSCOM activates Stage II and then, upon Secretary of Defense approval, Stage III when requirements exceed capacity at the prior stages.[323]

To meet activation requirements or voluntary agreements, participants can partner with other shipping companies to form Carrier Coordination Agreements (CCAs).[324] Such CCAs are exempt from antitrust prohibitions.[325] This protection helps ensure that firms are able to meet the government's needs and incentivized to participate while minimizing risk of disruption to their businesses[326] and the civilian economy.[327] As a corollary, participants may also use a Vessel Sharing Arrangement (VSA) to use a foreign-flag or foreign owned vessel, if vetted through USTRANSCOM.[328]

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311. Daniels, *supra* note 262 at 9.
312. *Id*. at 11.
313. *Id*. at 10.
314. *Id*. at 10-11.
315. *Id*. at 11.
316. *Id*. at 11, 21.
317. Lewis & Coulter, *supra* note 277, at 29.
318. Voluntary Intermodal Sealift Agreement Open Season, 81 Fed. Reg. 50052, 50053 (July 29, 2016).
319. *Maritime Administration Fact Sheet*, *supra* note 295.
320. *Id*.; *see* 46 U.S.C. § 53107.
321. *See* Voluntary Intermodal Sealift Agreement, 79 Fed. Reg. 64462, 64467 (Oct. 29, 2014).
322. *Id*.
323. *Id*.
324. Daniels, *supra* note 262 at 35.
325. *Id*.; Voluntary Intermodal Sealift Agreement—5 Year Extension, 84 Fed. Reg. 51710, 51710 (Sept. 30, 2019); Defense Production Act § 708, 50 U.S.C. § 4558.
326. Daniels, *supra* note 262, at 35.
327. Voluntary Intermodal Sealift Agreement, 79 Fed. Reg. 64462, 64468 (Oct. 29, 2014).
328. *Id*. at 64469.

Compensation at each stage is determined using one of several available compensation methodologies, which the participant selects at enrollment.[329] The statutory requirement is that the rates are "fair and reasonable," and not less than the contractor's commercial rates.[330] They are paid not just for the duration of their service but the time until their vessels are available to re-enter commercial service.[331]

VISA has never been activated,[332] likely because the DoD has yet to exhaust all avenues of voluntary contracts from U.S. and foreign-flag shipping firms.[333] U.S. shipping firms seem willing to take voluntary contracts for hazardous routes, albeit with Navy escorts.[334]

D. Government-Owned Reserve Vessels

Contrasted to VISA are the older Ready Reserve Force (RRF) and the National Defense Reserve Fleet (NDRF). NDRF is a reserve of cargo ships owned and maintained by the government intended to be "attrition fillers in a full mobilization scenario."[335] There are currently ninety-one such NDRF ships staged at various locations around the United States.[336] The RRF is a subset of the NDRF consisting of vessels in stand-by status[337] intended for more rapid deployment.[338] Otherwise, NDRF ships are not actively maintained.[339] RRF and NDRF ships are manned by merchant mariners,[340] a reserve force of civilian mariners.[341]

Poor condition,[342] years of deferred maintenance, high manpower requirements, and inexperienced or unqualified merchant mariner crews resulted in

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329. Voluntary Intermodal Sealift Agreement Open Season, 81 Fed. Reg. 50052, 50053 (July 29, 2016).

330. 46 U.S.C. § 53107(e); Voluntary Intermodal Sealift Agreement, 79 Fed. Reg. 64462, 64467 (Oct. 29, 2014) (requiring use of the same compensation methodology for § 53107).

331. 46 U.S.C. § 53107(e)(2)(D).

332. *Sealift Readiness Discussed at Key Industry Gathering*, SEAFARERS INTERNATIONAL UNION (Mar. 24, 2023), https://perma.cc/J3K8-2ZTY; LUKE A. NICASTRO, CONG. RSCH. SERV., IF11479, DEFENSE PRIMER: UNITED STATES TRANSPORTATION COMMAND (2022), https://perma.cc/FX78-NPN7.

333. *See* Lewis & Coulter, *supra* note 277 at 26, 29.

334. On January 24, 2024, U.S. Navy vessels intercepted Houthi missiles targeting them while they were escorting two contractor ships off the coast of Yemen. *See US Navy Intercepts Missiles in Red Sea While Escorting Maersk Ships*, REUTERS (Jan. 24, 2024), https://perma.cc/8CW6-6QYT.

335. Carl T. Bright & Sharon R. Hale, Strategic Sealift for Desert Shield Not a Blue Print for the Future 20 (June 21, 1991) (final paper, Naval War College) (available at https://perma.cc/H8KX-CMDQ).

336. U.S. DEP'T OF TRANSPORTATION: MAR. ADMIN., NATIONAL DEFENSE RESERVE FLEET INVENTORY FOR THE MONTH ENDING JANUARY 31, 2024, (Feb. 1, 2024). For an archive of the NDRF inventories, including RRF, *see National Defense Reserve Fleet Archive*, U.S. DEP'T OF TRANSPORTATION: MAR. ADMIN., https://perma.cc/33RL-3G2R.

337. *National Defense Reserve Fleet and Services*, U.S. DEP'T OF TRANSPORTATION: MAR. ADMIN., https://perma.cc/S9YG-6DGV.

338. *The Ready Reserve Force (RRF)*, U.S. DEP'T OF TRANSPORTATION: MAR. ADMIN. (Apr. 23, 2024), https://perma.cc/HNM7-YV9J.

339. Bright & Hale, *supra* note 338, at 20.

340. *Id.*; *National Defense Reserve Fleet and Services*, *supra* note 337.

341. *See generally* 46 U.S.C. §§ 51101-52101 (Merchant Marine Service).

342. RRF ships were purchased in the 1970s and 80s already at the end of their useful commercial life. Bright & Hale, *supra* note 335 at 16.

delays in RRF activation during Operation Desert Shield.[343] The NDRF fleet is similarly very aged,[344] so the higher-than-projected costs and longer-than-projected activation times resulted in none of these ships being activated for Operation Desert Shield.[345] Some critics called the NDRF an obsolete "drain on funds" that misleads "planners with the illusion of viable assets."[346] Furthermore, the merchant marine was historically plagued with shortages of the civilian mariners needed to staff such reserve ships.[347]

The criticism of RRF and NDRF after the First Gulf War[348] resulted in the push for taking a stronger commercial approach, and the eventual creation of VISA.[349] The contracting methods for commercial ships during Operation Desert Storm were criticized as too slow and caused resentment in the shipping industry.[350] However, commercially booked U.S.-flag liners "met or exceeded nearly every DoD delivery requirement" during the Gulf War.[351]

The NDRF and RRF provide a cautionary tale against such mothballed reserves. Operation Desert Shield revealed that the RRF's stand-by reserve was comprised of mostly types of ships ill-suited to meet the needs of that operation.[352] Today, reusable launch vehicles and satellites in orbit are unlikely to remain idle without a customer. However, in the future, the DoD should be cautious of these hurdles in maintenance, manning, and asset forecast. The case for mothballed sealift is already weak and the case for reserved idle space assets is even weaker. Given the space industry's rapid pace of innovation, policymakers likely will find the most prudent tool for crisis readiness is to use pre-arranged contracts to surge space capabilities.

VI. FURTHER ANALYSIS AND RECOMMENDATIONS FOR CASR

A. Development of the CASR Program Will Be a Continuous Process

The observations made during the First Gulf War have held consistent. In 2019, USTRANSCOM and MARAD conducted a large-scale test of the organic

343. *Id*. at 16-19.

344. At the time of Operation Desert Shield, the majority of the fleet were World War II ships. *Id*. at 20-21.

345. John C. Pirmann, *Is It Time To Subsidize American Sealift? An Alternative View For Strategic Sealift Requirements in the 21st Century*, GLOBALSECURITY.ORG (1997), https://perma.cc/F386-88XL.

346. Andrew E. Gibson & Jacob L. Shuford, *Desert Shield and Strategic Sealift*, 44 NAVAL WAR COLLEGE REVIEW 6, 16 (1991).

347. Edward J. Fisher, Merchant Marine Seamen Shortage and Its Impact Upon Strategic Sealift, DTIC (Apr. 9, 2002) (Strategy Research Project, U.S. Army War College), http://www.dtic.mil/docs/citations/ADA401051.

348. Some have argued that the Navy's switch in 1986 from cost-plus to fixed-cost contracts for RRF ship management encouraged low bids betting on ships not being activated. "As a consequence, maintenance and readiness suffered." *Id*. at 14. This illustrates another peril in relying on a stockpile approach.

349. *See* Daniels, *supra* note 262 at 52.

350. *Id*. at 3.

351. *See* Daniels, *supra* note 262 at 52.

352. Gibson & Shuford, *supra* note 346 at 15. ("Unfortunately, the structure of the Ready Reserve Force emphasizes breakbulk freighters and tankers, the two types of ships used least in Desert Shield.")

surge sealift fleet, dubbed TURBO ACTIVATION 19 PLUS.[353] The result of TURBO ACTIVATION was a 40.7% success rate despite a goal of eighty-five percent availability,[354] before even accounting for personnel sourcing and ship performance degradation out at sea.[355] Then, in 2023, USTRANSCOM acknowledged that the ships that make up the nation's surge sealift have an average age of forty-four years, with nearly half being at least five decades old.[356] "We are a generation late in recapitalizing our ready sealift fleet to meet our national objectives."[357] This aging inventory tends to suggest that space reserves will also suffer, with maintenance and replacement left to the wayside, if subject to constrained budgets and competing annual priorities. In contrast to the troubled NDRF and RRF, the commercial sealift market had abundant capacity—the United States only tapped thirty percent of available commercial sealift capacity during the First Gulf War.[358] The private space industry already dwarfs government activity by a factor of four to one.[359] In a future crisis, the U.S. government could surge its space services to potentially quintuple in size by calling upon the commercial industry.

In a crisis, CASR could provide an expedient solution for surging not only assets but also the manpower for those assets. During the First Gulf War, the United States opted not to employ much of its CRAF capability because doing so would have placed hardship on the domestic airlines during their "busy and profitable summer vacation season."[360] Instead, the DoD contracted foreign carriers.[361] Similarly, due to summer vacation season, the Coast Guard had to relax licensing and training requirements to secure adequate mariners to man RRF ships.[362] To avoid the mistakes of the First Gulf War, the USSF could provide lucrative incentives for the commercial vendors to build out adequate capacity and flexibility for both their own commercial needs and CASR's projected needs.

Development of CASR will be a continuous process for the foreseeable future. Although exercising sealift yearly, USTRANSCOM took two decades before developing a "step-by-step VISA activation guide" that identified roles and

353. U.S. TRANS. COMMAND J37, COMPREHENSIVE REPORT FOR TURBO ACTIVATION 19-PLUS, 19 (Dec. 16, 2019), https://perma.cc/PCX8-5UTX. U.S. Transportation Command seemingly does not release such reports publicly for all iterations of the recurring exercise. *See* Sal Mercogliano, *Turbo Activation: Ready, Set. . .SEALIFT!*, GCAPTAIN (Sep. 7, 2021), https://perma.cc/XLK4-UCDD.

354. COMPREHENSIVE REPORT FOR TURBO ACTIVATION 19-PLUS, *supra* note 353 at 19.

355. Salvatore R. Mercogliano, *American Strategic Sealift in Peer-to-Peer Conflicts: A Historical Retrospective, Pt. 2*, CIMSEC (June 29, 2021), https://perma.cc/57XU-N42V.

356. David Vergun, *General Expresses Concerns Over Readiness in Sealift, Air Refueling*, U.S. DEP'T OF DEF.: DOD NEWS (Apr. 27, 2023), https://perma.cc/RDS6-578N.

357. *Id.*

358. Daniels, *supra* note 262 at 13.

359. *See* discussion *supra* Part III.B. ($427 billion in private sector compared to $119 billion government budgets).

360. MATTHEWS & HOLT, *supra* note 277 at 51.

361. *Id.* at 52.

362. *Id.* at 127.

responsibilities for activation and deactivation of the program.[363] The nascent space industry is rapidly evolving. Given that the United States only founded the USSF in 2019[364] and brought USSPACECOM to full operational capacity at the end of 2023,[365] USSF should expect to continually revise its concept of CASR for decades after initial implementation.

B. The Military is Free to Broaden or Narrow the Scope of CASR Since Most Commercial Space Services are Viable Candidates

In 2022, USSPACECOM released its commercial integration strategy,[366] with a goal "to develop a framework for better integrating commercial capabilities in a way that helps fill capability gaps."[367] The strategy expressly prioritized leveraging commercial purchases for "command and control battle management systems, information technology systems to include [artificial intelligence, machine learning,] and big data management, modeling and simulation systems, space control systems, and SATCOM satellites and terminals."[368] The strategy also prioritized integration, utilizing contracts and leases, for "operational intelligence[,] [Space Domain Awareness (SDA)], SATCOM bandwidth, remote sensing, space control (defensive), modeling and simulation, Al/ML, quantum computing, and encryption."[369]

Then in April of 2024, the DoD published its Commercial Space Integration Strategy,[370] and the USSF published its Commercial Space Strategy.[371] Both documents, particularly the USSF document, provide clarifying guidance on the "buy what we can" approach to the space domain.[372] The USSF document nests

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363. Andre Kok, *Tabletop Exercise Refines Voluntary Intermodal Sealift Agreement Activation Process*, DVIDS (Feb. 16, 2021), https://perma.cc/EW96-KR6A.

364. Space Policy Directive 4 of February 19, 2019, Establishment of the United States Space Force, 84 Fed. Reg. 6049 (Feb. 25, 2019).

365. *USSPACECOM Commander Declares Full Operational Capability*, U.S. SPACE COMMAND (Dec. 15, 2023), https://perma.cc/7X5V-AAY5.

366. USSPACECOM declared three strategic "ways" or lines of effort toward enhanced military space power and space superiority: (1) accelerating acquisition and technology refresh timelines with commercial off-the-shelf products, (2) exploring integration as a service, and (3) leveraging industry expertise to strengthen partnerships. U.S. SPACE COMMAND, COMMERCIAL INTEGRATION STRATEGY OVERVIEW 2 (2022), https://perma.cc/N97R-NYZF. The USSPACECOM strategy is not to be confused with the Space Acquisition Tenets that the Department of the Air Force released later in 2022. That addresses more of the actual practice of procurements. *See* Memorandum from Frank Calvelli, Assistant Sec'y of the A.F. (Space Acquisition & Integration) to the Department of Air Force Space Acquisition Workforce, Space Acquisition Tenets (Oct. 31, 2022), https://perma.cc/8VGV-292L.

367. Courtney Albon, *US Space Command Releases Commercial Integration Strategy*, C4ISRNET (Apr. 5, 2022), https://perma.cc/UM8R-4BXH.

368. *Id*.

369. *Id*.

370. Press Release, DoD Releases 2024 DoD Commercial Space Integration Strategy, U.S. DEP'T OF DEFENSE (Apr. 2, 2024), https://perma.cc/C4K5-2V3Z; U.S. DEP'T OF DEF., DOD COMMERCIAL SPACE INTEGRATION STRATEGY (2024), https://perma.cc/ZHJ2-V53Z.

371. U.S. SPACE FORCE, COMMERCIAL SPACE STRATEGY (Apr. 8, 2024), https://perma.cc/4AFV-UPW4.

372. *Id*. at 6, 13. The USSF Commercial Space Strategy document was long-awaited under draft and went through significant revision. Unshin Harpley, *Space Force's Long-Awaited Commercial Strategy*

within and executes responsibilities laid out by the DoD document.[373] The USSF document declares the priorities for new commercial integration are: (a) Tactical Surveillance, Reconnaissance, and Tracking; (b) Space-based Environmental Monitoring; (c) PNT, (d) Space Access, Mobility, and Logistics (SAML); and (e) continued integration into mature missions like SATCOM, launch, and SDA.[374]

Since the DoD is intent on pursuing these day-to-day capabilities from the private sector, these services are also natural candidates for both the types of wartime services that the DoD would surge through the CASR program and the types of peacetime contracts that could require offerors be first enrolled in CASR.

For intermediate steps on integrating commercial vendors into DoD operations, USSF can look to other government agencies for some ideas. For example, the NGA dabbled in the past few years with bailment contracts, in a "try before you buy" approach.[375] Under this approach, the agency takes temporary possession of a company's imagery, analysis, or other service to assess its capabilities before giving feedback to the provider or pursuing a long-term contract.[376] Integration will look different with the multitude of commercial space services. Of course, USSF has also done its own exercises to integrate commercial services.[377] For example, in exercises, the Air Force has successfully connected its command and control systems to Starlink.[378]

C. The Government Has Significant Maneuver Space in Crafting Incentives and Imposing Obligations on Commercial Space Vendors But Will Require New Legislation and Regulations

The contractual incentives for CASR participation are a large problem set to solve. Unlike CRAF where all vendors offer some form of airlift, CASR's scope would include a wide variety of space services. Different space firms in the same markets also have vastly different capabilities. The space industry is undergoing

May Finally Be Coming, AIR & SPACE FORCES MAGAZINE (Feb. 16, 2024), https://perma.cc/7A3P-PBFZ. In 2023, the Chief of Space Operations, Lieutenant General B. Chance Saltzman, acknowledged the then current draft strategy document was replete with "aspirational platitudes" rather than practical, actionable guidance that industry and USSF needed. Sandra Erwin, *Space Force Challenged to Define Commercial Services*, SPACENEWS (Oct. 12, 2023), https://perma.cc/YZ34-APT3.

373. U.S. SPACE FORCE COMMERCIAL SPACE STRATEGY, *supra* note 374 at 4.

374. *Id*. at 6.

375. Nathan Strout, *NGA Taking a 'Try before You Buy' Approach to Commercial Solutions*, C4ISRNET (Oct. 6, 2021), https://perma.cc/TFH2-ATN2.

376. *Id*.

377. *See* Gillian Rich, *SpaceX Starlink Impresses Air Force Weapons Buyer In Big Live-Fire Exercise*, INVESTOR'S BUSINESS DAILY (Sep. 23, 2020), https://perma.cc/MT5C-SBAP. For more insight into operational risks and challenges of the DoD utilizing commercial space vendors, *see* WONG ET AL., *supra* note 223. For further considerations in the technical evaluation of how the assets in a commercial space reserve will physically perform, *see* YOOL KIM & GEORGE NACOUZI, A FRAMEWORK FOR BUILDING A CIVIL RESERVE SPACE PROGRAM: APPLICABILITY OF U.S. TRANSPORTATION COMMAND'S COMMERCIAL PARTNERSHIP MODELS (RAND Corp., 2023), https://perma.cc/GRZ2-MAZ7.

378. *Id*.

tremendous growth and the technology is developing rapidly.[379] There may be firms with unique offerings without rival, such as the case of Starlink discussed earlier.[380] Failure to win over these more elusive critical firms and bring them into CASR would mean a repeat of the Starlink-Ukraine episode—last-minute public relations pressure tactics, social media cajoling, and international affairs subject to the whims of private actors whose personal motives may not align with the interests of national security. When designing incentives, those costs would have to be weighed against the costs and difficulties of the alternative, the president activating his authority under the DPA. Resorting to the DPA would likely take a toll on the USSF's relationships with the industry, given the emphasis that all the space acquisitions policy documents have placed on building relationships and partnerships with private industry, and the efforts of the USSF COMSO into building those partnerships.[381]

History demonstrates that firms do pay attention to contract incentives. The U.S. government first decided to impose CRAF participation requirements in 1995, for passenger travel and small package express; this requirement "played a major role in encouraging CRAF participation."[382] This contracting requirement was strengthened in 2000 when the DoD mandated that for significant requirements in overseas transportation of items, the contracting officer must include an evaluation factor or subfactor that supports using carriers that participate in the CRAF or VISA programs.[383] The government's omission of such priority preferences in a contract solicitation has been the subject of bid protest.[384]

These incentives do not restrict the government's freedom of maneuver; well-crafted regulations will attract participants but not bind the government to exclusively do business with them. For example, the government can choose to make VISA participation a non-price factor for technical acceptability.[385] However, they do not have to only award to VISA participants. When Maersk challenged a small business set aside as a violation of the VISA program, the GAO denied the protest since the rule in the Defense Federal Acquisition Regulation Supplement[386] only required an evaluation criterion for VISA participation, and nothing more.[387] In another example, the GAO denied a protest and found the government is not required to award international haul contracts only to participants from the CRAF

379. See *supra* Part III.B.

380. See *supra* Part II.

381. *COMSO Fact Sheet*, SPACE SYS. COMMAND, https://perma.cc/A77M-TX3C (last visited Feb. 26, 2024).

382. Lewis & Coulter, *supra* note 277 at 29.

383. Major John J. Siemietkowski et al., *Contract and Fiscal Law Developments of 2000—the Year in Review*, ARMY LAW. 1, 72 (Jan. 2001).

384. *E.g.*, Maersk Line, Limited., B-410280, 2014 CPD ¶ 359, 4 n.5 (Comp. Gen. Dec. 1, 2014).

385. Tactical Shipping, LLC., B-416223.4 et al., 2018 CPD ¶ 403 (Comp. Gen. Sept. 5, 2018); Note that GAO has found that a protestor cannot bypass and claim that VISA participation is merely a responsibility determination. *Id.* at 4.

386. DFARS 247.573-2 (2024). *See infra* Appendix. See *supra* note 200 for explanation of the FAR.

387. Maersk Line, Limited., B-410280, 2014 CPD ¶ 359, 5 n.6 (Comp. Gen. Dec. 1, 2014).

international segment.[388] The government may award domestic haul contracts to CRAF international segment participants and may award international haul contracts to CRAF domestic segment participants.[389] However, under the Fly CRAF Act, the DoD must only award an airlift contract to CRAF participants whenever CRAF participants are capable of performing.[390]

The Department of Defense can impose CASR-participation incentives for all space service contracts[391] or carve out just some categories of contracts. As discussed, the preferential access can be in the form of an evaluation factor or an acceptability factor. The rather obvious candidate for imposing CASR priority is space launch, which is most analogous to conventional sealift and airlift. Another potential candidate would be the SDA Marketplace, a market exchange hosted by Space Systems Command where DoD customers purchase space domain awareness data from commercial vendors.[392] One more candidate could be GSA's purchasing schedules for SATCOM.[393] In a similar fashion to how the City Pair program run by the GSA, which now requires CRAF participation, attaching a CASR-participation clause to these procurements means that CASR would draw in many of the SATCOM vendors who do business with the U.S. government.

Given that space companies typically offer multiple products, the DoD can tailor the parameters of the CASR participation requirements to capture its desired roster of participants. In crafting Federal Acquisition Regulation (FAR) supplement rules that prioritize CASR participation, the United States could choose to impose strict or loose requirements. For example, companies like SpaceX and Blue Origin sell both satellite services and space launches. Under strict requirements, Blue Origin would only compete for SATCOM contracts if Blue Origin were a CASR participant in SATCOM; if Blue Origin only participates in CASR for SATCOM, it would not be eligible to compete for peacetime contracts for launches or satellite refueling. Under looser requirements, Blue Origin could participate in CASR for just SATCOM and compete for SATCOM, launch, or any other type of peacetime contract. Similarly, the DoD could allow a company to compete for various earth observation contracts even if the company is a CASR participant solely for infrared imaging. The CASR participation parameters could modulate in strictness from solicitation to solicitation, depending on the needs of

388. United Airlines, Inc., B-411987 et al., 2015 CPD ¶ 376, 8-9 (Comp. Gen. Nov. 30, 2015).

389. See *id*.

390. 49 U.S.C. § 41106.

391. For reference, the DoD identifies that "[t]here are currently 13 mission areas for national security space: Combat Power Projection; Command and Control (C2); Cyberspace Operations, Electromagnetic Warfare (EW); Environmental Monitoring (EM); Intelligence, Surveillance, and Reconnaissance (ISR); Missile Warning (MW); Nuclear Detonation Detection (NUDET); [PNT]; Space Access, Mobility, and Logistics (SAML); [SATCOM]; [SDA]; and Spacecraft Operations. DOD COMMERCIAL SPACE INTEGRATION STRATEGY, *supra* note 370, at 5.

392. Sandra Erwin, *New Space Force Procurement Shop Subscribes to the Space-as-a-Service Model*, SPACENEWS (Nov. 21, 2022), https://perma.cc/E69C-468V.

393. *How to Order Satellite Communications*, U.S. GEN. SERV. ADMIN. (Apr. 29, 2024), https://perma.cc/UG9N-SPJ4; *Satellite Communications Products and Services*, U.S. GEN. SERV. ADMIN., https://perma.cc/ST5R-YCAR (last visited June 21, 2024).

the government and its predictions on how many competitors they predict they will attract or discourage. Thus, CASR can enable the DoD to be very intentional in shaping what capabilities are available to surge in a crisis without hampering contract competition.

Space reserves give the DoD not only the ability to surge in a crisis, but also temporarily reconstitute the relatively fragile satellite systems after attack by adversaries.[394] A benefit of contract reserves compared to requisitioning space assets through DPA Title I or new statutory authority[395] is that the government does not have to concern itself with providing the manpower to operate those assets; the commercial firms provide the staffing and assets together as parts of the capabilities offered. However, if domestic firms struggle to compete in the open market or industry standards fall below DoD requirements, Congress may need to implement a direct subsidy program similar to the Merchant Marine's MSP. Additionally, Congress could allow DoD authority to contract and pay for upgrades to civilian-owned space systems to make them compatible with DoD requirements, similar to the authority allowed under CRAF.[396]

Although the domestic space industry is currently booming, there is no guarantee that space firms will continue to operate largely within the United States. Both the national airlift mobility system and the U.S. merchant marine are propped up by a web of legislation that promote protectionism and incentivize firms and their vessels to stay tied to the United States, steering government business to only U.S.-flagged or U.S.-owned firms. That legislation notably includes the Military Cargo Preference Act of 1904,[397] Cargo Preference Act of 1954,[398] Merchant Marine Act of 1936,[399] Merchant Marine Act of 1970,[400] Jones Act,[401] Fly America Act,[402] and Fly CRAF Act.[403] These are in addition to the general Buy American contracting provisions and clauses.[404] As space services mature and

394. *See* Sara Schmitt & Robert A Bettinger, *The Potentiality of Space Enterprise Force Reconstitution*, 33 AIR & SPACE POWER J. 61, 66 (2019).

395. *Cf.* 46 U.S.C. § 56301 (akin to the executive authority to requisition ships under declaration of national emergency); *see* discussion *supra* note 261.

396. 10 U.S.C. § 9513.

397. 10 U.S.C. § 2631.

398. 46 U.S.C. § 55305.

399. 46 U.S.C. app. § 1241(a)-(c) (requiring official travel, fifty percent of government shipping generally, and shipping of motor vehicles all be on U.S. ships).

400. Merchant Marine Act of 1936, Pub. L. No. 91-469, 84 Stat. 1019 (1936) (amended 1970).

401. Section 27 of the Merchant Marine Act of 1920 is known as the Jones Act. The Act requires ships transporting goods (whether commercial or government goods) between U.S. ports be U.S.-flagged, -owned, and crewed. Pub. L. 66–261, 41 Stat. 988 (1920); 46 U.S.C. § 55102. Companies can face large fines for violating this law. *See* Press Release, U.S. Att'y's Off., Dist. of Alaska, Two Companies in Alaska Seafood Shipping Industry to Pay $9.5M to U.S. in Settlement for Jones Act Violations (Feb. 23, 2024), https://perma.cc/AFQ4-2RVR.

402. 49 U.S.C. § 40118; FAR 47.401-405 (2024). See *supra* note 200 for explanation of the FAR.

403. 49 U.S.C. § 41106.

404. FAR 25.001, 25.1101, 25.1103, 52.225-1, 52.225-3, 52.225-5 (2024). Additional related consideration is International Traffic in Arms Regulations (ITAR) which may apply to limit U.S. firms from collaborating with foreign firms or employees on developing rocket-launched space systems. *See*

firms find increasing convenience to operate from and register with other countries,[405] the DoD and Congress may need to look at implementing further legislation to steer business to domestic space firms.

VII. CONCLUSION

CASR may be an effective means of achieving the USSF acquisitions czar's strategy of "proliferation everywhere."[406] Significant aspects of the funding and regulation still need to be worked out. Despite the underutilization of sealift programs, airlift programs have seen significant use at critical junctures in U.S. international operations. Spacelift, space data, and earth observation are already prolific areas of partnership between the United States and the private space industry. Incidents such as the use of Starlink in Ukraine have already demonstrated the value in having pre-arranged crisis surge capabilities contracted out instead of conducting procurements on-the-fly, subject to the whims of private actors. As the demand for space capabilities keeps growing, the United States is likely to see an ever-increasing need for space procurement. However, as clients in the DoD are ever hungry to acquire as much space data as their budgets allow, a clear line will need to be drawn to distinguish everyday capacity from surge capacity. Also, the USSF should draw lessons from and avoid repeating the neglected state of disrepair and undermanning of the NDRF. Meanwhile, CRAF has a seven-decade history of successes and policy improvements that provide practices to emulate. Similarly, VISA, although untested, is a strong model. The U.S. government can offer contract incentives to promote participation and bolster the domestic space industry without many drawbacks. The USSF will have much arduous work ahead of it to set price ratemaking guidelines and allocating mobilization values to the various space capabilities that the CASR will seek to capture. At minimum, modeling after existing CRAF and VISA authorities and regulations would be a strong start.

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generally International Traffic in Arms Regulations, 22 C.F.R. §§ 120-130 (2024); The United States Munitions List, 22 C.F.R. § 121.1 ("Category-IV—Launch Vehicles . . .") (2024).

405. For discussion on flags of convenience, see Frans Gerhard Von Der Dunk, *Towards "Flags of Convenience" in Space?*, SPACE, CYBER, AND TELECOMMUNICATIONS LAW PROGRAM FACULTY PUBLICATIONS (2012), https://perma.cc/9XR8-9BS8; H. Edwin Anderson III, *The Nationality of Ships and Flags of Convenience: Economics, Politics, and Alternatives*, 21 TUL. MAR. L.J. 139 (1996–1997); *Vessel Operations Under Flags of Convenience and Their Implications on National Security: Hearing Before the Spec. Oversight Panel on the Merchant Marine of the H. Comm. on Armed Servs.*, 107th Cong. 3–169 (2002), https://perma.cc/JX8X-4NWG; Douglas R. Kramer, The Use of Foreign-Flagged or Foreign-Owned Shipping in U.S. Military Sealift: Risks for the Combatant Commander (Oct. 30, 2008) (final paper, Naval War College), https://perma.cc/YY3V-PRSC.

406. Greg Hadley, *'Proliferation Everywhere': How Space Force Will Answer New Threats*, AIR & SPACE FORCES MAGAZINE (Feb. 26, 2024), https://perma.cc/LZ2V-ZJM6 (statement of Assistant Secretary Frank Calvelli) ("I'm an advocate of proliferation everywhere. . . I think we should be proliferating more in MEO, we should be proliferating more in GEO as well. And so I think we're taking the first steps through SDA in proliferation of LEO, but I also see us proliferating more at other orbits and trying strange orbits too, as well.").

APPENDIX: EXCERPTS OF REGULATIONS

A. Federal Acquisition Regulation (FAR)

FAR 1.101 Purpose.

The Federal Acquisition Regulations System is established for the codification and publication of uniform policies and procedures for acquisition by all executive agencies. The Federal Acquisition Regulations System consists of the Federal Acquisition Regulation (FAR), which is the primary document, and agency acquisition regulations that implement or supplement the FAR. The FAR System does not include internal agency guidance of the type described in 1.301 (a)(2).

FAR 1.102 Statement of guiding principles for the Federal Acquisition System.

(a) The vision for the Federal Acquisition System is to deliver on a timely basis the best value product or service to the customer, while maintaining the public's trust and fulfilling public policy objectives. Participants in the acquisition process should work together as a team and should be empowered to make decisions within their area of responsibility.

FAR 1.105-1 Publication and code arrangement.

(a) The FAR is published in—

(1) The daily issue of the Federal Register;
(2) Cumulated form in the Code of Federal Regulations (CFR); and
(3) A separate edition available at https://www.acquisition.gov/browse/index/far.

(b) The FAR is issued as Chapter 1 of Title 48, CFR. Subsequent chapters are reserved for agency acquisition regulations that implement or supplement the FAR (see subpart 1.3). The CFR Staff will assign chapter numbers to requesting agencies.

(c) Each numbered unit or segment (e.g., part, subpart, section, etc.) of an agency acquisition regulation that is codified in the CFR shall begin with the chapter number. However, the chapter number assigned to the FAR will not be included in the numbered units or segments of the FAR.

FAR 1.105-2 Arrangement of regulations.

(a) General. The FAR is divided into subchapters, parts (each of which covers a separate aspect of acquisition), subparts, sections, and subsections.

(b) Numbering.

(1) The numbering system permits the discrete identification of every FAR paragraph. The digits to the left of the decimal point represent the part number. The numbers to the right of the decimal point and to the left of the dash, represent, in order, the subpart (one or two digits), and the section (two digits). The number to the right of the dash represents the subsection. Subdivisions may be used at the section and subsection level to identify individual paragraphs. The following example illustrates the make-up of a FAR number citation (note that subchapters are not used with citations):

(2) Subdivisions below the section or subsection level consist of parenthetical alpha numerics using the following sequence: (a)(1)(i)(A)(1)(i).

(c) References and citations.

(1) Unless otherwise stated, cross-references indicate parts, subparts, sections, subsections, paragraphs, subparagraphs, or subdivisions of this regulation.

(2) This regulation may be referred to as the Federal Acquisition Regulation or the FAR.

(3) Using the FAR coverage at 9.106-4(d) as a typical illustration, reference to the—

(i) Part would be "FAR part 9" outside the FAR and "part 9" within the FAR.

(ii) Subpart would be "FAR subpart 9.1" outside the FAR and "subpart 9.1" within the FAR.

(iii) Section would be "FAR 9.106" outside the FAR and "9.106" within the FAR.

(iv) Subsection would be "FAR 9.106-4" outside the FAR and "9.106-4" within the FAR.

(v) Paragraph would be "FAR 9.106-4(d)" outside the FAR and "9.106-4(d)" within the FAR.

(4) Citations of authority (e.g., statutes or executive orders) in the FAR shall follow the Federal Register form guides.

B. Defense Federal Acquisition Regulation Supplement (DFARS)

DFARS 247.206 Preparation of solicitations and contracts.

Consistent with FAR 15.304 and 215.304, consider using the following as evaluation factors or subfactors:

(1) Record of claims involving loss or damage; and

(2) Commitment of transportation assets to readiness support (e.g., Civil Reserve Air Fleet and Voluntary Intermodal Sealift Agreement).

DFARS 247.301-71 Evaluation factor or subfactor.

For contracts that will include a significant requirement for transportation of items outside the contiguous United States, include an evaluation factor or subfactor that favors suppliers, third-party logistics providers, and integrated logistics managers that commit to using carriers that participate in one of the readiness programs (e.g., Civil Reserve Air Fleet and Voluntary Intermodal Sealift Agreement).

C. Transportation Federal Acquisition Regulation Supplement (TRANSFARS)

TRANSFARS 5547.4-100 Contract clauses.

(d) The contracting officer shall insert the clause at 5552.247-9003, Requirement for Civil Reserve Air Fleet (CRAF) Participation in Good Standing, in solicitations and contracts for air transportation services which require CRAF participation as a prerequisite for award, or other solicitations and contracts approved by Director of Acquisition.

TRANSFARS 5552.247-9003 Requirement for Carriers to Participate in the Civil Reserve Air Fleet (CRAF) and Maintain Good Standing.

As prescribed in 5547.4-100(d), insert the following clause in solicitations and contracts for air transportation services which require CRAF participation as a prerequisite for award, or other solicitations and contracts approved by Director of Acquisition:

REQUIREMENT FOR CARRIERS TO PARTICIPATE IN THE CIVIL RESERVE AIR FLEET (CRAF) AND MAINTAIN GOOD STANDING (AUG 2015)

This contract is conditioned upon the Contractor (if the contractor is a team arrangement, applies to each team member) being an approved Department of Defense approved carrier not in a suspended non-use status (carrier in good standing) participating in the Civil Reserve Air Fleet (CRAF) throughout the performance of this contract. The contractor shall be a U.S. registered air carrier operating under Federal Aviation Regulations, Part 121, and possessing a current certificate issued by the FAA pursuant to Federal Aviation Regulations, Part 121.

(End of Clause)