# The Legal Challenges of the US Military's Use of Commercial Space Transportation

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**Abstract**

The US military has considered the possibility of space transportation since the Cold War, but high costs and technological limitations were prohibitive at the time. The rise of commercial space has led to advances in space technology and decreasing launch costs. Private companies are making rapid strides in the development of orbital and suborbital space transportation. Consequently, the US military is assessing the viability of contracting commercial space transportation services. However, the current international space legal regime was not designed for such a scenario. Many aspects of space law and regulation have been developed under the assumption that states would occupy the predominant role in space. Additionally, neither the Chicago Convention nor the various space treaties were designed in anticipation of the existence of spaceplanes that straddle the line between air and space. Moreover, the Hague or Geneva Conventions did not contemplate conflict in space nor the role of private companies in such conflicts.

Therefore, this thesis examines the domestic and international legal issues of the US military's use of commercial space transportation. It identifies the relevant legal provisions and traces their historical origins. This contextualization provides a basis for understanding the gaps in the current law and how they may be addressed. Specifically, it examines the ambiguity of state versus civil aircraft under the Chicago Convention if air law becomes the regime applicable to sub-orbital spacecraft. It explores the possibility of using the Civil Reserve Air Fleet as a model to integrate space transportation into the US military's existing airlift capability. It assesses the current US domestic framework and notes a limitation for the military's full utilization of space transportation for troops and cargo. Finally, it applies space law and the law of armed conflict to the US military's use of commercial space transportation during conflict to identify gaps in the law and differences in the US interpretation.

**Résumé**

Dès la guerre froide, l'armée américaine s'est intéressé au potentiel du transport via l'espace, mais les coûts prohibitifs et les limitations technologiques ont limité ses aspirations. Depuis, la commercialisation progressive de l'espace a entraîné des progrès technologiques et une diminution des coûts de lancement. Le secteur privé progresse rapidement dans le développement du transport orbital et suborbital. Par conséquent, l'armée américaine évalue aujourd'hui la viabilité de la sous-traitance de services de transport spatial. Toutefois, le régime juridique spatial international actuel n'a pas été conçu pour un tel scénario. De nombreux aspects du droit et de la réglementation de l'espace ont été élaborés selon l'idée que les États occuperaient le rôle prédominant dans l'espace. Ni la Convention de Chicago ni les divers traités spatiaux ont été conçus en prévision de l'existence d'avions spatiaux qui chevauchent obscurcissent la démarcation entre l'air et l'espace. Pareillement, les Conventions de La Haye ou de Genève n'envisagent ni la présence de conflits dans l'espace ni le rôle des entreprises privées dans de tels conflits.

La présente thèse examine les questions juridiques nationales et internationales de l'emploi par l'armée américaine de transport spatial commercial. Y sont identifiées les dispositions légales pertinentes et leurs origines historiques. Cette contextualisation fournit une base pour comprendre les lacunes juridiques actuelles et comment elles pourraient être comblées. Plus précisément, est examinée l'ambiguïté entre les aéronefs d'État et les aéronefs civils en vertu de la Convention de Chicago en supposant que la Convention devenait le régime applicable aux engins spatiaux suborbitaux. La thèse explore aussi le concept de la flotte aérienne de la Réserve civile comme modèle pour intégrer le transport spatial dans la capacité de transport aérien existante de l'armée américaine. Ensuite, les limites du cadre national américain actuel sont examinées dans un contexte d'utilisation par l'armée du transport spatial pour les troupes et le fret. Finalement, cette thèse applique le droit spatial et les lois de la guerre à l'utilisation du transport spatial commercial en conflit afin d'identifier les manques juridiques et l'unique interprétation américaine de l'enjeu.

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# I. Introduction

## A. Research Motivation and Problématique

Advances by commercial space companies are challenging the traditional notion of outer space as mostly accessed and used by governments.[1] During the Cold War era of space discovery, outer space was a means of demonstrating a nation's economic might, harnessing national security, and enhancing national prestige. Two military superpowers, the US and the Soviet Union, dominated space exploration and related technological advances of the time.[2] In fact, through 1991, the US and the Soviet Union conducted over 95 percent of all space launches worldwide, the overwhelming majority of which were government launches.[3] Political historian Walter McDougall described the state during this era as "the dominant promoter and manager of technological progress."[4] Government-dominated space exploration and technological progress created centralized, bureaucratic technocracies.

Since the end of the Cold War, space has reached an inflection point and has transitioned from an era of discovery to a new phase of security and commerce.[5] Regarding the space security environment, the Cold War rivalry between the USSR and the US has been replaced by a paradigm of strategic competition among the US, Russia, and China.[6] From a security standpoint, the space domain is increasingly "congested, contested, and competitive."[7] Regarding space commerce, private commercial actors are playing an ever-greater role in space. Space security expert James Moltz has characterized this shift as a move from state-led 'technocracy' to "a more flexible,

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[1] Takuya Wakimoto, "Ensuring the Safety of Commercial Space Transportation through Standardization: Implications of the Chicago Convention and ICAO Standards" (2019) 49 Space Policy 1 at 1.
[2] James Clay Moltz, "The Changing Dynamics of Twenty-First-Century Space Power" (2019) 13:1 Strategic Studies Quarterly 66 at 69.
[3] Claude Lafleur, "The Spacecrafts Encyclopedia: A Comprehensive Census of All Spacecraft Ever Launched" (last visited 5 June 2022), online: <claudelafleur.qc.ca/Spacecrafts-index.html> (statistics found in Table 1).
[4] Walter A McDougall, ... *The heavens and the earth: a political history of the space age* (Baltimore, MD: Johns Hopkins University Press, 1997) at 5, 451.
[5] Clementine Starling et al, "The Future of Security in Space: A Thirty-Year US Strategy", *Atlantic Council* (April 2021), online: <www.atlanticcouncil.org/wp-content/uploads/2021/04/TheFutureofSecurityinSpace.pdf>.
[6] Natalia Azarova, "In the New Space Race, Will Russia and China Triumph Over America?" (28 December 2021), online: *Carnegie Endowment for International Peace* <carnegiemoscow.org/commentary/86094>; Thomas D Taverney, "Welcome to the NEW Space Race", *Air Force Magazine* (19 January 2022), online: <www.airforcemag.com/article/welcome-to-the-new-space-race/>.
[7] US Department of Defense, *National Security Space Strategy Unclassified Summary*, 2011 at i [*National Security Space Strategy*], online: <www.dni.gov/index.php/newsroom/reports-publications/reports-publications-2011/item/620-national-security-space-strategy>.

disaggregated, and resilient 'netocracy'."[8] These two phenomena are shaping the present era of space.

Much of the international legal framework relevant to space technology, comprised of five space treaties, and many national laws and regulations related to space were written during the Cold War when governments were the primary actors in space. Law inevitably evolves more slowly than technology. To this point, renowned air and space law scholar Daniel Goedhuis[9] observed in 1978:

> When one considers how many centuries it has taken for the world to adopt the principle of freedom of the high seas, and that the principle of the freedom of outer space was recognised as legally binding only a few years after the first spacecraft was put into orbit, one realises in *how revolutionary a way the international legal process has been accelerated by these formidable technological developments* [emphasis added].[10]

Thus, rapid advances in space technology, especially driven by the private sector, will drive legal developments within and among states.

The United States has the most comprehensive domestic system of space law in the world and has significantly influenced and should continue to shape the international law of space.[11] Consequently, the United States' approach to its military's use of commercial space technology, including suborbital and orbital transportation, will likely shape international law. During the Cold War, the competition between the United States and the USSR profoundly influenced the pace of advancements in space and the development of the current legal regime.[12] Therefore, an examination of the current legal framework, including an understanding of its limitations stemming from past strategic eras, is relevant.

This thesis examines the following research question: What gaps or problems exist in international and national law related to the US military's use of commercial space transportation,

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[8] Moltz, *supra* note 2 at 78.

[9] Professor Daniel Goedhuis served as the world's first Chair of Air and Space Law of at Leyden University, was Secretary at IATA, and was the International Law Association's (ILA) first Chairman of the Committee on Space Law. In his time working at the ILA, he proposed the principle that "outer space constitutes common property of mankind, open to use by all and not subject to appropriation by any one State." Although the ILA was not ready to adopt this language, it eventually was included in the Outer Space Treaty of 1967. See Maarten Bos, "In Memoriam Professor Daniel Goedhuis (1905–1995)" (1995) 42:3 Netherlands International Law Review 349.

[10] D Goedhuis, "The Changing Legal Regime of Air and Outer Space" (1978) 27:3 The International and Comparative Law Quarterly 576 at 582.

[11] Ram S Jakhu & Joseph N Pelton, "National Space Policies and Laws and Global Space Governance" in Ram S Jakhu & Joseph N Pelton, eds, *Global Space Governance: An International Study* (Cham, Switzerland: Springer International, 2017) 87 at 106.

[12] See generally Albert K Lai, *The Cold War, the Space Race, and the Law of Outer Space: Space for Peace* (London: Routledge, 2021).

and how did they come to be? This thesis addresses several areas of law that apply to the military's use of commercial space transportation: the ambiguity of state versus civil aircraft of the Chicago Convention if applied to suborbital flights; whether the US Civil Air Reserve fleet is a suitable model to integrate spacelift into the military's capabilities; space law and domestic law applicable to launch and spaceports; and legal issues of targeting. Each chapter addresses several sub-questions or issues that all fall within the overarching question of this thesis.

B. Methodology

This research endeavor employs a mixed methodology, employing both doctrinal and geopolitical approaches. To effectively examine the system of law surrounding the US military's use of suborbital and orbital transportation, it is necessary to look at the black letter law. However, beyond identifying the current state of the law, it is useful to trace and understand the development of the current legal system and its limitations. Therefore, in addition to the black letter law, this research endeavor examines primary sources of current and past US airlift, space and security policy as well as strategy documents shaping US positions on international treaties; declassified government records; and some congressional records leading up to relevant domestic legislation. Secondary sources consulted included books, journal articles, government and think tank reports, and newspaper articles. These sources were consulted to provide historical or geopolitical context to topics of law where such context helped to explain a gap in the current system.

As part of preliminary research to understand the technology (and its role within the US military logistics capability) on which the legal issues are based, phone interviews and email consultations with experts were conducted. Experts interviewed or consulted for this thesis included LCDR Rickey Turner and Mr. Mark Surina, Office of Research and Technology Applications at US Transportation Command (USTRANSCOM);[13] Dr. Greg Spanjers, Chief Scientist of the Air Force Strategic Development Planning and Experimentation Directorate; Mr. Robert W. Jarman, Office of Deputy General Counsel for Intelligence, International & Military Affairs; and Lt Col Seth Dilworth, Deputy Chief, Space Law, US Air Force Operations and

[13] US Transportation Command is one of eleven unified combatant commands of the United States Department of Defense. It coordinates transportation requirements, including military and civilian transportation resources, for US military missions worldwide. US Transportation Command, "About USTRANSCOM" (last visited 30 June 2022), online: <www.ustranscom.mil/cmd/aboutustc.cfm>; "US Transportation Command (TRANSCOM)" (last visited 30 April 2022), online: *GlobalSecurity.org* <www.globalsecurity.org/military/agency/dod/transcom.htm>.

International Law. These consultations provided valuable insight into the technology itself, its role within the US logistics network and broader US policy objectives, and guidance for potential areas of the law requiring examination and revision to fully integrate and utilize this technology.

C. Focus and Definitions

Though much scholarship has addressed and will continue to address issues such as the delimitation of space and outer space, what regulatory body should manage space traffic, and other such issues, these are not the focus of the present research. These topics, while worthy endeavors, are not unique to the military's contracting of commercial space transportation. This thesis focuses on the legal issues unique to this specific scenario.

Because this research deals with commercial space transportation, it is useful to define what is being referenced. Spaceflight can generally fall into one of three categories: sub-orbital, orbital, and intercontinental. In the case of sub-orbital spaceflight, orbital velocity is not achieved. A suborbital space vehicle can be launched either vertically or horizontally and can attain an altitude of approximately 100 kilometers. In orbital spaceflight, a spacecraft must reach orbital velocity so as not to fall back to earth. This means of transportation is more energy intensive, technically difficult, and more expensive than sub-orbital spaceflight. Intercontinental rocket transport shortens the time between two points on earth by transiting through outer space. These terms are used throughout this thesis.

D. Roadmap

This thesis proceeds in several parts. The first chapter discusses the military's desired use of space transportation for cargo and passenger transport. It outlines the military's historical attempts at using such technology, the needs this technology satisfies for the military, and contemporary initiatives examining the utility of this technology for military purposes. The second chapter examines an unresolved legal issue within air law: the ambiguity of state versus civil aircraft, its historical origins and attempts to resolve the issue, examples of past problems, and what implications this ambiguity has for the military's use of commercial suborbital transportation. Chapter three examines the possibility of using the Civil Air Reserve Fleet as a legal model for integrating spacelift into the US military's existing surge capacity. Chapter four discusses the relevant domestic law of launch and spaceports. The fifth chapter discusses the legality of

targeting military contracted civilian orbital and suborbital flights during armed conflict. Finally, a summary of findings concludes the thesis.

# II. The US Military's Past and Current Interest in the Use of Space Transportation for Passengers and Cargo

## A. Introduction

Prior to the examination of legal issues surrounding military contracted commercial spaceflight, this chapter explains the US military's interest and endeavors to use space transportation as part of its logistics network. Understanding the technology, related background, and how the user wants to implement this technology are necessary prerequisites to an analysis of the relevant law. This section addresses these questions:

(1) What is the US military's interest in using commercial space transportation as part of its logistics capabilities, and what are the origins of this interest?
(2) What mission advantages does commercial space transportation offer over current options such as airlift?
(3) What companies and commercial technology is the US military currently considering and why?

This section proceeds in several parts. The first part explains the first major military interest in utilizing point-to-point space transportation during the 1960s. The second part describes the space transportation options considered during the war on terror under the initiatives SUSTAIN and HOT EAGLE. The third part discusses current USAF initiatives, the Vanguard program and Rocket Cargo, which explore the possibility of using commercial rockets to transport cargo. This section includes a discussion about current agreements, funding, commercial providers of the technology, challenges to use, and capabilities sought. This chapter concludes with a summary of the development of commercial space technology and its role within US military logistics.

## B. Necessity Is the Mother of Invention: Cold War Concepts for Rocket Transport of Personnel and Cargo

### *1. The Berlin Airlift, the Berlin Wall, and Operation Big Lift: the Importance of Airlift*

Although concepts for rocket-launched transportation existed prior to the 1960s, several events of the Cold War led to the first serious consideration of the US military's use of rockets for point-to-point transportation of troops and cargo. The Berlin Airlift of 1948-49 highlighted the critical role of airlift to delivering humanitarian relief to sustain 2.2 million inhabitants where land access

was denied.[14] A little over a decade later, on the night of 13-14 August 1961, Berlin again became an area of denied access when East German police and military units sealed off routes to West Berlin.[15] After the Berlin Wall was built, the US recognized that relying solely on airlift for another such crisis would not be sufficient. A combination of airlift and pre-positioned troops and supplies would be required to respond to a future crisis with the USSR.[16]

On 22 October 1963, the US military initiated Operation Big Lift,[17] a military exercise conducted in consultation with NATO allies to respond to a simulated attack by a Warsaw Pact force on West Germany.[18] According to Defense Secretary Robert McNamara, the operation would "provide a dramatic illustration of the United States' capability for rapid reinforcement of NATO force."[19] The goal was to transport, within 72 hours, a division, two artillery battalions, and assorted transportation units from around the US to Germany.[20] In total, the USAF transported circa 14,500 troops[21] and 500 tons of cargo in 235 missions across the 5,600-mile route between Texas and the airfields of Western Europe.[22] Though it demonstrated that the US could successfully augment NATO forces in the event of an attack, it also highlighted the limitations of airlift in such a scenario.

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[14] Gary Endersby & Barry Fulbright, "Effects-based airpower" (1998) 12:4 Airpower Journal 89 at 95–96.
[15] US National Records and Archives Administration - National Declassification Center, *A Brief History of the Berlin Crisis of 1961*, by Neil Carmichael (Washington, DC) at 4, online: <www.archives.gov/files/research/foreign-policy/cold-war/1961-berlin-crisis/overview/berlin-wall-overview.pdf>.
[16] Research Analysis Corporation, *Study of the Prepositioning Concept Prior to BIG LIFT*, by Ralph A Hafner, Carl F Blozan, No AD0361542 (McLean, VA: Research Analysis Corporation, April 1965) at 26, online: <apps.dtic.mil/sti/pdfs/AD0361542.pdf>.
[17] The US Army produced a 25 minute documentary highlighting the entire operation step-by-step: from preparation for deployment, the airlift, arrival in Germany, forward deployment, the operation, the simulated engagement, post-engagement maintenance and cleaning, and redeployment. Charlie Dean Archives, "US Army: Exercise Big Lift - 1963" (5 November 2013), online (video): *YouTube* <www.youtube.com/watch?v=3qVzwlXISZg>.
[18] David I Goldman, "Operation BIG LIFT" (7 May 2012), online: *United States Army* <www.army.mil/article/28749/operation_big_lift>.
[19] *Ibid*.
[20] *Ibid*.
[21] NATO, "Germany and NATO - 1955" (last visited 17 May 2022), online: <www.nato.int/cps/en/natohq/declassified_185912.htm>.
[22] Philip Bono & George G Goldbaum, "'ithacus'—a new concept of inter-continental ballistic transport (ICBT)" (Paper delivered at the 1st AIAA Annual Meeting, Washington, DC, 29 June -2 July 1964) at 1, online: <arc.aiaa.org/doi/10.2514/6.1964-280>.

### 2. *Ithacus: A Rocket Concept for Overcoming the Limitations of Airlift*

*"Strange as it may seem, the Air Force, except in the air, is the least mobile of all services. A squadron can reach its destination in a few hours, but its establishment, depots, fuel, spare arts, and workshops take many weeks, and even months to develop."*[23]

- Winston Churchill, 1949

After Operation Big Lift, Philip Bono, a project engineer at Douglas Aircraft Company, worked on a solution to the major problems of such airlift operations supporting contingency operations. His study noted that aircraft such as those used in Operation Big Lift require:

> perfectly conditioned 10,000 foot landing runways, operational landing aids, stand-by support equipment, and ideal weather conditions. . . As long as military transport systems must depend upon prepared landing surfaces, easily detected and destroyed by enemy gunfire or missiles the entire concept of such troop movement is rendered completely impractical under hostile conditions.[24]

Bono's observations show the scope of the limitations of airlift—denied access, personnel requirements, the tonnage of military materiel or humanitarian supplies, and time lag—that space transportation could overcome.

Accordingly, by the mid-1960s, representatives from Douglas presented a troop transport alternative to the Congressional Committee on Science and Astronautics.[25] Douglas created the Icarus concept (intercontinental aerospacecraft, range unlimited system, later renamed Ithacus)[26] as a modification of another Douglas vehicle, the Rombus.[27] Rombus had a reusable booster and the potential to deliver logistics supplies to the Moon.[28] With the modifications to Rombus, Icarus could have transported a 500,000-pound payload to any point on Earth in 45 minutes.[29] For the military, this capability would have meant transporting the equivalent of 1,200 fully equipped

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[23] fCharles M Westenhoff & Air University (US) Press, *Military air power: the CADRE Digest of Air Power Opinions and Thoughts* (Maxwell Air Force Base, AL: Air University Press, 1990) at (pdf pagination) 26.
[24] Bono & Goldbaum, *supra* note 22.
[25] US, *1965 NASA Authorization: Hearings on HR 9641 (superseded by HR 10456) Before the Committee on Science and Astronautics, House of Representatives*, 88th Cong (Washington, DC: US Government Printing Office, 1964) [*1965 NASA Authorization*], online: <www.google.com/books/edition/1965_NASA_Authorization/8MFGAQAAMAAJ?hl=en&gbpv=1>.
[26] For an excellent concise overview video of the Icarus (later Ithacus) program including concepts leading up to it, the military needs it would serve, technical specifications, and the result of the program see Found and Explained, "ICARUS - How This Rocket Could Have Changed Warfare Forever" (19 March 2021), online (video): *YouTube* <www.youtube.com/watch?v=5NRpSiPy4EU>.
[27] *1965 NASA Authorization*, *supra* note 25 at 1147, 1151.
[28] *Ibid* at 1147.
[29] *Ibid*.

troops at speeds of 17,000 miles per hour.[30] The concept vehicle relied on liquid-hydrogen propellant tanks that could be jettisoned after takeoff and recovered intact.[31] At the time, Bono posited that Ithacus "could evolve into the most revolutionary advance in military transportation since the airplane."[32]

Ithacus had several advantages over airlift options. First, it could land on any type of terrain except quicksand or silt.[33] By comparison, military aircraft (the B-52C and DC-8 were specifically considered) require a hard surface, and a C-118 requires soft-rock.[34] Second, it had a range that was 2.5 times or more than a supersonic jet.[35] During Operation Big Lift, the US military transported some 4.45 million pounds in 235 missions, with each mission taking approximately ten hours.[36] By comparison, Ithacus could have transported the same tonnage in 17 missions, with each mission taking approximately a half hour (without refueling).[37]

Several limiting factors ultimately prevented Ithacus from being realized. The time required to make Ithacus ready for troop transport using the then available expendable boosters made a rocket transport mission for troop or cargo transport for military purposes impractical. For the Rombus, the turnaround time from launch to relaunch was 76 days.[38] The other limiting factor was the time required to load and unload the vehicle. As compared with then-available airlift options, Ithacus would take about twice as long to load 600 troops and 132,000 pounds of cargo, the equivalent of ten aircraft.[39] The major disadvantage of Ithacus was its cost. Ithacus would have cost 27 times as much to operate as a conventional jet aircraft.[40] Ultimately, Ithacus would not have been an economical or time-efficient alternative to airlift for an operation such as Big Lift.

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[30] Scientific and Technical Information Division, *Astronautics and Aeronautics, 1964: Chronology on Science, Technology and Policy* (Washington, DC: NASA, 1965) at 81.
[31] *Ibid* at 82–83.
[32] Bono & Goldbaum, *supra* note 22 at 1.
[33] *Ibid* at 13.
[34] *Ibid*.
[35] *Ibid* at 14.
[36] *Ibid*.
[37] *Ibid*.
[38] *Ibid* at 13.
[39] *Ibid*.
[40] *Ibid* at 14. Ithacus' ballistic trajectory would have consumed far more propellant weight for the same range and payload. For example, Ithacus could carry the equivalent of seven DC-8 aircraft, which would consume 1.46 million pounds of jet fuel (then costing USD 0.02 per pound). By comparison, Ithacus would have consumed 12 million pounds of cryogenic propellants (then costing USD 0.05 per pound).

The Douglas endeavor was useful to show what was at least *possible* in the 1960s, even if not practical for the reasons stated above. Moreover, the study conducted by Douglas of Operation Big Lift identified limitations of airlift that rocket-launched transportation could at least theoretically overcome. These conclusions are still valid today. The limitations of airlift and the desire to gain access to degraded or denied territory during conflict or humanitarian crises are still reasons why the US military has continued to pursue space transportation options.

### C. SUSTAIN and HOT EAGLE: Concepts for the War on Terror and Technological Developments since the early 2000s

#### *1. The War on Terror and Space Transportation for Special Operations Missions*

Since Ithacus, the US military has revisited the possibility of using space transportation to transport troops and cargo several times over the decades. For the sake of brevity, only two additional prior programs are highlighted. These two programs highlight different modes of space transportation relevant to different military needs, from asymmetric warfare to humanitarian assistance.

The terrorist attacks of 11 September 2001 set US defense priorities for nearly two decades of the post-Cold War era. In 2002 the US military began working on space transportation options to support combat operations of the war on terror.[41] Two closely related programs explored the possibility of suborbital and orbital transportation for the US Air Force and US Marine Corps.[42] The vision of these programs was to use space vehicles for transportation of special operations forces into hard-to-reach or hostile areas.[43] The US Air Force goal with the Small Unit Space Transport and Insertion (SUSTAIN) program was to be able insert an unmanned aerial vehicle into any area of the world within two hours.[44] The companion initiative to SUSTAIN was the High

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[41] Volpe National Transportation Systems Center, *Point-to-point Commercial Space Transportation in the National Aviation System Final Report*, by Ruth A McFarlane Hunter, Richard Wright, No 9464 (Cambridge, MA: US Department of Transportation, 10 March 2010) at 24, online: <rosap.ntl.bts.gov/view/dot/9464>.
[42] *Ibid*.
[43] *Ibid*.
[44] John M Jurist et al, "Small Unit Space Transport and Insertion (SUSTAIN): How to Do It and Use It as a Driver for Low-Cost Responsive Orbital Launch" (Paper delivered at the AIAA 7th Responsive Space Conference, Los Angeles, 27-30 April 2009), online: <citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.519.8195&rep=rep1&type=pdf>.

Operations Tempo Energetic Access to Globe and Launch Experiment (HOT EAGLE) concept.[45] HOT EAGLE was launched by the Defense Advanced Research Projects Agency (DARPA) and the Air Force Research Laboratory (AFRL) to investigate spacecraft options to fulfill the SUSTAIN vision.[46] The US Marine Corps requirement was to insert a Marine squad of 13 riflemen with field supplies to any potentially hostile area of the world within 2 hours and retrieve them.[47] Space transport options considered by these programs would have significant advantages over aircraft in terms of speed, global reach, and unconstrained overflight.[48]

Several different technologies were considered to meet the requirements of SUSTAIN.[49] Only one, a rocket-launched aerial and recovery system, was deemed both technically and economically feasible.[50] Other concepts previously rejected on for cost or technological reasons are worth noting because technology has evolved and costs have decreased such that these options might be viable in the future. One option considered was a rocket vehicle capable of vertical take-off and landing similar to the DC-X, an experimental single-stage-to-orbit space vehicle.[51] This concept was rejected because of the already high delta-v requirement[52] and the need to support troop insertion with tactical air support to suppress resistance, which could increase the delta-v requirement. The second concept considered but rejected was a space plane like the West German Sänger[53] two-stage-to-orbit spaceplane of the 1990s.[54] This concept was also rejected, not on technical grounds but because the space planes available in the early 2000s were too experimental and required a landing field near the target area, a requirement not ideal for combat operations.[55]

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[45] Conceptual Research Corporation, *High Operations Tempo Energetic Access to Globe and Launch Experiment (HOT EAGLE) Phase 1*, by Daniel P Raymer, No AD1005980 (Playa del Rey, CA: January 2006) at 6, online: <apps.dtic.mil/sti/citations/AD1005980>.
[46] McFarlane Hunter & Wright, *supra* note 41 at 24.
[47] Raymer, *supra* note 45 at 6.
[48] McFarlane Hunter & Wright, *supra* note 41 at 24.
[49] Schafer Corporation, *Marine Operations Using Space Transportation*, by Terry Phillips (Arlington, VA: 13 July 2005), online: <vdocuments.net/marine-operations-using-space-transportation-terry-phillips-schafer-corp-13.html>.
[50] Jurist et al, *supra* note 44 at 1.
[51] "DC-X FAQ Page" (last visited 23 July 2022), online: <www.hq.nasa.gov/office/pao/History/x-33/dcx-faq.htm>.
[52] Delta-v is typically provided by the thrust of a rocket engine. It is the scalar measure for the amount of effort needed to carry out a maneuver.
[53] Dietrich E Koelle, "Sänger II, A Hypersonic Flight and Space Transportation System" Proceedings of 16th ICAS Congress, online: <www.icas.org/ICAS_ARCHIVE/ICAS1988/ICAS-88-1.5.1.pdf>.
[54] Jurist et al, *supra* note 44 at 3–4.
[55] *Ibid* at 1.

SUSTAIN and HOT EAGLE contemplated a security environment in which the US may not have its current network of foreign bases on which to land aircraft for troop insertion.[56] Notably, unlike the Rocket Cargo program discussed in the following section, which appears to be geared more at resupply of troops and delivering humanitarian aid,[57] these initiatives aimed at gaining access to contested areas during a conflict. Thus, one can see that the security environment and strategic priorities of a country shape the development of technology, which in turn can drive changes to the law.[58]

*2. Commercial Space Transportation: Better and Cheaper*

Since that time, commercial space transportation technology has advanced, and cost has decreased.[59] Recent advances in technology and decreases in cost have even opened the space travel market to tourism, at least for the ultra-wealthy. For example in 2021, Virgin Galactic successfully reached space with a full crew in its SpaceShipTwo spaceplane.[60] Also in 2021, Blue Origin reached even deeper into space using its New Shepherd launch vehicle.[61] Thus, commercial transportation options previously considered unfeasible by the US military just a decade ago may be feasible today or in the near future. Therefore, the three technologies described in section I.C above are considered as part of the examination of the relevant law in subsequent chapters.

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[56] *Ibid* at 2.

[57] Air Force Research Laboratory, "Rocket Cargo for Agile Global Logistics" (2021), online (pdf): *AFRL* <cdn.afresearchlab.com/wp-content/uploads/2021/06/03155149/AFRL_Rocket-Cargo_FS_0621.pdf>.

[58] See e.g. US, The White House, *United States Space Priorities Framework*, 2021 [*US Space Priorities*], online: <www.whitehouse.gov/wp-content/uploads/2021/12/United-States-Space-Priorities-Framework-_-December-1-2021.pdf> (US space policy outlining the current security environment, noting growth in the commercial sector, and highlighting the consequential need to update space policies, regulations, and export controls governing commercial space activities).

[59] See e.g. Harry W Jones, "The Recent Large Reduction in Space Launch Cost" (Paper delivered at the 48th International Conference on Environmental Systems, Albuquerque, New Mexico, 8-12 July 2018), online: <ttu-ir.tdl.org/bitstream/handle/2346/74082/ICES_2018_81.pdf> (discussing the historical costs of rocket launch and noting that in the past decade, the cost of commercial rocket launch has decreased by a factor of 20); Michael Greshko, "What Virgin Galactic's milestone flight means for the future of tourists in space", *National Geographic* (11 July 2021), online: <www.nationalgeographic.com/science/article/what-virgin-galactic-milestone-flight-means-for-the-future-of-tourists-in-space> (discussing the development of Virgin Galactic's human spaceflight program including spaceplanes); Elizabeth Howell, "8 ways that SpaceX has transformed spaceflight", *Space.com* (14 March 2022), online: <www.space.com/ways-spacex-transformed-spaceflight> (discussing how commercial space company SpaceX has contributed to advances in spaceflight).

[60] Chelsea Gohd, "Virgin Galactic launches Richard Branson to space in 1st fully crewed flight of VSS Unity", *Space.com* (11 July 2021), online: <www.space.com/virgin-galactic-unity-22-branson-flight-success>.

[61] Scott Neuman, "Jeff Bezos And Blue Origin Travel Deeper Into Space Than Richard Branson" (20 July 2021), online: *NPR.org* <www.npr.org/2021/07/20/1017945718/jeff-bezos-and-blue-origin-will-try-to-travel-deeper-into-space-than-richard-bra>.

D. The Return of Great Power Competition: the Vanguard Program and Rocket Cargo

*1. Strategic Competition: A Change in Priorities*

The emergence of great power competition between China and Russia, and the US has changed the security landscape and US priorities.[62] The global war on terror focused on counterterrorist operations and US military operations in the Middle East. These elements are now less prominent in the US security dialogue, which has shifted to grand strategy and the geopolitics of great power competition.[63] In 2017, the US *National Security Strategy* acknowledged a changed strategic environment where great power competition is the central challenge to security, including security in space.[64]

*2. Science and Technology Strategy: Translating Strategic Priorities into Tangible Technology*

Recognizing the shift in US security priorities, in 2019 the US Air Force published *Science and Technology Strategy*.[65] This document outlines three objectives: (1) develop and deliver transformational strategic capabilities; (2) reform the way science and technology are led and managed; (3) deepen and expand the scientific and technical enterprise.[66] Under the first objective is the Vanguard program. This program intends to produce leap-ahead capabilities for the US Air Force.[67] One of those capabilities is Rocket Cargo, which is discussed further below.

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[62] Congressional Research Service, *Renewed Great Power Competition: Implications for Defense--Issues for Congress*, by Ronald O'Rourke, No R43838 (Washington, DC: 10 March 2022) at 1–4, online: <sgp.fas.org/crs/natsec/R43838.pdf>.

[63] *Ibid* at 1, 4.

[64] US President Donald J Trump, *National Security Strategy*, 2017 at 2–3, 31 [*Trump's NSS*], online: <trumpwhitehouse.archives.gov/wp-content/uploads/2017/12/NSS-Final-12-18-2017-0905.pdf>; US Air Force, *US Air Force Science and Technology Strategy*, 2019 at iii [*USAF Science and Technology Strategy*], online: <www.af.mil/Portals/1/documents/2019%20SAF%20story%20attachments/Air%20Force%20Science%20and%20Technology%20Strategy.pdf>. Although this document has been replaced in 2022, the updated version still acknowledges strategic completion as a top security concern. The 2017 document marked a paradigm shift away from the war on terror to strategic competition with China and Russia as priorities for US security interests. US President Joe Biden, *National Security Strategy*, 2022 [*Biden's NSS*], online: <www.whitehouse.gov/wp-content/uploads/2022/11/8-November-Combined-PDF-for-Upload.pdf>.

[65] *USAF Science and Technology Strategy*, *supra* note 64 at 11.

[66] *Ibid* at iii–iv. The objectives of the US Air Force's Science and Technology Strategy align with several of the priorities in the 2017 *National Security Strategy*: (1) build a more lethal force; (2) strengthen alliances and attract new partners; (3) reform the US Department of Defense for greater performance and affordability. *Trump's NSS*, *supra* note 64 at 26–29, 37.

[67] *USAF Science and Technology Strategy*, *supra* note 64 at 10–12.

### 3. *Rocket Cargo: Space Priorities for a New Era of Security*

*"Rapid logistics underpins our ability to project power. That is the fundamental motivation for initiating the rocket cargo program. We see its initial applications in swiftly restoring operational capability for forces forward in austere environments as well as dramatically reducing the time required to deliver crucial humanitarian assistance and disaster relief."*[68]

- Gen. Arnold W. Bunch Jr., Commander, Air Force Materiel Command, 2021

On 4 June 2021, the USAF announced the designation of Rocket Cargo as the fourth Vanguard program as part of its transformational technology portfolio.[69] Under this Vanguard, the Air Force Research Laboratory (AFRL) is assessing the possibility of utilizing commercial rocket technology to rapidly transport military materiel across the globe.[70] The stated objective of the program is to "demonstrate new trajectories and ways to fly large rockets, the ability to land rockets at austere locations, and design and test an ejectable pod for air drop."[71] This capability lends itself to disaster relief supply transport, as depicted in AFRL's promotional video on Rocket Cargo.[72]

The US military's role in disaster relief has grown in the last few decades. Several factors have contributed to this growth. Post-Cold War realignment, military downsizing and finding new roles for the military, especially as a force for good and the perceived inadequacy of civilian capabilities, have driven the rise in the use of military assets in disaster response operations.[73] The need for emergency relief in the context of large-scale disasters often occurs in difficult terrain,

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[68] Eric Kulisch, "Understanding Mars helps rocket cargo on Earth, military official says", *FreightWaves* (21 February 2022), online: <www.freightwaves.com/news/understanding-mars-helps-rocket-cargo-on-earth-military-official-says>.

[69] Secretary of the Air Force Public Affairs, "Department of the Air Force announces fourth Vanguard program" (4 June 2021), online: *United States Air Force* <www.af.mil/News/Article-Display/Article/2646703/department-of-the-air-force-announces-fourth-vanguard-program/>. The other three Vanguard programs are: Skyborg (an autonomous aircraft teaming architecture), Golden Horde (an integration of datalink radios and collaborative behaviors on inventory weapon systems), and Navigation Technology Satellite – 3 (a global positioning constellation). See Air Force Research Laboratory, "Air Force Vanguards – Air Force Research Laboratory" (last visited 22 July 2022), online: *AFRL* <afresearchlab.com/technology/vanguards/>.

[70] Air Force Research Laboratory, "Rocket Cargo for Agile Global Logistics" (last visited 13 May 2022), online: *AFRL* <afresearchlab.com/technology/successstories/rocket-cargo-for-agile-global-logistics/>.

[71] US Department of the Air Force, "Department of Defense Fiscal Year (FY) 2022 Budget Estimates: Research, Development, Test & Evaluation, Air Force - Vol I" (2021) at 211, online (pdf): <www.saffm.hq.af.mil/Portals/84/documents/FY22/RDTE_/FY22_PB_RDTE_Vol-I.pdf?ver=DGijGVofWq4jnTnOLuU5Bg%3D%3D>.

[72] Air Force Research Laboratory, "Rocket Cargo" (20 September 2021), online (video): *YouTube* <www.youtube.com/watch?v=thS5oSwhRF8>.

[73] Humanitarian Policy Group, *Resetting the Rules of Engagement: Trends and Issues in Military-humanitarian Relations*, Victoria Wheeler & Adele Harmer, eds (London: Overseas Development Institute, 2006) at 7, online: <reliefweb.int/attachments/4f3decd1-726e-312d-80f0-268b4692276f/C963360F7A801240852572EC006BF020-odihpg-resettingtherulesofengagement-march06.pdf>.

and civilian humanitarian organizations are stretched to provide adequate logistical support and protection to affected populations.[74] Military forces are easily deployable and have assets that other organizations do not, such as logistics, transport, and security.[75] Deployment of military assets for disaster relief is less politically sensitive than conflict-related crises and has a clearer end state.[76] This trend is likely to continue and even increase as governments prepare for greater roles of their militaries in disaster response by participating in military exercises.[77]

The Rocket Cargo program is evaluating the feasibility of using rocket-launched cargo for global logistics, including improvements in cost and speed compared to current air cargo options.[78] The program focuses solely on using commercial rocket capabilities as a leased service rather than developing those capabilities internally, much as the military contracts launch capabilities.[79] Rocket Cargo uses modeling and simulation to evaluate "the military utility, performance, and cost of transporting cargo on commercial rockets and air dropping cargo payloads." The project is looking at rockets with 30 to 100 tons of potential capacity.[80] Additionally, AFRL is researching the ability to land such a rocket on non-traditional surfaces and air drop cargo from the rocket after re-entry to transport cargo to remote locations.[81] Scientists and engineers are also exploring the possibility of landing a rocket near personnel and structures, a factor that affects the speeds of loading and unloading cargo.[82] Funding has been allocated to this program, and several contracts have already been awarded to private companies. In 2021, $9.7 million was allocated for Rocket

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[74] Alicia Kamara, "The Role of the Military in Humanitarian Crises Response: A Case for West Africa" ALC Working Paper (Paper published as part of the ALC Working Paper series by the African Leadership Centre, Nairobi, Kenya, May 2013) at 2, online: <africanleadershipcentre.org/attachments/article/177/ALC%20Working%20Paper%20No.10%20Alicia%20Kamara.pdf>.

[75] Humanitarian Policy Group, *supra* note 73 at 7.

[76] *Ibid*.

[77] Tomora Nance, "Army, FEMA Prepare for Disaster Relief in Vigilant Guard Exercise" (14 August 2017), online: *US Department of Defense* <www.defense.gov/News/News-Stories/Article/Article/1277725/army-fema-prepare-for-disaster-relief-in-vigilant-guard-exercise/>; Christopher Stelte & Daisy Zimmer, "Disaster relief exercise tests German, American first responders" (25 October 2019), online: *US Army* <www.army.mil/article/228157/disaster_relief_exercise_tests_german_american_first_responders>; Jiayao Li, "Cobra Gold 2022 HADR exercise wraps up—China Military" (2 March 2022), online: <eng.chinamil.com.cn/view/2022-03/02/content_10136610.htm>.

[78] Air Force Research Laboratory, *supra* note 57.

[79] *Ibid*.

[80] Theresa Hitchens, "Costs Plunge So 'Rocket Cargo' To Battlefield Takes Off", *Breaking Defense* (4 June 2021), online: <breakingdefense.sites.breakingmedia.com/2021/06/costs-plunge-so-rocket-cargo-to-battlefield-takes-off/>.

[81] Secretary of the Air Force Public Affairs, *supra* note 69.

[82] Kulisch, *supra* note 68.

Cargo, and nearly $48 million was requested for the 2022 fiscal year budget to conduct studies and rocket cargo demonstrations.[83]

While AFRL is exploring the logistics and enabling technologies through Rocket Cargo, USTRANSCOM is simultaneously partnering with companies to better understand the potential of applying this capability to a military context.[84] These partnerships will inform AFRL's work on rocket cargo.[85] USTRANSCOM signed cooperative research and development agreements (CRADAs) with SpaceX and Exploration Architecture Corporation (XArc) in 2020[86] and with Blue Origin in 2021.[87] Under a CRADA, companies agree with the government to share information about their products and capability developments, but the government is not obligated to purchase the product.[88] These CRADAs task the companies with assessing the technical, regulatory, and cost barriers of space-based delivery.[89] A discussion of the technology pertinent to Rocket Cargo and the work that has begun under the three CRADAs follows.

*4. CRADAs: Revisiting the Limitations of Airlift and How to Overcome Them*

In January 2021, SpaceX was awarded a $102 million contract to SpaceX to work on four areas: collect data from commercial orbital launches and landings; explore cargo bay designs compatible with USTRANSCOM containers that allow for rapid loading and unloading; research options to land on different terrain; and demonstrate the cargo launch and landing process.[90] Under the program, AFRL will gather data on performance and environments through access to SpaceX's orbital launches and booster landings.[91] SpaceX would also present cargo bay designs compatible

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[83] Hitchens, *supra* note 80.
[84] Courtney Albon, "AFRL partners with SpaceX to explore Rocket Cargo potential", *C4ISRNet* (20 January 2022), online: <www.c4isrnet.com/2022/01/20/afrl-partners-with-spacex-to-explore-rocket-cargo-potential/>.
[85] *Ibid*.
[86] US Transportation Command Public Affairs, "USTRANSCOM expands cooperative research to explore space cargo" (30 December 2021), online: <www.ustranscom.mil/cmd/panewsreader.cfm?ID=75F1C274-9204-D030-6AA5CF965952B8FF&yr=2021>.
[87] Emre Kelly, "Blue Origin again delays upcoming New Glenn rocket's first launch from Florida", *Florida News* (23 March 2022), online: <www.floridatoday.com/story/tech/science/space/2022/03/23/blue-origin-again-delays-new-glenn-rockets-first-florida-launch/7130846001/>.
[88] *Ibid*.
[89] Aaron Mehta, "Pentagon wants SpaceX delivering cargo around the globe—and a live test could come next year", *C4ISRNet* (7 October 2020), online: <www.c4isrnet.com/space/2020/10/07/the-pentagon-wants-spacex-delivering-cargo-around-the-globe-and-a-live-test-could-come-next-year/>.
[90] Albon, *supra* note 84.
[91] Jane Edwards, "SpaceX Awarded $102M AFRL Rocket Cargo Contract", *GovCon Wire* (20 January 2022), online: <www.govconwire.com/2022/01/spacex-awarded-102m-afrl-rocket-cargo-contract/>.

with USTRANSCOM containers as part of the contract, and the company has an option to provide AFRL with a full demonstration of heavy cargo transport and landing operations.[92] Two possible modes are being examined. The first is a rocket launched from a space base in the continental US to another point on Earth.[93] The second involved prepositioning supplies in orbit on a spacecraft that could rapidly deorbit and land as needed.[94] Both options could deliver cargo in roughly an hour or less.

SpaceX is currently testing prototypes of Starship with the aim of reusing rockets quickly to make spaceflight more like travel by air. Starship is a fully reusable super heavy launch vehicle.[95] SpaceX's goal with Starship is to create a reusable transportation system that can carry cargo and people beyond Earth.[96] Starship is fueled by a mix of methane and liquid oxygen to lift at least 100 tons of payload into low-Earth orbit.[97] Starship is one option to transport people or cargo from any city to another in under an hour.[98] Starship has the ability to revolutionize commercial launch costs and capabilities, especially those capabilities relevant to the US military:

> It will enable 'a conveyor belt logistical capacity to Low Earth Orbit (LEO) comparable to the Berlin Airlift,' increasing LEO payloads from a historical total of 500 tons per year to 500 tons *per week*. Launch costs are predicted to drop as low as $50 per kilogram, about 100 times lower than today.[99]

In 2020, USTRANSCOM signed a two-year research agreement with SpaceX to look at the possibility of using Starship to transport personnel and materiel for expedited global delivery.[100]

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[92] *Ibid*.
[93] Kyle Mizokami, "The Pentagon Wants to Send Cargo Rockets Around the World in Minutes—with Elon Musk's Help", *Popular Mechanics* (9 October 2020), online: <www.popularmechanics.com/military/weapons/a34315992/pentagon-cargo-rockets-spacex-elon-musk/>.
[94] *Ibid*.
[95] Alec Stapp, "To the Moon and Stars: Why Elon Musk's SpaceX is an underrated strategic national asset for the US—and NASA deserves some credit", *City Journal* (3 March 2022), online: <www.city-journal.org/why-elon-musks-spacex-is-a-strategic-national-asset>.
[96] Michael Sheetz, "Elon Musk, defending the value of space travel, presents SpaceX's Starship as the 'holy grail'", *CNBC* (11 February 2022), online: <www.cnbc.com/2022/02/11/elon-musk-spacexs-starship-is-solution-to-efficient-space-travel.html>.
[97] Paul Rincon, "What is Elon Musk's Starship?", *BBC News* (17 November 2021), online: <www.bbc.com/news/science-environment-55564448>. See also SpaceX, "Starship Users Guide" (2020) at 1, online (pdf): <www.spacex.com/media/starship_users_guide_v1.pdf>.
[98] SpaceX, "Starship | Earth to Earth" (28 September 2017), online (video): *YouTube* <www.youtube.com/watch?v=zqE-ultsWt0>.
[99] See Stapp, *supra* note 95 (quoting Casey Handmer, a former software system architect at NASA Jet Propulsion Laboratory).
[100] Kulisch, *supra* note 68.

The objectives of the contract also included using the Civil Air Reserve Fleet program as a model for partnership with rocket transport providers.[101]

Per the CRADA with XArc, a company specializing in space architecture and engineering, the company will assess the ground support basing and logistics requirements to integrate a spacelift capability into USTRANSCOM's network.[102] XArc provides consulting services on spaceport design and development.[103] XArc will evaluate three types of rocket landing sites: rugged terrain with no infrastructure, remote sites with limited support, and established sites with infrastructure and capabilities.[104]

Blue Origin is developing a heavy-lift orbital launch vehicle, New Glenn, with a reusable first stage, which would lend itself to the aims of the Rocket Cargo program.[105] Reusable stages and capsules that utilize parachutes are the technologies that may be employed in the kind of point-to-point cargo deliveries envisioned by the US military.[106] Blue Origin has designed New Glenn's first stage rocket to be used for a minimum of 25 flights, which makes it more cost-competitive.[107] Additional advantages of New Glenn would be its seven meter long fairing,[108] which is two times the payload of any existing launch vehicle.[109] New Glenn is projected to be able to launch and land in 95% of weather conditions, which would be crucial for the delivery of military materiel or

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[101] Michael P Kleinman, "US Transportation Command considers next steps for potential space logistics" (28 October 2020), online: *US Navy Military Sealift Command* <www.msc.usff.navy.mil/Press-Room/News-Stories/Article/2398103/us-transportation-command-considers-next-steps-for-potential-space-logistics/>; Eric Kulisch, "US Civil Reserve Air Fleet could be model for rocket cargo carriers", *FreightWaves* (3 November 2020), online: <www.freightwaves.com/news/space-companies-could-join-us-civil-reserve-air-fleet>.

[102] XArc, "XArc Partners with USTRANSCOM | Exploration Architecture Corporation" (22 October 2020), online: <explorationarchitecture.com/xarc-and-spacex-featured-in-spacenews/>.

[103] XArc, "About | Exploration Architecture Corporation" (14 July 2020), online: <explorationarchitecture.com/about/>.

[104] Noi Mahoney, "Military, SpaceX studying rockets to move cargo around the world", *FreightWaves* (14 October 2020), online: <www.freightwaves.com/news/military-spacex-studying-rockets-to-move-cargo-around-the-world>.

[105] As of the date of writing, Blue Origin has delayed New Glenn's launch another year to 2023 or later after being originally scheduled to launch in 2020, then delayed to 2021, and then delayed again to 2022. In the meantime, Blue Origin will continue to fly its smaller, tourist focused New Shepherd Rocket, which has (as of March 2022) flown 14 tourists. See Kelly, *supra* note 87.

[106] Sandra Erwin, "Blue Origin joins US military 'rocket cargo' program", *SpaceNews* (29 December 2021), online: <spacenews.com/blue-origin-joins-u-s-military-rocket-cargo-program/>.

[107] Blue Origin, "New Glenn" (last visited 16 May 2022), online: <www.blueorigin.com/new-glenn>.

[108] A payload fairing is a nose cone used to protect the payload of a spacecraft against the impact of pressure and heating during launch through the atmosphere. See e.g. NASA, "Payload Fairing" (last visited 22 July 2022), online: <mars.nasa.gov/mer/mission/launch-vehicle/payload-fairing/>.

[109] Blue Origin, *supra* note 107.

disaster supplies.[110] New Glenn will use BE-4, a combination of liquid oxygen-liquid gasoline, to launch payloads over 13 tons to geostationary orbit and 45 tons to low earth orbit, which is consistent with military requirements.[111]

Ultimately, the technology offered by these companies has several benefits. First, it has the potential to significantly increase the speed of cargo delivery compared to the current airlift options. Current transportation via airlift is constrained to approximately 40,000 feet altitude and a maximum of 600 miles per hour.[112] A C-17 Globemaster III, which can carry a maximum load of 170,900 lbs (77,519 kilograms)[113] flying at 500 miles per hour, takes 12 hours to fly from California to Japan.[114] A rocket could make the trip in 30 minutes or less.[115] Second, rockets do not need aerial refueling tankers to support a mission, nor do they need permission for overflight once beyond airspace. The ability to launch a C-17 payload equivalent anywhere in the world in less than an hour would enhance the US military's logistics capabilities in remote or austere locations. This enhanced capability is particularly important in a geostrategic era of power competition among the US, China, and Russia. In today's geopolitical environment, finding routes through friendly airspace to deliver US forces or military cargo are key complications in a logistics network.[116]

E. Conclusion

This section traced the US military's interest in using space transportation for troops and cargo from the Cold War to the present as a backdrop to an examination of the legal issues surrounding the military's use of such technology. The security environment of the various eras, from the Cold War to the war on terror to today, impacted the kind of technological solutions the US sought for its missions. Regardless of era or security priorities, the US military has always been interested in

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[110] *Ibid*.
[111] *Ibid*.
[112] US Transportation Command Public Affairs, "TRANSCOM announces next frontier for logistics – space" (8 October 2020), online: *US Air Force Expeditionary Center* <www.amc.af.mil/News/Article-Display/Article/2376322/transcom-announces-next-frontier-for-logistics-space/>.
[113] US Air Force, "C-17 Globemaster III" (last visited 21 May 2022), online: <www.af.mil/About-Us/Fact-Sheets/Display/Article/1529726/c-17-globemaster-iii/>.
[114] Mizokami, *supra* note 93. This article aptly notes that such a flight would bring assets by cargo to China's doorstep in a mere 30 minutes or less.
[115] *Ibid*.
[116] David Axe, "Semper Fly: Marines in Space", *Popular Science* (18 December 2006), online: <www.popsci.com/military-aviation-space/article/2006-12/semper-fly-marines-space/>.

using space transportation to augment airlift options and overcome limitations. As one will see in the sections to follow, the security environment plays a role in the development of technology and the law.

## III. Sub-Orbital Flight: Ambiguity of the State vs. Civil Aircraft Distinction

### A. Introduction

International law is ambiguous on the status of suborbital transportation; namely, it is not clear whether the provisions of space law or air law should apply. Outstanding issues of applicability of air or space law to sub-orbital flights exist, but they are not the focus of this research. For example, no consensus has been reached on where air space ends and outer space begins.[117] Additionally, two widely debated approaches—the functionalist approach and the spatialist approach—address whether sub-orbital flights should be the province of air law or space law.[118] The relevant conventions contain elements of both functionalism and spatialism.[119] Some provisions of the outer space treaties seem to exclude suborbital vehicles, but other provisions would include them.[120] The definition of "aircraft" in the Annexes of the Chicago Convention does not appear to contemplate rocket-powered vehicles.[121] These issues relate to sub-orbital

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[117] ICAO, *Concept of Sub-orbital Flights*, ICAO Doc C-WP/12436 (contained in UN Doc A/AC105/C2/2010/CRP9) (2005) at 4, online: <www.unoosa.org/pdf/limited/c2/AC105_C2_2010_CRP09E.pdf>.

[118] Upasana Dasgupta, "Legal Issues on Sub-Orbital Space Tourism: International and National Law Perspectives" (2013) 38 Annals Air & Space L 237 at 245–50.

[119] Paul Stephen Dempsey & Maria Manoli, "Suborbital Flights and the Delimitation of Airspace Vis-À-Vis Outer Space: Functionalism, Spatialism and State Sovereignty" (Paper submitted to the United Nations Office of Outer Space Affairs, 9 December 2017) at 4, online: <www.unoosa.org/res/oosadoc/data/documents/2018/aac_105c_22018crp/aac_105c_22018crp_9_0_html/AC105_C2_2018_CRP09E.pdf>.

[120] The Outer Space Treaty could include sub-orbital flight. The main provisions of the treaty refer to "outer space" rather than to whether or not a spacecraft is orbiting. If reaching orbit is not necessary for the Outer Space Treaty to apply, then relevant provisions (such as requiring authorization and supervision of the responsible state and international liability of the launching state) of the Outer Space Treaty would apply to sub-orbital flights. *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies*, 27 January 1967, 610 UNTS 205, 18 UST 2410 arts VI-VII (entered into force 10 October 1967) [*Outer Space Treaty*]. On the other hand, the Registration Convention applies to "launched into Earth orbit and beyond." For this reason, in 2004 the US did not register SpacShipOne in its national registry or in the UN Registry. This practice suggests that suborbital vehicles do not need to be registered per the requirements of the Registration Convention. *Convention on Registration of Objects Launched into Outer Space*, 6 June 1975, 28 UST 695, 1023 UNTS 15 art II (entered into force 15 September 1976) [*Registration Convention*]; Andrea J Harrington, "US State Spaceflight Liability and Immunity Acts in Context" in Jan Wouters, Philip De Man & Rik Hansen, eds, *Commercial Uses of Space and Space tourism: Legal and Policy Aspects* (Cheltenham, UK: Edward Elgar, 2017) at 122. On the other hand, the Liability Convention does not contain a requirement to reach earth orbit. If a suborbital space vehicle is considered a "space object" for purposes of that convention, the launching state will be internationally liable for any damage caused by it. *Convention on International Liability for Damage Caused by Space Objects*, 29 March 1972, 961 UNTS 187, 24 UST 2389, 10 ILM 965 arts II-III (entered into force 1 September 1972) [*Liability Convention*]. Therefore, some provisions of the various outer space treaties apply to suborbital vehicles, but others do not.

[121] ICAO, *Annex 7 to the Convention on International Aviation—Aircraft Nationality and Registration Marks*, 6th ed (2012) at 7, online: <store.icao.int/en/annex-7-aircraft-nationality-registration-marks>.

transportation generally and are not unique to the scenario of the US military contracting for such services making them beyond the scope of this thesis.

However, one issue is potentially relevant in a scenario in which the US military is contracting commercial sub-orbital transportation. That issue is whether a sub-orbital spacecraft is state or civil. In space law, the actions of both government (state) and private (civil) actors are attributable to the contracting state to the relevant space treaty.[122] Therefore, whether a spacecraft is a government (state) spacecraft or a private (civil) spacecraft is not as crucial as under air law. Under air law, this distinction matters. For the reasons stated above, the debate of air versus space law regarding applicability to sub-orbital transportation will not be addressed here. However, if an international consensus is reached that air law should apply to sub-orbital spacecraft (at least for the duration of the flight in airspace), understanding the ambiguity of civil versus state aircraft as applied to spacecraft is a useful exercise. Therefore, this section answers three questions:

(1) What are the origins of the ambiguity between civil and state aircraft in the Chicago Convention?

(2) How is the status of military-contracted civil aircraft (and hence, spaceplanes) determined?

(3) What potential pitfalls does the legal ambiguity under international law pose in the case of the military contracting civil aircraft or spacecraft?

This section begins by tracing the current ambiguity in the law to its historical origins. Although early air law jurisprudence predates the First World War,[123] this was the first war in which aircraft could be a decisive factor. Due to the rapid advancements in aircraft technology increasing the damage aircraft could inflict, significant developments in air law followed WWI.[124] The interwar period was characterized by competition between the military and civilian

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[122] *Outer Space Treaty*, *supra* note 120, art VI.

[123] For more on the history of civil aviation law prior to the Paris Convention of 1919, see H B Jacobini, "International Aviation Law a Theoretical and Historical Survey" (1953) 2:2 J Pub L 314.

[124] Airpower historian an analyst retired Colonel Phillip S. Meilinger argued that reconnaissance aircraft played a vital role as early as the Battle of Marne in WWI, saving Paris and possibly France. The importance of airpower was affirmed during the Second World War. For example, in1940 the Battle of Britain in WWII proved that whichever side controlled the air also controlled the ground and sea. If Germany had achieved air superiority over the English Channel, Great Britain could not have staved off a German invasion and would have lost the war. In 1944, airpower enabled the invasion of Normandy by breaking through the German Luftwaffe and establishing air superiority over the beach. See Phillip S Meilinger, "A Short History of 'Decisiveness'", *Air Force Magazine* (1 September 2010), online: <www.airforcemag.com/article/0910history/>.

aviation spheres and concern about the resurgence of Germany's aviation sector. Significant developments in civil aviation technology and law during the interwar years and the aircraft as a dual-use object are relevant to this section and the following sections on the Civil Air Reserve Fleet and Targeting. The devastating destruction wrought by airpower during WWII led to significant developments in the law, including the Chicago Convention. Following the historical discussion is a description of the state versus civil aircraft dilemma, its significance, and examples of where the ambiguity in the law has had disastrous consequences. Finally, an assessment of the ambiguity as it relates to the military's possible use of commercial sub-orbital transportation and concluding remarks are offered.

## B. The Origins of the Ambiguity

### *1. WWI and the Paris Convention of 1919*

The First World War demonstrated the "ugly potential of aviation."[125] The technical advances of aviation during WWI, which enabled the rapid transport of cargo and passengers over extended distances, necessitated a legal regime to regulate this mode of transportation and to ensure its safety.[126] After the war, international collaboration in aviation matters, initially born out of military necessity, was aimed at peaceful ends. During the Paris Peace Conference of 1919 and 1920, the victorious Allies met to set the terms for the defeated Central Powers.[127] A special Aeronautical Commission was set up to handle matters of aviation. As one of the victorious powers with a huge empire and then the leading air power, Britain had a significant influence on the outcome of negotiations leading to an international treaty, especially regarding sovereignty over airspace.[128]

The Convention for the Regulation of Aerial Navigation was signed on 13 October 1919 with the expressly stated desire to "encourage the peaceful intercourse of nations by means of aerial

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[125] ICAO, "History: The beginning" (last visited 15 June 2022), online: *European and North Atlantic (EUR/NAT) Office* <www.icao.int/EURNAT/Pages/HISTORY/history_1910.aspx>.
[126] *Ibid*.
[127] Office of the Historian, "Milestones: 1914–1920 - The Paris Peace Conference and the Treaty of Versailles" (last visited 15 June 2022), online: *US Department of State* <history.state.gov/milestones/1914-1920/paris-peace>.
[128] Alan Dobson, *A History of International Civil Aviation: From its Origins through Transformative Evolution* (London: Routledge, 2017) at 12.

communications."[129] It was the first multilateral agreement on international aviation law.[130] Article 1 declared the right of every state to "complete and exclusive sovereignty over the air space above its territory," including national territory and colonies and its territorial waters.[131] In spite of this declaration, the Convention granted a right of innocent passage during peacetime to aircraft of Member States without discrimination as to nationality.[132]

The Paris Convention distinguished between "private aircraft" and "State aircraft." State aircraft included military aircraft and aircraft "exclusively employed in a State, such as postal, customs, and police."[133] All other aircraft were deemed private aircraft, and all State aircraft other than these enumerated categories were also treated as private aircraft. As stated above, the Paris Convention granted, during peacetime, the freedom of innocent passage through the sovereign airspace of aircraft of other contracting states.[134] Notably, however, military aircraft[135] were excluded from the freedom of innocent passage.[136] Once a contracting State granted permission for overflight over its sovereign territory to the military aircraft of another contracting state, the military aircraft had "the privileges, which are customarily accorded to foreign ships of war."[137] Thus, the Paris Convention crystallized the concept of extraterritoriality

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[129] *Convention for the Regulation of Aerial Navigation*, 13 October 1919, 11 LNTS 173 (entered into force 31 May 1920) [*Paris Convention*].
[130] Jacobini, *supra* note 123 at 314.
[131] *Paris Convention*, *supra* note 129, art 1.
[132] *Ibid*, art 2.
[133] *Ibid*, art 30.
[134] The law was already trending in the direction of recognizing state sovereignty over its airspace before 1919. For example, in 1911, Great Britain passed the Aerial Navigation Act, which held that air over Britain, its Empire, and Dominions was inviolable. This law mirrored the principles of the common law tradition which held an owner of land to also own the space above with no height limit. Two years later, France and Germany signed the first aviation treaty that recognized sovereignty of the state over its airspace. However, the Hague Conventions did not provide guidance as to the legality of overflight of foreign military aircraft during peacetime as these Conventions applied only in time of war. Thus, the regulations were only enforceable as a war measure, but a comprehensive legal treaty as to the legality of overflight of military aircraft during peacetime was still to be concluded. See William M Gibson, "The Development of International Air Law to 1919" (1931) 5:2 Temp LQ 161 at 184. See also Gbenga Oduntan, *Sovereignty and Jurisdiction in Airspace and Outer Space: Legal Criteria for Spatial Delimitation* (London: Routledge, 2012) at 59–64 (tracing the historical development of the principle of sovereignty in the airspace above a nation's territory); Dobson, *supra* note 128 at 9.
[135] The Paris Convention specified that "every aircraft commanded by a person in military service detailed for the purpose shall be deemed to be a military aircraft." *Paris Convention*, *supra* note 129, art 31.
[136] ". . . [N]o military aircraft of a contracting State shall fly over the territory of another contracting State nor land thereon without special authorization." *Ibid*, art 32.
[137] *Ibid*.

of military aircraft.[138] As such, military aircraft are exempt from legal enforcement measures of other states related to civil aircraft.[139]

*2. The Interwar Years*

During this period, the difficulty of classification of civil and state aircraft became evident due to the restrictive terms of the Treaty of Versailles pertaining to German aviation. The treaty, which ended the war, required that "the armed forces of Germany must not include any military or naval force."[140] Between 1919 and 1922, three international committees of air experts convened in Geneva, Paris, and Washington, respectively.[141] During these meetings, the relationship between civil and military aviation was discussed as several attempts were made to delineate civil and military aircraft vis-à-vis Germany.[142] All three committees arrived at the same conclusion independently: "civil aviation is very readily convertible to war purposes, and that no means can be devised to prevent such convertibility which would not, at the same time, prejudice the development of civil air-transport."[143]

In 1920, the Paris Peace Conference's Supreme War Council tasked one of these committees, the Aeronautical Advisory Commission to the Peace Conference, to draft rules distinguishing civil and military and naval aviation forbidden in the treaty.[144] The Commission's report concluded that the task was impossible. The Supreme Council insisted that the commission create a set of rules to distinguish the aircraft. The commission then produced "the Nine Rules"

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[138] Michel Bourbonniere & Louis Haeck, "Military Aircraft and International Law: Chicago Opus 3" 66:3 J Air L & Com 885 at 891.

[139] Thus, military aircraft cannot be compelled to pay charges or taxes by attachment or execution of the aircraft. See Lassa Oppenheim, *International law: a treatise*, 8th ed, Hersch Lauterpacht, ed (London: Longmans, Green and Co, 1962) at 851; Bin Cheng, *The law of international air transport* (London: Stevens and Sons, 1962) at 75; Chester D Taylor Jr, "International Flight of Military Aircraft in Peacetime" (1968) 28 FED BARJ 36 at 43; Ian Brownlie, *Principles of Public International Law*, 3d ed (Oxford, UK: Clarendon Press, 1979) at 353; JL Brierly, *The Law of Nations: An Introduction to the International Law of Peace*, 6th ed, Sir Humphrey Waldock, ed (New York: Oxford University Press, 1963) at 269.

[140] Office of the Historian, "Papers Relating to the Foreign Relations of the United States, The Paris Peace Conference, 1919, Volume XIII" (last visited 19 June 2022), online: *US Department of State* <history.state.gov/historicaldocuments/frus1919Parisv13/ch14subch3>.

[141] ICAO Legal Committee, 29th Session, *Secretariat Study on Civil/State aircraft*, ICAO Doc LC/29-WP/2-1 (1994) at 6, online: <www.icao.int/Meetings/LC37/References/LC.29.WP.2-1.EN-CivilState%20Aircraft.pdf#search=Secretariat%20Study%20on%20Civil%2FState%20Aircraft%2C%20C%2DWP%2F9835>.

[142] *Ibid*.

[143] John C Cooper, *The Right to Fly* (New York: H Holt, 1947) at 90.

[144] *Secretariat Study on Civil/State aircraft*, *supra* note 141 at 7.

in an attempt to distinguish civil and military aircraft.[145] However, these guidelines were abandoned as they were based on technical criteria such as engine size, speed, and fuel capacity, which many civil aircraft met.[146]

The inability to clearly distinguish civil and military aircraft eventually led to the easing of restrictions on Germany's aviation industry. After the end of WWI, the Allies tried to confiscate aircraft they deemed to be military, but which Germany asserted were civil.[147] After the abandonment of the Nine Rules, Germany's post-war civil aviation industry flourished in the interwar period. In 1926, several small companies merged to form Lufthansa, a government-sponsored airline.[148] Its services expanded during the 1920s and 1930s, aided by two factors.[149] First, the German government was eager to expand its influence.[150] Second, remaining restrictions on German commercial aviation were lifted in 1928.[151] Lufthansa's director even recommended the clandestine formation of a German air force of 390 bombers and 10 air reconnaissance squadrons.[152]

By comparison, the US fell behind Germany in aviation advancements in the immediate post-WWI period.[153] After the financial strain of WWI and the Great Depression, US aviation struggled. Additionally, the US never became a party to the Paris Convention because the Senate never ratified the Versailles Treaty. Thus, aviation procedures and laws were split between the US and Europe in the interwar years, with the US civil aviation industry lagging behind its German and British counterparts.[154] To ensure its national security with dwindling financial resources, the US government turned to the civilian sector.

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[145] Frank Fedele, "Overflight by Military Aircraft in Time of Peace" (1965) IX:5 The United States Air Force JAG Law Review 8 at 10.
[146] *Ibid* at 11.
[147] Michael Milde, "'Rendition Flights' and International Air Law" (2008) REDRESS at 4, online: <redress.org/wp-content/uploads/2018/01/Jul-08-Rendition-Flights-and-International-Air-Law.pdf>.
[148] "Lufthansa—The Covert Air Force" (last visited 19 June 2022), online: *GlobalSecurity.org* <www.globalsecurity.org/military/world/europe/de-dlh.htm>.
[149] *Ibid*.
[150] *Ibid*.
[151] *Ibid*.
[152] Wilhelm Deist, *The Wehrmacht and German Rearmament* (London: Palgrave Macmillan, 1981) at 55.
[153] Dobson, *supra* note 128 at 18.
[154] Peter Hugill, "The American Challenge to British Hegemony, 1861-1947" (2009) 99:3 Geographical Review 403 at 412–13.

In 1925, US President Calvin Coolidge appointed a board, subsequently known as the Morrow Board named after its chairman Dwight Morrow,[155] to study "the best means of developing and applying aircraft in national defense."[156] Though the board was intended to solve the problem of US military airpower, especially in relation to falling behind Germany, it contributed a lot to the growth of civilian aviation.[157] The Morrow Board's recommendations led to the Air Commerce Act, which spurred a massive injection of funds into the US civil aviation industry. The Air Commerce Act was the first aviation law at the federal level and was a major milestone in fostering "sincere cooperation between the public and private sectors."[158] By 1939, the US was the dominant civil aviation power.

### *3. WWII and the Chicago Convention*

The Second World War demonstrated the importance of civil aviation for manufacturing and overseas logistics crucial for projecting air power. It was also a significant catalyst for technical developments in aircraft. During this period, an expansive network of passenger and freight lines was established.[159] Though aircraft played an important role during the First World War, WWII was the first war in which the airplane became essential for military supply lines and, in

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[155] Coolidge had asked his trusted friend, a fellow Amherst graduate and prominent banker, to take charge of the board. The board was to interview military, political, and civilian experts on aviation in arriving at its conclusions. Coolidge wanted the board to be thorough and to shape aviation policy according to his economic views, but anticipated political blowback from having ordered the court-martial of Colonel Billy Mitchell in September 1925. One of the issues before the board was whether the Air Service should become an independent branch of the armed forces, a position for which Colonel Mitchell and others airpower advocates staunchly advocated. The board held extensive hearings of over 100 witnesses in coming to their conclusions, and published its report on 20 November 1925. Among other recommendations, and much to the chagrin Colonel Mitchell, the board rejected the idea of an independent Air Service. It recognized the increased role of airpower, but without changing its role within the Army. The board instead recommended changing the name of the Air Service to the Air Corps, proposed additional aviation personnel allocations to the US Army, and outlined a five year procurement plan. The Army Air Corps Act of 1926 enacted the final recommendations of the Morrow Board. The act also authorized the Morrow Board's recommendations to expand the Air Corps over a five year period. See *Report of President's Aircraft Board* (Washington, DC: US Government Printing Office, 1925) at 7–21; *Army Air Corps Act of 1926*, Pub L No 69–446, 44 Stat 780. See also Barbara Greenwood, *A Question of Loyalty* (Richmond Hill, Ontario: Scholastic Canada, 1993) (discussing the court-martial of Billy Mitchell and the battle within the US military to create and independent Air Force).

[156] US Air Force Historical Support Division, "1926—The US Army Air Corps Act" (last visited 19 June 2022), online: <www.afhistory.af.mil/FAQs/Fact-Sheets/Article/459017/1926-the-us-army-air-corps-act/>.

[157] David D Lee, "Herbert Hoover and the Development of Commercial Aviation, 1921-1926" (1984) 58:1 The Business History Review 78 at 99–101.

[158] *Ibid* at 101–02.

[159] Louis de Gouyon Matignon, "The Chicago Convention of 1944" (28 January 2019), online: *Space Legal Issues* <www.spacelegalissues.com/space-law-the-chicago-convention-of-1944/>.

some instances, was the only supply line.[160] As more aircraft were needed for the war effort, civil aircraft were converted to military use. For example, four and a half months after the bombing of Pearl Harbor, the US War Department notified airlines that a portion of their fleet must be turned over to the military.[161]

As part of its global logistics network during WWII, the US wanted to establish bases across the world. At the height of war production in 1944, the US was producing 100,000 planes per year.[162] This massive fleet of aircraft needed a logistics network for support.[163] However, the US could not build military bases in nations that wanted to stay neutral during the war. Instead, the US government relied on a private carrier, Pan American Airlines. In 1940, the War Department signed a secret contract with Pan American Airports Corporation to operate an airport development program.[164] Outwardly, the program was supposed to improve commercial airports, but secretly it was created to build airfields for military use.[165]

After the war's conclusion, no country could ignore the development of civil aviation because of its potential advantage in projecting military airpower.[166] After the war, the United Kingdom, US, USSR, and Provisional Government of the French Republic established a Control Council, which had complete authority over Germany.[167] The ease with which Germany had developed its military airpower from civilian aviation was evident. For that reason, the Control Council abolished all German Air Forces and prohibited the manufacture, import, export, transport and storage of aircraft of all types,[168] including all component parts and ground equipment for services aircraft, and also prohibited scientific research on aerodynamics and related fields and on rocket propulsion.[169] The Council declared all airfields illegal in Germany as it classified them as part of military installations.[170] It wasn't until the 1950s that the first

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[160] Robert J Serling, *When The Airlines Went To War* (Washington, DC: AIAA, 1997) at 2.
[161] Serling, *supra* note 160.
[162] Dobson, *supra* note 128 at 38.
[163] *Ibid*.
[164] Marylin Bender & Selig Altschull, *The Chosen Instrument: Pan Am, Juan Trippe, the Rise and Fall of an American Entrepreneur* (New York: Simon & Schuster, 1982) at 331.
[165] *Ibid*.
[166] Dobson, *supra* note 128 at 39.
[167] Alex Meyer, "The Development and Present State of German Air Law" (1956) 23 J Air L & Com 188 at 189.
[168] *Prohibition of the Manufacture, Import, Export, Transport and Storage of War Materials*, Allied Control Council, Law No 43 (1946) art I.
[169] *Control of Scientific Research*, Allied Control Council, Law No 25 (1946) art II.
[170] *Prohibition of Military Construction in Germany*, Allied Control Council, Law No 23 (1946) arts I–II.

relief measures in legislation related to civil air aviation took place, after the creation of the Military Security Board in 1949, which was tasked with enabling Germany to participate in international cooperation without risking the rebirth of its war potential.[171]

The US and Great Britain recognized the importance of civil aviation to security and wanted to shape its future to avoid the commercial and security risks of allowing others to do so. After several studies in the US and in consultation with major allies, the US invited 54 states[172] to attend an International Civil Aviation Conference in Chicago in 1944.[173] On 7 December 1944, three years to the day of the bombing of Pearl Harbor and nearly nine months before the end of the war, the delegates of fifty-two states signed the Chicago Convention.[174] The preamble recognized that the potential of civil aviation to "greatly help to create and preserve friendship and understanding among the nations and peoples of the world, yet its abuse can become a threat to the general security. . ."[175]

C. Chicago vs. Paris

To some extent, the Chicago and Paris Conventions take different approaches to differentiating state and civil aircraft. The differences between "state" and "civil" aircraft are left somewhat ambiguous in the Chicago Convention. Several Annexes to the Chicago Convention define the term "aircraft" as "any machine that can derive support in the atmosphere

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[171] US Department of State, Office of Public Communication, Bureau of Public Affairs, "Military Security Board for Western Zones of Germany" (1949) 20:502 The Department of State Bulletin 195 at 195.

[172] Those States included the following: Afghanistan, Australia, Belgium, Bolivia, Brazil, Canada, Chile, China, Colombia, Costa Rica, Cuba, Czechoslovakia, the Dominican Republic, Ecuador, Egypt, El Salvador, Ethiopia, the French Delegation, Great Britain, Greece, Guatemala, Haiti, Honduras, Iceland, India, Iran, Iraq, Ireland, Lebanon, Liberia, Luxembourg, Mexico, the Netherlands, New Zealand, Nicaragua, Norway, Panama, Paraguay, Peru, the Philippines, Poland, Portugal, Saudi Arabia, Spain, Sweden, Switzerland, Syria, Turkey, the Union of South Africa, the Union of Soviet Socialist Republics, Uruguay, Venezuela, Yugoslavia, the Danish Minister in Washington and the Thai Minister in Washington.

[173] *Proceedings of the International Civil Aviation Conference: Chicago, Illinois, November 1-December 7, 1944* (Washington, DC: US Government Printing Office, 1948) at 11. The invitation reads:

> The Government of the United States believes that an international civil aviation conference might profitably be convened within the near future, for the purpose of agreeing on an increase in existing services and on the early establishment of international air routes and services for the operation in and to areas now freed from danger of military interruption, such arrangements to continue during a transitional period. This conference might also agree so far as possible upon the principles of a permanent international structure of civil aviation and air transport, and might set up appropriate interim committees to prepare definite proposals.

[174] ICAO, "Convention on International Civil Aviation—Doc 7300" (last visited 17 June 2022), online: *ICAO* <www.icao.int/publications/pages/doc7300.aspx>.

[175] *Convention on International Civil Aviation*, 7 December 1944, 15 UNTS 295 at Preamble (entered into force 4 April 1947) [*Chicago Convention*].

from the reactions of the air other than the reactions of the air against the earth's surface."[176] Article 3 expressly states that the Convention applies only to civil aircraft and does not apply to state aircraft.[177] Beyond defining aircraft, the convention only partially delineates the differences between civil and state aircraft, leaving it to states to determine specifics at the national level.

The Chicago Convention defines State aircraft as "aircraft used in military, customs and police services."[178] The phrase "used in" implies that the aircraft itself does not have some inherently distinguishable quality as a state or civil aircraft, but rather its use is determinative. The term "services" read conjunctively with "military" appears to be synonymous with "in the service of the military," which also suggests that an aircraft is a state aircraft base on its function in military service rather than any quality inherent to the aircraft itself. The phrase "aircraft used in military…services" differs from the phrasing of the Paris Convention by spelling out "military aircraft" and "aircraft *exclusively employed* in State service." The Paris Convention's text suggests that for an aircraft to be considered a State aircraft, its use must be in the exclusive employment in the service of the state. The Chicago Convention's phrasing lacks the exclusivity requirement. The degree to which an aircraft must be used by the state is ambiguous.

An example is useful to highlight the differences between Chicago and Paris. The US military regularly contracts commercial airlines to transport military cargo and troops.[179] However, often the military is only buying capacity with cargo contracts rather than chartering the entire aircraft.[180] Under the Paris Convention, because the aircraft are not exclusively contracted by the state, they are civil aircraft. Reading the plain text of the Chicago Convention, the analysis is less clear. If, for example, the aircraft is carrying 80% military cargo and 20% commercial cargo, the aircraft is still probably not an aircraft "used in military service."[181] However, the definiteness of the answer

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[176] The portion of the definition "other than the reactions of the air against the earth's surface" were added in 1967 to exclude hovercraft from the definition of aircraft. See Bourbonniere & Haeck, *supra* note 138 at 894.
[177] *Chicago Convention*, *supra* note 175, art 3.
[178] *Ibid*, art 3(b).
[179] A well-known example of such an arrangement is the Flying Tiger Line, which was founded during the final months of WWII and was the first commercial all-cargo carrier. The Flying Tiger Line hauled air freight by contract with the US military, and expanded to also provide troop transport service during the Korean and Vietnam Wars. Kimberly Johnson, "60 Years Missing: The Mystery of Flying Tiger Line Flight 739", *FLYING Magazine* (16 March 2022), online: <www.flyingmag.com/60-years-missing-the-mystery-of-flying-tiger-line-flight-739/>.
[180] USTRANSCOM approved 11 airlines' eligibility to compete for cargo contracts worth approximately $34.7 million between February 2021 and January 2022. "US DOD extends cargo contract eligibility of 11 airlines" (3 February 2021), online: *ch-aviation* <www.ch-aviation.com/portal/news/100070-us-dod-extends-cargo-contract-eligibility-of-11-airlines>.
[181] *Chicago Convention*, *supra* note 175, art 3(b).

is less apparent than under the Paris Convention, and the outcome could be different based on additional factors.[182]

Notably absent from the Chicago Convention is the Paris Convention's recognition that military aircraft benefit from the privileges customarily given to foreign ships of war. Other international conventions,[183] US law,[184] as well as customary law recognize warships as having sovereign immunity, so one might wonder why the same was not specifically articulated for aircraft in the Chicago Convention. Professor John Cobb Cooper, the chairman of the committee that drafted Article 3 of the Chicago Convention, provides a clear response:

> It is felt that the rule stated in the Paris Convention that aircraft engaged in military services should, in the absence of stipulation to the contrary, be given the privileges of foreign warships when in national port is sound and may be considered still part of international air law even though not restated in the Chicago Convention.[185]

Thus, although this provision is absent from the convention, it still applies by way of customary international law.[186] The sovereignty of military aircraft is recognized in several states' armed forces manuals.[187]

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[182] However, Hornik argues that civil aircraft are frequently used for military purposes and do not lose their designation under the Chicago Convention as civil aircraft. He notes that during the Vietnam War, chartered civilian flights were often used for military purposes to bring troops into theater. Additionally, the Civil Reserve Air Fleet program was used to augment military airlift during the Persian Gulf War. See Jiri Hornik, "Article 3 of the Chicago Convention" (2002) 27:3 Air and Space Law 161 at 181. Though Hornik is correct that these aircraft have been regarded as civil, it is likely because these aircraft are not given the designation as "being required in the national interest" by the Secretary of Defense under domestic law that would make them public (state) aircraft. However, that is not to say that another country is obliged to recognize the US designation of military chartered civil aircraft as civil. On the contrary, the examples that follow demonstrate that disagreements have indeed occurred. See sections III.D and III.E, *below*, for more on this topic.

[183] See *United Nations Convention on the Law of the Sea*, 10 December 1982, 1833 UNTS 397 (entered into force 16 November 1994) [*UNCLOS*]. The UNCLOS confirms that military and other government aircraft enjoy sovereign immunity the same as a warship. See *UNCLOS*, art 42(5) (addressing international responsibility of state of registry for loss or damage caused by aircraft entitled to sovereign immunity during transit passage); *UNCLOS*, *supra* art 236 (like warships, military and other government aircraft are expressly immune from provisions regarding the protection and preservation of the marine environment). *See UNCLOS*, Art. 42(5) (addressing international responsibility of state of registry for loss or damage caused by aircraft entitled to sovereign immunity during transit passage), Art. 236 (like warships, military and other government aircraft are expressly immune from provisions regarding the protection and preservation of the marine environment).

[184] See *The Schooner Exchange v McFaddon*, 11 US (7 Cranch) 116 (1812) (recognizing that US courts have no jurisdiction over military vessels in the service of another sovereign State because warships are regarded as political and military instruments of the State).

[185] John Cobb Cooper, "A Study on the Legal Status of Aircraft" in Ivan A Vlasic, ed, *Explorations in Aerospace Law: Selected Essays, 1946-1966* (Montreal: McGill-Queen's University Press, 1968) 205 at 243.

[186] Bourbonniere & Haeck, *supra* note 138 at 892.

[187] The Australian manual states:

> "Military aircraft, similar to warships, have sovereign immunity from foreign laws in relation to search and inspection. This means that military aircraft cannot be boarded, searched or inspected by foreign authorities without the captain's consent. However, because military aircraft require diplomatic clearance to enter

D. Determining Status: State or Civil

The answer is simply that the Chicago Convention's ambiguity leaves it up to contracting states to determine whether an aircraft is state or civil. A couple of examples of the differences in national interpretation follow. Under Chinese domestic law, a civil aircraft is an aircraft other than those used in flight missions of military, customs, and police services and does not define these types of state aircraft further.[188] In the UK, the Civil Aviation Act of 1982 states that it only applies to an aircraft other than those used in military, customs, or police services or to any aircraft to which the Queen specifies by Order in Council.[189] One can see that the Chicago Convention's ambiguity on whether state versus civil aircraft is not fully clarified under national laws.

In the United States, a "civil aircraft means an aircraft except a public aircraft."[190] A public aircraft is any of an enumerated list, which includes an aircraft owned or operated by the armed forces or chartered to provide transportation or other commercial air services to the armed forces. An aircraft is a public aircraft when it is chartered to provide transportation or other commercial air services to the armed forces and the Secretary of Defense designates the operation of the aircraft as being required in the national interest.[191] Thus, US law designates a military-chartered aircraft

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> another state's airspace, they may be required to submit to search as a condition of entry. Host state authorities may not board a military aircraft without the captain's consent. If the captain does not or cannot comply with the host state's customs, immigration and quarantine requirements, the aircraft may be directed to leave that state's territory."

See Royal Australian Air Force, "AAP1003 Operations Law for RAAF Commanders" (2004) at 15, online (pdf): *Airpower Development Centre* <airpower.airforce.gov.au/sites/default/files/2021-03/AAP1003-Operations-Law-for-RAAF-Commanders.pdf>.

The US manual states that:

> "as military aircraft are state aircraft within the meaning of the Chicago Convention, they enjoy sovereign immunity from foreign searches, inspections, and taxation. Local officials may not board the military aircraft of another State without the consent of the aircraft commander. A territorial sovereign may not arrest or seize foreign military aircraft lawfully in its territory, but it may order the aircraft to promptly leave. U.S. military aircraft commanders should not authorize boarding, search, seizure, inspection, or similar exercises of jurisdiction by foreign authorities, except by direction of the appropriate service headquarters or the U.S. embassy in the country concerned."

See US Air Force Judge Advocate General, "The Law of Air, Space, and Cyber Operations" (2020) at 56, online (pdf): <www.afjag.af.mil/Portals/77/documents/Publications/AFOPSLAW%202020%20Web3c.pdf?ver=E_fCdUrdLtN4Upnj--Anfw%3D%3D>.

[188] The Standing Committee of the National People's Congress, *Civil Aviation Law of the People's Republic of China*, Order of the President of the People's Republic of China No 56 (1995), online: <www.caac.gov.cn/PHONE/XXGK_17/XXGK/FLFG/201510/P020160114508884408047.pdf>.

[189] *Civil Aviation Act 1982* (UK).

[190] *Air Commerce and Safety - Definitions: civil aircraft*, 49 USC § 40102(a)(16).

[191] *Qualifications for public aircraft status*, 49 USC § 40125(c)(1)(C).

as a civil aircraft unless the Secretary of Defense designates the aircraft as being "required in the national defense."[192] This operative phrase is a domestic interpretation of the Chicago Convention's "used in military service."

One example discussed below highlights the problem of leaving the interpretation regarding the status of aircraft to states. This example illustrates the consequences of having a military aircraft not equipped with the same safety equipment that would have been required of the same aircraft if it were civil. Although this is the inverse of a situation in which the US military would contract a civil spacecraft, the insights it provides into the problem of leaving interpretation up to states are instructive.

On 3 April 1996, a US Air Force CT-43A (military version of a Boeing 737-200) carrying the Secretary of Commerce, other government officials, and a delegation of business executives crashed on a mountainside while approaching Dubrovnik Airport in Croatia.[193] Because the aircraft was military rather than civil, it did not have the same safety and navigational features required of the civil version of the aircraft.[194] Another factor in the crash was the absence of an instrument landing system at Dubrovnik airport due to Serb forces stealing it in 1991.[195] All passengers and crew members on board were killed in the crash.

The significant aspect of this case is the Croatian investigation authority's determination that the aircraft was treated as a civil aircraft under Croatian domestic law. Because the aircraft was transporting an American commerce delegation, the Croatian authorities concluded that "this transport cannot be treated as a flight for military purposes."[196] The Croatian Air Navigation Act treated "all foreign military aircraft which are not used for military purposes and which are authorized to operate within Croatian airspace are to be treated as civilian aircraft.[197] Therefore,

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[192] *Ibid*.
[193] Hornik, *supra* note 182 at 179. US National Transportation Safety Board, *1996 Annual Report to Congress*, by James Evan Hall et al (Washington, DC: 1996) at 36, online: <www.ntsb.gov/about/Documents/SPC9901.pdf>. For a short video play-by-play analysis of the approach and issues leading to the crash, see Allec Joshua Ibay, "Fog of War | 1996 Croatia USAF CT-43 Crash" (12 March 2016), online (video): *YouTube* <www.youtube.com/watch?v=8-QMEjia9II>.
[194] Tim Weiner, "DEADLY FLIGHT -- A special report;In Crash That Killed Brown, Signs of Safety Shortcomings", *The New York Times* (28 April 1996), online: <www.nytimes.com/1996/04/28/world/deadly-flight-special-report-crash-that-killed-brown-signs-safety-shortcomings.html>.
[195] *Ibid*.
[196] US Department of the Air Force, *Accident Investigation Board Report: United States Air Force AT-43A, Registration: 31149, April 3, 1996 at Dubrovnik, Croatia*, by US Air Force Accident Investigation Board (Washington, DC: August 1996) at 4, cited in Hornik, *supra* note 182 at 180.
[197] US Air Force Accident Investigation Board, *supra* note 196 at 4.

according to Croatian law, the aircraft should have complied with all civil aviation standards, which it did not have the requisite equipment to do even if it complied with the standards for US military aircraft. This case illustrates the problem of each leaving it to states to determine whether their aircraft are civil or state as two states may come to different conclusions with different requirements and different assumptions.

The domestic laws of states differ as to how much supplementary guidance they provide to the Chicago Convention. Some closely follow the wording of the Chicago Convention. Others, such as US law, provide more detail on how to differentiate state (public) and civil aircraft and on the status of military charter flights. As is discussed in more detail below, each state can determine what constitutes a state aircraft (to which the Chicago Convention largely does not apply), and disagreements can occur.

E. ICAO Study on State vs. Civil Aircraft: Examples of Where Interpretations Clash

In a 1993 decision, the ICAO Council instructed the Secretariat to study the interpretation of Article 3(b) regarding civil and state aircraft.[198] The study explored different factors to be considered in the classification of civil or state aircraft, similar to the efforts of the interwar years. The report affirmed the functional approach as the phrase "used in military . . . services" suggests in determining the status of aircraft.[199] In determining whether an aircraft is "used" in such services, the report suggested a number of factors: the nature of the cargo, ownership, operation, passengers or personnel on board, aircraft registration and nationality markings, secrecy of the flight (ICAO flight plan filed or not), nature of the crew, operator, whether documents required by the Chicago Convention are carried on board, area of operations, and customs clearances.[200] The list is not exhaustive and different factors may be given more or less weight depending on the circumstances. Several problems have occurred due to the ambiguity of whether an aircraft is civil or state and are detailed below.

One concern is where a state aircraft does not obtain preauthorization to overfly or land in another and proceeds on the assumption that it is a civil aircraft. The overflown state may take actions applicable to state aircraft. Civil aircraft are protected against the use of force under Article

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[198] *Secretariat Study on Civil/State aircraft*, *supra* note 141.
[199] *Ibid* at 12.
[200] *Ibid* at 14.

3*bis* of the Chicago Convention, but no such equivalent protection applies to state aircraft, although that is not to say the use of force would be the first line of defense.

Another concern is the investigative authority and judicial authority in the event of an accident.[201] Under Article 1 of the Convention, every state has complete and exclusive sovereignty over the airspace above its territory. The Chicago Convention requires the state in which an accident occurs involving death or serious injury to investigate the accident.[202] The state of registry may appoint observers to the investigation.[203] However, a state aircraft is not bound by Article 26. In the US, legislation dictates a different procedure regarding military aircraft investigations.[204] If the accident did not involve death or serious injury, but the crew was forced to land in a state that did not concur with the designation as a state aircraft, the state where the aircraft landed may try to exercise judicial jurisdiction over the crew.

A third concern is that contracting parties to the Chicago Convention have clashed over the definition of state and civil aircraft, as already previously highlighted in the Croatian case. The Secretariat study notes two examples of disagreement among states regarding the status of aircraft. Both incidents are military interception events, and both occurred within a short time frame in 1985 and early 1986.

In October 1985, US Navy F-14 fighters intercepted Egypt Air Flight MS 2843 en route from Cairo to Tunis and forced it to land in Sicily.[205] Onboard the flight were four members of the Palestine Liberation Front connected to the hijacking of a cruise liner, *Achille Lauro*.[206] During the hijacking, they murdered an elderly American tourist and dumped his body overboard.[207] The pilot of the aircraft considered it a civil flight.[208] Egypt's response was to accuse the US of committing an act of piracy "unheard of under any international law or code" and demand the US

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[201] *Ibid* at 9.
[202] *Chicago Convention*, *supra* note 175, art 26.
[203] *Ibid*.
[204] *Civil Aircraft Accident Investigations*, 49 USC § 1132.
[205] Jack Nelson, "US Jets Intercept Plane With Ship Hijackers; All 4 Seized: Italy Holds Terrorists at Base in Sicily", *Los Angeles Times* (11 October 1985), online: <www.latimes.com/archives/la-xpm-1985-10-11-mn-17022-story.html>.
[206] *Ibid*.
[207] *Ibid*.
[208] *Secretariat Study on Civil/State aircraft*, *supra* note 141 at 11.

to apologize.[209] Interestingly, Egypt did not bring a case before ICAO Council against the US.[210] The US position was that its actions were aimed against known terrorists based on very reliable intelligence regarding their whereabouts.[211] In a letter to the International Federation of Airline Pilots' Associations dated 13 November 1985, the US stated:

> [I]t is our view that the aircraft was operating as a state aircraft at the time of the interception. The relevant factors—including exclusive State purpose and function of the mission, the presence of armed military personnel on board and the secrecy under which the mission was attempted—compel this conclusion.[212]

One can see the pitfalls of leaving particulars of determining whether an aircraft is state or civil can have contentious results in practice.

On 4 February 1986, just four months after the Egypt Air incident, Israeli fighters intercepted a Libyan Airlines aircraft traveling from Tripoli to Damascus on a non-scheduled flight.[213] The flight was carrying Syrian government officials. The Israelis believed, based on faulty intelligence that top Palestinian officials were on board.[214] However, the only passengers were "seven Syrian politicians and two low-ranking Lebanese militia officials."[215] The fighters forced the Libyan aircraft to land in Israel. In this case, however, Libya did bring a case against Israel before the ICAO Council. Israel objected that the Council did not have jurisdiction over the matter because the Libyan Airlines aircraft was a state aircraft.[216] Israel asserted that the interception was justified because it was a state aircraft believed to be carrying Palestinians who were planning attacks against Israel.[217] To rebut this assertion, the Libyan government produced a Libyan Civil Aviation Authority-issued certificate of airworthiness and certificate of registration.[218] On 28 February 1986, the Council adopted a resolution holding that Israel had "committed an act against international civil aviation in violation of the principles of the Chicago Convention" and "condemns the act of Israel for its interception and diversion of a Libyan Arab Airlines aircraft in

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[209] George M Borkowski, "Interception of Egyptian Airliner by the United States, Oct 10, 1985 and Interception of Libyan Airplane by Israel, Feb 3, 1986" (1986) 27 Harv Int'l L J 761 at 763.
[210] Andrew S Williams, "Interception of Civil Aircraft Over the High Seas in the Global War on Terror" (2007) 59 Air Force Law Review 73 at 91.
[211] Borkowski, *supra* note 209 at 762–63.
[212] *Secretariat Study on Civil/State aircraft*, *supra* note 141 at 11–12.
[213] *Ibid* at 12.
[214] Borkowski, *supra* note 209 at 762.
[215] Bourbonniere & Haeck, *supra* note 138 at 908.
[216] *Secretariat Study on Civil/State aircraft*, *supra* note 141 at 12.
[217] Williams, *supra* note 210 at 92.
[218] *Secretariat Study on Civil/State aircraft*, *supra* note 141 at 12.

flight within international airspace."[219] This example further highlights the problems with leaving states to interpret whether an aircraft is state or civil under Article 3 of the Chicago Convention.

The ICAO Secretariat study highlights several problems with the ambiguity of the drafting of Article 3. The absence of clear and generally accepted rules affects the safety and good order of international aviation operations. Despite identifying the problems of interpretation in 1993 and the Secretariat recommending to the Council to adopt an interpretation of Article 3(b) as guidance for contracting states, the ambiguity still exists. Although some progress has been made in the intervening years concerning several specific questions regarding the civil/state aircraft issue, important questions remain unanswered.[220] In a working paper from the Legal Committee in 2015, the question of aircraft status when the military charters a civil aircraft, either in whole or in part, was noted as still being unanswered.[221]

Regarding the scenario of sub-orbital space transportation, if the international consensus reached is that air law should apply to sub-orbital spacecraft (at least while transiting through airspace), a national system of designation for such spacecraft would need to be created. This would not be very difficult in the US as such a system already exists for aircraft. Furthermore, until more consensus is reached on delineating civil and state aircraft, one simple option could be to update the ICAO model flight plan template to include a designation for state aircraft.[222] The current version of the form Item 8 has a field with the following options: scheduled air service, non-scheduled air transportation operation, general aviation, military, other.[223] If an option for state, non-military were added, that would broaden the field of options to notify of the status of the aircraft, thereby taking the onus off the crew. Presumably, the aviation authority or the operator would make the determination in filling out the form, which may offer them some additional protection in the event of a disagreement.

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[219] ICAO Council, 117th Session, *Resolution Adopted 28 February 1986*, ICAO Doc 9485-C/1094 (1986). See ICAO Council, *Council Condemns the Act of Israel for Its Interception of Libyan Arab Airlines Aircraft*, Press Release PIO 1/86 (1986).
[220] ICAO Legal Committee, 36th Session, *State/Civil Aircraft Definition and its Impact on Aviation*, ICAO Doc LC/36-WP/2-6 (2015) at 2, online: <www.icao.int/Meetings/LC36/Working%20Papers/LC%2036%20-%20WP%202-6.en.pdf>.
[221] *Ibid* at 3.
[222] See e.g. Federal Aviation Administration, "Form FAA 7233-4—Pre-Flight Pilot Checklist and International Flight Plan" (2015), online (pdf): <www.faa.gov/forms/index.cfm/go/document.information/documentid/1027892>.
[223] *Ibid*.

## F. Conclusion

This chapter examined the application of international air law to sub-orbital spacecraft. Specifically, it analyzed the application of the Chicago Convention. The historical origins of the development of the state versus civil aircraft ambiguity were explained. A theme throughout this section is that the development of the current system of public international air law is intimately intertwined with technological advances in airpower and the geostrategic consequences of war. Understanding the tension between the progress that can be spurred by competition and the conflict that can also result from competition is useful in understanding how the law develops in response and how it can possibly limit or encourage state action. One can readily see the parallels between the competition among airlines and countries to develop their airline industry and the growth of the private space sector in the last few decades. After discussing the historical origins of this issue, a discussion of different states' divergent interpretations of state and civil aircraft followed. The ICAO has already identified this ambiguity as a problem, and an ICAO study highlighted examples of where states have clashed on interpretation. As such, no consensus has been reached on this issue. If states were to agree that international air law should apply to suborbital spacecraft, this ambiguity would carry over, and national systems designation of state or civil spacecraft would be necessary. However, even with national designations, until the ambiguity is clarified in the Chicago Convention, states will likely still clash over differing interpretations of whether a suborbital spacecraft is state or civil.

# IV. A Civil Reserve Space Fleet?

*"We are thinking about [space transportation of cargo] in a very similar model to CRAF, where you have a commercial partner that presents capability to the Department of Defense."*[224]

- Gen Stephen R. Lyons, Commander, US TRANSCOM, 2020

The Civil Reserve Air Fleet (CRAF) can serve as a model for the integration of spacelift into the military's surge capabilities. The current CRADAs already enable USTRANSCOM and private companies to assess the business case for and return on investment on long-term space transportation surge capability agreements, similar to the Civil Air Reserve Fleet emergency preparedness programs.[225] This chapter answers the following questions:

(1) What historical events led to the creation of the CRAF, and what legal authorities established it?
(2) What are the relevant legal and policy considerations?
(3) What are the function and structure of the CRAF, and what are examples of CRAF activation?
(4) How can commercial space transportation be integrated into this model?

Therefore, the following section provides a historical overview of the creation of CRAF, its structure, function, policy considerations, legal authorities, instances of activation, and recommendations as to how to integrate spacelift into the current legal framework of the CRAF.

## A. Historical Origins of the CRAF

### *1. The Interwar Years*

Recalling the discussion of the interwar years from section III.B.2, several events during the interwar period are pertinent to understanding the development of the CRAF. The US civil aviation sector struggled initially in the years after WWI. Nearly the entire aviation industry had been created during the war, either from scratch or by conversion of another industry. Demobilization after WWI was rapid. By the end of June 1919, the Air Service, which had grown from 1,200 personnel in April 1917 to 190,000[226] by the Armistice of WWI, shrank to 27,000.[227]

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[224] Kulisch, *supra* note 101.
[225] US Transportation Command Public Affairs, *supra* note 112.
[226] Maurer Maurer, *Aviation in the US Army, 1919-1939* (Washington, DC: Office of Air Force History, US Air Force, 1987) at 3.
[227] *Ibid* at 5.

Moreover, the Air Service began abandoning airfields and liquidating aircraft soon after the Armistice. During this period of massive contraction of military airpower, the Air Service hoped the development of civil aviation would create a large demand for aircraft, thereby supporting an industry available for expansion in any future emergency.[228]

Several events of the 1920s and 30s demonstrated the need to delineate military and civilian air carrier functions and the importance of civilian carriers in augmenting military airlift.[229] During the interwar period, civil and military aviation were somewhat at odds because the military began providing non-military services (mapping, forest observation, mail, and crop dusting). The military provided these services at government-subsidized prices with which the civilian sector could not compete. The delivery of mail by the US Army Air Corps became an especially contentious issue.

In 1934, after investigations into the preferential allocation of air mail routes to companies friendly to President Hoover's administration, Hoover's successor Franklin D. Roosevelt canceled the air mail contracts and ordered the Army Air Corps to take over the mail service.[230] The Army Air Corps Mail Operation's (AACMO) pilots were mostly lieutenants with less than two years of flying experience, limited night flying hours, and lacking instrument training and equipment.[231] Additionally, the AACMO's aircraft, the majority of which were open-cockpit biplanes for pursuit, observation and attack, were not suited to carrying mail loads.[232] As a result, dozens of AACMO flights crashed.[233] Even before the Army stopped flying air mail, the Secretary of War formed a

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[228] Benedict Crowell & Robert Forrest Wilson, *How America Went to War: Demobilization*, vol 6, Demobilization: our industrial and military demobilization after the armistice, 1918-1920 (New Haven, CT: Yale University Press, 1921) at 206–7.

[229] F Robert van der Linden, *Airlines and Air Mail: The Post Office and the Birth of the Commercial Aviation Industry* (Lexington, KY: The University Press of Kentucky, 2002).

[230] Nancy A Pope, "1934 Airmail Scandal" (last visited 20 July 2022), online: *Smithsonian National Postal Museum* <postalmuseum.si.edu/collections/object-spotlight/1934-airmail-scandal>. Kenneth P Werrell, "'Fiasco' Revisited" (2010) 57:1 Air Power History 12 at 15.

[231] John T Correll, "The Air Mail Fiasco", *Air Force Magazine* (1 March 2008), online: <www.airforcemag.com/article/0308airmail/>; Office of Air Force History, *Foulois and the US Army Air Corps 1931-1935*, by John F Shiner, No ADA139833 (Washington, DC: 1983) at 133, online: <apps.dtic.mil/sti/citations/ADA139833>.

[232] Correll, *supra* note 231; Shiner, *supra* note 231 at 133.

[233] Correll, *supra* note 231. The Air Corps' safety record carrying mail was abysmal. Although the air mail operation accounted for 12 percent of Air Corps flying hours, it was represented 31 percent of its fatal accidents. See Werrell, *supra* note 230 at 21.

committee to investigate the Air Corps' performance, which was chaired by Woodrow Wilson's Secretary of War, Newton Baker.

The Baker Board's task was to study the operations of the Army Air Corps, the adequacy and efficiency of its equipment and training to perform its missions in peacetime and in war, and the proper relationship between Army aviation and civil aviation.[234] After a month of investigating and hearing the testimony of 105 witnesses, the board produced its report.[235] The report noted the "striking" progress made by the civil air transport industry, especially the "production of the high speed, long range, large capacity passenger and cargo transport."[236] Moreover, the report concluded that despite having suffered in the immediate aftermath of WWI and the Great Depression, the airline and commercial transportation aviation in the US was:

> . . . far ahead of that of foreign nations. There is more transport flying in the United States, with more passengers carried annually, than in all the rest of the world combined. Our air-line transport development has resulted in airplanes superior in design, characteristics and performance to those of any other nation. Our air-line pilots are more highly trained than those of any other country.[237]

The board's findings of the exemplary state of civil aviation in the US contrasted starkly with its findings on military aviation, especially the Army Air Corps:

> In military aviation the latest statistics indicate that the United States stands second of the great powers insofar as total numbers of Army and Navy airplanes are concerned. . . . [O]ur Army combat aviation appears to have been allowed to fall below other leading aviation powers of the world in strength.[238]

Given that the board was tasked with determining the state of Army Air Corps aviation after a spate of accidents delivering mail, which civilian contractors had done successfully and without incident, these conclusions are not surprising. These findings echo those of the Morrow board concerned with Germany's rise as an aviation power.

As discussed above and in section III.B.2, the Baker and Morrow boards of the interwar years were efforts to evaluate military and civilian aviation in the US and to stimulate and regulate the civil aviation industry as an aspect of national security. By the late 1930s, the civilian aviation sector was thriving. Meanwhile, airlift strategists realized that military airlift requirements far

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[234] War Department Special Committee, *Final report of War department Special committee on Army Air Corps*, by Newton Diehl Baker (Washington, DC: US Government Printing Office, 18 July 1934) at 1–2.
[235] Theodore Joseph Crackel, *A History of The Civil Reserve Air Fleet* (Washington, DC: Air Force History & Museums Program, 1998) at 5.
[236] Baker, *supra* note 234 at 7.
[237] *Ibid* at 9–10.
[238] *Ibid* at 10.

exceeded the capabilities of any airlift force that the Army and Navy could muster.[239] Thus, the only choice was to utilize civilian airlines as a crucial adjunct to the military fleet. This conclusion has become a central tenet of airlift policy and is also a fundamental principle in the US federal code provisions regarding the CRAF.[240]

*2. World War II, the Berlin Airlift, and post-Korean War*

Once the US became involved in WWII, the military requisitioned civil aircraft for the war effort, which gutted the stock of the civil aviation industry. The war also enabled the US to establish an unprecedented worldwide air transportation network, which required a balancing of interests between civilian and military aviation interests after the war. After the war, the civil sector, no longer subject to requisitioning, expanded rapidly by hiring employees, ordering new aircraft, and expanding routes. The expansion, given a still somewhat delicate post-war supply chain, was too rapid, and the airlines were overextended. Between public dissatisfaction with air carrier dependability, several notorious accidents, aircraft groundings, and labor strikes, the civil aviation industry was suffering financially.[241] During this period, competition for routes between the civil and military sectors intensified and government officials were concerned about the airlines' ability to augment the military as a reserve.[242]

In response to these and other issues organizing airpower within the military, in 1947, President Truman established the Air Policy Commission to "make an objective inquiry into national aviation policies and problems" and to assist him in formulating an integrated national aviation policy.[243] Known as the Finletter Commission, it concluded that duplication of effort was a major problem within the military and between the military and civilian sectors.[244] Not only did the Naval Air Transport Service (NATS) and Air Transport Command (ATC) provide services over

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[239] Robert C Owen, "The Airlift System: A Primer" (1995) IX:3 Air Power Journal 16 at 6.
[240] *Ibid*.
[241] Office of History, "Anything, Anytime, Anywhere: An Illustrated History of the Military Airlift Command, 1941-1991" (1991) at 81, online (pdf): *Military Airlift Command* <www.amc.af.mil/Portals/12/documents/AFD-131018-047.pdf>.
[242] *Ibid*.
[243] *Ibid* at 64.
[244] Thomas K Finletter, *Survival in the Air Age: A Report by the President's Air Policy Commission* (Washington, DC: US Government Printing Office, 1948).

the same routes, but the military mirrored commercial carrier routes because many military facilities were collocated or near civilian airports.[245]

The Finletter Commission made three significant recommendations. First, it advised consolidating NATS and ATC into a single military command responsible for all airlift assets.[246] This is another major tenet of airlift policy: airlift operations represent a continuum that should be under the operational and administrative direction of a single command.[247] Just prior to the commencement of the Berlin Airlift, the military consolidated ATC and NATS into the Air Force's Military Air Transportation Service (MATS). Second, acknowledging the airlift shortfall of the military, the Finletter Commission recommended that no cuts be made to military airlift and that the private sector supplement airlift when needed. The report recognized that expanding the commercial aviation sector would ensure a viable domestic and international transportation network available to the US military when needed. This finding echoed the airlift strategists' conclusions of the 1930s regarding the inadequacy of the Navy and Army to muster sufficient assets for wartime airlift operations.[248] Third, noting the lack of coordination between the military and civilian aviation sectors, the commission recommended a contractual relationship between the two.[249] The report further recommended established procedures for the number and type of civilian assets to contractually provide to the military during a national emergency and dubbed this pool of aircraft the "Civil Reserve Air Fleet." These recommendations became the foundation of CRAF, which was established a few years later.

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[245] Christopher J Bence, *Bedding Down with C-O-T-S Leveraging Commercial Industry to Solve the Strategic Airlift Shortfall* (Maxwell Air Force Base, AL: Air University Press, 2000) at 12; Roger D Launius, "Military Unification's Precursor: The Air Force and Navy Strategic Airlift Merger of 1948" (1992) 39:1 Air Power History 22. Already during WWII, Pan American founder Juan Tripped observed that "A single large system permits efficiency and economy in the training of personnel and the use of equipment that are impossible for smaller separate units. All air transport beyond the borders of the U.S. should be centralized in one organization." Bender & Altschull, *supra* note 164 at 360.

[246] Finletter, *supra* note 244 at 35.

[247] Owen, *supra* note 239 at 9.

[248] Finletter, *supra* note 244 at 35.

[249] *Ibid*.

B. The Creation of CRAF, Legal Authorities, Definition, and Purpose

President Harry Truman established the CRAF by executive order in 1951.[250] The establishment of CRAF followed the Berlin Airlift of 1948-1949, in which US and UK forces plus civilian carriers resupplied Allied-controlled West Berlin during a Soviet land blockade.[251] The Berlin Airlift demonstrated the utility of civilian augmentation for military airlift during a crisis. The Defense Production Act of 1950 is the authority under which the CRAF program is activated.[252] CRAF is authorized under the allocation authority in Title I of the Defense Production Act. Title I pertains to the presidential authority to require the performance under contracts or orders that the president deems necessary or appropriate to promote the national defense.[253] Title I also empowers the president to allocate materials, services, and facilities the president deems necessary and appropriate to promote national defense.[254] Further delegations and specifications of the Defense Production Act applicable to CRAF were issued via executive order by President Barack Obama in 2012.[255]

The program is operated by a joint agreement between the DoD and the Department of Commerce. Under his original initial executive order, President Truman directed the Department of Commerce along with the DoD to formulate plans and programs for using aircraft to meet contingency airlift requirements.[256] Consequently, the Secretaries of Commerce and Defense signed a memorandum of understanding that outlined the basic policies.[257] In March 1952, the Secretary of the Air Force began recruiting for the CRAF program by providing essential details to key executives of US airlines.[258] Later, by executive order of President John F. Kennedy, the

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[250] US President Harry S Truman, *Executive Order 10219—Defining Certain Responsibilities of Federal Agencies with Respect to Transportation and Storage*, 1951 [*Executive Order 10219*], online: <www.trumanlibrary.gov/library/executive-orders/10219/executive-order-10219>.
[251] Congressional Research Service, *The Civil Reserve Air Fleet (CRAF) and the Defense Production Act (DPA)*, by Heidi M Peters, No IN11731 (Washington, DC: 2021) at 1, online: <crsreports.congress.gov/product/pdf/IN/IN11731>.
[252] *Defense Production Act of 1950*, Pub L No 81–774, 64 Stat 798 (codified as amended at 50 USC Chapter 55).
[253] *Priority in contracts and orders*, 50 USC § 4511(a).
[254] *Ibid*.
[255] US President Barack H Obama, *Executive Order 13603—National Defense Resources Preparedness*, 2012 [*Executive Order 13603*], online: <obamawhitehouse.archives.gov/the-press-office/2012/03/16/executive-order-national-defense-resources-preparedness>.
[256] *Executive Order 10219*, *supra* note 250, s 301(b).
[257] Logistics Management Institute, *The Civil Reserve Air Fleet: Trends and Selected Issues*, by Roger K Coffey, F Roland Frola, No ADA313220 (McLean, VA: US Government Printing Office, 1996) at A-1, online: <apps.dtic.mil/sti/citations/ADA313220>.
[258] *Ibid*.

Secretary of Commerce became responsible for developing plans for a national emergency preparedness program, of which CRAF plays a part.[259] When the Department of Transportation (DOT) was established in 1967, the transportation portion of the emergency preparedness program, including CRAF, was transferred to the newly established DOT.[260]

The Civil Reserve Air Fleet is defined in several places in US federal code and regulations. Under Title 10 of the US Code, CRAF is defined as those aircraft allocated, or identified for allocation, to the Department of Defense under section 101 of the Defense Production Act of 1950.[261] It also includes those aircraft made available (or agreed to be made available) for use by the Department of Defense under a contract as part of the program developed by the DoD.[262] The purpose of this DoD program is to augment military airlift capability by use of civil aircraft.[263]

Under the Code of Federal Regulations, the CRAF is defined as a wartime readiness program to ensure quantifiable, accessible, and reliable commercial airlift capability to augment DoD airlift and to assure a mobilization base of aircraft available to the DoD in the event of any level of national emergency or defense-orientated situations.[264] As a readiness program, CRAF quantifies the number of commercial assets for passengers and cargo required to support various levels of wartime requirements. While military aircraft are designed to carry oversized cargo, CRAF carriers primarily transport passengers and cargo pallets. To maintain the readiness and interoperability of CRAF carriers, the US government ensures appropriate levels of peacetime airlift augmentation to maintain networks and infrastructure, exercise the system, and interface effectively within the military airlift system.[265] This process allows DoD to account for their use when developing and executing contingency operations and war plans. CRAF is an important component of the military airlift system in support of US defense and foreign policies.[266]

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[259] US President John F Kennedy, *Executive Order 10999—Assigning emergency preparedness functions to the Secretary of Commerce*, 1962 [*Executive Order 10999*], online: <www.presidency.ucsb.edu/documents/executive-order-10999-assigning-emergency-preparedness-functions-the-secretary-commerce>.
[260] US Department of Transportation, "Civil Reserve Airfleet" (20 November 2020), online: <www.transportation.gov/mission/administrations/intelligence-security-emergency-response/civil-reserve-airfleet-allocations>.
[261] *Civil Reserve Air Fleet: Definitions*, 10 USC § 9511; *Priority in contracts and orders*, 50 USC § 4511.
[262] *Civil Reserve Air Fleet: Definitions*, *supra* note 261.
[263] *Ibid*.
[264] *Department of Defense Ratemaking Procedures for Civil Reserve Air Fleet Contracts: Definitions*, 32 CFR § 243.3.
[265] *Level of readiness of Civil Reserve Air Fleet carriers*, 10 USC § 9517.
[266] *Ibid*.

The CRAF is composed of US-registered aircraft owned or controlled by US air carriers specifically allocated (by FAA registration number) for this purpose by the DOT. An air carrier is defined as "a citizen of the United States undertaking by any means, directly or indirectly, to provide air transportation."[267] CRAF aircraft are those allocated aircraft, which the carrier owning or controlling them, has contractually committed to the DoD to meet varying emergency needs for civil airlift augmentation of the military airlift capability. The contractual commitment of the aircraft includes the supporting resources required to provide the contract airlift. In return for a commitment to the CRAF program, the US government provides commercial carriers with economic incentives for their participation. One incentive is giving such carriers preference in carrying cargo and passenger traffic during peacetime.[268]

C. Activation, Benefits and Cost Savings, and Safety Requirements

Three stages of incremental activation of CRAF allow for tailoring airlift force requirements based on the contingency.[269] Stage I activation is for a minor regional crisis, Stage II is for a major theater of war, and Stage III is for periods of national mobilization.[270] Each stage of CRAF is used to provide the amount of airlift augmentation the US military needs. The activation authority for CRAF is the commander of USTRANSCOM with the approval of the Secretary of Defense. When notified of activation, a carrier has 24 to 48 hours to ready the aircraft for a mission. When activated, the air carriers operate and maintain the aircraft, but the military controls the missions.[271] Air Mobility Command, a major Air Force command and the air component of USTRANSCOM, manages and executes CRAF operations and provides airlift for USTRANSCOM.[272]

CRAF has been formally activated three times. The first activation occurred to support Operations Desert Shield and Desert Storm from 18 August 1990 to 24 May 1991.[273] Prior to CRAF activation in support of Desert Shield, the US military only used contract airlift on a

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[267] *Air Commerce and Safety - Definitions: citizen of the United States*, 49 USC § 40102(a)(15).
[268] US Department of Transportation, *supra* note 260.
[269] Congressional Research Service, *Civil Reserve Air Fleet (CRAF)*, by William Knight, Christopher Bolkcom, No RL33692 (Washington, DC: 25 April 2008) at 2, online: <digital.library.unt.edu/ark:/67531/metadc818139/m2/1/high_res_d/RL33692_2008Apr25.pdf>.
[270] *Ibid*.
[271] *Ibid* at 3.
[272] US Department of Defense, Office of Inspector General, *Management Advisory: The DoD's Use of the Civil Reserve Air Fleet in Support of Afghanistan*, by Maurice L Foster, No DODIG-2022-109 (Alexandria, VA: 28 June 2022) at 2, online: <media.defense.gov/2022/Jun/30/2003027866/-1/-1/1/DODIG-2022-109.PDF>.
[273] Knight & Bolkcom, *supra* note 269 at 3.

volunteer basis by expanding peacetime contracts. The activation level during Desert Shield and Desert Storm included long-range international passenger and cargo transport up to Stage II.[274] These airlift operations were massive. For example, by its sixth week of operation, Desert Shield had surpassed the 1948 Berlin Airlift in intensity.[275] During the Berlin Airlift, planes flew 697 million ton-miles (one ton of cargo flown for one mile).[276] By the sixth week of Desert Shield, more than 1.5 billion ton-miles had been flown, a new milestone in airlift operations.[277] These statistics show the total surge capacity that can be enabled with civilian carriers augmenting the US military.

CRAF was activated the second time to support Operation Iraqi Freedom from 8 February 2003 to 18 June 2003.[278] CRAF activation to Support Iraqi Freedom included long-range international passenger transport up to Stage I, but long-range cargo was not required.[279] During the operation, 11 fleet carriers flew more than 1,625 missions airlifting 254,143 troops.[280]

The third activation of CRAF occurred on 22 August 2021 to 13 September 2021 to support non-combatant evacuation operations (NEO) in Afghanistan under Operation Allied Refuge.[281] The activation was somewhat unusual because CRAF passengers being transported to and from theater have previously consisted entirely of US forces (combatants) rather than civilian foreign nationals (non-combatants).[282] CRAF carriers did not fly into Hamid Karzai International Airport in Kabul, but they rather transported passengers onward from temporary safe havens and interim staging bases.[283] Of the 26 air carriers participating in CRAF in 2021, six were activated, totaling

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[274] *Ibid*.
[275] Kevin Roderick, "Berlin Airlift Left in Dust by Effort on Desert Shield : Transport: Over 5,500 flights have delivered 195,000 troops as well as mail, mess halls and machines of war", *Los Angeles Times* (22 November 1990), online: <www.latimes.com/archives/la-xpm-1990-11-22-mn-6935-story.html>.
[276] *Ibid*.
[277] *Ibid*.
[278] Knight & Bolkcom, *supra* note 269 at 3.
[279] *Ibid*.
[280] US Air Force, "Reserve air fleet call-up ending" (last visited 21 July 2022), online: <www.af.mil/News/Article-Display/Article/139042/reserve-air-fleet-call-up-ending/>.
[281] US Department of Defense, "Department of Defense Activates Civil Reserve Air Fleet to Assist with Afghanistan Efforts" (22 August 2021), online: <www.defense.gov/News/Releases/Release/Article/2741564/department-of-defense-activates-civil-reserve-air-fleet-to-assist-with-afghanis/>.
[282] Foster, *supra* note 272 at 3.
[283] US Department of Defense, *supra* note 281.

18 aircraft, not including another seven commercial air carriers that volunteered their aircraft to the NEO.[284]

The primary benefit of CRAF is its low cost for tremendous surge capacity.[285] The US Government Accountability Office (GAO) noted that CRAF provides up to half of America's long-range airlift capability without the government having to purchase additional aircraft and pay personnel expenses and maintenance costs.[286] GAO noted the cost savings of CRAF during Operation Desert Storm:

> The use of CRAF aircraft during an activation is not free . . . but the cost is minimal in comparison to the costs of acquiring and supporting aircraft, paying and training aircrew, and other expenses of maintaining standby military airlift capability. AMC paid the carriers about $1.5 billion for using their aircraft during the operation. Purchasing additional military aircraft to provide similar capability would cost from $15 to $50 billion . . .[287]

Another study also confirmed the substantial cost savings of CRAF. A RAND study found that for a small cost, the DOD has a substantial airlift capability. Replacing CRAF's 1992 Stage II capability with the equivalent military airlift would have cost the DOD $1 billion annually (in 1992 dollars).[288] Replacing the Stage III capability would have cost approximately $3 billion annually ($6.3 billion in 2022 dollars).[289] Thus, the sheer amount of capacity available to the military on demand is enormous, and it is available at a comparatively low cost.

The CRAF program divides routes into two main segments: international and national.[290] The international segment is further divided into short-range and long-range sections.[291] The assignment of aircraft to a segment depends on the nature of the requirement and the aircraft performance characteristics required.[292] The long-range international sector is comprised of passenger and cargo aircraft capable of transoceanic operations. To participate in international

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[284] Foster, *supra* note 272 at 3.
[285] Knight & Bolkcom, *supra* note 269 at 5.
[286] *Ibid*.
[287] US Government Accountability Office, *MILITARY AIRLIFT Changes Underway to Ensure Continued Success of Civil Reserve Air Fleet*, No GAO/NSIAD-93-12 (Washington, DC: 31 December 1992) at 7, online: <www.gao.gov/assets/nsiad-93-12.pdf>.
[288] RAND, *Finding the Right Mix of Military and Civil Airlift, Issues and Implications: Volume 1 Executive Summary*, by Jean R Gebman, Lois J Batchelder, Katherine M Poehlmann, No MR-406/1-AF (Santa Monica, CA: RAND Corporation, 1994) at 21, online: <www.rand.org/pubs/monograph_reports/MR406z1.html>.
[289] *Ibid*, n 2.
[290] Air Mobility Command, "Civil Reserve Air Fleet" (August 2021), online: *AMC* <www.amc.af.mil/About-Us/Fact-Sheets/Display/Article/144025/civil-reserve-air-fleet/>.
[291] *Ibid*.
[292] *Ibid*.

segments, carriers must maintain a minimum commitment of forty percent of their CRAF-capable fleet.[293] As of August 2021, 24 carriers and 450 aircraft (413 in the international segment and 37 in the national segment) are enrolled in the program.[294]

To ensure the safety of carriers participating in CRAF, several prerequisites and ongoing inspections are required. All carriers participating in CRAF must be certified Federal Aviation Administration Carriers and meet the current FAA regulations and standards applicable to commercial airlines.[295] Prior to concluding a contract with CRAF, a carrier must demonstrate that it has provided substantially equivalent commercial service for one year prior to submitting its offer to fly to the Department of Defense.[296] Additionally, the Department of Defense Commercial Airlift Division continues monitoring the carrier's safety record, operations and maintenance status, contract performance, financial condition, and summarizes its findings in a biannual review.[297] In addition to this in-depth review, other safety checks occur, including pre-flight inspections by DoD inspectors and periodic cockpit observations on operational flights by experienced DoD pilots.[298]

D. Airlift Policy

An analysis of the CRAF as a model for integrating spacelift would be incomplete without a discussion of airlift policy. The following section builds on the preceding discussion on the global and domestic events that led to the creation of CRAF. This section picks up the discussion just before the creation of CRAF and traces the development of airlift policy, which has shaped and refined the CRAF program and its role in military operations.

As discussed above, during the interwar years and again in the 1950s after the Berlin Airlift and Korean War, the nation debated the proper balance between military and civilian airlift capabilities. It would take another formal effort to examine the issue to finally develop the first airlift policy. The Morrow, Baker, and Finletter boards were followed by another committee

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[293] *Ibid*.
[294] *Ibid*.
[295] *Operating Requirements: Domestic, Flag, and Supplemental Operations*, 14 CFR Chapter III, subchapter G, part 121.
[296] US Air Force, "Civil Reserve Air Fleet" (last visited 27 June 2022), online: <www.af.mil/About-Us/Fact-Sheets/Display/Article/104583/civil-reserve-air-fleet/>.
[297] *Ibid*.
[298] *Ibid*.

appointed to review the peacetime airlift activities of the military and its division of labor with the civilian sector. The public's perception was that the military relied too often on more costly military assets when civilian options would have been more cost effective.[299] The Holifield Committee, named after Congressman Chet Holifield, examined all facets of military airlift.

The Holifield Committee reviewed the peacetime airlift activities of the military and reported its findings. The committee was keenly aware of the debate on the appropriate division of labor between the military and commercial airlines for military requirements during peacetime. It recommended utilizing civilian air assets to the maximum practical extent during peacetime to reduce costs.[300] Given an aging military airlift fleet, the committee stressed the need to modernize "hard-core" military requirements.[301] Examples of such requirements are the ability to handle bulky cargo not suited for commercial carriers and a high wing design to reduce damage from runway impediments at remote locations.[302] The committee further recommended that the military shift more of its cargo to commercial carriers to encourage the modernization of the CRAF.[303] Thus, the Holifield Committee recognized the military's unique capabilities to ensure national defense and also solidified the role the civilian sector should play when those unique functions are not required.

Based on the Holifield Committee's recommendations, President Dwight D. Eisenhower tasked the DoD to study the role of the military performed by MATS in peace and war. The study recommended "Presidentially Approved Courses of Action," which Eisenhower implemented and which established the first national airlift policy in 1960.[304] This first policy document directed that MATS be equipped and operated in peacetime to ensure its ability to meet hard-core requirements in war and any other requirements that cannot be met by commercial carriers.[305] It also directed the increased use of commercial carriers for routine logistic supply and personnel

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[299] One Congressman, after reviewing a survey of the previous year's commercial airlines' unutilized capacities, famously declared MATS a "billion dollar boondoggle." Office of History, *supra* note 241 at 95.
[300] *Ibid*.
[301] Ronald N Priddy, *A History of the Civil Reserve Air Fleet in Operations Desert Shield, Desert Storm, and Desert Sortie* (Cambridge, MA: Volpe National Transportation Center, 1994) at 22.
[302] Bence, *supra* note 245 at 14.
[303] *Ibid*.
[304] US Department of Defense, *The Role of Military Air Transport Service in Peace and War*, by Office of the Assistant Secretary of Defense (Supply and Logistics) (Washington, DC: February 1960) at 5–6, online: <library.si.edu/digital-library/book/roleofmilitaryai00unit>.
[305] *Ibid* at 20.

movement.[306] The recommendations of the Holifield Committee and many of its predecessor boards had finally crystallized into a national airlift policy. In 1962, Eisenhower's successor, President John F. Kennedy, further enshrined the Holifield Committee's recommendations into practice by officially shifting the peacetime airlift responsibility to the civilian sector.[307]

For the next 25 years, the airlift policy of the United States remained unchanged. In response to the lessons learned during Vietnam requiring a more flexible response which placed more demands on airlift, the military increased the number of airports and personnel prepositioned overseas.[308] The civilian sector also benefited from this flexible response strategy as it opened new air routes and shifted some missions to commercial carriers. In 1987, President Ronald Reagan issued a new airlift policy, which is still current today.[309]

In nine short paragraphs in three pages, the policy encapsulates many of the principles articulated by the various commissions and committees. It emphasizes the importance and benefits, including fiscal advantages, of using civil carriers as surge support in ensuring optimum effectiveness and responsiveness of military airlift capabilities. The policy's first guideline states that US policies shall be designed to strengthen and improve military airlift capability, including enhancing the mobilization base of the US commercial carrier industry.

It emphasizes the coequal usefulness of military and civilian components of the national airlift fleet. The second guideline outlines the goal of the US government during peacetime to maintain organic military airlift resources, manning, and equipment to ensure readiness for military airlift during wartime. Furthermore, the third guideline states that the DoD shall determine which airlift requirements must be met with military aircraft and crews and which airlift requirements can be fulfilled by commercial carriers. The fourth guideline requires the DoD to rely on the commercial air industry to provide airlift capability beyond that available in the organic military airlift fleet. The logic of this reliance is clear: the commercial fleet is always available and largely without cost to the government unless the government contracts for its services during peacetime or mobilizes the civil fleet for war or other contingencies.[310] Additionally, the policy recognizes "the

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[306] *Ibid*.
[307] *Executive Order 10999*, *supra* note 259.
[308] Office of History, *supra* note 241 at 145.
[309] US President Ronald W Reagan, *Presidential Directive NSDD-280, National Airlift Policy*, 1987 [*National Airlift Policy*], online: <www.reaganlibrary.gov/public/archives/reference/scanned-nsdds/nsdd280.pdf>.
[310] Owen, *supra* note 239 at 6.

interdependence of military and civilian airlift capabilities in meeting wartime airlift requirements, and to protect those national security interests contained within the commercial air carrier industry."[311]

Guidelines five and six discuss the use of commercial aircraft during peacetime and minor surges. The fifth guideline requires the DoD to procure cargo and passenger airlift services from carriers participating in the CRAF program to the extent that those services are responsive to military requirements. Civil carrier cargo augmentation during peacetime promotes the effectiveness of the CRAF and provides training within the military airlift system. The sixth guideline urges the DoD to consider commercial capabilities for short-term airlift during minor surges.

The seventh through ninth guidelines recognize the importance of the civil aviation sector to US national defense. The seventh guideline of the document states that US government policies "should provide a framework for dialogue and cooperation with our national aviation industry."[312] The DoD should apprise the civil aviation industry of long-term requirements in support of national defense. The DoD and DOT shall work jointly to develop policies and programs to increase participation in CRAF and promote the incorporation of national defense features in commercial aircraft. Government policies should also encourage research programs that "promote the development of technologically advanced transport aircraft and related equipment."[313]

The eighth guideline tasks the Department of State and other appropriate agencies with ensuring that international agreements governing foreign air carriers foster fair competition, safeguard US economic rights, and protect US national security interests in commercial cargo capabilities. Such agencies should also promote among allies an appreciation of the importance of intercontinental airlift and other transportation capabilities and obtain further commitments from allies and foreign carriers in support of mutual security interests.[314] Finally, the ninth guideline of the memo requires US domestic and foreign aviation policy to strengthen the US airlift capability and, where appropriate, promote the global position of the US aviation industry. These

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[311] *National Airlift Policy*, *supra* note 309 at 2 (guideline 4).
[312] *Ibid* (guideline 7).
[313] *Ibid* (guideline 7).
[314] Notably, however, the Federal Aviation Act of 1958 requires that US air carriers be US citizens and eligibility for registering aircraft in the US extends only to US citizens. See *Air Commerce and Safety - Definitions: air carrier*, 49 USC § 40102(a)(2); *Citizen of the US*, *supra* note 267; *Civil aircraft*, *supra* note 190.

nine guidelines represent the lessons learned from the post-WWI period through the Vietnam War and have withstood the test of time as they are still the current US policy for airlift.

One historian has distilled US airlift policy into just four principles, previously alluded to in the above discussion on the origins of CRAF. The most important tenet of airlift policy is that the commercial airline fleet is the heart of national airlift.[315] A corollary to this principle is that, to the maximum extent possible, commercial airlift should move military cargo and personnel.[316] The second tenet is that the role of the military component of airlift is to do what commercial aircraft or civilian crews cannot or will not do.[317] The third tenet follows logically from the second: the military component should be equipped with aircraft specifically designed for its role. The fourth tenet is that airlift operations represent a continuum that should be under the operational and administrative control of a single command. This tenet reflects the observations of airpower strategists and legislators who saw the duplication of effort within the military and between the military and civilian sectors. [318]

E. Integration of Spacelift Using the CRAF Model?

US TRANSCOM is already considering integrating space transportation as part of the military's capabilities under the CRAF model. Integrating space transportation into the CRAF is legally possible under the Defense Production Act as a surge capacity.[319] Because Title I is a broad authorization to require performance under contracts, and to allocate materials, services, and facilities to promote national defense, the underlying authority already exists.[320] The US president could mobilize space transportation under this authority for a national emergency or exigent military requirement, much like President Kennedy did.[321]

The Civil Reserve Air Fleet name and definition would have to be updated, or a complementary program would have to be added to the current statutes. Under Title 10 of the US Code, the program would have to be updated to "aircraft and spacecraft allocated, or identified for allocation,

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[315] Owen, *supra* note 239 at 6.
[316] *Ibid*.
[317] *Ibid* at 8.
[318] *Ibid* at 9.
[319] *Priority in contracts and orders*, *supra* note 253.
[320] *Ibid*.
[321] *Executive Order 10999*, *supra* note 259.

to the Department of Defense under section 101 of the Defense Production Act of 1950."[322] The law would have to include a provision for voluntary contracts by commercial spacecraft providers as part of the new statutory language.[323]

Similarly, the purpose would have to be updated to be an augmentation program of military airlift *and spacelift* capability by use of civil aircraft *and spacecraft*.[324] This statutory provision is where the difference between current airlift and spacelift capabilities is evident: the military currently has no functional equivalent of space vehicles (capable of carrying tons of cargo or humans) to what it is looking for in the civilian sector. Therefore, the question becomes: what would the space component of CRAF, or a wholly separate civil reserve space fleet, augment? The answer could still be airlift, or if the military ever has such spacecraft, then it would augment military spacelift.

One has to remember that the CRAF is a surge capability.[325] As discussed above, CRAF is the result of decades of debate and refinement over the proper role of civilian and military air transportation. The outcome of these debates is that civilian transportation should be the default option unless special military capabilities or assets are necessary. This is the default policy rule in both war and peacetime. The legal authorities of CRAF are based on the president's executive powers as Commander in Chief under the Defense Production Act.[326] The CRAF is only activated if the military needs a surge capacity and civilian air carriers have voluntarily agreed to provide aircraft availability that would bump existing passengers and cargo for the sake of national security.[327] Unless private companies have other customers for their services that would need to be deprioritized expeditiously so the military could be prioritized, the creation of a CRAF program for spacecraft is *not yet* necessary. Normal contracts for services will do.

The future may necessitate such a surge capacity that exceeds normal contract requirements. For example, the US President also has the authority to authorize any US government department or agency exercising functions connected with the national defense to enter into contracts or amendments of contracts and to make advance payments (not to exceed $50,000) whenever he

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[322] *Civil Reserve Air Fleet: Definitions*, *supra* note 261; *Priority in contracts and orders*, *supra* note 261.
[323] *Civil Reserve Air Fleet: Definitions*, *supra* note 261.
[324] *Ibid*.
[325] *DoD Ratemaking Procedures for CRAF Contracts: Definitions*, *supra* note 264.
[326] *Priority in contracts and orders*, *supra* note 253.
[327] *Civil Reserve Air Fleet: Definitions*, *supra* note 261; *Priority in contracts and orders*, *supra* note 261.

deems that doing so facilitates the national defense.[328] However, the cost of accidents from spacecraft could far exceed this threshold. If space transportation becomes more commonplace and the demand from civilian consumers or companies increases (as might be the case in the future[329]), then a CRAF-type program for civilian spacecraft augmentation would be necessary.

Several additional policy and legal factors would need to be considered. A normal contractual arrangement (without CRAF-like provisions) may come under strain without additional government insurance coverage. If the US military uses spacelift for cargo to support humanitarian or contingency operations, such operations may fall outside of standard contracts that exempt insurance coverage in the event of war or natural disasters. Such operations may necessitate similar government coverage to commercial space transportation providers that air carriers have under the CRAF.[330]

In terms of incentives, the same preference given to airlines would need to be implemented to attract space transportation providers to the program and to promote the development of the US commercial space transportation sector.[331] This type of incentive program would make commercial spacelift "the heart of national spacelift.[332] Furthermore, to the maximum extent possible, commercial spacelift (as opposed to military spacelift) should move military cargo and personnel.[333] Additional legal complications currently exist with regard to transporting personnel, but these are discussed in the next section. Assuming the military ever has a functional equivalent, the role of the military component of spacelift should be to do what commercial spacecraft or civilian crews cannot or will not do.[334] Moreover, the military component should be equipped with

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[328] *Authorization; official approval; Congressional action: notification of committees of certain proposed obligations, resolution of disapproval, continuity of session, computation of period*, Pub L No 85–804, § 1, 72 Stat 972 (codified as amended at 50 USC § 1431).

[329] It is certainly possible that other civilian customers are interested in the same services the military is currently pursing in the commercial space transportation sector. For example, investment firm Morgan Stanley has already identified the possible applicability of the SpaceX Big Falcon Rocket to parcel service providers such as UPS and FedEx. Michael Sheetz, "Delivery by rocket could change the game for UPS, FedEx", *CNBC* (13 October 2017), online: <www.cnbc.com/2017/10/13/delivery-by-rocket-could-change-the-game-for-ups-fedex.html>.

[330] *Indemnification of Department of Transportation for losses covered by defense-related aviation insurance*, 10 USC § 9514.

[331] *National Airlift Policy*, *supra* note 309 at Rule 9.

[332] Owen, *supra* note 239 at 6.

[333] *Ibid*.

[334] *Ibid* at 8.

spacecraft specifically designed for its role. Finally, spacelift operations should be under the operational and administrative control of a single command such as USTRANSCOM.

## F. Conclusion

This chapter examined whether the CRAF program would be a suitable model under which to integrate commercial space transportation for the military's use. The answer is that it certainly could be, but it might not yet be necessary as the number of competing parties with the government for space transportation services is low. This chapter traced the history of the debate between the proper use of military and civilian aviation, with the default policy rule being that the civilian sector is the main provider of air transportation unless specific military capabilities are required. This policy enables significant cost savings. The result of years of debate and the adoption of this policy helped to establish the CRAF program, a surge capability for the US military during national emergencies. As a surge capability, the CRAF program would have the existing legal authority under the Defense Production Act to incorporate commercial space transportation.

# V. Launch and Spaceports

## A. Introduction

This section addresses the international law and national law relevant to launch and spaceports. Launch is a critical part of operating commercial space transportation, and spaceports are necessary infrastructure. This section answers the following questions:

(1) What requirements and limitations exist under international space law for the military to fully make use of commercial space transportation?
(2) What would prevent another country from using US commercial space transportation for its purposes?
(3) Are there any limitations in domestic law that currently limit the US military's ability to fully use commercial transportation for troop and cargo transport?
(4) What safeguards exist under domestic law regarding foreign use or investment in spaceport infrastructure or launch company?

This section proceeds in several parts. First, the law of outer space applicable to the military's use of commercial space transportation is discussed. Then an analysis of US domestic law for launch and spaceports is presented. Finally, concluding remarks summarize the answers to these questions.

## B. Space Law

### *1. The Outer Space Treaty*

Five articles of the Outer Space Treaty are relevant to this discussion: Articles II, IV, VI, and VII. Article II states that outer space, the Moon, or other celestial bodies cannot be appropriated.[335] Articles IV is discussed in more detail in the chapter on Targeting and are, therefore, only briefly discussed here. Article IV prohibits the placement of weapons of mass destruction into orbit or on celestial bodies.[336] Article IV further prohibits the establishment of military bases, testing of

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[335] *Outer Space Treaty*, *supra* note 120, art II.
> Outer Space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.

[336] *Ibid*, art IV; see Chapter VI. Targeting, *below*, for further discussion on the topic.
> State Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner. The Moon and other celestial bodies shall be

weapons, and conducting military training or exercises on celestial bodies.[337] Therefore, the US military is precluded from establishing military bases, including military spaceports on the Moon or other celestial bodies.

However, the answer is less clear regarding civilian commercial spaceports. Article II likely prohibits a single nation from building a spaceport and excluding others from its use. Building an international spaceport on the Moon as an international cooperative venture might be permissible. Thus, although a purely military or national spaceport would be prohibited under the Outer Space Treaty, an intergovernmental one or commercial joint venture one might be permissible, but no state practice yet exists on this point. Although not discussing spaceports on the Moon directly, the head of the European Space Agency (ESA), Johann-Dietrich Wörner, proposed a Moon village on the far side of the Moon. [338] Regarding such a village, he stated "[w]e should have international cooperation, without any limitations, with any countries of the world."[339] Eventhough this is not an official policy position or program of the ESA, it seems to follow the same logic described above—that the Outer Space Treaty permits such an endeavor so long as the village or spaceport does not appropriate the Moon for its national interest or make claims of sovereignty.[340]

Articles VI and VII are relevant in the context of commercial launches and spaceports. Article VI holds state parties to the treaty responsible for their national activities in outer space, including the Moon and celestial bodies.[341] The Outer Space Treaty requires state parties to supervise the

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> used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installation and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited.

[337] *Ibid*.

[338] Richard Hollingham, "Should we build a village on the Moon? - BBC Future", *BBC* (13 July 2015), online: <www.bbc.com/future/article/20150712-should-we-build-a-village-on-the-moon>.

[339] *Ibid*.

[340] *Ibid*.

[341] *Outer Space Treaty*, *supra* note 120, art VI.

> States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty. When activities are carried on in outer space, including the moon and other celestial bodies, by an international organization, responsibility for compliance with this Treaty shall be borne both by the international organization and by the States Parties to the Treaty participating in such organization.

activities of their non-governmental entities in outer space.[342] State parties are also liable for objects launched into outer space.[343] Therefore, states are responsible for the actions of the private sector for launch and in space and on the Moon, regardless of whether the government or private sector contracts for those commercial space services.

*2. Registration Convention*

Given the different options of space transportation the US military has considered in the past or is currently considering, the Registration Convention may or may not apply. For a spaceplane on a suborbital flight, the object is not launched into earth orbit and does not require registration.[344] However, given that the Rocket Cargo program is also considering orbital transportation options such as New Glenn, the Registration Convention would apply.

The Registration Convention provides more specificity Article VIII (requiring the State of registry of a launched object to retain jurisdiction and control over the object) of the Outer Space Treaty.[345] As stated in the preamble of the Registration Convention, its purpose is to establish and maintain a central register of objects launched into outer space.[346] As such, the registry promotes transparency of the states' space activities and plays an important role in international space governance, including peace and security.[347]

The Registration Convention requires the launching state to register the space object in its national registry.[348] The launching state is defined as the one that launches or procures the launching of a space object; or a state from whose territory or facility a space object is launched.[349]

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[342] *Ibid*, art VI.

[343] *Ibid*, art VII.

> Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the moon and other celestial bodies.

[344] Ram S Jakhu, Bhupendra Jasani & Jonathan C McDowell, "Critical issues related to registration of space objects and transparency of space activities" (2018) 143 Acta Astronautica 406 at 407.

[345] *Outer Space Treaty*, *supra* note 120, art V and 8.

[346] *Registration Convention*, *supra* note 120 at preamble. The Preamble to the Registration Convention states (in part): *Desiring* further that a central register of objects launched into outer space be established and maintained, on a mandatory basis, by the Secretary-General of the United Nations. *Desiring* also to provide for States additional means and procedures to assist in the identification of space objects.

[347] Jakhu, Jasani & McDowell, *supra* note 344 at 407.

[348] *Registration Convention*, *supra* note 120, art II.

[349] *Ibid*, art I.

Article IV requires each state of registry to provide certain information about its space object on its national registry to the Secretary-General:

(a) Name of launching State or States;
(b) An appropriate designator of the space object or its registration number;
(c) Date and territory or location of launch
(d) Basic orbital parameters, including:
    (i) Nodal period,
    (ii) Inclination,
    (iii) Apogee,
    (iv) Perigee;
    (e) General function of the space object[350]

Therefore, if the US military were to contract commercial space transportation services that launched into earth orbit, the US would—as the launching state—be required to furnish the above information. The general function of the object could be described broadly as a "spacecraft engaged in transportation services."[351] The Registration Convention further provides states must provide such information "as soon as practicable."[352] This requirement is not defined further, but it is one the US must abide by if it uses commercial space transportation to reach earth orbit.

C. Domestic Launch Regulation

*1. The Commercial Space Launch Act of 1984 and Related Federal Regulations*

The principle domestic law governing the licensing and regulation of commercial space transportation is the Commercial Space Launch Act of 1984 (CSLA), amended and re-codified at Commercial Space Launch Activities – Title 51 of the US Code, Chapter 509.[353] Congress

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[350] *Ibid*, art IV(1).

[351] This description is in line with similarly general descriptions of functions provided to the UN Secretariat as required by Article IV. Recent descriptions have included: "spacecraft engaged in investigation of space flight techniques and technology," "spacecraft engaged in research and exploration of the upper atmosphere," and "spacecraft engaged in practical applications and uses of space technology such as weather or communications." See "United Nations Register of Objects Launched into Outer Space, Notifications from States & Organizations: United States of America" (last visited 14 August 2022), online: *UNOOSA* <www.unoosa.org/oosa/en/spaceobjectregister/submissions/usa.html> (listing the various objects the US has launched and their descriptions provided to the UN Secretariat).

[352] *Registration Convention*, *supra* note 120, art IV(1).

[353] *Commercial Space Launch Act of 1984*, Pub L No 95575, 98 Stat 3055 (codified as amended at 51 USC §§ 50901–50923). This legislation covers a number of aspects of space activities including license and permit applications and requirements; liability insurance and financial responsibility requirements; effective periods, modifications, suspensions and revocations of licenses; and restrictions on launches, operations, and re-entries. For a short overview of this and other US regulations applicable to space, see the Australian Navigational Guide Explaining Laws for Space (ANGELS). ANGELS is a joint initiative by Adelaide Law School and the International Aerospace Law Group with the goal of helping those seeking to understand the basic legal and regulatory

recognized the private applications of space technology and the significant growth potential of the private sector.[354] The act was designed to encourage private sector launches and to regulate such launches in accordance with international obligations.[355] The purpose of the act was to promote "economic growth and entrepreneurial activity through utilization of the space environment for peaceful purposes."[356] The DOT established the Office of Commercial Space Transportation (OCST), reporting directly to the Secretary of Transportation.[357] In November 1995, the OCST's responsibilities were delegated to the Administrator of the FAA, who established the Office of the Associate Administrator for Commercial Space Transportation (AST).[358] This office overseas, authorizes, and regulates launch and re-entry vehicles and launch and re-entry sites.[359]

The CSLA has been amended several times since it was first enacted. For example, in 1998, Congress extended DOT licensing authority to re-entry, thereby enabling the licensing of re-entry sites and reusable launch vehicles. In 2004, Congress amended the CSLA again to encourage the commercial human space-flight industry.[360] This amendment granted the DOT authority to implement regulations to oversee commercial human space flight,[361] which the DOT has delegated to the FAA AST.[362] The FAA encourages, facilitates, and promotes commercial space launches and re-entries, including those involving space flight participants.[363]

Turning to the example of the US military contracting for commercial space transportation services, one might ask what would prevent another country's military from contracting for those same services. Another related question would be what would prevent a foreign country from acquiring ownership in a US commercial launch services company. After all, a private company's

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requirements applicable to space activities. Australian Navigational Guide Explaining Laws for Space, "Space Licensing in the United States" (last visited 30 May 2022), online: *ANGELS* <spacelaws.com/articles/space-licensing-in-the-united-states/>.

[354] *Commercial Space Launch Activities—Findings and purposes*, 51 USC § 50901(a)(2).

[355] *Ibid*, § 50901(a)(7).

[356] *Ibid*, § 50901(b)(1).

[357] Timothy Robert Hughes & Esta Rosenberg, "Space Travel Law (and Politics): The Evolution of the Commercial Space Launch Amendments Act of 2004" (2005) 31:1 Journal of Space Law 1 at 13, n 41.

[358] *Ibid*.

[359] Federal Aviation Administration, "Commercial Space Transportation" (18 May 2021), online: <www.faa.gov/regulations_policies/faa_regulations/commercial_space>.

[360] Michael Mineiro, "Chapter 14—Regulation and licensing of US commercial spaceports" in Joseph N Pelton & Ram S Jakhu, eds, *Space Safety Regulations and Standards* (Oxford, UK: Butterworth-Heinemann, 2010) 161 at 162.

[361] *Ibid*.

[362] *Ibid* at 166.

[363] Federal Aviation Administration, *supra* note 359.

interest is to make a profit, and perhaps another country would be willing to pay more for such services or seek capital from other sources. The answer lies in the protections ensured under the licensing scheme. Under the statute, a person applies to the Secretary of Transportation for a license. Under federal regulations, this process has been delegated to the FAA.[364] This discussion focuses mainly on the federal statute, but the reader should be aware that further detail can be found in Commercial Space Transportation Regulations – Title 14 Code of Federal Regulations (CFR) Chapter III.[365]

The Secretary may establish procedures for safety approvals of launch vehicles, re-entry vehicles, safety systems, processes, services, or personnel (including crew, government astronauts, and space flight participants).[366] The Secretary may prescribe any requirements to ensure compliance, including on-site verification that a launch, operation, or re-entry complies with the representations stated in the application for a license.[367] Additional requirements to protect the

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[364] *Policy and safety approvals*, 14 CFR § 415.5.

[365] *Commercial Space Transportation, Federal Aviation Administration, Department of Transportation*, 14 CFR Chapter III (2004).

[366] *License applications and requirements—applications*, 51 USC § 50905(a)(2).

[367] *License applications and requirements—requirements*, 51 USC § 50905(b)(2)(A). The specifics of how to apply for a launch license are contained in 14 CFR Chapter III Part 413 License Application Procedures. See *14 CFR Chapter III*, *supra* note 365, part 413. Per § 413.3 Who must obtain a license or permit:

(a) A person must obtain a license in accordance with this section, unless eligible for an experimental permit under paragraph (f) of this section.
(b) A person must obtain a license to -
(1) Launch a launch vehicle from the United States;
(2) Operate a launch site within the United States;
(3) Reenter a reentry vehicle in the United States; or
(4) Operate a reentry site within the United States.
(c) A person who is a U.S. citizen or an entity organized under the laws of the United States or any State must obtain a license to -
(1) Launch a launch vehicle outside the United States;
(2) Operate a launch site outside the United States;
(3) Reenter a reentry vehicle outside the United States; or
(4) Operate a reentry site outside the United States.
(d) A foreign entity in which a United States citizen has a controlling interest must obtain a license to launch a launch vehicle from or to operate a launch site in -
(1) Any place that is outside the territory or territorial waters of any nation, unless there is an agreement in force between the United States and a foreign nation providing that such foreign nation has jurisdiction over the launch or the operation of the launch site; or
(2) The territory of any foreign nation, including its territorial waters, if there is an agreement in force between the United States and that foreign nation providing that the United States has jurisdiction over the launch or the operation of the launch site.
(e) A foreign entity in which a U.S. citizen has a controlling interest must obtain a license to reenter a reentry vehicle or to operate a reentry site in -

health and safety, property, national security, and foreign policy interests of the United States may also be imposed.[368] This provision allows the Secretary of Transportation, as carried out by the FAA, to deny a launch license to a commercial entity seeking to transport foreign military personnel or cargo. The FAA can and has denied a launch license if it has concerns about foreign ownership interest in a commercial space launch entity.[369]

*2. Committee on Foreign Investment in the US*

Another oversight mechanism for foreign investment is the Committee on Foreign Investment in the US (CFIUS).[370] President Gerald Ford established the CFIUS in 1975 to review the acquisition of US firms by foreign entities that had the potential of negatively impacting US national security. The establishment of CFIUS stemmed from concerns of investment by members of the Organization of the Petroleum Exporting Countries in the US.

In 1988, Congress strengthened the CFIUS review process by passing the Exon-Florio Amendment to the Defense Production Act of 1950 amid concerns of Japanese firms acquiring interest in US firms.[371] The Exon-Florio provision transformed CFIUS.[372] It granted the president the authority to block proposed or pending foreign mergers, acquisitions, or takeovers of persons engaged in interstate commerce in the US that threaten US national security. By executive order, President Reagan delegated his authority to administer the Exon-Florio provision to CFIUS.[373] As

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(1) Any place that is outside the territory or territorial waters of any nation, unless there is an agreement in force between the United States and a foreign nation providing that such foreign nation has jurisdiction over the reentry or the operation of the reentry site; or
(2) The territory of any foreign nation if there is an agreement in force between the United States and that foreign nation providing that the United States has jurisdiction over the reentry or the operation of the reentry site.

(f) A person, individual, or foreign entity otherwise requiring a license under this section may instead obtain an experimental permit to launch or reenter a reusable suborbital rocket under part 437 of this chapter.

[368] *License applications and requirements—requirements*, 51 USC § 50905(b)(2)(B).

[369] Jeff Foust, "Firefly halts launch preparations after federal government seeks divestment of foreign ownership", *SpaceNews* (30 December 2021), online: <spacenews.com/firefly-halts-launch-preparations-after-federal-government-seeks-divestment-of-foreign-ownership/> (discussing Firefly Aerospace having to divest itself from the investment of a Ukrainian national before its next launch).

[370] "CFIUS Overview" (last visited 12 December 2022), online: *US Department of the Treasury* <home.treasury.gov/policy-issues/international/the-committee-on-foreign-investment-in-the-united-states-cfius/cfius-overview>.

[371] *Omnibus Trade and Competitiveness Act of 1988*, Pub L No 100–418, § 5021, 102 Stat 1107.

[372] Congressional Research Service, *The Exon-Florio National Security Test for Foreign Investment*, by James K Jackson, No RL33312 (Washington, DC: 29 March 2013) at 3, online: <sgp.fas.org/crs/natsec/RL33312.pdf>.

[373] US President Ronald W Reagan, *Executive Order 12661—Implementing the Omnibus Trade and Competitiveness Act of 1988 and related international trade matters*, 1988 [*Executive Order 12661*], online: <www.archives.gov/federal-register/codification/executive-order/12661.html>.

a result of this delegation, CFIUS was empowered to advise the president on foreign investment transactions and recommend transactions be suspended or blocked.[374]

In 2018, the Foreign Investment Risk Review Modernization Act of 2018 additional legislation was passed that strengthened and modernized CFIUS to address national security concerns.[375] This legislation broadens the authority of the US president and CFIUS to review and take action to address security concerns from foreign investments. Prior to invoking this authority, the provision required the president to conclude that US laws are inadequate or inappropriate to protect national security and he must have "credible evidence" that the foreign investment will impair national security.[376] In assessing the national security risk, CFIUS looks at the threat including intent and capabilities of the acquirer; the vulnerability of aspects of the US business that could impact national security; and the potential national security consequences if the vulnerability is exploited.[377] Therefore, a foreign country or company seeking ownership in companies such as SpaceX or Blue Origin or investing in a private spaceport is subject to review by CFIUS.

*3. Export Controls*

The International Traffic in Arms Regulation (ITAR) regulates the export of weapons systems and related technologies including launch vehicles. The ITAR process falls under the jurisdiction of the Department of State and is administered by the Directorate of Defense Trade Controls (DDTC).[378] The ITAR process controls items, information, and activities that could be used for foreign military purposes. Special considerations exist for launch vehicles under the ITAR. "A launch vehicle, re-entry vehicle, or payload that is launched or reentered is not, because of the launch or reentry, an export or import" so long as the launch occurs within the US or a US territory,

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[374] Congressional Research Service, *The Committee on Foreign Investment in the United States*, by James K Jackson, No RL33388 (Washington, DC: 26 February 2020) at 8, online: <crsreports.congress.gov/product/pdf/RL/RL33388/93>.

[375] *John S McCain National Defense Authorization Act for Fiscal Year 2019*, Pub L No 115–232, §§ 1701–1728, 132 Stat 1636 at 1654 (2018) (modernizing and strengthening the CFIUS to more effectively guard against US national security risks posed by certain types of foreign investment).

[376] *Authority to review certain mergers, acquisitions, and takeovers*, 50 USC § 4565(d).

[377] *Risk-based analysis*, 31 CFR § 800.102.

[378] Office of Space Commerce, US Department of Commerce & Office of Commercial Space Transportation, Federal Aviation Administration, "Introduction to US Export Controls for the Commercial Space Industry" (2017) at 5, online (pdf): <www.faa.gov/about/office_org/headquarters_offices/ast/media/export_controls_guidebook_for_commercial_space_industry_doc_faa_nov_508.pdf>.

thus it does not require an export license from the Department of State or the Department of Commerce.[379]

However, the launch of a US launch vehicle outside the US requires ITAR authorization in compliance with Missile Technology Control Regime (MCTR) controls. The MCTR is an informal political understanding among states to limit the proliferation of missiles and missile technology.[380] It was established in 1987 by the G-7 (the US, Canada, France, Germany, Italy, Japan, and the United Kingdom).[381] The applicable MCTR controls establish a presumption of denial for exports of US launch vehicles including to other launching states. A private company desiring to apply for a launch vehicle export license would have to apply to the State Department and work with the recipient state to establish a Technology Safeguards Agreement (TSA) to cover the export.[382] Thus, the ITAR is an additional safeguard to foreign countries access to launch technology.

*4. Special Issues Related to the Transportation of Passengers*

The next question salient to military contracted commercial space transportation is whether transporting troops would be feasible. Special requirements exist regarding commercial launches transporting human beings. Launch is defined as to place or to try to place a launch vehicle or re-entry vehicle and any payload or human being from earth in a suborbital trajectory, in earth orbit in outer space, or otherwise in outer space.[383] In general, the Secretary of Transportation can waive a requirement, including the requirement to obtain a license if certain conditions are met.[384] However, the requirement to obtain a license is not waivable if human beings are on board.[385] Different conditions to obtain a license must be met depending on whether the space vehicle will transport crew or also space flight participants. A space flight participant is "an individual, who is not crew or a government astronaut, carried within a launch vehicle or re-entry vehicle."[386]

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[379] *Relationship to other executive agencies, laws, and international obligations—Launch Not an Export; Reentry Not an Import*, 51 USC § 50919(f).
[380] "Missile Technology Control Regime—Frequently Asked Questions (FAQs)" (last visited 14 August 2022), online: *MTCR* <mtcr.info/frequently-asked-questions-faqs/>.
[381] *Ibid*.
[382] Office of Space Commerce, US Department of Commerce & Office of Commercial Space Transportation, Federal Aviation Administration, *supra* note 378 at 36–37.
[383] *Commercial Space Launch Activities - Definitions: launch*, 51 USC § 50902(7).
[384] *License applications and requirements—requirements*, 51 USC § 50905(b)(3).
[385] *Ibid*.
[386] *Commercial Space Launch Activities - Definitions: space flight participant*, 51 USC § 50902(20).

The holder of a license may launch and re-enter a flight participant only if a number of conditions are met.[387] First, the license holder must inform the flight participant in writing about the risks of launch and re-entry, including the safety record of the launch or re-entry vehicle type.[388] Second, the holder of the license must inform a flight participant in writing, and *prior to* receiving compensation from that person or otherwise concluding an agreement to fly that participant, that the US government has not certified the launch vehicle as safe for carrying crew or space flight participants.[389] Third, the spaceflight participant must provide written informed consent to participate in the launch and re-entry.[390]

The additional requirements for transporting space flight participants make using such transportation for military transport not very feasible at present. The current rules are based on the state of space launch still being a relatively uncommon and dangerous event, and especially rare in the context of transporting passengers who are not trained astronauts.[391] One could counter that the inherent nature of the military's purpose places its members in danger. However, the inherent risks of a soldier's occupation are irrelevant because the launch service provider is a civilian commercial company that must act in accordance with the rules and safety requirements for commercial launch. As discussed previously, the benefit of space transportation are its speed and access to areas that might be contested. These features are only advantageous in a situation where time is of the essence, such as in armed conflict or a humanitarian disaster. However, if the private entity seeking a launch license must provide written disclosures and receive written consent from every single flight participant (passenger) before it can conclude an agreement with the US

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[387] *License applications and requirements—requirements*, 51 USC § 50905(b)(5).
[388] *License applications and requirements—requirements*, 51 USC § 50905(b)(5)(A).
[389] *License applications and requirements—requirements*, 51 USC § 50905(b)(5)(B).
[390] *License applications and requirements—requirements*, 51 USC § 50905(b)(5)(C).
[391] As of May 2022, Blue Origin has launched four space tourist flights; SpaceX two, and Virgin Galactic announced that the launch of its commercial passenger service, previously scheduled for late 2022, is delayed until early 2023. See Debra Kamin, "The Future of Space Tourism Is Now Well, Not Quite", *The New York Times* (7 May 2022), online: <www.nytimes.com/2022/05/07/travel/space-travel-tourism.html>. The risk of spaceflight is lower, but still very high compared to air transport. In the early days of space shuttle transportation, the risk of a space shuttle flight ending in disaster was 1 in 9. Phil McAlister, director of commercial spaceflight for NASA estimated that a ride on SpaceX's Crew Dragon is three times safer than a ride on NASA's space shuttle in the final years of its operation when flights were at their safest. By the time the shuttle was retired in 2011, the odds of a catastrophic accident had dropped to 1 in 90. Based on McAlister's estimates, that would make the probability of a catastrophic accident on a modern commercial spacecraft like Crew Dragon 1 in 270. That is still high compared with the aviation sector where the *lifetime risk* of the average American dying in an aircraft accident is 1 in 205,552 based on data from the National Safety Council. See Tereza Pultarova, "Do space tourists really understand the risk they're taking?", *Space.com* (27 September 2021), online: <www.space.com/space-tourism-risk-safety-regulations>.

military for launch; the advantage of speed disappears. For commercial space transportation to be a viable option for troop transport, the current rules would need to change. For the current rules to change for commercial operators, the technology would likely have to reach a point where it is significantly more common, safe, and reliable. However, these additional hurdles are not required for the transportation of cargo, thereby making cargo transportation by spacecraft a more feasible option.

D. Spaceports

A spaceport is known under the CSLA as a launch and re-entry site. A launch site is defined as "the location on Earth from which a launch takes place (as defined in a license the Secretary issues or transfers . . .) and necessary facilities at that location.[392] A re-entry site means "location on Each to which a re[-]entry vehicle is intended to return (as defined in a license the Secretary issues or transfers . . .).[393] Spaceports are a major piece of US infrastructure, and special security considerations exist with regard to their opening and operation.

The licensing process of launch sites has safeguards to protect US national interests. As delegated by the Secretary of Transportation, the FAA issues launch site licenses, which authorize a person to operate a launch or re-entry site. To obtain a license for operating a launch site, the operator must provide certain identification information[394] and a description of the location of the proposed site.[395] As with the issuance of a launch license, the US government can deny a license to foreign entities through the licensing process. To obtain a launch site operator license, the operator must identify foreign ownership of the applicant.[396] Furthermore, the Secretary of Transportation may prohibit, suspend, or end immediately the operation of a launch or re-entry site if the Secretary determines that operation of the site would be detrimental to the public health, safety, property, or national security or foreign policy interests of the US.[397]

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[392] *Commercial Space Launch Activities - Definitions: launch site*, 51 USC § 50902(10).
[393] *Commercial Space Launch Activities - Definitions: reentry site*, 51 USC § 50902(18).
[394] *Criteria and Information Requirements for Obtaining a License—Information requirements*, 14 CFR § 420.15(a)(1).
[395] *Criteria and Information Requirements for Obtaining a License—Information requirements*, 14 CFR § 420.15(a)(2).
[396] *Criteria and Information Requirements for Obtaining a License—Information requirements*, 14 CFR § 420.15(a)(3).
[397] *Prohibition, suspension, and end of launches, operation of launch sites and reentry sites, and reentries*, 51 USC § 50909.

As identified above, for the US military to feasibly contract commercial space transportation to transport troops, the technology would have become so safe and dependable that the statute would not require express disclosures. To normalize space transportation to this degree would require the proliferation of spaceports.[398] Again, noting the time value of this transportation option, if the US military first must transport its troops via aircraft across long distances to reach a spaceport, the benefit of space transportation is diminished.

Recent efforts by the FAA to streamline the launch site approval process may help. To help streamline the process, in 2018, Congress directed the FAA in a reauthorization bill to establish an Office of Spaceports. The bill directed the Office of Spaceports to address issues such as licensing, infrastructure improvements, technical support and promotion of spaceports, as well as strengthening the resilience of the commercial space transportation infrastructure.[399] It is no surprise that restructuring is necessary due to a massive increase in demand for licenses. From 2012 to 2020, licensed activities increased 1000%, and AST's budget and staffing increased 40%.[400] To meet this growing demand, the FAA established new streamlined regulations for launch and re-entry activities and internal reorganization of processes and functions to increase efficiency.[401] The bill reauthorization act also directed the FAA to produce a report on national spaceport policy.[402]

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[398] However, a recent Government Accountability Office report found that most launch providers believe that US space transportation infrastructure is generally sufficient for them to meet their customers' current requirements. Given that the military is not yet a customer for transportation services of its troops and cargo (it is only in the preliminary stages of exploring such option with industry), that assessment could change. *Commercial Space Transportation—FAA Should Examine a Range of Options to Support US Launch Infrastructure*, by US Government Accountability Office, No GAO-21-154 (December 2020) at highlights, online: <www.gao.gov/assets/gao-21-154.pdf>.

[399] Jeff Foust, "FAA establishes spaceport office to support growing number of launch sites", *SpaceNews* (8 May 2020), online: <spacenews.com/faa-establishes-spaceport-office-to-support-growing-number-of-launch-sites/>.

[400] Wayne R Monteith, "Letter from Federal Aviation Administration Office of Commercial Space Transportation" (2020) at 1, online (pdf): <www.faa.gov/about/office_org/headquarters_offices/ast/media/AST_Update_Letter_April_2020.pdf>.

[401] *Ibid*.

[402] Foust, *supra* note 399; see also Global Spaceport Alliance, "National Spaceport Network Development Plan" (2020), online (pdf): <www.faa.gov/about/office_org/headquarters_offices/ast/advisory_committee/meeting_news/media/2020/june/National_Spaceport_Network_Development_Plan.pdf> (identifying necessary infrastructure and other requirements to support the development of a network of spaceports in the US that would support civil, commercial, and national security requirements for space); US, *Starships and Stripes Forever - An Examination of the FAA's Role in the Future of Spaceflight: Remote Hearing Before the Subcommittee on Aviation of the Committee on Transportation and Infrastructure, House of Representatives*, 117th Cong (Washington, DC: US Government Publishing Office, 2021) [*FAA's Role in the Future of Spaceflight*], online: <www.congress.gov/117/chrg/CHRG-117hhrg46249/CHRG-117hhrg46249.pdf> (discussing in the House Committee on Transportation and Infrastructure

As of May 2022, the FAA's spaceport map (including commercial, government, and active private spaceports) lists 13 FAA-licensed launch sites and three non-FAA licensed sites (two of SpaceX and one of Blue Origin). Given the efforts to streamline the licensing process and the current political support for infrastructure improvement, spaceports will likely open at a faster rate than in the past.[403]

E. Conclusion

This chapter examined the international and national laws applicable to launch and spaceports. International space law prohibits the US military from building bases on celestial bodies, but it may allow commercial entities to build spaceports. The Outer Space Treaty requires the US to be responsible for and monitor the activities of its commercial companies in space. Under the Registration Convention, sub-orbital flights are not required to be registered. Therefore, international law does not present major obstacles regarding launch or spaceports for the US military's use of commercial space transportation.

The US has a robust domestic regulatory regime for commercial space launches including safeguards for its national security interests. Generally, domestic laws and regulations do not inhibit the US military's use of commercial space transportation, with one exception. Given the relatively rare and still comparatively unsafe nature of spaceflight, the US regulations would not allow the US military to rapidly use commercial transportation for troops. Because of the additional mandatory disclosures and written acknowledgments, a time-sensitive operation would not be well-served by choosing this mode of transportation given these additional requirements.

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the future of the US commercial transportation industry, its rapid growth and expansion in to human spaceflight, and the role of the FAA in overseeing and regulating the industry).

[403] The White House, "Biden Administration Announces Nearly $1B in Bipartisan Infrastructure Law Funding Improving Airport Terminals across US" (7 July 2022), online: <www.whitehouse.gov/briefing-room/statements-releases/2022/07/07/biden-administration-announces-nearly-1b-in-bipartisan-infrastructure-law-funding-improving-airport-terminals-across-u-s/> (announcing FAA award of $1 billion from bipartisan infrastructure bill to improve airports across the US).

# VI. Use of Force

## A. Introduction

No specific international treaty exists discussing the use of force in space. The use of force in armed conflict involves targeting, which is the process by which military officials choose which objectives to strike.[404] To examine the issues pertinent to the use of force against commercial space transportation contracted by the US military, this section discusses the relevant provisions of international law related to space and the law of armed conflict. This examination is distinct from the previous discussion of whether the military's use of a commercial space plane when transiting through airspace is a state or civil aircraft under the Chicago Convention. The prohibitions of Article 3*bis* of the Chicago Convention apply during peacetime,[405] whereas this discussion focuses on the legality of targeting such spacecraft during armed conflict. This analysis focuses on the questions related to a space vehicle's status as a targetable object under the law of armed conflict, where the US stance on the law differs, and on potential problems for the US military's use of commercial space transportation during armed conflict.

## B. Provisions of the Outer Space Treaty and Rescue Agreement

One of the fundamental principles of space law is articulated in the Outer Space Treaty principle of use "for peaceful purposes."[406] Preceding this treaty was UN General Assembly

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[404] PJ Blount, "Targeting in Outer Space: Legal Aspects of Operational Military Actions in Space" (2012) Harv Nat'l Sec J at 4, online: <ssrn.com/abstract=2387318>.

[405] Article 89 of the Chicago Convention (War and Emergency Conditions) states: "In case of war, the provisions of this Convention shall not affect the freedom of action of any of the contracting states affected, whether as belligerents or as neutrals. The same principles shall apply in the case of any contracting state which declares a state of national emergency and notifies the fact to the Council." *Chicago Convention*, *supra* note 175, art 89.

[406] *Outer Space Treaty*, *supra* note 120 at preamble and art IV. The extent to which "peaceful purposes" applies was debated during the negotiations of the Outer Space Treaty. Christol argues based on the record of deliberation in UN COPUOS that the omission of "outer space" in Article IV, paragraph 2 was deliberate. Christol notes that several states in UN COPUOS objected to the omission of "outer space" from article IV, paragraph 2, but the US and USSR positions to omit "outer space" prevailed. See Carl Q Christol, *The modern international law of outer space*, Pergamon policy studies on international politics (New York: Pergamon Press, 1982) at 20–24. The US did not want "peaceful purposes" to apply to outer space generally. According to a former Legal Adviser in the US Department of State, the "language of Article IV was carefully chosen to ensure that 'peaceful uses' would not interfere with the testing" of weapons including nuclear weapons. See Ivan A Vlasic, "The Legal Aspects of Peaceful and Non-Peaceful Uses of Outer Space" in Bhupendra Jasani, ed, *Peaceful and Non-Peaceful Uses of Space: Problems of Definition for the Prevention of an Arms Race* (London: Routledge, 1991) 37 at 42; Abram Chayes, Antonia Handler Chayes & Eliot Spitzer, "Space Weapons: The Legal Context" (1985) 114:3 Daedalus 193 at 196.

Resolution 1884 (XVIII) of 1963, which called on states not to station nuclear weapons or other weapons of mass destruction on celestial bodies or place them into orbit.[407] Although the Outer Space Treaty broadens the scope of the UN Resolution, it does not provide for the complete demilitarization of outer space.[408] Article III of the Outer Space Treaty incorporates the UN Charter into the space law regime.[409] The US position has always been that "peaceful" does not mean "non-military" but rather "non-aggressive."[410] This interpretation echoes the principle of the UN Charter as incorporated in Article III, which precludes the use of force or threat of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the purposes of the UN.[411] While state practice reveals no clear use of force threshold with respect to a spacecraft, such an act could be considered an act of aggression in outer space depending on the nature of the force and surrounding circumstances.

Because Article III incorporates the UN Charter, it incorporates the provision of Article 51, which states that "nothing in the Charter shall impair the inherent right of individual or collective self-defence if an armed attack occurs against a Member of the United Nations, until the Security Council has taken measures necessary to maintain international peace and security."[412] Therefore,

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[407] *Question of general and complete disarmament*, GA Res 1884 (XVIII), UNGAOR, 18th Sess, UN Doc A/RES/1884(XVIII) (1963).

[408] Allan Rosas, "The Militarization of Space and International Law" (1983) 20:4 Journal of Peace Research 357 at 358.

[409] *Outer Space Treaty*, *supra* note 120, art III.

[410] In the US representative's speech to the United Nations First Committee on 20 December 1965, he stated that "[s]ince the beginning of the space age, the United States has constantly endorsed the principles that space should be used for peaceful purposes. In that context, 'peaceful' meant non-aggressive rather than non-military. . . . The test of any space activity must therefore be not whether it was military or non-military but whether it was consistent with the Charter and other obligations of international law." See *Summary Record of the 1422nd Meeting*, First Committee, UNGAOR, 20th Sess, UN Doc A/C1/SR1422 (1965) 429 (discussing remarks of the US Ambassador Charles Yost). The Soviet position initially took a different approach, but ultimately reached the same result. On one hand, the Soviet Union and its allies strongly supported a ban on military uses of outer space, but the Soviet Union undermined its own position by launching satellites into space for military purposes. See *Summary Record of the Sixty-Sixth Meeting*, Legal Sub-Committee, UNCOPUOS, UN Doc A/AC105/C2/SR66 (1966) 7 (containing remarks of Soviet representative Morozov stating that the Soviet Union was "naturally in favor of a total ban on the use of outer space for military purposes"); Paul G Dembling & Daniel M Arons, "The Evolution of the Outer Space Treaty" (1967) 33 Journal of Air Law and Commerce 419 at 419. Despite its official position, the Soviet Union ultimately supported the limitation of the phrase "peaceful purposes" in reference to celestial bodies in Article IV of and in the Preamble of the Outer Space Treaty.

[411] *Charter of the United Nations and Statute of the International Court of Justice*, 26 June 1945, 59 Stat 1031, TS 993 art 2(4) (entered into force 24 October 1945) [*UN Charter*].

[412] *Ibid*, art 51. The rest of Article 51 reads: "Measures taken by Members in the exercise of this right of self-defence shall be immediately reported to the Security Council and shall not in any way affect the authority and responsibility of the Security Council under the present Charter to take at any time such action as it deems necessary in order to maintain or restore international peace and security."

the Outer Space Treaty leaves open the possibility of targeting a spacecraft if a state is exercising lawful self-defence[413] in response to an armed attack, other requirements of the law of armed conflict notwithstanding.

The preceding discussion addressed the *ends* of targeting, namely, whether and under what circumstances a spacecraft force may be used. The Outer Space Treaty also limits at least one *means* (or at least the location of that means) of targeting by limiting the kinds of weapons that can be placed in outer space. Article IV prohibits states from placing into orbit objects carrying nuclear weapons and any other weapons of mass destruction.[414] Furthermore, Article IV prohibits the installation of weapons of mass destruction on celestial bodies or stationing such weapons in outer space.[415] Although the Outer Space Treaty prohibits the placement of weapons of mass destruction in outer space, it does not necessarily preclude the use of such weapons from earth against spacecraft in space if such use is an otherwise lawful act in self-defence or it meets other requirements under the law of armed conflict.

The Sanremo Handbook on Rules of Engagement articulates a potential corollary to the "peaceful purposes" provision of the second paragraph of Article IV. The Handbook states that it is prohibited to place conventional weapons on the Moon and celestial bodies and to station weapons of mass destruction anywhere in outer space.[416] Although the Sanremo Handbook is not an official position of states or governments, its aim is to serve as a guide concerning the generally accepted and widespread concepts of the rules of engagement and related legal considerations.[417] However, rules of engagement generally include policy limitations as well, and the Handbook does not specify whether this prohibition stems from a legal constraint or policy consideration. If one recognizes this prohibition as a generally accepted corollary to the "peaceful purposes" provision of Article IV (as a purely legal restraint), then the targeting of a spacecraft using both conventional and weapons of mass destruction from the Moon and other celestial bodies is prohibited.

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[413] Ram S Jakhu & Steven Freeland, eds, *McGill Manual on International Law Applicable to Military Uses of Outer Space—Volume I - Rules* (Montreal, Canada: Centre for Research of Air and Space Law, McGill University, 2022) at 22, Rule 152 [*MILAMOS - Vol I*].
[414] *Outer Space Treaty*, *supra* note 120, art IV.
[415] *Ibid*.
[416] Alan Colen, Phillip Drew & Robert McLaughlin, *Sanremo Handbook on Rules of Engagement*, Dennis L Mandsager, ed (Sanremo, Italy: International Institute of Humanitarian Law, 2009) at 15, online: <iihl.org/wp-content/uploads/2017/11/ROE-HANDBOOK-ENGLISH.pdf>.
[417] *Ibid* at ii.

Article V of the Outer Space Treaty requires states to treat astronauts as envoys of mankind in outer space.[418] It further requires states to provide all possible assistance in the event of an accident, distress, or emergency landing on the territory of another State Party or on the high seas. Additionally, astronauts in space shall assist other astronauts. Turning to the issue of the military using commercial space transport services, it is not clear whether the crew or passengers would be considered astronauts for the purpose of the Outer Space Treaty.

Under US law implementing the Outer Space Treaty, three agencies can designate people as astronauts: NASA, the FAA, and the military.[419] Each has a different definition of who qualifies for the designation. For NASA[420] and the military,[421] the distinction is reserved only for their personnel who meet certain criteria. On 20 July 2021, the FAA updated its policy on who qualifies to be an astronaut. Commercial launch crew members must be employed by an FAA-certified company performing the launch, they must reach an altitude of higher than 50 miles (80 kilometers) above the earth's surface during flight, and they must have demonstrated activities during the mission that were "essential to public safety, or contributed to human space flights

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[418] *Outer Space Treaty*, *supra* note 120, art 5.

> State Parties to the Treaty shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party of on the high seas. When astronauts make such a landing, they shall be safely and promptly returned to the State of registry of their space vehicle. In carrying on activities in outer space and on celestial bodies, the astronauts of one State Party shall render all possible assistance to the astronauts of other State Parties. State Parties to the Treaty shall immediately inform the other State Parties to the Treaty or the Secretary-General of the United Nations of any phenomena they discover in outer space, including the Moon and other celestial bodies, which could constitute a danger to the life or health of astronauts.

[419] Denise Chow, "The FAA just updated its definition of 'astronaut' These two billionaires don't qualify", *Yahoo!News* (23 July 2021), online: <news.yahoo.com/gets-called-astronaut-complicated-192755714.html>.

[420] *Commercial Space Launch Activities - Definitions: government astronaut*, 51 USC § 50902(4).

> "government astronaut" means an individual who— (A) is designated by the National Aeronautics and Space Administration under section 20113(n); (B) is carried within a launch vehicle or reentry vehicle in the course of his or her employment, which may include performance of activities directly relating to the launch, reentry, or other operation of the launch vehicle or reentry vehicle; and (C) is either— (i) an employee of the United States Government, including the uniformed services, engaged in the performance of a Federal function under authority of law or an Executive act; or (ii) an international partner astronaut.

See *Identification of Government Astronauts*, 51 USC § 20113(n).

[421] US Air Force, "Air Force Guidance Memorandum to Air Force Manual (AFMAN) 11-402, Aviation and Parachutist Service" (2021), online (pdf): <static.e-publishing.af.mil/production/1/af_a3/publication/afman11-402/afman11-402.pdf>; US Navy, "Naval Astronaut Designation—MILPERSMAN 1210-020" (2008), online (pdf): <www.mynavyhr.navy.mil/Portals/55/Reference/MILPERSMAN/1000/1200Classification/1210-020.pdf?ver=KPSLtoZ7m5GTRsxo9_tpgA%3D%3D>.

safety."[422] Under the FAA policy, being merely transported from one point to another is not enough to be considered an astronaut on a commercial launch.

The military has its own designation process for astronauts, but being a passenger on board would not qualify one for the designation. Under Title 10,[423] the USAF may award aeronautical ratings, including astronaut qualifier rating.[424] The Navy can also designate astronauts. Naval qualifications include naval astronaut (pilot) and naval astronaut (specialist) designations.[425] The military's qualification rules do not contemplate a uniformed service member passenger on a military-contracted commercial space transportation service. Thus, such passengers would not qualify for the astronaut designation.

Interestingly, the Rescue Agreement does not use the same language as the Outer Space Treaty, as it refers generically to "personnel of a spacecraft," which would encompass military members transported via spacecraft. If an accident were to occur and a spacecraft were to land in the territory of a contracting party or the high seas, a contracting state is obliged to take all possible steps to rescue them and render all necessary assistance.[426] This provision is similar to the Chicago Convention's Requirements under Article 25 to render assistance to aircraft in distress[427] and such a requirement is also proscribed under maritime law discussed below. The provisions of the Rescue Agreement spell out the circumstances under which a contracting state must render

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[422] Federal Aviation Administration, "88002—FAA Commercial Space Astronaut Wings Program" (2021) at para 5, online (pdf): <www.faa.gov/documentLibrary/media/Order/FAA_Order_8800.2.pdf>.

[423] *Flying Officer Rating: qualifications*, 10 USC § 9253.

[424] US Air Force, *supra* note 421 at 29, at para 4.3.3.

> A USAF rated officer qualified to perform duties in space (50 miles above the earth's surface) who completes a minimum of one operational mission is eligible for the astronaut qualifier.

[425] US Navy, *supra* note 421 at para 2. To be awarded astronaut designation naval and marine officers need to:

> Fly (pilots) a powered vehicle designed for flight about 50 mile from the earth's surface; and/or
> Serve as a mission specialist on a powered vehicle designated for flight above 50 miles from the earth's surface; and
> Have completed a minimum of one flight as a pilot or mission specialist on an extraterrestrial vehicle in a flight above 50 miles from the earth's surface.

[426] *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space*, 22 April 1968, 672 UNTS 119, 19 UST 7570, TIAS No 6599, 7 ILM 121 arts 1–4 (entered into force 3 December 1968) [*Rescue Agreement*].

[427] The relevant provision states:

> Each contracting State undertakes to provide such measures of assistance to aircraft in distress in its territory as it may find practicable, and to permit, subject to control by its own authorities, the owners of the aircraft or authorities of the State in which the aircraft is registered to provide such measures of assistance as may be necessitated by the circumstances. Each contracting State, when undertaking search for missing aircraft, will collaborate in coordinated measures which may be recommended from time to time pursuant to this Convention. *Chicago Convention*, *supra* note 175, art 25.

assistance: "owing to accident, distress, emergency or unintended landing."[428] The Rescue Agreement does not limit the circumstances to whether the spacecraft is military or civilian or the statute of the passengers.

Although space law does not specifically address whether military passengers on a commercial spacecraft must be rescued, some analogies from maritime law are insightful. These analogies suggest how the law of space might develop in the future. If the requirements from maritime law were to be adopted into the body of space law (during peacetime) and the law of armed conflict (during war), rescue would be required even for opposing military forces and civilians. In peacetime, the UN Convention on the Law of the Sea imposes a duty to rescue.[429] It is required that every ship and coastal states have special obligations to establish and provide rescue services.[430] In war, a duty to rescue also exists.[431] The 1910 Salvage Convention states that "[e]very master is bound, so far as he can do so without serious danger to his vessel, her crew ad her passengers, to render assistance to everyone even though an enemy, found at seas in danger of being lost."[432] Additional Protocol I of the Geneva Conventions defines shipwrecked persons as those who:

> whether military or civilian, who are in peril at sea or in other waters as a result of misfortune affecting them or the vessel or aircraft carrying them and who refrain from any act of hostility. These persons, provided that they

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[428] *Rescue Agreement*, *supra* note 426, art 2.

[429] *UNCLOS*, *supra* note 183.

[430] *Ibid*, arts 1 and 2.

> (1) Every State shall require the master of a ship flying its flag, in so far as he can do so without serious danger to the ship, the crew or the passengers:
>
> (a) to render assistance to any person found at sea in danger of being lost;
>
> (b) to proceed with all possible speed to the rescue of persons in distress, if informed of their need of assistance, in so far as such action may reasonably be expected of him;
>
> (c) after a collision, to render assistance to the other ship, its crew and its passengers and, where possible, to inform the other ship of the name of his own ship, its port of registry and the nearest port at which it will call.
>
> (2) Every coastal State shall promote the establishment, operation and maintenance of an adequate and effective search and rescue service regarding safety on and over the sea and, where circumstances so require, by way of mutual regional arrangements cooperate with neighbouring States for this purpose

[431] Irini Papanicolopulu, "The duty to rescue at sea, in peacetime and in war: A general overview" (2016) 98:902 Int Rev Red Cross 491 at 502–509.

[432] *Brussels Convention for the Unification of Certain Rules of Law Relating to Assistance and Salvage at Sea*, 23 September 1910, art 11 (entered into force 1 March 1913) [*Brussels Convention*]. Although the Salvage Convention has been superseded by the 1989 International Convention on Salvage, arguably the 1910 Convention still remains in force regarding the duty to rescue during wartime as the 1989 Convention does not contain any provisions on that issue. The 1989 Convention, therefore, leaves the issue of rescue during war unaddressed rather than superseding such provisions. See *Vienna Convention on the Law of Treaties*, 23 May 1969, 1155 UNTS 331 art 59(1)(b) (entered into force 27 January 1980) [*Vienna Convention*].

> continue to refrain from any act of hostility, shall continue to be considered shipwrecked during their rescue until they acquire another status under the Conventions or this Protocol;[433]

Essentially, so long as the shipwrecked do not take up arms again, they are considered *hors de combat* and cannot be targeted. Furthermore, Article 18 provides that:

> After each engagement, Parties to the conflict shall, without delay, take all possible measures to search for and collect the shipwrecked, wounded and sick, to protect them against pillage and ill-treatment, to ensure their adequate care, and to search for the dead and prevent their being despoiled.[434]

The duty to rescue the shipwrecked at sea applies to any person at sea, whether an enemy force or a civilian. This is a rule of customary international law.[435] These provisions suggest ways in which the law might evolve in the future based on existing analogies in maritime law.

C. Law of Armed Conflict

Modern law of armed conflict began at The Hague Peace Conferences of 1899 and 1907. One of the most important outcomes of the conferences was the recognition that "[t]he right of belligerents to adopt means injuring the enemy is not unlimited."[436] Up to WWI, the civilian population did not suffer from the use of weapons in combat other than in the combat zone itself.[437] The measures adopted in 1899 and 1907 (prohibiting attacks on places not defended, the protection of certain buildings) appeared sufficient.[438] This situation changed during WWI with the increased range of artillery and the first bombardment by air.[439] Other treaties followed, which specified in greater detail the limits of violence in war. For example, the 1925 Geneva Protocol further restricted the use of poisons and asphyxiating gases.[440] However, World War II

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[433] *Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I)*, 8 June 1977, 1125 UNTS 3 art 8(b) (entered into force 7 December 1978) [*Protocol I*].
[434] *Geneva Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea*, 12 August 1949, 75 UNTS 85 art 18 (entered into force 21 October 1950) [*Geneva Convention (II)*].
[435] Jann Kleffner, "Protection of the Wounded, Sick, and Shipwrecked" in Dieter Fleck, ed, *The Handbook of International Humanitarian Law*, 4th ed (Oxford, UK: Oxford University Press, 2021) 360 at 362.
[436] *Convention respecting the Laws and Customs of War on Land and its Annex: Regulations Concerning the Laws and Customs of War on Land*, 18 October 1907, art 22 (entered into force 26 January 1910) [*Hague Convention (IV) on War on Land*].
[437] Bruno Zimmermann et al, *Commentary on the Additional Protocols: of 8 June 1977 to the Geneva Conventions of 12 August 1949* (Leiden, The Netherlands: Brill | Nijhoff, 1987) at 598.
[438] *Ibid*.
[439] *Ibid*.
[440] *Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare*, 17 June 1925, 94 LNTS 65 (entered into force 8 February 1928) [*1925 Geneva Protocol*].

demonstrated the inadequacy of existing treaties in protecting civilians and non-combatants. Strategic bombing during WWII was especially inhumane to civilians and was not prevented by existing agreements.[441] Reprisal was systematically used against towns and civilian populations.[442]

Whereas the body of law emerging from the Hague Conferences affected the conduct of hostilities, the four Geneva Conventions emerging after WWII aimed to protect victims of armed conflict.[443] The Geneva Conventions were strengthened by the Additional Protocols of 1977.[444] It is important to note that the US is not a party to these Protocols. However, the US considers many of the provisions of Additional Protocol I to be customary international law.[445] The four principles of the law of armed conflict (military necessity, distinction, proportionality, and humanity) as applied to military contracted commercial spacecraft are discussed below. Distinctions between Additional Protocol I and what the US has recognized as customary international law are also addressed.

### *1. The Law of Armed Conflict in Outer Space*

Prior to addressing the four principles of the law of armed conflict, it is useful to understand how the law of armed conflict applies in space. The Oslo Manual provides a restatement of the current law of armed conflict in a range of different contexts, including outer space. Although the

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[441] Phillip S Meilinger, "Winged Defense: Airwar, The Law, and Morality" (1993) 20:1 Armed Forces & Society 103 at 103. The bombing of Dresden in February 1945 killed 25,000 inhabitants and injured another 30,000. The bombings of Hiroshima and Nagasaki killed between 226,000 and 566,000 Japanese civilians. William J Fenrick, "The Rule of Proportionality and Protocol in Conventional Warfare" (1982) 98 Mil L Rev 91 at 122, 127.
[442] Zimmermann et al, *supra* note 437 at 598.
[443] Amanda Alexander, "A Short History of International Humanitarian Law" (2015) 26:1 Eur J Int Law 109 at 114–115.
[444] *Protocol I*, *supra* note 433; *Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II)*, 8 June 1977, 1125 UNTS 609 (entered into force 7 December 1978) [*Protocol II*].
[445] Theodore Thomas Richard, *Unofficial United States guide to the First Additional Protocol to the Geneva Conventions of 12 August 1949* (Maxwell Air Force Base, AL: Air University Press, 2019) at 3. See e.g. Office of General Counsel, US Department of Defense, "DoD Law of War Manual" (2016) n 471, online (pdf): <dod.defense.gov/Portals/1/Documents/pubs/DoD%20Law%20of%20War%20Manual%20-%20June%202015%20Updated%20Dec%202016.pdf?ver=2016-12-13-172036-190> [first published in June 2015, revised in December 2016] (noting that the US is not a party to Additional Protocol I but supports and respects, for example, the treatment of journalists and other media representatives as having protected civilian status).

Manual is not binding, its Black-Letter rules are the work of a group of experts to articulate the currently accepted state of the law of armed conflict in various contexts, including outer space.[446]

Several restatements of the law are helpful to the present issue of military contracted civilian space transportation. First, international law, including the UN Charter and the law of armed conflict, applies to operations in outer space.[447] Operations in outer space are broadly construed and include activities where an object temporarily traverses outer space.[448] Second, the principles of the law of armed conflict are the *lex specialis* during armed conflict and prevail over *the lex generalis* of space law.[449] Third, in the event of an armed conflict in space, states bear responsibility under the law of armed conflict, which is consistent with Article VI of the Outer Space Treaty.[450] Fourth, outer space systems and assets belonging to the armed forces constitute military objectives because, by their nature, they effectively contribute to an adversary's military action.[451] Fifth, civilian outer space systems and assets must not be attacked unless they qualify as military objectives by location, purpose, or use.[452] Sixth, the concept of direct participation in hostilities applies to civilians who conduct outer space operations in the context of an armed conflict.[453] Finally, belligerent states must conduct their outer space operations with due regard for the rights of neutral states in accordance with Article IX of the Outer Space Treaty.[454]

The Black-Letter rules are helpful in understanding how outer space law intersects with the law of armed conflict. Space law, including the Outer Space Treaty, is the general law applicable to space at all times. However, the law of armed conflict is the specific subject matter law

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[446] The Black-Letter rules are the collaborative effort of the Group of Experts collaborating for this publication. However, the commentary represents the work of the drafting committee, which has input from the Group, but does not represent the work of the Group as a whole. See Yoram Dinstein & Arne Willy Dahl, *Oslo manual on select topics of the law of armed conflict: rules and commentary* (Cham, Switzerland: Springer, 2020) at vii–viii.
[447] *Ibid* at 3–4, Rule 2.
[448] *Ibid* at 2, Rule 1 Commentary.
[449] *Ibid* at 5, Rule 4.
[450] *Ibid* at 5–6, Rule 5.
[451] *Ibid* at 9, Rule 9.
[452] *Ibid* at 9–10, Rule 10.
[453] *Ibid* at 11, Rule 12.
[454] Belligerent states should also implement measures to reduce the risk of damaging critical infrastructure and communications assets of neutral states. *Ibid* at 16, Rule 19. Similar duties exist in armed conflict at sea. See *Sanremo Manual on International Law Applicable to Armed Conflict at Sea* (Sanremo, Italy: International Institute of Humanitarian Law, 1994) at paras 12, 88 (requiring "due regard for the legitimate rights and duties" of neutral states).

governing during armed conflict. This discussion provided the space context for the more in-depth discussion of the law of armed conflict to follow.

*2. Military Necessity*

Military necessity is a fundamental principle of the law of armed conflict regarding the use of force.[455] However, it is not defined by treaty. Military necessity permits measures that are necessary to accomplish a legitimate military purpose and are not otherwise prohibited by the law of armed conflict. The principle cannot be used to justify violations of the law.[456] A legitimate military purpose is one that is required to secure the overpowering of the enemy.[457] Thus, it has two parts: a military requirement to undertake a certain measure, and that measure is not prohibited by the law of armed conflict. A reasonable connection must exist between the measures being undertaken and the military objective to be achieved.

Turning to the scenario of a commercial spacecraft contracted by the US military, this principle requires that using force against such an object or its personnel must be militarily necessary. This is a separate requirement that the rule of distinction discussed below. Several factual issues are pertinent to the analysis of necessity with respect to the application of armed force to this object, including its proximity to the conflict and utility to the adversary's warfighting ability. The destruction, disabling, or capture of such an object must meet a tangible military objective that would degrade an adversary's ability to continue to fight.[458] Therefore, to target a military-contracted commercial spacecraft, its passengers, or supporting infrastructure and personnel during armed conflict, the attack must achieve a valid military requirement, and the use of force must not otherwise be prohibited by the law of armed conflict.

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[455] See generally Sigrid Redse Johansen, *The military commander's necessity: the law of armed conflict and its limits* (Cambridge, UK: Cambridge University Press, 2019) (providing an extensive analysis of the history and interpretation of the principle of military necessity).
[456] Michel Bourbonniere, "Law of Armed Conflict (LOAC) and the Neutralisation of Satellites or Ius in Bello Satellitis" (2004) 9:1 J Conflict & Sec L 43 at 47.
[457] Frédéric de Mulinen, *Handbook on the law of war for armed forces* (Geneva, Switzerland: International Committee of the Red Cross, 1987) at 82–83.
[458] "Put otherwise, the attacker must be convinced that attacking the target will contribute to the victory of his military undertaking." Robert A Ramey, "Armed Conflict on the Final Frontier: the Law of War in Space" (2000) 48 AF L Rev 1 at 35.

*3. Proportionality*

The rule of proportionality requires that the use of military force be proportional to the military objective to be achieved. It requires more analysis than simply the amount of force necessary to achieve a military goal. Rather, proportionality requires weighing the anticipated military advantage to be gained against the damage that using force would cause. The requirement that the use of force does not result in disproportionate civilian casualties is recognized in customary law and in Additional Protocol I.[459]

Although the word "proportionality" or "proportionate" are not included in Additional Protocol I, Articles 51 and 57 embody this concept. Article 51(5)(b) prohibits indiscriminate attacks and describes what is essentially the principle of proportionality:

> an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated.[460]

The phrase "may be expected" in Article 51 requires a degree of objective reasonableness.[461] This language also denotes that the assessment of military advantage versus civilian casualties is *ex ante* rather than *ex post facto*.[462] Therefore, when conducting a use of force analysis, the balance a reasonable targeting authority must weigh is what civilian harm can be expected at the time of the attack.

The language of Article 57(2)(a)(iii) also embodies the notion of proportionality:

> With respect to attacks, the following precautions shall be taken:
>
> (a) those who plan or decide an attack shall:
>
> . . .
>
> (iii) refrain from deciding to launch any attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated;[463]

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[459] Judith Gardam, "Proportionality as a Restraint on the Use of Force" (1999) 20 Aust YBIL 161 at 165.
[460] *Protocol I*, *supra* note 433, art 51(5).
[461] Alexander Breitegger, *Cluster Munitions and International Law: Disarmament With a Human Face?*, Routledge Research in the Law of Armed Conflicts (Hoboken, NJ: Taylor & Francis Group, 2012) at 48.
[462] Timothy L H McCormack & Paramdeep B Mtharu, "Chapter 13 Cluster Munitions, Proportionality and the Foreseeability of Civilian Damage" in Ola Engdahl & Pål Wrange, eds, *Law at War: The Law as it Was and the Law as it Should Be* (Leiden, The Netherlands: Brill | Nijhoff, 2008) 191 at 196.
[463] *Protocol I*, *supra* note 433, art 57(2)(a)(iii).

Therefore, if the targeting authority concludes that the use of force would cause excessive civilian casualties, he must not authorize such force, or such use of force in progress must be suspended.[464] Although the assessment is *ex ante*, the duty to weigh the balance of achieving a military objective against the harm to civilians is a continuing obligation.[465]

Now that a basic definition of proportionality has been established, this concept will be applied to military contracted civilian space transportation. This discussion inevitably brings in some concepts from the concept of military necessity. Discussing proportionality requires an analysis of weighing the damage of achieving a valid military objective against civilian casualties.[466] In discussing whether an object is targetable, one must decide what object is to be targeted: the spacecraft itself, its supporting infrastructure and personnel (such as a spaceport), the personnel on board, or a combination. Issues of distinction (discussed in the next section) aside, once the target has been chosen, an assessment of the damage to civilians and civilian objects is required. Therefore, depending on what one is targeting, the other people or things that can be impacted by the attack are part of the collateral damage assessment, which must adhere to the principle of proportionality.

Outer space operations constituting attacks should consider the effects of space debris as part of a collateral damage assessment.[467] In a working paper submitted to the UN General Assembly, the International Committee of the Red Cross (ICRC) has recognized that damaging or destroying space objects could generate a huge amount of debris.[468] The debris generated by such attacks could destroy in an unpredictable manner other objects critical to civilian life, such as communication and weather satellites, which can, in turn, affect civilian industries such as shipping and air traffic control.[469] Given the difficulty in predicting how debris will further damage

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[464] Ben Clarke, "Proportionality in Armed Conflicts: A Principle in Need of Clarification?" (2012) 3:1 J Int Humanit Leg Stud 73 at 78.
[465] Belligerents must take "constant care to spare the civilian population" *Protocol I*, *supra* note 433, art 57(1).
[466] Ramey, *supra* note 460 at 39.
[467] Dinstein & Dahl, *supra* note 446 at 10–11, Rule 11.
[468] International Committee of the Red Cross, "Constraints under International Law on Military Operations in, or in Relation to, Outer Space during Armed Conflicts" (2022) at 4, online (pdf): <www.icrc.org/en/download/file/241858/icrc_working_paper_on_the_constraints_under_international_law_on_military_space_operations_final_en.pdf>.
[469] *Ibid*.

other objects, the consideration of space debris in a collateral damage assessment during the targeting process is an important, albeit highly difficult, one.

*4. Distinction*

The principle of distinction in armed conflict provides that a State may only target combatants or military objectives. The rule articulated in Additional Protocol I, Article 48:

> In order to ensure respect for and protection of the civilian population and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian population and combatants and between civilian objects and military objectives and accordingly shall direct their operations only against military objectives.[470]

This rule contains the basic requirement that a targeting authority must distinguish between civilians and military objectives. Article 51 prohibits indiscriminate attacks, namely those attacks which are not directed at a military objective.[471] It prohibits means of warfare that cannot be limited and which are of a nature to strike military objectives and civilians or civilian objects without distinction.[472] Distinction is also recognized as customary law, but the particularities of the principle are discussed below.

Under the principles of distinction of Additional Protocol I, civilians have a general protection against dangers arising from military operations.[473] However, civilians who directly participate in hostilities forfeit their protection from being attacked.[474] The US position expands this principle further. The DoD Law of War Manual asserts that "[t]aking a direct part in hostilities extends beyond merely engaging in combat and also includes certain acts that are an integral part of combat operations or that effectively and substantially contribute to an adversary's ability to conduct or sustain combat operations."[475] Thus, a difference exists between the US standard of distinction and that of Additional Protocol I. Under Additional Protocol I, civilians may only lose protection by involving themselves in *hostilities*.[476] The US

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[470] *Protocol I*, *supra* note 433, art 48.
[471] *Ibid*, art 51(4).
[472] *Ibid*, art 51(4)(c).
[473] *Ibid*, art 51(1).
[474] Peter Margulies, "At War with Itself: The DoD Law of War Manual's Tension between Doctrine and Practice on Target Verification and Precautions in Attack" in Michael A Newton, ed, *The United States Department of Defense Law of War Manual: Commentary and Critique* (Cambridge, UK: Cambridge University Press, 2019) 201 at 205.
[475] Office of General Counsel, US Department of Defense, *supra* note 445 at 228, at para 5.8.3.
[476] Adil Ahmad Haque, "Misdirected: Targeting and Attack under the DoD Manual" in Michael A Newton, ed, *The United States Department of Defense Law of War Manual: Commentary and Critique* (Cambridge, UK: Cambridge University Press, 2019) 225 at 231.

standard asserts that civilians can lose protection by involving themselves *in the ability to conduct or sustain operations*.[477]

One targeting example of the broader US interpretation of distinction is the US and coalition strikes on the Islamic State of Iraq and Syria (ISIL). These strikes targeted ISIL-controlled oil refineries in remote areas of eastern Syria and were aimed at degrading its war-sustaining capability.[478] Specifically, these strikes were aimed at eliminating the export of oil, which financed ISIL. The Military Commissions Act of 2009 adopted criteria that permit an attack on objects that, by "their nature, location, purpose, or use, effectively contribute to the war-fighting or war-sustaining capability of an opposing force."[479] By contrast, the HPCR Manual on International Law Applicable to Air and Missile Warfare rejects this position arguing that revenues from the export of oil and military action are too attenuated to be a valid military objective.[480] Thus, one can see how the US interpretation of this principle was used to include a broader scope of targets.

Although the US recognizes many provisions of Additional Protocol I as customary international law, it does not recognize the default presumption that a person or object is a civilian to be customary international law. Additional Protocol I Article 50(1) states that "[i]n case of doubt whether a person is a civilian, that person shall be considered a civilian." Furthermore, Article 52(3) requires: "[i]n case of doubt whether an object which is normally dedicated to civilian purposes, such as a place of worship, a house or other dwelling or a school, is being used to make an effective contribution to military action, it shall be presumed not to be so used." However, the US position, as articulated in the DoD Law of War Manual, is: "under customary international law, no legal presumption of civilian status exists for persons or objects, nor is there any rule inhibiting commanders or other military personnel from acting based on the information available to him in doubtful cases."[481]

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[477] *Ibid*.
[478] See Kenneth Watkin, "Targeting 'Islamic State' Oil Facilities" (2014) 90 Int'l L Stud 499 (providing an extensive analysis of the US-coalition targeting of ISIS facilities as a system written by the former Judge Advocate General of the Canadian Forces).
[479] *Military Commissions Act of 2009*, Pub L No 111–84, § 950p(a)(1), 123 Stat 2190.
[480] Program on Humanitarian Policy and Conflict Research, *HPCR Manual on international law applicable to air and missile warfare* (Cambridge, UK: Cambridge University Press, 2013) at Rule 24 and commentary.
[481] Office of General Counsel, US Department of Defense, *supra* note 445 at 200–201, at para 5.4.3.2.

Several scholars have criticized the Law of War Manual's position on this point. Margulies asserts that the DoD Law of War manual has "shaky support" for its rejection of a legal presumption of civilian status for persons or objects.[482] He further argues that such a principle would only be appropriate if the only alternative were the notion that *any* doubt (not just a substantial[483] or significant doubt[484]) would preclude the use of force, but that is not the legal standard.[485] Lederman describes the Manual's notion that there is no legal presumption of civilian status as "startling."[486] Goodman labels the Manual's interpretation of the law as a "clear error." Both Lederman and Goodman argue that the sources that the Manual cites in support of this position do not adequately support it.[487] With regard to the sources the Manual cites, Haque writes that "even if the rule of doubt was not part of customary international law in 1977, 1982, or 1993, it is now widely accepted as part of customary international law."[488] Hathaway et al. point out that the DoD itself has recognized the default civilian status of objects.[489] A US military report on the 2015 airstrike of the Médicins Sans Frontières (MSF) hospital in Kunduz, Afghanistan, found that the aircrew failed to comply with the law of armed conflict.[490] Additionally, the report found that the hospital "should have been presumed to be a civilian

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[482] Margulies, *supra* note 476 at 216.
[483] Michael N Schmitt, ed, *Tallinn Manual 20 on the International Law Applicable to Cyber Operations* (Cambridge, UK: Cambridge University Press, 2017) at 424, at para 3.
[484] Jean-Marie Henckaerts & Louise Doswald-Beck, *Customary International Humanitarian Law—Volume I: Rules* (Cambridge, UK: Cambridge University Press, 2005) at 244, at para 749.
[485] Margulies, *supra* note 476 at 216.
[486] Marty Lederman, "Troubling proportionality and rule-of-distinction provisions in the Law of War Manual", *Just Security* (27 June 2016), online: <www.justsecurity.org/31661/law-war-manual-distinction-proportionality/>.
[487] *Ibid*.
[488] Ryan Goodman, "Clear Error in the Defense Department's Law of War Manual: On Presumptions of Civilian Status", *Just Security* (9 February 2022), online: <www.justsecurity.org/80147/clear-error-in-the-defense-departments-law-of-war-manual-on-presumptions-of-civilian-status/>.
[489] Oona Hathaway, Marty Lederman & Michael Schmitt, "Two lingering concerns about the forthcoming Law of War Manual amendments", *Just Security* (30 November 2016), online: <www.justsecurity.org/35025/lingering-concerns-forthcoming-law-war-manual-amendments/>.
[490] US Central Command, *Investigation Report of the Airstrike on the Médecins Sans Frontières / Doctors Without Borders Trauma Center in Kunduz, Afghanistan on 3 October 2015*, by US Forces-Afghanistan (28 April 2016) at 61, at para 114(a), online: <www.justsecurity.org/wp-content/uploads/2022/02/Investigation-Report-of-the-Airstrike-on-the-Medecins-Sans-Frontieres-I-Doctors-Without-Borders-Trauma-Center-in-Kunduz-Afghanistan-on-3-October-2015-2016-report.pdf>. See also US Central Command, "April 29: CENTCOM releases investigation into airstrike on Doctors Without Borders trauma" (29 April 2016), online: <www.centcom.mil/MEDIA/PRESS-RELEASES/Press-Release-View/Article/904574/april-29-centcom-releases-investigation-into-airstrike-on-doctors-without-borde/> (discussing the release of report and factors contributing to the incident).

compound."[491] The absence of a default presumption that an object is civilian is problematic given "dual-use" objects and facilities, which are further discussed below.

Many objects are capable of a variety of applications and can be used for military or civilian functions or "dual-use." As discussed earlier, since the end of the Cold War, the military has dealt with an ever-shrinking budget by outsourcing many requirements to civilian companies. One of the tenets of airlift policy is to prioritize the use of civilian assets unless military capabilities are required. Utilizing civilian assets for surge capacity during a crisis is another reason that an asset may be used for both military and civilian purposes. Indeed, two benefits of CRAF previously noted included cost savings and surge capacity. Recent US space policy has not only "welcomed this heightened entanglement of private and public space functions" but it has "also promoted and directed it, including for performance of the most important national security duties."[492] The increase in comingling of military functions with civilian assets is what one scholar has deemed a violation of "reverse distinction," a state's obligation to separate or differentiate between its military and the nearby civilian population.[493] The US military's increasing use of civilian assets and personnel coupled with the US government's broad interpretation of what is targetable (under an expanded definition of effectively and substantially contributing to combat operations) potentially make such assets and personnel targetable.

Recalling the previous discussions of Rocket Cargo, to better clarify the status of the spacecraft under this program, the US government could adopt a policy whereby the military would only contract such spacelift services only to support humanitarian relief efforts and would not use them in conflict. Although the military would still be using a civilian asset, the military is in a support role to civilian government agencies such as the Federal Emergency Management Agency[494] or the State Department in a peacetime scenario. Under such a policy, the use of such

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[491] US Forces-Afghanistan, *supra* note 492 at 59, at para 113(g)(2).

[492] David A Koplow, "Reverse Distinction: A US Violation of the Law of Armed Conflict in Space" (2022) 13:1 Harv Nat'l Sec J 25 at 71. See also US President Donald J Trump, *Presidential Directive SPD-3, National Space Traffic Management Policy*, 2018 [*National Space Traffic Management Policy*], online: <trumpwhitehouse.archives.gov/presidential-actions/space-policy-directive-3-national-space-traffic-management-policy/> (encouraging the growth of the US commercial space sector); *US Space Priorities*, *supra* note 58 (fostering a policy and regulatory environment that enables a competitive and burgeoning US commercial space sector).

[493] Koplow, *supra* note 494 at 32.

[494] In 1950, Congress passed the Federal Disaster Relief Act (Public Law 81-875), authorizing the President to provide supplementary Federal assistance when a Governor requested help and the President approved the request by declaring

a spacecraft remains more easily distinguishable, and the spacecraft retains its status as a civilian object so long as it is not used to support a war-fighting capability. Additionally, the civilian crews of such spacecraft are not targetable as they would not be directly participating in hostilities.

However, as explained in the historical discussions of previous sections where civilian aircraft were readily requisitioned by the War Department during WWII, a civilian object could be quickly brought into the service of the military when needed for war effort. SUSTAIN clearly contemplated the use of various spacecraft options for the insertion of troops into theater, and Rocket Cargo might serve as a means of delivering military materiel during conflict. If the US military were to contract civilian companies for military cargo transportation forward into theater but not directly into the combat zone, its own interpretation of the principle of distinction might be broad enough to make the crew of such a spacecraft targetable, whereas the narrower construction of "direct participation in hostilities" of Additional Protocol I would likely exclude it.[495]

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a major disaster. Today, the Robert T. Stafford Act gives the Federal government its authority to provide response and recovery assistance in a major disaster including using the US military in a supporting role to civilian agencies.

[495] The ICRC published interpretative guidance about the law of armed conflict relating to civilians directly participating in hostilities in 2009. The ICRC guidance discusses the difference between "direct" and "indirect" participation in hostilities using the example of a truck driver transporting ammunition. The difference can be difficult to establish, but it is vital. If a truck driver delivered ammunition to the shooting position of the front line would be direct participation in hostilities. However, if the truck driver were merely transporting ammunition from a factory to a port far from a conflict zone, the connection is too attenuated. The ammunition truck remains a military objective subject to attack, but the driver driving it to a destination would not amount to direct participation in hostilities and, therefore, the civilian driver could not be targeted separately from the truck, according to the ICRC. See Nils Melzer, *Interpretive Guidance on the Notion of Direct Participation in Hostilities Under International Humanitarian Law* (Geneva, Switzerland: International Committee of the Red Cross, 2009) at 56. The US prosecution of Salim Ahmed Hamdan dealt with the issue of directly participating in hostilities by driving a vehicle containing two surface-to-air missiles in spatial and temporal proximity to ongoing combat operations. The prosecution argued that Hamdan "purposefully and materially supported hostilities by (1) serving as the personal driver and bodyguard of the al-Qaeda mastermind Osama bin-Ladin, (2) continuing to work for bin-Ladin after he became aware that bin-Ladin had planned and directed the USS Cole bombing, the attacks on the two U.S. Embassies in Africa, and the 9/11 attacks on the United States; and (3) by driving bin-Lad in around Afghanistan after the attacks of 9/11, in an effort to help him avoid detection and punishment by the United States." The Commission found that these acts were not enough to subject the accused to the jurisdiction of the commission. However, driving a vehicle loaded with toward a battlefield was an act the Commission deemed met the first half of the definition of an unlawful enemy combatant. *United States of America v Salim Ahmed Hamdan*, On Reconsideration Ruling on Motion to Dismiss for Lack of Jurisdiction (2007) at 6–7, online: <www.mc.mil/Portals/0/pdfs/Hamdan/Hamdan%20(AE084).pdf>. See Michael N Schmitt, "The Interpretive Guidance on the Notion of Direct Participation in Hostilities: A Critical Analysis" (2010) 1 Harv Nat'l Sec J 5 (discussing civilians who directly participate in hostilities and the ICRC interpretive guidance).

*5. Humanity*

This principle is the result of efforts to limit the means and methods of warfare causing unnecessary suffering. The principle of humanity is linked to military necessity.[496] Injury and death are inevitable in armed conflict, but there are limitations. Once a military purpose has been achieved, the infliction of additional suffering is unnecessary.[497] Additional Protocol I states that "it is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering."[498] It is also prohibited to continue to attack a person once he has been rendered *hors de combat*. A combatant is *hors de combat* if the person: is in the power of an adversary; has clearly expressed an intent to surrender; or has been rendered unconscious or otherwise incapacitated, thus is incapable of defense.[499]

Humanity, like the other principles, must be observed during armed conflict. The military's contracting of commercial space transportation does not pose any unique issues under this principle. However, as technology develops, especially in the cyber realm, the law may evolve more specifically to account for the fact that combatants cannot survive in space (or at very high altitudes in the air) without oxygen-supplying equipment. For example, if cyber-attacks could be used to shut down an aircraft or spacecraft's oxygen system, causing the crew or passengers to suffocate, this might be a means of warfare that is specifically outlawed for contravening this principle. If cyber-attacks became a method of war where such use may run afoul of this principle, the law may evolve to prohibit such means and methods of warfare much as it did after WWII.

D. Conclusion

This chapter analyzed the law applicable to the military's use of commercial space transportation during armed conflict, especially with regard to the use of force. The provisions of space law (*lex generalis*) were applied, as were the provisions of the law of armed conflict (*lex specialis*). Some ambiguity in the law exists as to the requirements for combatants who have become *hors de combat* in space. Maritime law provides a model for how space law and the law of armed conflict in space could evolve. The analogous provisions of maritime law require

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[496] William H Boothby, *The Law of Targeting* (Oxford, UK: Oxford University Press, 2012) at 59.
[497] *Ibid* at 60.
[498] *Protocol I*, *supra* note 433 at 35(2).
[499] Ian Henderson, *The Contemporary Law of Targeting: Military Objectives, Proportionality and Precautions in Attack under Additional Protocol I* (Leiden, The Netherlands: Martinus Nijhoff, 2009) at 84.

shipwrecked sailors be rescued regardless of their nationality during peacetime and in conflict. Under the principles of the law of armed conflict, a concern in space is the effect of kinetic attacks to cause space debris and the difficulty of predicting how damaging (and hence how proportional) an attack is. Additionally, the US' broad interpretation of the concept of "directly participating in hostilities," a legal interpretation from the war on terror, might be to its disadvantage if it wants to utilize civilian commercial space transport for its troops. Additionally, the US' lack of recognition of the default rule that an object with ambiguous status should be assumed to be civilian could have some extremely negative consequences in the context of its own commingled use of civil assets for military purposes.

## VII. Conclusions

This thesis examined the challenges under international and national law of the US military's use of commercial transportation. It first traced the major events leading to the military's initial interest in space transportation beginning in the Cold War through the changes in US security priorities, including the war on terror and the current era of strategic competition. Each era of security has shaped US priorities in technology and law. The first chapter also outlined the types of space transportation the US military is currently considering and their role in the US logistics network to deliver supplies to austere locations or disaster sites.

The second chapter examined the application of international air law to the military's potential use of commercial sub-orbital transportation. Under the current Chicago system, the delineation between state and civil aircraft is not always clear. Although the US has clearly delineated the two as a matter of domestic law and policy, countries have clashed on their recognition of another state's designation of its aircraft. If, as discussed in the first chapter, the US military role in disaster relief continues to grow, the lines will become increasingly blurred when the military uses commercial space transportation. Such a situation would entail the military (state), acting in support of a civilian domestic emergency agency or the State Department (state), contracting a commercial space carrier (civil) for carriage of humanitarian relief items provided by the Red Cross and other non-governmental organization (civil) and/or government provided relief supplies (state). One can see how this situation is not crystal clear under international air law. If, indeed, international consensus is that air law should apply to sub-orbital spacecraft under the regulation of ICAO, this is an issue the US military should take into consideration when using commercial space transportation services. Until international consensus is reached, filing accurate and detailed information into a flight plan can at least remove the onus from the crew to argue status in the event of a dispute and can provide notice.

The third chapter assessed whether the CRAF program would be a suitable model on which to integrate commercial space transportation. Understanding the development of both the CRAF program and US airlift policy helped answer this question. Years of competition between the military and civilian aviation sectors and several congressional assessments of the proper role of each culminated in the establishment of a policy making civil aviation the default (and more cost-effective option) for military requirements unless specific military capabilities were needed. Airlift policy also recognized that a healthy and robust civil aviation sector was crucial to US

national security. The same sentiment is recognized in the current US space and security policy documents. CRAF was established under the authority granted to the US president by the Defense Production Act to provide the US military with a surge capability of additional civilian airlift in times of need, and this authority could likewise encompass spacelift. Unlike aviation, the commercial space sector is not experiencing the same kind of encroachment into traditional civilian endeavors (such as parcel delivery) that were evident during the interwar years. Currently, there is not so much non-military demand for space transportation as to necessarily require a CRAF program for space assets. However, as this mode of transportation becomes more affordable and more widely used, that could change. Therefore, integrating civilian space carriers into the existing authorities and statutes as a surge capability would anticipate this future reality.

The fourth chapter analyzed international space law and domestic law pertinent to launch and spaceports. Given the limitations of international space law, the US military cannot build bases to expand its logistics network on the Moon or celestial bodies. However, this limitation does not apply to commercial entities so long as they do not appropriate it for their exclusive national use. US domestic law is robust and enables the military to take advantage of commercial space transportation options while adequately safeguarding these options from other countries or foreign investment interests. The only hurdle under US domestic law are the disclosure requirements for passengers aboard space transportation. The current legal notification requirements make the time advantage of this mode of transportation disappear. Until space transportation becomes reliable enough such that notifications are not legally required, the military could likely only use such transportation for cargo without significant lag time.

The fifth chapter examined the US military's use of commercial space carriers in the context of targeting. International space law does not clearly define the obligations for non-astronaut personnel who are lost in space. However, provisions from maritime law requiring rescue of shipwrecked personnel regardless of nationality suggest how space law and the law or armed conflict may evolve. Next, the principles of the law of armed conflict were analyzed in the context of the military using commercial space transportation. The rule of proportionality in space requires an assessment of space debris in a collateral damage assessment. The most concerning findings were under the law of armed conflict principle of distinction. During the war on terror, the US took a very broad interpretation of the loss of protected status due to direct participation in hostilities. The US definition is broad enough that it could encompass a commercial spaceflight

carrying troops into combat (but not yet at the frontlines), where Additional Protocol I and the ICRC interpretation would be more reserved. Additionally, the US does not recognize as customary law the provision to assume civilian status when an object or person is in doubt, which has been the subject of much criticism. This interpretation may pose problems for the US military using commercial space transportation because of the dual-use nature of such an object.

The development of the current system of international law is intimately intertwined with technological advances in airpower, space technology, and strategic competition. Many advances in space technology resulted from innovation and research during the WWII and the Cold War. Similarly, the logistics network needed to support the projection of airpower during WWII led to the beginning of a network of US bases around the world. While this logistics network proved not only useful but key to the projection of airpower during WWII and during critical crises such as the Berlin Airlift, this same network is now arguably a limiting factor. The massive infrastructure required for airpower projection worldwide is expensive and, in some places, becoming a point of tension with host nations.

The development of space transportation could provide a solution for the US military. By having a less permanent presence in other countries but still a means of rapidly transporting cargo and materiel as part of its global logistics network, the US may reduce the costs and friction of maintaining a presence in other countries while having a more agile option for logistics. The issues identified in this research endeavor provide a roadmap for where the law needs to evolve and where the US' particular or differing legal interpretations may be problematic in this context. Much like the era of expansion of the airline industry with which airpower projection and military logistics were closely related, the US has an incentive to shape the development of law related to space transportation "to create and preserve friendship and understanding among the nations and peoples of the world."

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