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Steven A. Mirmina
Georgetown University Law Center

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Astronauts Redefined: The Commercial Carriage of Humans to Space and the Changing Concepts of Astronauts under International and U.S. Law

*Steven A. Mirmina**

INTRODUCTION

On September 16, 2014, NASA announced contracts with Boeing and SpaceX to develop and certify crew transportation systems that will carry astronauts back and forth from the United States to the International Space Station (ISS). These two contracts mark a fundamental turning point in America's space history; never before has the U.S. Government hired a private company to transport humans to outer space.

The international legal structure governing the carriage of humans into space, drafted about fifty years ago, did not fully anticipate private commercial transportation of astronauts. Nor did the U.S. federal law on the subject, which was first drafted in the 1980s and most recently amended about ten years ago.

Commercial transportation of astronauts to and from space, referred to within as "commercial crew," raises novel legal issues. Combined with the advent of suborbital space tourism, popular notions of the term "astronaut" may be changing.

This article is being written for a nonprofessional audience—it is written at a high level, general enough to explain the issues to an audience other than "space lawyers." The first part of this paper will examine some issues raised by commercial crew and suborbital space tourism under international space law. The second part of this paper will address legal complications raised by commercial crew and suborbital space tourism under U.S. law. Finally, the paper will offer some comments for future consideration.

* Professor of Space Law, Georgetown University Law Center, Washington, D.C. J.D., University of Connecticut School of Law; LL.M. Leiden University, the Netherlands; LL.M. Georgetown University Law Center, Washington D.C. While the author also works as a lawyer for NASA, the views expressed in this paper are personal to him, and in no way reflect the views of NASA or the U.S. Government. The author would like to express warmest thanks to both Bari Greenfeld of the Army Corps of Engineers and Sabrina Jawed of the FAA for reviewing early drafts of this paper. The author also expresses his sincere appreciation for the generosity of Florida International University and the members of the *Law Review* for hosting this symposium.

WHAT WILL “COMMERCIAL CREW” LOOK LIKE?

As of the writing of this paper, the detailed design of the first commercial rocket ship transporting humans to the ISS is still not certain. NASA has awarded billions of dollars' worth of contracts and continues to review the specific designs.¹ And as this transportation service changes shape in the future, no one can predict with precision how it will function. For example, will the service be more in the nature of a taxi or a rental car? Anyone who has taken a taxi knows that a professional driver “pilots” the vehicle, while “passengers” ride in the back.² The professional driver is responsible for transporting passengers where they need to go. However, another option is the “rental car” model. If this type of service is offered, the rental car company prepares a vehicle and a “driver” hops in and pilots the car away. Of course, this model assumes that drivers have met some minimum level of training (e.g., in the form of a driver's license) in addition to receiving additional training from the rental car company before boarding the vehicle (e.g., where to find the turn signals, how to operate the radio and GPS system, and how to call for emergency assistance). A third possibility may involve a space ship which carries humans into space while being remotely-controlled by an operator on the ground. In other words, passengers only need to board the vehicle, while “pilots” on the ground control the vehicle during launch, landing, and on orbit, using a (very complicated) joystick.

COMMERCIAL CREW AND INTERNATIONAL SPACE LAW

These three scenarios (the taxi, the rental car, and the remotely-controlled vehicle) collectively have the potential to call into question the very nature of the word “astronaut.”

“Astronaut” is a word that, for many, evokes a vivid mental picture. One might think of a pressurized suit with various and sundry dials, a sturdy helmet and face mask (with a cool solar visor that lifts up), and perhaps some really thick gloves—so thick it would be hard to make a fist. One might also associate certain adjectives with the profession “astronaut:” well-trained; dedicated; intelligent; overall, someone with “the right stuff.”³

Unfortunately, the international legal regime does not provide a precise

¹ See *The US Will Spend \$6.8 Billion Hiring Boeing and SpaceX to Build New Spacecraft*, NEXTGOV, http://www.nextgov.com/emerging-tech/2014/09/us-will-spend-68-billion-hiring-boeing-and-spacex-build-new-spacecraft/94316/?oref=nextgov_today_nl (last visited Jan. 12, 2015).

² The word “passengers” is being used specifically to avoid using the word “crew” which is a term of art and will be addressed subsequently.

³ THE RIGHT STUFF (The Ladd Company 1983) (detailing the story of the original Mercury 7 astronauts).

definition. The Outer Space Treaty (OST) speaks of “astronauts” in its fifth article, but never defines the term.⁴ The Treaty requires that States “shall regard astronauts as envoys of mankind” and furthermore that States will “render to them all possible assistance” if there is an accident or emergency landing. Certainly, an “envoy of mankind” is an enviable distinction (presumably higher than an Ambassador or Diplomat, which would be considered an envoy of only one nation).

The OST was followed a year later by another treaty focused, in part, on rescuing astronauts and returning them to the state that registered the launch vehicle—namely, the Rescue and Return Agreement.⁵ This Treaty also does nothing to define the term “astronaut.” In fact, it seems to cause additional ambiguity. While the term “astronauts” is used twice in the title and twice in the Preamble, the term does not appear again in the operative text of the Treaty. Rather, the operative text lays out duties that run to “personnel of a spacecraft.” Thus, if “personnel of a spacecraft” have an accident, emergency or unintended landing in territory under the jurisdiction of a Contracting Party, then that State “shall immediately take all possible steps to rescue them and render them all necessary assistance.”⁶ That State also must notify the launching authority as well as the Secretary General of the U.N. of the steps it is taking to affect a prompt rescue.

It is reasonable to inquire why the Rescue and Return Agreement did not use the term “astronaut.” Did the drafters intend to use a broader term?⁷ And, why would it make a difference? One distinction could be that not all space travelers (or “personnel of a spacecraft”) have been professional astronauts.

Historically, numerous non-professional astronauts have gone into space. Some of those include: a teacher in space (Christa McAuliffe); an American engineer/investment manager (Dennis Tito); a U.S. Senator (Bill Nelson); a Saudi Arabian Sultan (and first Arab and Muslim in space,

⁴ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. 5, Oct. 10, 1967, U.N.T.S. vol. 610, No. 8843 [hereinafter Outer Space Treaty or OST].

⁵ Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, U.N.T.S. vol. 672, No. 9574 [hereinafter Rescue & Return Agreement].

⁶ Rescue & Return Agreement, *supra* note 5, at art. 2.

⁷ In the *travaux préparatoires*, there is widespread documentation that the Rescue and Return Agreement was hastily drafted. For more on this, see the discussion in Mark Sundahl, *The Duty to Rescue Space Tourists and Return Private Spacecraft*, 35 J. SPACE L. 165-66 (2009). This article is an excellent piece of scholarship on the humanitarian duty to rescue space travelers as well as the meaning of the terms of the Rescue and Return Agreement. See also E. Jason Steptoe, *infra* note 26, at 3 (citing BIN CHENG, *STUDIES IN INTERNATIONAL SPACE LAW* 272-75 (1997) (“The Agreement was negotiated and adopted by the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS) and the U.N. General Assembly in the incredibly brief period of five days . . .”).

Sultan bin Salman bin Abdulaziz Al Saud); an Internet security specialist and billionaire (Mark Shuttleworth); a Canadian clown, stilt-walker, fire eater, and founder of Cirque du Soleil (Guy Laliberte); and an entertainer who achieved fame and fortune singing in *Phantom of the Opera* (Sarah Brightman).⁸

The term “non-professional astronaut” is not intended to indicate that these space travelers are unprofessional—rather, their “professions” are something other than astronaut: i.e.: teacher; software engineer; politician; or entertainer.⁹ It is reasonable to question whether they are “astronauts” as that term is used in the Outer Space Treaty; and query whether these travelers were intended to be within the scope of the term “envoys of mankind” by the drafters of that Treaty. Clearly, these spacefarers constitute “personnel of a spacecraft,” and are thus entitled to rescue and “all possible assistance” in the event of distress or emergency.¹⁰ Suborbital space tourism, a topic covered by other papers in the issue of this journal, raises similar considerations.¹¹

Another instance in which there may be a new form of “non-professional astronaut” may be seen in one possible variant of the commercial crew model. In the taxi model, under which a commercial company transports astronaut-passengers to and from the ISS, there may be a question as to whether the pilot of the vehicle would be considered an astronaut as well. Without doubt, the pilot would be within the scope of the term “personnel of a spacecraft” as it is used in the Rescue and Return Agreement. However, when the operational model changes from a “taxi service” to one of a spaceship delivering astronauts to or from the ISS remotely-controlled from the ground, the “pilot” may never leave the surface of the earth. Whether that pilot would be considered “personnel of a spacecraft” or an astronaut may be debated. However, at least under U.S. domestic law, that pilot could likely be considered “Crew.” In fact, in this hypothetical, terrestrially remotely-controlled space ship, the pilot may be

⁸ *Expedition 44 Crew Profiles*, NASA, http://www.nasa.gov/mission_pages/station/expeditions/expedition44/#.VLPdqGPviVo (last visited, Jan. 12, 2015). Sarah Brightman was scheduled for launch in October 2015. However, on May 13, 2015, she issued a statement on her Facebook page that she was postponing her trip to space “for personal family reasons.” The announcement suggests that she will consider rescheduling her trip at a future date. See Jeffrey Kluger, *What Sarah Brightman’s ‘Postponed’ Mission Says About Space Tourism*, TIME (May 13, 2015), <http://time.com/3857685/sarah-brightman-space-tourism-mission/>.

⁹ For an interesting summary of the philosophical, legal, poetic, and cultural values associated with the various forms and incarnations of “spacefarers” from around the world, see Sara Langston and Sarah Jane Pell, *What Is in a Name? Perceived Identity, Classification, Philosophy, and Implied Duty of the ‘Astronaut’*, ACTA ASTRONAUTICA, Vol. 115, Oct.–Nov. 2015, at 185–94.

¹⁰ Sundahl, *supra* note 7, at 189.

¹¹ See Rafael Moro-Aguilar, *National Regulation of Suborbital Flights: A Fresh View*, 10 FIU L. Rev. 679 (2015) (pages 679–711 in this issue, *infra*).

the only “Crew” and, perhaps surprisingly, the passengers traveling in the remotely-controlled space ship may not be. This paradox is examined in the next section.

COMMERCIAL CREW AND U.S. DOMESTIC SPACE LAW

In the past, NASA sent its astronauts into space on U.S. government-owned rockets: such as Mercury, Gemini, Apollo, and eventually the Space Shuttle. Even when astronauts traveled on a foreign launch vehicle, such as the Russian Soyuz, that vehicle was government-owned. A generation ago, the very idea of putting NASA astronauts on commercially-owned, privately developed space launch systems would have seemed unrealistic.

That stretch of imagination is an indicator that, when Congress passed the “Commercial Space Launch Amendments Act (CSLAA),”¹² it never considered the possibility that private companies would be transporting NASA astronauts to the ISS. When the CSLAA was passed in 2004, NASA’s Shuttle program was still active.¹³

The CSLA gives the Federal Aviation Administration (FAA) exclusive licensing jurisdiction over commercial spaceflight. The FAA is authorized to license launches and reentries and regulate the procedures and requirements applicable to commercial space transportation activities conducted in the U.S. or by a U.S. citizen.¹⁴ Under the current statutory approach, there are two defined categories of individuals that can be carried within a commercial launch or reentry vehicle. Neither category seems appropriate for NASA (or its ISS International Partner) astronauts flying on commercially developed launch vehicles.

Are astronauts considered crew?

The first category is called “Crew.” Under the CSLA, “Crew” is a term of art, different from its dictionary definition. Specifically, “Crew” refers to “any employee of a licensee or transferee, or of a contractor or subcontractor of a licensee or transferee, who performs activities in the course of that employment directly relating to the launch, reentry, or other operations of or in a launch vehicle or reentry vehicle that carries human beings.”¹⁵ For example, certain employees of Boeing or Space X may be

¹² Commercial Space Launch Amendments Act, 49 U.S.C. § 70101 (2004).

¹³ When the original Commercial Space Launch Act (CSLA) was passed in 1984, its purpose was to stimulate the nascent commercial space industry. See Ronald Reagan’s Signing Statement on the Commercial Space Launch Act, The American Presidency Project, <http://www.presidency.ucsb.edu/ws/?pid=39335> (last visited Mar. 5, 2015).

¹⁴ 51 U.S.C. § 50904(a) (2014). The FAA regulations can be found at 14 C.F.R., part 400.1 et seq.

¹⁵ 51 U.S.C. § 50902(2) (2014).

Crew for NASA's "commercial crew" missions, because those companies are under contract with the government to operate a launch vehicle.¹⁶ However, NASA and International Partner (IP) astronauts may not be considered crew if they are *government* employees, not employees of the commercial licensee. For this reason, the CSLA definition of Crew could lead to confusion.¹⁷

Are astronauts considered Space Flight Participants?

The second category of passenger envisioned by the CSLA is the "Space flight participant (SFP)." At the time of its passage, Congress considered this group of spacefarers primarily as adventure-seeking tourists as opposed to professionally trained astronauts.¹⁸ In contrast, professional astronauts train for years for their missions. Nevertheless, considering the wording of the statute, since astronauts are not "employees of the licensee," they cannot be Crew—therefore, they have to be SFPs, even if they are the only persons on board.¹⁹

But the issues surrounding SFP classification are far more complicated than any personal desire to be categorized as "Crew" rather than an "SFP." The CSLA puts certain requirements on SFPs that may be inappropriate for NASA or other government astronauts. For example, the CSLA requires

¹⁶ See NEXTGOV, *supra* note 1.

¹⁷ To help alleviate some of the confusion which could potentially arise, the FAA responded to a question NASA raised concerning whether the FAA would restrict NASA astronauts, who would be flying as space flight participants, from engaging in operational functions during an FAA-licensed launch or reentry. See the "Legal Interpretation" of FAA Assistant Chief Counsel for International Law, Legislation, and Regulations Mark Bury, entitled "Interpretation Concerning Involvement of NASA Astronauts During a Licensed Launch or Reentry," dated December 2, 2013, which states that NASA astronauts may engage in operational activities during a licensed launch to ensure safety and mission success. The Interpretation reasoned that: "Because NASA astronauts are not the untrained space-flight participants originally contemplated by the FAA, the considerations underlying the policy have, at best, a limited applicability to NASA astronauts." See Legal Interpretation, 78 Fed. Reg. 231, 72011-13 (Dec. 2, 2013).

¹⁸ "[S]pace flight participants wishing to ride on board a launch vehicle have chosen to undertake a risky venture of their own accord." H.R. Rep. No. 108-429, at 12 (2004). Rep. Boehlert, a proponent of the Commercial Space Launch Amendments Act of 2004 referred to private human space flight as the "preserve of visionaries and daredevils and adventurers." Timothy Robert Hughes & Esta Rosenberg, *Space Travel Law (and Politics): The Evolution of the Commercial Space Launch Amendments Act of 2004*, 31 J. SPACE L. 1 (2005).

¹⁹ Crew is defined as "any employee or independent contractor of a licensee, transferee, or permittee, or of a contractor or subcontractor of a licensee, transferee, or permittee, who performs activities in the course of that employment or contract directly relating to the launch, reentry, or other operation of or in a launch vehicle or reentry vehicle that carries human beings." 51 U.S.C. § 50902 (2014) (Definitions). A crew consists of flight crew and any remote operator. "Space flight participant means an individual, who is not crew, carried aboard a launch vehicle or reentry vehicle." *Id.* (emphasis added).

that SFPs waive claims against the Government.²⁰ Moreover, the CSLA requires “individuals to undertake space flight at their own physical and financial risk. Space flight participants are excluded from indemnification eligibility under the 2004 Space Act and are not entitled to the benefits of liability insurance coverage.”²¹

However, if the requirement to waive claims against the Government were applied to NASA astronauts flying as SFPs, it could conflict with other applicable Federal laws. For example, employees of the civil service and the military are entitled to compensation for their injuries.²² If the CSLA mandated that astronauts waive claims for injuries suffered in the course of their employment, the result would be unjust and contrary to public policy.²³

Another potential issue raised by the CSLA’s requirement that SFPs waive claims is that it appears to conflict with the ISS Intergovernmental Agreement (IGA).²⁴ The IGA is a multilateral agreement among the United States and fourteen other countries establishing a framework for operation and utilization of the ISS. Under Article 12 of the IGA, when NASA transports IP astronauts to the ISS, it does so in fulfillment of its obligations to provide launch and return transportation services to the other IPs (whether or not NASA uses a government vehicle (such as the Space Shuttle) or a commercial service provider (such as Boeing or Space X).

Article 16 of the IGA contains a cross-waiver of liability. The IGA cross-waiver has an explicit carve out for “claims made by a natural person” for “bodily injury to, or other impairment of health of, or death of such

²⁰ The reciprocal waiver of claims of appendix E of part 440 requires the SFP to “waive[] and release[] claims it may have against the United States . . . for Bodily Injury, including Death, or Property Damage sustained by the Space Flight Participant . . . regardless of fault,” and “hold harmless and indemnify the United States . . . from and against liability . . . arising out of claims brought by anyone for Property Damage or Bodily Injury, including Death, sustained by Space Flight Participant.”

²¹ Hughes & Rosenberg, *supra* note 18, at 59.

²² See, e.g., the Federal Employee Compensation Act, 5 U.S.C. § 8102(a) (2014) (establishing compensation for federal employees for job-related injury or death regardless of fault). Also, active duty U.S. military personnel are entitled to disability compensation when they get injured in the scope of their employment. See generally, the Military Personnel and Civilian Employees’ Claims Act (31 U.S.C. § 3721(2014) (MPCECA).

²³ In a legal interpretation issued in the form a letter responding to a question raised by NASA, FAA explained that the CSLAA and the FAA implementing regulations did not intend to impliedly repeal either FECA or its military counterparts, and thus NASA astronauts would not have to sign the reciprocal waivers of claims that the statute requires of space flight participants generally. See the Legal Interpretation of FAA Assistant Chief Counsel for International Law, Legislation, and Regulations Mark Bury, dated December 23, 2013.

²⁴ Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning the Cooperation on the Civil International Space Station (IGA).

natural person.” Since the IGA expressly permits claims of natural persons against the government for “bodily injury to, or other impairment of health of, or death,” it appears to conflict with the CSLA’s requirement that SFPs waive claims against the government, at least as far as injury and death are concerned.²⁵

The bifurcation of Crew versus Space Flight Participants becomes even more complex within the specific context of Space Station cooperation, which uses the term “spaceflight participant” [sic] in a manner completely distinct from the FAA. “Spaceflight participants” [sic] who paid the Russian Space Agency to visit the ISS *are* considered to be ISS crew members in the parlance of NASA and its international partner space agencies.²⁶ These spacefarers are covered under Article 11 (Crew) of the IGA: “Each Partner has the right to provide qualified personnel to serve on an equitable basis as Space Station crew members.”

As shown by the above examples, the U.S. domestic statutory bifurcation of all spacefarers into two distinct categories of Crew or SFP has the potential to create both confusion and unintended results in relation to commercial crew.

WAY FORWARD?

Both domestic and international steps may need to be taken to start resolving some of the issues raised by the advent of commercial crew and suborbital space tourism. Domestically, it appears that a legislative change may need to occur. Congress may decide to amend the CSLA. One possibility currently under consideration is the creation of a third category of spacefarer under the law that is neither “Crew” nor “Space Flight Participant.”²⁷

²⁵ *But see*, 51 U.S.C. §50919(e)(1) (2014), which states that FAA licensing generally must be carried out “consistent with an obligation the United States Government assumes in a Treaty, convention, or agreement in force between the Government and the Government of a foreign country.” The IGA is such an agreement, as are the four bilateral Memoranda of Understanding NASA signed with the international partner space agencies contemporaneously with the IGA. These international agreements enabled the FAA to issue a separate legal interpretation dated November 21, 2013, clarifying that International Partner astronauts would not have to waive their claims for personal injury or death, even if they are considered SFPs, since that entitlement to bring those claims was protected by the IGA, Article 16.3(d)(2). This interpretation might not apply to other astronauts traveling to space that are outside the scope of the ISS IGA (e.g., if they were traveling to a commercial lunar habitat).

²⁶ See discussion in E. Jason Steptoe, *Astronaut Rescue and Return in an Era of Planetary Exploration: “Envoy of Mankind,” “Space Flight Participants” and Celestial Settlers 7* (2008), (unpublished manuscript, on file with author) (Steptoe was then-Associate General Counsel for International Law, National Aeronautics and Space Administration, Washington, D.C.).

²⁷ NASA and FAA have jointly proposed to Congress that it amend the CSLA to add a new definition of “government astronaut” that would include USG astronauts and astronauts provided by other ISS Partners pursuant to the IGA. See letters from Charles F. Bolden, Jr., Administrator of NASA, and Michael P. Huerta, Administrator of the FAA to the President of the Senate, Speaker of the House,

Internationally, the road ahead may prove more challenging. Amendment of the Outer Space Treaty or the Rescue and Return Agreement (to fill in some of the gaps or ambiguities that have arisen with the advent of time) is not a reasonable prospect for the foreseeable future. So, short of amending the Treaty, other steps should be considered. It may turn out that a formal Treaty amendment may not be necessary. There has not been widespread discussion of denying commercial space passengers the privileges to which personnel of a spacecraft are entitled under the Rescue and Return Agreement. It is doubtful that a State would refuse assistance to space faring passengers, or fail to return space faring passengers to the responsible state, merely because they were transported to space by a commercial company. Potentially, should it surface internationally that commercially delivered spacefarers will be denied rescue or return because they are not considered “astronauts” under the treaties, then states might consider an “agreed interpretation” of the existing treaties (either bilaterally or multilaterally) to resolve any perceived ambiguity in terminology.²⁸

The Rescue and Return Agreement and the Commercial Space Launch Act were both drafted to reflect the realities of space exploration at the time of their creation, as well as what was reasonably expected to occur in the immediate future. However, human ingenuity has never been confined by reasonable expectations. And, law can and must adapt similarly. As is carved into the walls of the Jefferson Memorial in Washington, D.C.:

I am not an advocate for frequent changes in laws and constitutions, but laws and institutions must go hand in hand with the progress of the human mind. As that becomes more developed, more enlightened, as new discoveries are made, new truths discovered and manners and opinions change, with the change of circumstances, institutions must

Chairman and Ranking of the Senate Commerce Committee, Chairman and Ranking of the Science and Space Subcommittee, Chairman and Ranking of the House Science Committee, and the Chairman and Ranking of the Space Subcommittee, dated February 5, 2015. The purpose of this legislative change is to resolve the potential conflicts raised when “government astronauts” are considered “Space flight participants,” a term which, seemingly, was never intended to cover government astronauts.

²⁸ Article 31(3)(a) of the Vienna Convention on the Law of Treaties (regarding Treaty interpretation) provides that Treaties are to be interpreted in good faith, in accordance with their ordinary meaning, and in the context of the Treaty’s object and purpose. Furthermore, the article states that if there is any ambiguity regarding a Treaty’s terms, reference may be made to “subsequent agreement between the parties regarding the interpretation of the treaty or the application of its provisions.” See ANTHONY AUST, *MODERN TREATY LAW AND PRACTICE* 191 (2000) (“Given that the parties can agree later to modify the treaty, they can also subsequently agree on an authoritative interpretation of its terms, and this can amount, in effect, to an amendment.”); *id.* at 193 (“This technique is particularly useful if there is a need to fill a lacuna, to update a term or postpone the operation of a provision.”).

advance also to keep pace with the times.²⁹

Thomas Jefferson realized that no one can reliably legislate what is yet to be imagined—terrestrially or otherwise. Laws need to evolve following technological advancements. The concept of “astronaut” has remained constant for nearly fifty years, while commercial innovation continues to expand the scope of who can reach the stars. The reality of space travel has changed, and it will continue to change into the future. And in order to stay current, our conceptions of the term “astronaut” may need to do the same.

²⁹ Monticello, *Quotations on the Jefferson Memorial*, MONTICELLO.ORG, <http://www.monticello.org/site/jefferson/quotations-jefferson-memorial> (last visited Jan. 12, 2015).