From Space Tourists to Unruly Passengers? The US Struggle with 'On-Orbit Jurisdiction'

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Abstract

With the first proper commercial sub-orbital 'space tourist' flights seemingly around the corner, the need to develop a proper legal system addressing all relevant parameters, scenarios and events also arises more visibly. This is particularly true for the United States, where so far the major developments in private manned spaceflight are concentrated, some of which may soon move from relatively straightforward up-and-down sub-orbital trajectories to longer-duration sub-orbital and/or orbital flights, or even long-duration presence in (potentially private) space stations. As one author succinctly put it: humans are essentially unpredictable, and the longer their flights will be, the less pre-ordained and foreseeable will their activities be.

As a consequence, the somewhat haphazard and multi-faceted approach US national law has so far taken *vis-à-vis* space activities now threatens to result in major gaps, notably in the exercise of domestic jurisdiction for the purpose of compliance with US international responsibilities and liabilities under the outer space treaties. In between the regulatory competencies of the FAA (to license launch and re-entry), FCC (to license and regulate satellite operations as far as the use of radio-frequencies and attendant orbits is concerned), NOAA (to license and regulate remote sensing satellite operations) and NASA (to regulate life on board manned US civil space vehicles and the ISS, at least as far as the US modules and/or US astronauts is concerned), questions now arise in Congress for example as to how to legally address a future space tourist turned unruly passenger.

The paper addresses these issues in some detail, which includes touching upon some vexing definitional issues as regards 'launch', 're-entry', 'sub-orbital', 'orbital' and 'outer space' itself as these might ultimately have to be clarified before a comprehensive, logical and effective legal regime for exercising of US national jurisdiction as appropriate and necessary can be developed.

1. Introduction: Jurisdiction and Outer Space

"Jurisdiction" of a state as a key notion of public international law has been defined as "its lawful power to act and hence to its power to decide whether,

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and if so, how to act, whether by legislative, executive or judicial means"; it refers "primarily, but not exclusively, [to] the lawful power to make and enforce rules".[1] It thereby constitutes one of the fundamental legal hallmarks of a sovereign state, as opposed to non-governmental or international organizations or even individual human beings. It is the baseline tool for states also to exercise legal control for the sake of meeting responsibilities and liabilities in international law.

This is no different in principle for space law, even as territorial jurisdiction cannot extend to outer space on a territorial basis.[2] Territorial jurisdiction consequently only applies indirectly as it can be asserted over anyone conducting space activities from the territory of a particular state. On the other hand, personal jurisdiction of a state over its citizens (natural or legal) continues to apply as well – even if those persons would happen to be in outer space. In addition, Article VIII of the Outer Space Treaty provides states with the fundamental opportunity to exercise, through registration of spacecraft, jurisdiction on a quasi-territorial basis on board of such spacecraft and even over personnel thereof if out on EVAs.[3]

The application of such registration-based jurisdiction is not triggered by entry into outer space as such, but by the involvement of a 'space object' – which in turn is then, further to the rather summary and partly circular definition contained in the Registration Convention, usually considered to refer to man-made objects intended to be launched into outer space.[4] This does bring back the issue of delimitation of outer space, even if, as it were, through the backdoor. Moreover, the applicability of the Registration Convention is

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1 B.H. Oxman, Jurisdiction of States, in *The Max Planck Encyclopedia of Public International Law*, Vol. VI (Ed. R. Wolfrum)(2012), 546.

2 *Cf.* Art. II, Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (hereafter Outer Space Treaty), London/Moscow/Washington, done 27 January 1967, entered into force 10 October 1967; 610 UNTS 205; TIAS 6347; 18 UST 2410; UKTS 1968 No. 10; Cmnd. 3198; ATS 1967 No. 24; 6 ILM 386 (1967).

3 Art. VIII, Outer Space Treaty (*supra*, n. 2), provides: "A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body". Artt. I, II, Convention on Registration of Objects Launched into Outer Space (hereafter Registration Convention), New York, done 14 January 1975, entered into force 15 September 1976; 1023 UNTS 15; TIAS 8480; 28 UST 695; UKTS 1978 No. 70; Cmnd. 6256; ATS 1986 No. 5; 14 ILM 43 (1975); further clarify how such jurisdiction is to be applied.

4 See Art. I(b), Registration Convention (*supra*, n. 3); cf. further e.g. M. Lachs, *The Law of Outer Space* (1972), 68-9; B. Cheng, Convention on International Liability for Damage Caused by Space Objects, in *Manual on Space Law* (Eds. N. Jasentuliyana & R.S.K. Lee), Vol. I (1979), 116-7; G. Zhukov & Y. Kolosov, *International Space Law* (1984), 85-6.

generally considered to be further premised on such objects actually going into "Earth orbit or beyond".[5]

Indeed, this means that various states having sent or about to send space objects – in particular manned ones – into outer space have asserted such jurisdiction in outer space by specific, legislative means for specific purposes. For example, the United States by way of its Patents in Outer Space Act[6] extended the scope of application of existing US patent legislation to inventions made on board of US-registered space objects. Following the conclusion of the Intergovernmental Agreement on the International Space Station and the build-up and operation of that station, Germany and Italy have similarly extended the scope of their national intellectual property right laws to – in this case – inventions made on board the European module of the ISS.[7]

2. Jurisdiction vis-á-vis manned spaceflight

So far, jurisdictional issues in a broad sense have remained confined to the relatively few instances of public manned spaceflight, where the capacity of the astronauts and cosmonauts as employees of governmental space agencies basically guaranteed the appropriate level of exercise of jurisdiction over their behaviour, largely already by way of their employment contracts. Thus, even in the context of the ISS, the most pronounced legal environment for manned space operations in view of the multi-national construction – each partner registers its own modules, as per Article 5 of the Intergovernmental Agreement – apart from the specific issue of intellectual property rights referred to above only the issue of possible exercise of criminal jurisdiction needed to be addressed, which was effectuated by means of Article 22.[8]

With the impending likely arrival on the scene of private 'space tourism' flights however, as planned by such companies as Virgin Galactic and XCOR, this

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5 *Cf.* Art. II(1), Registration Convention (*supra*, n. 3), as for the national registry to be developed; as for the purpose of the international register under Artt. III & IV, the information to be provided should include "basic orbital parameters" (Art. IV(1)(d)).

6 Patents in Outer Space Act, 15 November 1990, Public Law 101-580; 35 U.S.C. 10; 104 Stat. 2863.

7 *Cf.* Art. 21(2), 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 Cooperation on the Civil International Space Station (hereafter Intergovernmental Agreement), Washington, done 29 January 1998, entered into force 27 March 2001; TIAS No. 12927; Cm. 4552; *Space Law – Basic Legal Documents*, D.II.4. See further *e.g.* A.M. Balsano & J. Wheeler, The IGA and ESA: Protecting Intellectual Property Rights in the Context of ISS Activities, in *The International Space Station* (Eds. F.G. von der Dunk & M.M.T.A. Brus)(2006), 67.

8 Art. 22, Intergovernmental Agreement (*supra*, n. 7), addresses this issue by in first instance allowing individual states to exercise active personal jurisdiction over personnel for criminal law purposes, adding a certain fall-back option for other duly affected states to exercise criminal jurisdiction.

picture will change profoundly. Essentially for the first time spaceflight participants who have no employment contract with a space agency but fly on their own account and out of their own interest – and whose selection and training, even if not negligible, will be far less extensive than those of professional astronauts and cosmonauts – will enter outer space in a purely private context[9].

Consequently, the "range of in-space activity" conducted on board of the craft would not anymore be, more or less, "pre-ordained" and/or remain closely related to the actual operation of the vehicles, but may now come to encompass many ordinary activities humans are conducting on earth all the time – and humans "make mistakes, commit violence, develop afflictions, and so on", and may well "behave in ways that regulators have not contemplated beforehand".[10]

For the time being, the flights contemplated by those operators would remain little more than sub-orbital hops, barely entering into outer space before starting to re-enter, but for the further future they intend to target longer and longer flights, from sub-orbital transportation between various continents to semi-orbital or orbital transportation to 'space hotels' such as Bigelow is developing.

From the perspective of current space law, the first issue which then arises is the aforementioned fact that the Registration Convention only formally addresses space objects "launched into Earth orbit or beyond"[11], which has usually been taken to mean that sub-orbital flights like the ones envisaged by Virgin Galactic and XCOR would not be subject to the Convention's regime. However, the phrasing 'Earth orbit or beyond' on closer view would seem to refer to a certain area being (intended to be) reached by the space object at issue for the Convention to apply. So a sub-orbital space object which would achieve an altitude 'beyond' an 'Earth orbit', in other words, in outer space as it is most commonly defined with reference to the lowest-orbit approach, could well fall within the ambit of the Convention.[12]

In addition, Article VIII of the Outer Space Treaty, which allows states to retain jurisdiction over space objects launched into outer space, does not limit

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[9] Note, that by contrast Dennis Tito and other private guests undertook their 'space tourism' flights from 2001 onwards to the public facility of the ISS. Also, the operators working with NASA on commercial manned spaceflight to and from the ISS present a different legal picture in view of the leading role of NASA in this context.

[10] B. Perlman, Grounding U.S. Commercial Space Regulation in the Constitution, 100 *The Georgetown Law Journal* (2012), 940, 941.

[11] Art. II(1), Registration Convention (*supra*, n. 3).

[12] See for a very extended analysis and argument F.G. von der Dunk, Beyond *What*? Beyond *Earth orbit*?...! The Applicability of the Registration Convention to Private Commercial Manned *Sub-Orbital* Spaceflight", 43 *California Western International Law Journal* (2013), 269-341.

this to space objects 'launched into Earth orbit or beyond'. As soon as a space object is intended to reach an area called 'outer space', the state registering it may exercise its jurisdiction over and on board of that space object. To the extent therefore these phrases – of 'beyond Earth orbit' respectively 'outer space' – would *not* be considered to refer to the same geographical area, it is the 'outer space' label of the two which prevails in determining – for example – whether an object triggers the application most notably of the Registration Convention, but also Liability Convention[13].

In the absence of a well-established and generally-acknowledged lower boundary of outer space in particular within the United States, the question as to whether the sub-orbital vehicles now giving rise to the discussion regarding 'on-orbit jurisdiction' would (intend to) enter into outer space can not be definitively answered, which also means that the question whether they are 'space objects' in the sense of the space treaties cannot be finally answered – at least not authoritatively as for the United States. Suffice it to say at this point, nevertheless, that the United States so far *has*, consciously or not, turned out to address them as if they were 'space objects' by applying the Commercial *Space Launch* Act to them and their operations.[14]

At the same time, in view of their technologies and intended trajectories and activities, the only reasonable alternative to qualifying those vehicles as 'space objects' would be to qualify them as 'aircraft'. 'Aircraft' have been defined as "any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface".[15] ICAO, though acknowledging the applicability of the general definition of 'aircraft' to most of the vehicles currently being designed for private sub-orbital flight, has decided to desist (at least for the time being) from developing Standards and Recommended Practices (SARPs) for such sub-orbital vehicles or the operations conducted with them.[16]

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[13] Convention on International Liability for Damage Caused by Space Objects (hereafter Liability Convention), London/Moscow/Washington, done 29 March 1972, entered into force 1 September 1972; 961 UNTS 187; TIAS 7762; 24 UST 2389; UKTS 1974 No. 16; Cmnd. 5068; ATS 1975 No. 5; 10 ILM 965 (1971).

[14] See also further *infra*, § 3.4.

[15] *E.g.* Annex 7 to the Convention on International Civil Aviation (hereafter Chicago Convention), Chicago, done 7 December 1944, entered into force 4 April 1947; 15 UNTS 295; TIAS 1591; 61 Stat. 1180; Cmd. 6614; UKTS 1953 No. 8; ATS 1957 No. 5; ICAO Doc. 7300; Aircraft Nationality and Registration Marks, 5th edition, July 2003, Definitions; Annex 8, Airworthiness of aircraft, 10th edition, April 2005, Definitions. See also V.J. Vissepó, Legal Aspects of Reusable Launch Vehicles, 31 *Journal of Space Law* (2005), 185-9.

[16] See Working Paper on Concept of Suborbital Flights, ICAO Council, 175th Session, 30 May 2005, C-WP/12436. *Cf.* also in general T.R. Hughes & E. Rosenberg, Space Travel Law (and Politics): The Evolution of the Commercial Space Launch Amendments Act of 2004, 31 *Journal of Space Law* (2005), 76-7; Vissepó (*supra*, n. 15), 179-85. SARPs are the detailed elaborations of general obligations and

In the last resort however this would not make a fundamental difference. Also a qualification of the vehicles at issue as 'aircraft' would still give rise to the full-fledged possibility for the state concerned to exercise jurisdiction on board of that vehicle, as "[a]ircraft have the nationality of the State in which they are registered"[17], and such nationality *ipso facto* allows the state of nationality to exercise its national jurisdiction on board. From this perspective, the indecisiveness of the United States on the issue of delimitation of outer space does not (need to) stand in the way of properly exercising such jurisdiction.

3. The exercise of jurisdiction over space objects in the US context

In contrast to other countries which have so far established a single coherent piece of national space legislation to ensure the desired level of exercise of national jurisdiction over duly registered space objects[18], however, for largely historical reasons the situation in the US context has developed into a complicated one by virtue of the existence of a number of acts and statutes addressing specific aspects or elements of space operations conducted with US spacecraft and/or by US private operators.

3.1. NASA 'jurisdiction' over public manned space activities

To the extent the United States has been involved so far in manned spaceflight and this was considered to require any exercise of jurisdiction on the part of the US government, the National Aeronautics and Space Administration (NASA) was the governmental agency to handle this, being tasked to "exercis[e] control over aeronautical and space activities sponsored by the United States".[19] Thus, the NASA Administrator "shall be responsible for the exercise of all powers and the discharge of all duties of the

requirements under the regime created by the Chicago Convention (*supra*, n. 15); *cf.* Art. 37 *et seq.*, Chicago Convention.

17 Art. 17, Chicago Convention (*supra*, n. 15).

18 *Cf. e.g.* for the United Kingdom Sec. 1, Outer Space Act, 18 July 1986, 1986 Chapter 38; *National Space Legislation of the World*, Vol. I (2001), at 293; *Space Law – Basic Legal Documents*, E.I; 36 *Zeitschrift für Luft- und Weltraumrecht* (1987), 12 ("This Act applies to (…) any activity in outer space."); for Russia Art. 9(2), Law of the Russian Federation on Space Activities, No. 5663-1, 20 August 1993, effective 6 October 1993; *National Space Legislation of the World*, Vol. I (2001), at 101 ("Subject to licensing shall be the space activities"), in conjunction with Art. 2(1) (defining the term "space activities" for the purposes of the Law); and for Sweden Sec. 1, Act on Space Activities, 1982: 963, 18 November 1982; *National Space Legislation of the World*, Vol. I (2001), at 398; *Space Law – Basic Legal Documents*, E.II.1; 36 *Zeitschrift für Luft- und Weltraumrecht* (1987), 11 ("This Act applies to activities in outer space (space activities).").

19 51 U.S.C. Sec. 20102(b).

Administration and shall have authority and control over all personnel and activities thereof".[20]

As already indicated, the application of US jurisdiction to completely public space operations and -craft did not require specific acts of extension of such jurisdiction since the nationality of the people, entities and craft[21] involved guaranteed that at least US personal jurisdiction, as well as, through the contract of government-employed astronauts, effective control by the relevant government agency could be asserted.

This also applied to the US contribution to, and activities undertaken in, the context of the International Space Station, where obviously modules from other states, registered with such states, as well as astronauts and cosmonauts from other states were also implicated, and issues of jurisdiction had to be carefully and internationally arraigned. The only specific elements to be further so arraigned, as discussed, concerned criminal law, where NASA would not have any such jurisdiction properly speaking[22], and IPR jurisdiction, which involves NASA potentially only as an IPR-owner[23].

Thus, it was NASA which took care (as far as the US interests were concerned) of the complications caused by the visit of the first 'space tourist' to the ISS in 2001. It did so by firstly agreeing with Russia and the other ISS Partners on a special *ad hoc* arrangement, taking care *inter alia* of potential third-party liability risks resulting from the visit of Tito, and then by concluding with those Partners the Principles Regarding Processes and Criteria for Selection, Assignment, Training and Certification of ISS (Expedition and Visiting) Crewmembers towards the end of 2001.[24] This document defines 'spaceflight participants' as including crewmembers of non-Partner space agencies, engineers, scientists, teachers, journalists, filmmakers or tourists, and provides for specific guidance regarding the extent to and

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20 51 U.S.C. Sec. 20111(a).

21 Though formally speaking Art. VIII, Outer Space Treaty (*supra*, n. 2), does not provide for a 'nationality' of a spacecraft, for all practical purposes the effect of registration of a space object amounts to precisely that, such as the fundamental right to exercise jurisdiction on a quasi-territorial basis and the fact that a space object can only have one registration state (*cf.* Art. II(2), Registration Convention (*supra*, n. 3)).

22 The registration of the US modules as per Art. 5, Intergovernmental Agreement (*supra*, n. 7), basically allowed US criminal law to be applied on board those modules on a quasi-territorial basis. In view of its nature, NASA obviously would not be part of any such US exercise of criminal jurisdiction, but that is essentially a US sovereign choice, not predicated by international law.

23 *Cf.* 51 U.S.C. Sec. 20135 for the relevant arrangements in US law in this context.

24 At http://www.spaceref.com/news/views/html?pid=4578, last visited 9 September 2014. See also e.g. R.P. Veldhuyzen & T.L. Masson-Zwaan, ESA Policy and Impending Legal Framework for Commercial Utilisation of the European Columbus Laboratory Module of the ISS, in *The International Space Station* (Eds. F.G. von der Dunk & M.M.T.A. Brus)(2006), 54-5.

conditions under which amongst others such tourists might be allowed on board of the ISS.

3.2. FCC jurisdiction over space communication activities

Ever since the 1934 Communications Act, the US Federal Communications Commission (FCC) has the authority to license the use of "all the channels of radio transmission" within the United States,[25] which as of 1970 has officially been confirmed to include the licensing competence *vis-à-vis* persons or entities interested in operating such channels to or from satellites in outer space.[26] In other words, through the principled means of a license the United States through the FCC exercises a fundamental form of jurisdiction over any satellite or other spacecraft – including manned – operated from US territory *to the extent that* the use of radio transmission channels is at issue.

As to this licensing competence, furthermore, it allows the FCC both to ensure upfront, by way of the license requirements, that the use of radio channels in outer space will take place in conformity to the requirements considered necessary by the US government, and to monitor (at least in theory; with spacecraft in outer space obviously site-visits are impossible and monitoring could only be done by radio-contact and other telemetry, tracking and control devices) that post-grant the licensee will continue to comply with such requirements.[27] By definition, however, this is limited to those requirements predicated by the FCC, hence foreseen prior to the actual launch of the space object (although there would be a limited opportunity to suspend a license post-grant in case one of the events specifically listed would occur[28]), and then of course only limited to those related to the actual use of radio channels.

A fall-back clause offering further possibilities to maintain jurisdiction also after a licensed satellite operation has started arises from the authority to "[m]ake such rules and regulations and prescribe such restrictions and conditions, not inconsistent with law, as may be necessary to carry out the provisions of this chapter, or any international radio or wire communications treaty or convention, or regulations annexed thereto, including any treaty or convention insofar as it relates to the use of radio, to which the United States is or may hereafter become a party".[29]

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25 Sec. 301, Communications Act, 19 June 1934; 47 U.S.C. 151 (1988); 48 Stat. 1064. 'US territory' includes vessels and aircraft with US nationality.

26 As per Communications Satellite Facilities, *First Report and Order*, 22 FCC 2d 86 (1970), Appendix C, p. 1.

27 *Cf. e.g.* Sec. 303, esp. sub (b), (e), (f), (h)-(n), Communications Act (*supra*, n. 25), for such requirements and monitoring competences; further Secc. 307 & 308.

28 See Sec. 303(m)(1), Communications Act (*supra*, n. 25).

29 Sec. 303(r), Communications Act (*supra*, n. 25).

3.3. NOAA jurisdiction over space remote sensing activities

A second US government department exercising some substantial and direct measure of US jurisdiction over space activities concerns the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce. Under the two national acts addressing the licensing of private remote sensing satellite operators, the 1984 Land Remote-Sensing Commercialization Act[30] as then superseded by the 1992 Land Remote-Sensing Policy Act[31], NOAA was the government agency actually handling the licensing – as (again) the most fundamental form of exercise of jurisdiction.[32] The licensing competence refers to private remote sensing systems, more particularly their operation and the follow-on handling of data generation, treatment and distribution – and to those aspects *only*.[33]

Whilst the soon-to-be-expected private sub-orbital flights may not likely become involved in remote sensing operations (which would then essentially be private in nature, hence possibly subject to the application of the Land Remote-Sensing Policy Act), somewhat further into the future one cannot exclude such involvement either. The two currently leading contenders, Virgin Galactic and XCOR, have both indicated they would also entertain opportunities to fly certain small experimental payloads into the lower regions of outer space, and sooner or later a research or other institute might be interested in flying a remote sensing-experiment, either or not accompanied by a researcher on board.

3.4. FAA jurisdiction over private manned spaceflight

Obviously the most directly relevant element of US jurisdiction for the current discussion is that of the FAA over private manned spaceflight. Like the specific US government agency competences of FCC and NOAA to license specific in-space operations addressed above, this competence also started out as a competence addressing unmanned space activities.

When in 1984 with the Commercial Space Launch Act[34] the first fundamental possibility was created for private entities to start engaging in the provision of launch services for commercial purposes subject to a licensing regime, under the Secretary of Transportation's responsibility it was the FAA which would host

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30 Land Remote-Sensing Commercialization Act, 17 July 1984, Public Law 98-365, 98th Congress, H.R. 5155; 98 Stat. 451; *Space Law – Basic Legal Documents*, E.III.4.

31 Land Remote Sensing Policy Act, 28 October 1992, Public Law 102-555, 102nd Congress, H.R. 6133; 15 U.S.C. 5601; 106 Stat. 4163.

32 See further 51 U.S.C. Sec. 60121.

33 See 51 U.S.C. Sec. 60121(a), *cf.* esp. *sub* (2): "In the case of a private space system that is used for remote sensing and other purposes, the authority of the Secretary under this subchapter shall be limited only to the remote sensing operations of such space system."

34 Commercial Space Launch Act, 30 October 1984, Public Law 98-575, 98th Congress, H.R. 3942; 98 Stat. 3055; *Space Law – Basic Legal Documents*, E.III.3.

the Office for Commercial Space Transportation (OCST) responsible for properly licensing those activities.[35]

Addressing the relevant possibilities for such private launch service providers to offer launches with expendable launch vehicles to customers interested in having their payload – usually a commercial communication satellite – launched into the desired orbit, the licensing focused essentially on the launch phase. This phase was supposed to begin at the "commencement of licensed launch activities" and to end, for "orbital launches, until the later of (i) Thirty days following payload separation, or attempted payload separation in the event of a payload separation anomaly; or (ii) Thirty days from ignition of the launch vehicle".[36] For non-orbital launches, this phase supposedly came to an end upon "completion of licensed launch activities at the launch site", which presumably includes flight control and monitoring of the launch at the launch site.[37]

The Commercial Space Launch Act and its implementing regulations focused their licensing requirements on the safety and security aspects of the launch, which included third-party liability – partly since the United States as such might be held liable if such damage occurred in an international setting triggering the application of the Liability Convention[38]. Thus, a license is to be granted "[c]onsistent with the public health and safety, safety of property, and national security and foreign policy interests of the United States";[39] the licensing authority "may establish procedures for safety approvals"[40] or prescribe "any additional requirement necessary to protect the public health and safety, safety of property, national security interests, and foreign policy interests of the United States".[41]

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35 *Cf.* 51 U.S.C. Sec. 50903(d), indicating that the Secretary of Transportation, formally charged under the Act with supervising commercial launches, could call upon an executive agency to perform such tasks; & Sec. 50921, headed "Office of Commercial Space Transportation".

36 Sec. 440.11, 14 C.F.R.; note that this 'definition' strictly speaking remains confined to the required insurance coverage or financial responsibility of the licensee; the Commercial Space Launch Act (*supra*, n. 34) itself does not define launch other than as the effort "to place or try to place a launch vehicle or re-entry vehicle and any payload, crew, or space flight participant from Earth (A) in a suborbital trajectory, (B) in Earth orbit in outer space; or (C) otherwise in outer space, including activities involved in the preparation of a launch vehicle or payload for launch"; 51 U.S.C. Sec. 50902(4). See further *e.g.* A. Kerrest de Rozavel & F.G. von der Dunk, Liability and Insurance in the Context of National Authorisation, in *National Space Legislation in Europe* (Ed. F.G. von der Dunk)(2011), 146.

37 Sec. 440.11, 14 C.F.R.; also this provision actually addresses the required insurance coverage or financial responsibility of the licensee only.

38 *Cf.* Artt. I(c), II, III, Liability Convention (*supra*, n. 3).

39 *E.g.* 51 U.S.C. Sec. 50905(a)(1).

40 51 U.S.C. 50905(a)(2)

41 51 U.S.C. 50905(b)(2)(B).

Once it became apparent that actual launches of private manned launch vehicles were seriously being contemplated, the FAA firstly was provided with the authority to, mirror-wise as it were to the launch, also regulate and exercise its licensing competence *vis-à-vis* the re-entry of such vehicles – as obviously these launch vehicles should also return safely, and as a matter of fact the operators-to-be were for commercial reasons focusing on reusable vehicles as well. This was purportedly done by way of the 1998 Commercial Space Act[42] which resulted in the Commercial Space Launch Act to be "amended (…) to address liability and government indemnification concerns and to address licensing authority for RLVs [reusable launch vehicles]", thus allowing the FAA already in principle to start licensing re-entry operations in addition to launches.[43]

With the victory of Scaled Composites in the X-Prize contest[44] and the ensuing establishment of Virgin Galactic this process quickly gave rise to the conclusion that the most appropriate way to handle such flights on a more consolidated basis in the future would be to adapt the regime of the Commercial Space Launch Act, which had regulated launch activities precisely for similar reasons of public interests (notably safety-, liability- and national security-related) to the specifics of launches with humans on board.[45] The result was the 2004 Commercial Space Launch Amendments Act[46] amending the 1984/1988 Act to achieve such goals, followed by further legal measures as part of the Code of Federal Regulations[47].

Most fundamentally, the licensing obligation was now also applied to re-entry, whereas formerly it only applied to launches.[48] 'Re-entry' is defined to

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42 Commercial Space Act, 27 January 1998, Public Law 105-303, 105th Congress, H.R. 1702; 51 U.S.C. 50101; 112 Stat. 2843 (1998). The Act was enunciated for addressing several and rather varied issues of space commercialization and the resulting involvement of private entities in space operations; *cf. e.g.* P.S. Dempsey, Overview of the United States Space Policy and Law, in *National Regulation of Space Activities* (Ed. R.S. Jakhu)(2010), 389-90.

43 Hughes & Rosenberg (*supra*, n. 16), 4, see also 19-24, incl. references to FAA regulations drafted in consequence (14 C.F.R. § 401.5 (2000)); *cf.* Secc. 14751-14753, Commercial Space Act (*supra*, n. 42).

44 Note that the FAA licensed the first-ever private flight into the edge of outer space of Scaled Composites' SpaceShipOne on 1 April 2004 using the Commercial Space Launch Act as amended in 1988 (Commercial Space Launch Act Amendments, 15 November 1988, Public Law 100-657, 100th Congress, H.R. 4399; 49 U.S.C. App. 2615; 102 Stat. 3900; *Space Law – Basic Legal Documents*, E.III.3, 13 ff.); although an experimental airworthiness certificate under 14 C.F.R. parts 21 & 91 was also required; see Hughes & Rosenberg (*supra*, n. 16), 37-8, also 66-7.

45 See *e.g.* Hughes & Rosenberg (*supra*, n. 16), 21 ff.; P. van Fenema, Suborbital Flights and ICAO, 30 *Air and Space Law* (2005), 399-400.

46 Commercial Space Launch Amendments Act, Public Law 108-492, 108th Congress, 23 December 2004, 49 U.S.C.; 118 Stat. 3974.

47 To wit 14 C.F.R. Ch. III, Commercial Space Transportation, Federal Aviation Administration, Department of Transportation.

48 See also 51 U.S.C. Sec. 50904(a). See furthermore Secc. 50904, 50905, for the general licensing requirements; also *e.g.* Hughes & Rosenberg (*supra*, n. 16), 21 ff.

mean "to return or attempt to return, purposefully, a reentry vehicle and its payload, crew, or space flight participants, if any, from Earth orbit or from outer space to Earth";[49] in other words, also a rather vague and potentially broad definition, as no specific point of begin of a re-entry phase is indicated (whilst that phase may of course be presumed to have ended at the latest upon actual landing). The House Committee on Science at least shed some further light in narrowing this loose 'definition' down to "that phase of the overall space mission during which re-entry is intentionally initiated", more specifically "when the vehicle's attitude is oriented for propulsion firing to place the vehicle on its reentry trajectory".[50]

Interestingly this broadness of in particular the applicable concept of 'launch' allowed the FAA to *de facto* regulate the whole sub-orbital trajectory at least as far as the near-term private sub-orbital flight projects are concerned, with the launch more or less seamlessly transitioning into the re-entry – and as far as public safety is directly at issue.

Launch and re-entry operations are still far from routine and actually presumably still hazardous – witness the 'informed consent' requirement giving rise to a strong defence by the operator against any claim for damage under contractual liability by a spaceflight participant[51]. Consequently, almost *any* behaviour of such a spaceflight participant that would be out of sync, such as what would make such a spaceflight participant an 'unruly passenger' as this concept is known in aviation, would raise safety-related concerns, hence at least in principle be addressable under FAA rules. Therefore, as long as sub-orbital flights do not provide transportation services across major sections of the globe effectively the comprehensive flight is thus regulated.

As, however, the FAA has not been given explicit 'on-orbit jurisdiction' by the US Congress, but was authorized only to license launch and re-entry[52],

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49 51 U.S.C. Sec. 50902(13).

50 Commercial Space Act of 1997, H.R. Rep. No. 105-347, 105th Cong., 1st Sess. at 21, as quoted in Hughes & Rosenberg (*supra*, n. 16), 20; see also 21.

51 See 51 U.S.C. Sec. 50905(b)(5); further e.g. R.A. Yates, State Law Limitations on the Liability of Spaceflight Operators, 9-1 *The SciTech Lawyer* (summer 2012), 15; T. Knutson, What is "Informed Consent" for Space-Flight Participants in the Soon-to-Launch Space Tourism Industry?, 33 *Journal of Space Law* (2007), 105 ff.

52 *Cf.* 51 U.S.C. Sec. 50904; further *e.g.* Perlman (*supra*, n. 10), 930, 935-7; also COMMERCIAL SPACE TRANSPORTATION – Industry Trends, Government Challenges, and International Competitiveness Issues, GAO-12-836T, 19. Strictly speaking, Sec. 50904 only refers to 'launch' and 're-entry', without specifying whether this does encompass (parts of) the flight in outer space, which of course also means that in the licensing process the FAA will keep an eye out also for what might happen in the outer space-portions of any space object's flight, if only for international third-party liability reasons, and insert as possible relevant conditions, for example in a safety approval if at issue. Furthermore, firstly Sec. 50902(4), defines launch with reference to placing or trying to place spacecraft, manned or

uncertainty as to its precise parameters continues to exists as this, for example, clearly does not amount to proper commercial, civil or criminal jurisdiction. Such lack of 'on-orbit jurisdiction' would effectively start to rear its head once flights would be extended beyond the sub-orbital hops currently envisaged.

Such a development would also essentially open up a major gap between, on the one hand, the international liability and responsibility of the United States under the space treaties for instance for damage caused or threatened by commercial spaceflight operations due to unruly passengers being the root cause of such damage or threat thereof, and, on the other hand, the inherent possibility for – especially – the FAA to make sure by way of regulation that such unruly passengers will be duly restrained and prosecuted.

4. Towards some form of 'on-orbit' jurisdiction?

Interestingly, the United States does already exercise jurisdiction of a rather more comprehensive character in outer space – namely when it comes to criminal jurisdiction. The Federal Criminal Code namely applies to "[a]ny vehicle (…) in space and on the registry of the United States pursuant to the [Outer Space Treaty] and the [Registration Convention], while that vehicle is in flight".[53] While that application thus addresses crimes, including economic crimes such as money laundering, in space, it might not seem to address more normal commercial behaviour or 'unruly passengers' not meeting the threshold of criminal conduct.[54] More importantly, it is far from clear how the US criminal law system would (attempt to) apply to such 'in-space' activities in practice, without any expert agency involved to make it work.

In spite of its official stance that no boundary should be formally established (yet) between airspace and outer space, this application of the Federal Criminal Code also implicitly recognizes the clear international legal difference between the two realms. As for airspace namely, the 1963 Tokyo Convention – to which the United States is also a party – provided that the state in whose airspace an aircraft registered with another state is flying is the primary state entitled to

unmanned, into outer space, *suggesting* that the in-space part of the operations should no longer be defined as part of the launch – but since normal payload separation *does* take place in outer space, one need not simply assume that there is *no* FAA jurisdiction in outer space whatsoever as such. Secondly, it may be noted that 14 C.F.R., § 440.11, requires insurance obligations under a launch license to cover the period up to thirty days from payload separation alternatively from the launch properly speaking, apparently extending FAA authority over the licensed operations to that extent into outer space also. The underlying rationale for these limitations largely seems to refer back to a hesitation on the part of the United States to exert extra-territorial jurisdiction in the 'global commons' of outer space; *cf.* Perlman, 942 ff.

53 18 U.S.C. Sec. 7(6) (2006), as quoted by Perlman (*supra*, n. 10), 937.

54 So e.g. Perlman (*supra*, n. 10), 937.

exercise its "criminal jurisdiction over an offence committed on board" an aircraft – although the former state should not do so unless other criteria apply.[55]

What is missing, then, is firstly, some actual temporary enforcement competence. Like the captain of an aircraft, the 'captain' of a suborbital spaceship should perhaps be endowed with the right to exercise temporary police powers during flight in order to be able to take appropriate measures of physical restraint – as necessary and, of course, feasible! – until formal enforcement can take over after landing.[56] Interestingly, the aforementioned Tokyo Convention in establishing such powers for an aircraft commander does seem to apply to "any act regardless whether it is an 'offence' that may or actually does jeopardize safety or good order and discipline on board. It would thus apply, *e.g.*, to unruly conduct such as smoking on board when it is prohibited, use of electronic equipment when prohibited, rude behaviour etc."[57].

Secondly, the civil and commercial jurisdiction of federal law over US-registered space objects should be principally established, even if Congress might wish to effectively limit its application to cases where specific statutes then determine which particular parts of, for example, commercial law or contract law, would actually extend to such registered objects, and how. Carve-outs would probably be needed to the extent that the use of radio-frequencies would be involved, as per FCC competencies, respectively as far as concerning remote sensing activities as per NOAA competencies, but that should not stand in the way of establishing the jurisdiction as such.

As there is no inherent reason at the international level obstructing such exercise of US jurisdiction, the solution is essentially one that could and should be found by the United States itself. The main problem the United States in that context would have to address, concerns the delimitation of airspace and outer space – which it has so far been unwilling to tackle head-

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[55] Namely, if "(a) the offence has effect on the territory of such State [being overflown]; (b) the offence has been committed by or against a national or permanent resident of such State; (c) the offence is against the security of such State; (d) the offence consists of a breach of any rules or regulations relating to the flight or manoeuvre of aircraft in force in such State; [or] (e) the exercise of jurisdiction is necessary to ensure the observance of any obligation of such State under a multilateral international agreement"; Art. 4, in conjunction with Art. 1(2), Convention on Offences and Certain Other Acts Committed on Board Aircraft (hereafter Tokyo Convention), Tokyo, done 14 September 1963, entered into force 4 December 1969; 704 UNTS 219; 2 ILM 1042 (1963); ICAO Doc. 8364. See R. Abeyratne, Space Tourism – Parallel Synergies Between Air and Space Law?, 53 *Zeitschrift für Luft- und Weltraumrecht* (2004), 190-3; M. Chatzipanagiotis, *The legal status of space tourists in the framework of commercial suborbital flights* (2011), 43-4.

[56] See Artt. 6-9, Tokyo Convention (*supra*, n. 55). Cf. also Perlman (*supra*, n. 10), 954, linking this to the US obligation under Art. VI, Outer Space Treaty (*supra*, n. 2), to 'authorise and continuously supervise' its "national activities in outer space".

[57] M. Milde, International air law and ICAO (2012), 225.

on – as (only) in outer space exercise of its jurisdiction would not be faced with any substantive legal obstacle, but in airspace the ruling 'territorial' sovereignty might put precisely obstacles of such a legal nature in front of that exercise of US jurisdiction.

This, however, from the perspective of public international law is only really a problem if the airspace of *other* countries than the United States would be at issue. As long as the flights at issue would only cross US airspace and the parts of outer space above it, establishing 'on-orbit' jurisdiction would just require aligning the FAA's authority with respect to space launches and re-entries with the FAA's competences in regulating the National Air Space.

This would therefore, at least for the time being, not require any definitive decision on (1) where, vertically speaking, the boundary-line between the US National Air Space and outer space would lie, or even whether such a boundary should be determined at all; (2) whether 'on-orbit' jurisdiction as the applicable label should not consequently be replaced with 'in-space' jurisdiction, requiring a solution regarding the extent to which the lower boundary of outer space would be equivalent to the lowest possible orbit[58]; and/or (3) whether a workable definition of 'space object' for the purposes of arranging for US liabilities under international space law can exist *without* reference to a well-defined area of 'outer space' into which such objects are intended to be launched.

As Perlman in his extensive analysis has made clear, there is on the one hand ample reason to expect a growing need for such regulation of more normal commercial and (un)civil behaviour on board of US-registered vehicles, potentially being used for longer and longer flights, and on the other hand there do not exist principled obstacles even within the US context itself to the exercise of such US jurisdiction on a more profound and coherent basis than hitherto.[59] Since the United States in both the areas of sub-orbital and orbital private commercial spaceflight is the leading nation globally, the development of a more coherent and comprehensive system of exercise of US jurisdiction is also beneficial, perhaps even crucial, for any ultimate realization of a more globally-applicable legal regime of private commercial spaceflight.

[58] See for the discussions on this issue e.g. M. Benkö & E. Plescher, Space Law – Reconsidering the Definition/Delimitation Question and the Passage of Spacecraft Through Foreign Airspace (2013), 3 ff.

[59] See Perlman (*supra*, n. 10), 937-66.