In the cases after separation in the aircraft launch scenario, and in the rocket-propelled launch scenario, the provisions of international space law apply. Passengers can potentially raise claims against the space flight operator, other passengers, the vehicle manufacturer, and against the relevant launching State(s). Article III of the 1972 Convention on International Liability for Damage Caused by Space Objects[35] makes a "launching State" liable for damage caused to persons on board a space object where the damage is due to its fault or the fault of persons for whom it is responsible. Article I(c) defines a "launching State" as a State which launches or procures the launch of a space object, or a State from whose territory or facility a space object is launched. Further to this, Article VI of the 1967 Outer Space Treaty[36] makes States Parties "bear international responsibility" for activities in outer space, even where such activities are carried out by non-governmental entities. Such activities require "authorisation and continuing supervision" by the appropriate State. This obligation is generally fulfilled through a licensing process. It is significant to note however, that these treaties do not require States to adopt safety and certification standards for crew, vehicles or passengers.

It has been shown that at present there is no international space legislation that regulates passenger liability. National legislation however, may be used as a source for formulating international legal rules, especially where such legislation is adopted by States whose interests are specially affected by the particular issue at hand. In this regard, the United States of America has established the most sophisticated national space legislation. The regulation of reusable launch vehicles (RLV) by the Federal Aviation Administration (FAA) was governed by the 1998 Commercial Space Launch Act (Title 49 of the US Code, Chapter 701) and the Final Rule of the Commercial Space

[35] Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 961 U.N.T.S. 187, T.I.A.S. No. 7762 [hereinafter "Liability Convention"].

[36] See *supra* note 26.

Transportation Reusable Launch Vehicle and Reentry Licensing Regulations.[37]

In 2004, the United States enacted the Commercial Space Launch Amendment Act ("CSLAA" – amending Chapter 701 of Title 49 U.S.C.), with the objective "to encourage the development of a commercial space flight industry".[38] Under the CSLAA a licence is required for the launch of a launch vehicle or the operation of a launch site or re-entry site, or for the re-entry of a re-entry vehicle, either in the United States or by a US citizen. The licence requirements are set out in 49 U.S.C. 70105(b). For launch vehicles carrying a human being for compensation or hire, additional licence requirements necessary to protect the health and safety of crew or space flight participants may be prescribed, but only by means of final regulations.

According to 49 U.S.C. 70105(b)(5)(A), the licensee must inform the space flight participant in writing about the risks of the launch and re-entry, including the safety record of the launch/re-entry vehicle type. Moreover, the operator must disclose that participation in space flight may result in death, serious injury, or total or partial loss of physical or mental function. The space flight participant must be given an opportunity to ask questions orally before flight.

2. Waivers of Liability

Under 49 U.S.C. 70112(b)(1) of the 2004 CSLAA, the licensee is required to make a reciprocal waiver of claims with its contractors, subcontractors and customers.[39] While the FAA final rule makes it clear that a space flight participant is not a customer, the operator is not prevented by the CSLAA from making a waiver of liability part of the agreement with a space flight participant except in cases of gross negligence. This is in

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[37] For an account of the RLV Regulatory Regime according to the CSLAA and the Final Rules, *see* Charity T. Ryabinkin, *Let there be Flight: It's Time to Reform the Regulation of Commercial Space Travel*, 69 J. AIR L. & COM. 101 (2004).

[38] 49 U.S.C. § 70105(c). On the objectives of the CSLAA, *see* Spencer H. Bromberg, *Public Space Travel - 2005: A Legal Odyssey into the Current Regulatory Environment for United States Space Adventurers Pioneering the Final Frontier*, 70 J. AIR L. & COM. 639, 658 *et seq.* (2005).

[39] 49 U.S.C. § 70112(b)(1).

line with section 7 (a.)(7) of the FAA Draft Guidelines, which provide that the written informed consent to be signed by the space flight participant should not relieve the RLV operator of responsibility for gross negligence.

B. Third-Party Liability

Third-party liability in the aircraft launch scenario before separation is regulated by the 1952 Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface.[40] The Rome Convention provides for the limited liability of the operator of the aircraft[41] upon proof that the damage on the surface was caused by an aircraft in flight or by any person or thing falling thereof.[42] Unlimited liability applies if the victim proves that damage was caused by a deliberate act or omission of the operator done with intent to cause damage.[43] The Rome Convention is however, hampered by a small number of ratifying States.[44] At the time of writing, the International Civil Aviation Organisation (ICAO) is discussing a re-working of the liability system, to be based on the two-tiered system employed by the Montreal Convention.

After separation in the aircraft launch scenario and throughout the rocket-propelled launch scenario, international space law applies. In this respect, the Liability Convention applies. Article VII(a) however, states that the Liability Convention is not applicable to damage caused to the nationals of the launching State.

VI. STATUS OF FLIGHT PARTICIPANTS

The final challenge of space tourism to the international legal community is the definition, and therefore the rights and obligations, of space flight participants.

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[40] Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface, Oct. 07, 1952, ICAO Doc. 7364 [hereinafter Rome Convention].

[41] *Id*, at art. 2(1).

[42] *Id.* at art. 1(1).

[43] *Id.* at art. 12(1).

[44] At the time of writing, 49 States had ratified the Convention, *see* ICAO, http://www.icao.int/icao/en/leb/rome1952.pdf (last visited Dec. 8, 2007).

The determination of this inquiry would have a considerable effect on the rights and obligations of such space flight participants. Article V(1) of the Outer Space Treaty[45] obliges States Parties to render to astronauts "all possible assistance in the event of accident, distress, or emergency landing on the territory of another State party or the High Seas". This is further elaborated in the 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space,[46] which broadens this obligation to include all "personnel of a spacecraft".[47] Given that the Outer Space Treaty in Article V confers the rather lofty status of "envoy of mankind" on all astronauts, it is questionable whether the conception of "astronaut" in this context refers to space tourists as well. The terms "astronaut", "personnel of a spacecraft" and "envoy of mankind" have yet to be defined in international space law.[48] However, given the humanitarian overtones in the rescue of such "personnel of a spacecraft", it could be argued that these rescue obligations would extend as well to space tourists. It is questionable however, whether the privileges and immunities extended to astronauts on national or scientific missions, will also be extended to paying space tourists.[49]

In line with this argument, if space flight participants are to be regarded as "personnel of a spacecraft", then the logical consequence is that the State of registry of the spacecraft exercises jurisdiction and control over the space flight participants

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[45] *See supra* note 26.

[46] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue Agreement].

[47] *Id.* at art. 1.

[48] Ram Jakhu & Raja Bhattacharya, *Legal Aspects of Space Tourism*, 45 PROC. COLLOQ. L. OUTER SPACE, 112, 119 (2002).

[49] Patrick Collins & Koichi Yonemoto, *Legal and Regulatory Issues for Passenger Space Travel*, 41 PROC. COLL. LAW OF OUTER SPACE 224, 232 (1998); Stephen Gorove, *Interpreting Salient Provisions of the Agreement on the Rescue of Astronauts, and Return of Objects Launched in Outer Space*, 11 PROC COLL. LAW OF OUTER SPACE 93 (1968); Leopold Peyrefitte, DROIT DE L'ESPACE, 195 (Paris, 1993); Lesley Jane Smith & Kay-Uwe Hörl, *Legal Parameters of Space Tourism*, 46 PROC. COLL. LAW OF OUTER SPACE 5 (2003); for another view *see* MARCO G. MARCOFF, TRAITÉ DE DROIT INTERNATIONAL PUBLIC DE L`ESPACE, 265 (Fribourg, 1973).

aboard the spacecraft.[50] Where space flight participants transfer to or visit a spacecraft of another State of registry in outer space, then they would come under the jurisdiction and control of the State of registry of the visited spacecraft.[51]

VII. CONCLUSION

Space tourism gives rise to many normative and practical challenges, the effects of which will be felt for some time in the air and space law community. The issues of the applicability of the law, registration and jurisdiction, authorisation, and liability all lead back to the source questions of international law: those of compliance, enforcement, and the rule of law. Commentary on the challenges posed by space tourism reflects the economic, political and technological advances in the field of space activities; reactions to the ambient developments in the field will determine whether air law and space law will continue to remain relevant in the next evolution of aerospace activities. The legitimacy, cogency, applicability and urgency necessary in addressing these issues become readily evident in the recent developments in the field. The tide of space tourism waits for no law – but the rule of law must prevail in the exploration and use of outer space. It is left to the international legal community to ensure that air and space law are not swept away by the relentless tide of change.

[50] HORST BITTTLINGER, HOHEITSGEWALT UND KONTROLLE IM WELTRAUM, 91 et seq. (Cologne 1988); *see also* George Paul Sloup, *Legal Regime of International Space Flight: Criminal Jurisdiction and Command Authority Aboard the Space Shuttle / Spacelab,* 21 PROC. COLL. LAW OF OUTER SPACE, 148, 151 (1978).

[51] Horst Bittlinger, *Menschen im Weltall*, *in* HANDBUCH DES WELTRAUMRECHTS, see *supra* note 11, 205, 215. For an opposing view, *see* STUDIES IN INTERNATIONAL SPACE LAW, *supra* note 15, at 488.

SUBORBITAL SPACE TOURISM FLIGHTS: AN OVERVIEW OF SOME REGULATORY ISSUES AT THE INTERFACE OF AIR AND SPACE LAW

Melanie Walker

I. INTRODUCTION

This paper focuses on issues and considerations regarding sub-orbital space flights because these flights have a "near term possibility" for space tourism compared to the implementation of orbital flights for that purpose.[1] This distinction is important because, at least for now, the costs of going orbital require "enormous infrastructure."[2] The suborbital market however is driven by adventure entertainment[3] incurring costs at the lower end of the economic scale[4], thereby making the feasibility of the market more likely to exist in the near future.

The Commercial Space Launch Act (CSLA) (2004) is said to have eliminated "confusion over what government agency should regulate sub-orbital aircraft"[5] because the law specifically authorized the Office of Commercial Space Transportation (AST) in the Federal Aviation Administration (FAA)[6] of the U.S. Department of Transportation to regulate the newly-emerging space tourism industry. However, the Congressional delegation of authority has still left room for some confusion because the authority granted to the FAA was first, granted with restriction,

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[1] R.D. Launius and D.R. Jenkins, *Is it Finally Time for Space Tourism?*, 4 ASTROPOLITICS: INT'L J. SPACE POWER & POL'Y, 253, 255 (2006).

[2] Frans G. Von der Dunk, European Centre for Space Law (ECSL) Practitioner's Forum, *Space Tourism: Legal and Policy Aspects*, at iv (March 17, 2006) (on file with author).

[3] *Id.*

[4] Andre Farand, ECSL Practitioner's Forum, *Space Tourism: Legal and Policy Aspects,* at 1 (2006) (on file with author).

[5] Rosanna Sattler, *Transporting a Legal System for Property Rights: From the Earth to the Stars,* 6 CHI. J. INT'L L. 23 (2005), *available at* http://www.mackrell.net/formuploads/epic1_1170261733.pdf (last visited Dec. 2, 2007).

[6] *Id.*

and second, the definition of a "sub-orbital vehicle" is still open for debate.

II. ISSUES

A. Restricted Authority

In order to promote innovation, the FAA is restricted from regulating "design features and operating practices" unless they result in a human space flight incident;[7] a fatal injury;[8] or a serious injury[9] to a space flight participant during a licensed or permitted commercial human space flight.[10] This restriction is authorized until December 23, 2012.[11] In other words, "for the next [5] years, the FAA has to wait for harm to occur, or almost occur, [to an SFP] before it can impose restrictions."[12] Thus, although the FAA is authorized to protect the uninvolved public,[13]

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[7] "Human space flight incident means an unplanned event that poses a high risk of causing a serious or fatal injury to a space flight participant or crew." Commercial Space Launch Act, 14 C.F.R. § 401.5 (2007).

[8] "Fatal injury means any injury which results in death within 30 days of the accident." 49 C.F.R. § 830.2 (2004).

[9] "Serious injury means any injury which (1) requires hospitalization for more than 48 hours, commencing within 7 days from the date of the injury was received; (2) results in a fracture of any bone (except simple fractures of fingers, toes, or nose); (3) causes severe hemorrhages, nerve, muscle, or tendon damage; (4) involves any internal organ; or (5) involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface." *Id.*; 49 U.S.C.S. § 70105 (2007).

[10] Human Space Flight Requirements (hereinafter HSFR), 71 Fed. Reg. 75616, 75624 (Dec. 15, 2006); 49 U.S.C.S. § 70105. The legislation does not further define what constitutes "during a...commercial human space flight." Current legislation does reference 49 C.F.R. § 830 for other definitions for fatal injury and serious injury. Grouped within this referenced body of legislation, 49 C.F.R. § 830 addresses aviation accidents and incidents as those "associated with operation of the aircraft." It is unclear whether the current legislation for a space flight tourist intended to include injuries that may occur at the launch site independent of the operation of the spacecraft. The fact that the legislators reference other definitions in 49 C.F.R. §830 which include the language about aircraft operation association may suggest that the legislators do not consider injury occurrence to exceed the scope of the space vehicle operation.
49 U.S.C.S. § 70105.

[11] *Id.*

[12] *Id.*

[13] "Uninvolved public" has not been specifically defined. One commentator suggested that it includes "populations living under the flight path of the spacecraft." The term also appears to be used interchangeably with "third party." "Third party" has been defined as "terrestrial populations in flight paths." Molly K. Macauley, *Flying in the Face of Uncertainty: Human Risk in Space Activities*,

it is only authorized to protect space flight participants (SFP)[14] in the circumstances referenced above.[15]

In the absence of such circumstances, the only protection afforded an SFP is the legal doctrine of "informed consent." The new regulations promulgated by the FAA require an operator to inform an SFP of all risks related to launch reentry as well as hazards and risks that could result in serious injury, death, disability or total or partial loss of physical and mental function.[16] Under the new regulations, operators are now also required to inform an SFP that unknown hazards exist as well.[17]

The level of disclosure is limited in one regard. Disclosure regarding the FAA's self-imposed restriction on SFP regulation is left to the operator's discretion.[18] Thus, an operator does not have to disclose the FAA's own restriction on regulating safety of SFPs relating to "design features and operating procedures" unless a serious injury or fatality occurs.[19]

The rationale for this restriction is based on protecting and promoting innovation, which is premised on the idea that too much safety regulation might suffocate the industry and prevent its growth.[20] However, an SFP might be hesitant to participate if they were aware of the FAA's decision to refrain from involving itself so early in the industry's nascent. Thus, the fact that the FAA leaves the disclosure of this information to the operator's discretion offers the SFP very little information at all.

Another consideration of why the informed consent doctrine may not be sufficient protection with respect to this industry is the issue of duty. One commentator suggested it is the duty of the SFP to research design features that affect personal risk.[21]

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6 CHI. J. INT'L L. 131 (2005).

[14] A space flight participant is "an individual, who is not crew, carried aboard a launch vehicle or reentry vehicle." HSFR, *supra* note 10, at 75631.

[15] *Id*. at 75618.

[16] 14 C.F.R. § 460.45 (2007).

[17] HSFR, *supra* note 10, at 75624.

[18] *Id.*

[19] *Id.*

[20] 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., at 46 (2005).

[21] HSFR, *supra* note 10, at 75624.

The FAA however, disagreed and recognized that an SFP will "come from 'all walks of life'" with varying degrees of technical expertise and understanding."[22] By placing the duty to warn on the space tourism company, the FAA's disposition regarding duty is consistent with the doctrine of informed consent. The doctrine of informed consent, most commonly known in the physician-patient context, places the duty on the physician to warn the patient of any material risks.[23]

However, "the full range of risks in the new suborbital market is not yet realized, and standards, policies and procedures to minimize risk have not yet been developed. As a result, effective warnings are difficult to articulate."[24] Unlike the physician-patient context, "one of the primary hazards or risks associated with space travel is that there are no accepted industry standards."[25] Thus, without accepted industry standards it may be difficult to ascertain whether a party has fulfilled their duty. This leaves the SFP with very little to rely on if informed consent is currently their only protection.

The informed consent doctrine also poses difficulty in assessing whether an SFP truly understands the risks associated with the specific vehicle boarded by the SFP. "All risk potentially affecting the decision must be unmasked."[26] In the case of a reusable launch vehicle (RLV) the risks associated with the specific vehicle are likely to vary with each flight. Reusability of any vehicle will eventually wear with use and time. Thus, an SFP on an RLV with a longer launch history may be more susceptible to risk than an RLV with a shorter launch history. Arguably a longer launch history may suggest the RLV's ability to withstand multiple flights safely. This longer track record could suggest that the vehicle is both safe and reliable.

On one hand, this variance in technological expertise is the reason why the FAA should impose restrictions on the industry.

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[22] *Id*.

[23] Cynthia Dokas, *The Duty to Warn in Aviation Law: A New Tort Theory in the Aftermath of Pan American Flight 103,* 8 N.Y.L. SCH. J. HUM. RTS. 227, 243 (1990).

[24] Tracey Knutson, *Informed Consent for Spacefaring Passengers*, SPACE NEWS, April 30, 2007, at 17-18..

[25] *Id.*

[26] *Canterbury v. Spence*, 464 F.2d 772 (1972).

Although requiring disclosure of a safety record does not circumvent the fact that an SFP may lack the technological understanding to interpret such mandated disclosures.[27]

Moreover, the FAA's focus on the uninvolved public as the primary party deserving protection is inconsistent with the FAA's role of safety regulation because the uninvolved public is the one party that is least likely to be at risk. Regarding test flights, one industry leader, Mr. Burt Rutan, commented that "...the government, was only interested in the best safety for people on the ground...there's been hundreds of accidents with research airplanes but nobody's ever been hurt on the ground." Mr. Rutan further commented that the CSLA "didn't address the problem [of]....getting an FAA acceptance of the safety of passengers."[28] Although thousands of people are likely to be present during a test launch and susceptible to risk of injury from falling debris, there are many test flights that occur before a public test launch in which passengers are present but the uninvolved public is not. Since, the passenger is exposed to more risk than the uninvolved public, the focus on passenger safety should not be neglected.

This is not to say that the FAA's approach of focusing on the uninvolved public is indefinite. The FAA will begin regulating the industry in 2012, if not sooner, should there be a human space flight incident, fatality, or serious injury to an SFP.[29] Thus, the FAA may eventually shift its focus of safety regulation to include passengers and those who are susceptible to greater risk.

B. Laissez-Faire Approach or Not?

"Congress is clearly saying that it doesn't want to be a barrier…It wants to open doors and fly the American public into

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[27] The FAA requires an operator to provide a safety record of launch or reentry human rated vehicles.
HSFR, *supra* note 10, at 75624.

[28] Interview by Ted Balaker with Burt Rutan, Space Entrepreneur, Scaled Composites (Apr. 2005), http:www.reason.org/apr2005/space_travel.html (last visited 04/25/07).

[29] HSFR, *supra* note 10, at 75624.

space."[30] Yet, other commentators argue "[t]he single biggest factor facing the private sector in reaching orbit or interplanetary or even reaching the surface of the moon is the United States Congress."[31]

One Senator argued that the amendments were made to reduce government interference and protect the industry.[32] This is important because the legal framework and regulations cannot be addressed without discussing whom the law is designed to protect. The current law is designed to protect the space industry. Space industry leaders fought for minimal regulation and many of them claim that the industry does not advocate a *laissez -faire* approach to space tourism policy.[33] However, the facts that led to the adoption of the regulations and the regulatory result indicate this is the case.

Opponents of the original bill[34] that proposed an 8-year hold on the industry's regulation criticized the adoption of a *laissez-faire* approach because refraining from regulation until a fatality occurs precludes the prevention of harm, which is inherent to the government's role of protecting public safety. Although many commentators argue that regulation will stifle the industry, at least one industry leader stated that he is not opposed to regulation.[35] Regulation is not the issue.[36] The issue, according to this view, is that the regulators lack the knowledge and experience of regulating experimental vehicles that are yet to be in existence.[37] In other words, the regulators do not know, and can not know, what it is that they are to regulate.[38]

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[30] Alan Boyle, *Private-spaceflight bill signed into law* (2004), http://www.msnbc.msn.com/id/6682611 (last visited Dec. 2, 2007) (quoting James *James* Muncy, Space Policy Consultant in response to the Commercial Space Launch Amendments Act, H.R. 5382).

[31] Catherine E. Parsons, Comment, *Space Tourism: Regulating Passage to the Happiest Place Off Earth*, 9 CHAP. L. REV. 493, 509 (2006) (quoting Stuart Witt, Manager of the Mojave Spaceport).

[32] Parsons, *supra* note 31, at 513.

[33] *Id.*

[34] H.R. 3752, 108th Cong. (2004).

[35] *See supra* note 28.

[36] *Id.*

[37] *Id.*

[38] *Id.*

If the regulators are going to authorize permitting an SFP to assume risks that are tantamount to voluntarily offering oneself as an "experiment" for the sake of promoting innovation and to advance the industry's economic interests, then the Government should also require that an SFP be fully informed by the entity offering the commercial service. If a space tourism company is authorized to use a government launch facility an SFP might be misled into thinking that it is a government sponsored launch, especially an activity that falls within the definition of government "involvement." U.S. government involvement exists when a launch operator launches from a U.S. Government facility or when a U.S. Government payload or personnel is being transported.[39]

14 CFR §440.17(e) requires an SFP and crew to waive any claims that might otherwise be filed against the U.S. Government for "participation in a launch or reentry in which the U.S. government, any of its agencies or its contractors and subcontractors is involved."[40] Blue Origin[41] suggested that the FAA specify the definition of government "involvement" for purposes of knowing exactly when a waiver of claims is triggered.[42] Blue Origin further commented that FAA authorization of launch or reentry is a means of oversight and does not constitute government "involvement." The FAA agreed based on the fact that the FAA is functioning in its regulatory capacity.

Another commentator argued that this requirement "deprives the SFP or crew member of a normal expectation of customary behavior on the part of the operator by virtue of the normal potential for legal liability."[43] An SFP might choose to decline the offer of services, if he or she learns that not even a minimum standard has been set for SFP safety.

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[39] HSFR, *supra* note 10, at 75628.

[40] *Id.* at 75627.

[41] Blue Origin is a private aerospace company pursuing both sub-orbital and orbital flights. *See* Alan Boyle, *Amazon Founder Unveils Space Plans: Bezos' Blue Origin Venture to Build West Texas Rocket Facility* (Jan. 13, 2005), http://www.msnbc.msn.com/id/6822763/ (last visited Dec. 2, 2007)*; See also* Blue Origin website, http://public.blueorigin.com/index.html (last accessed Dec. 2, 2007).

[42] HSFR, *supra* note 10, at 75628.

[43] *Id.*

One change resulting from the recent regulations is that §460.45(g) requires the SFP to be given an opportunity to orally ask questions regarding the hazards and risks.[44] "The FAA hopes that this will allow the SFP to have a chance to get clarification on any information that may be confusing or unclear."[45] It is questionable, however, whether an SFP would know what kinds of questions to ask. For example, an SFP is likely to make general inquiries related to quantity of accidents. The SFP may not have enough information to make more specific inquiries. For example, an SFP may not think to pose questions that would distinguish between quantity of accidents that occurred in the air or on the ground.[46] It is unclear that an SFP would know, just by reading an SFP informed consent form, what risk he or she is assuming.

C. Informed Consent

Informed consent is the legal doctrine that governs the risks that may be assumed by the SFP. "Informed consent" is "a person's agreement to allow something to happen, made with full knowledge of the risks involved and the alternatives."[47] "True consent to what happens to one's self is the informed exercise of a choice, and that entails an opportunity to knowledgeably evaluate the options available and the risk attendant upon each."[48] However, the issue of determining whether a person's consent is informed, is predicated on numerous factors including the type of information provided; adequacy of information; and, the person's appreciation of that information.

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[44] HSFR, *supra* note 10, at 75627.

[45] *Id.*

[46] The FAA requires the safety record disclosure to include accidents that occur on the ground. The Federation commented that disclosure should not include accidents that occur on the ground. This is just one example where an SFP may not know what specific questions to ask regarding a minute detail. The Federation is a group of spaceship developers and operators, spaceports, destinations and transportation agents. Members include Bigelow Aerospace, Virgin Galactic, Armadillo Aerospace, the X PRIZE Foundation and Rocketplane-Kistler. The Space Fellowship, http://spacefellowship.com/News/?cat=53 (lasti visited Dec. 3, 2007).

[47] BLACK'S LAW DICTIONARY (8TH ed. 2004).

[48] *Canterbury,* 464 F.2d 772.

The only mandatory informed consent requirements imposed by the FAA are that the SFP understands the risk associated with being an SFP aboard the specific vehicle and that his or her presence on board is voluntary.[49] Section 460.45 requires an operator to inform an SFP in writing of launch and reentry risks including "known hazards and risks" resulting in "serious injury, death, disability, or total or partial loss of physical and mental function."[50] An operator must also inform the SFP that "unknown hazards" exist.[51] The new regulations prohibit an SFP and crew from bringing a claim against the U.S. Government by imposing a waiver of claims.[52] In addition, this waiver extends to bringing a claim on behalf of crew and SFP including heirs, administrators and assignees.[53]

One industry leader responded to this requirement[54] by suggesting that the FAA require the disclosure of its self-imposed, temporary restraint on regulating design and operations of the industry.[55] The FAA, however, left this to the discretion of the operator.[56] This seems inconsistent with guaranteeing "risk information adequacy" because for information to be adequate, it should be complete and allowing the exclusion of regulatory restraint information creates an informational void. However, the FAA does require the operator to inform the SFP that the U.S. Government has not certified the launch vehicle and any reentry vehicle as safe. This might imply that the FAA did not entirely overlook the importance of this type of information.

The new Federal regulations attempt to achieve an "acceptable level of safety to the general public" and to ensure that [SFPs] are "aware of the risks" associated with launch or reentry.[57] Attempting to achieve a level of safety by relying on in-

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[49] *Id.*

[50] HSFR, *supra* note 10, at 75624.

[51] *Id.*

[52] *Id.* at 75627.

[53] *Id*.

[54] 14 C.F.R. § 440.17(e) and (f) require SFP and crew to waive any potential claims that could be filed against the U.S. government.

[55] HSFR, *supra* note 10, at 75624.

[56] *Id*.

[57] *Id.* at 75616.

formed consent is difficult because even if the level of information provided to the SFP is adequate, there exists a greater issue, one of cognizance. "The kind of threshold that we will have to figure out how to achieve is the cognizance issue. How do we know that [an SFP] understand[s] the risk that they are taking?"[58] The FAA addressed this issue by implementing a "cognizance test" that allows the SFP to clarify confusing issues by orally asking questions prior to flight.[59] This "cognizance test" may be insufficient.

Even industry leaders are aware that informed consent does not function as simply as it sounds. They have acknowledged the difficulty of insuring their duty to inform is met by taking extreme measures to filter out any ambiguity. Greg Maryniak, Executive Director of the X-Prize Foundation suggested advising the SFP to draft a will prior to space flight.[60] Jeff Greason, president of X-Cor acknowledged the necessity of a written notice including blatant statements such as "You have a 1 in 14 chance of dying on this flight." Yet, Mr. Greason also acknowledged that a written notice may not be enough.[61] He stated that in addition to a written notice, he would provide the SFP with dramatic videos portraying catastrophic rocket accidents.[62]

These suggestions do address the concern that the industry might mask the true risks posed by space flight by failing to include them in their disclosure.[63] Moreover, these suggestions imply that some industry leaders understand the complexity of

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[58] Brooke N. Weeber, Dirk C. Gibson, and Matthew Petrunia, *Adequate Risk Communication & Informed Consent: The Duty to Warn, Judicial Warning Adequacy Standards, and the Federal Aviation Administration's Proposed "Human Space Flight Requirements for Crew & Spaceflight Participants*, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, SPACE 2006 (Sept. 2006); John Antczak, *Space Tourism Safety Weighed: Regulations Being Developed by FAA*, (Oct. 11, 2004) http://www.enquirer.com/editions/2004/10/11/biz_spacetourism11.html (Quote by Patti Grace Smith, FAA Associate Administrator in the Office of Commercial Space Transportation in 2004).

[59] HSFR, *supra* note 10, at 75626.

[60] Laura Montgomery, *Space Tourism and Informed Consent: To Knowingly Go*, 51 FED. LAW 26 (July 2004).

[61] *Id.*

[62] *Id.*

[63] *Id.*

informed consent and the importance of adequately informing an SFP so as to avoid liability.

However, this does not address the crux of the "cognizance" issue which turns on one's appreciation of the information rather than adequacy of the information itself. The CEO of Incredible Adventures[64] expressed her concern about this by commenting that despite the non-conspicuous language on the informed consent form provided to her consumers, the consumer is not able to conceptualize the risk because they are seeking her service for the sake of adventure.[65] In this context, the consumer is paying for a thrilling experience filled with risk.[66] The consumer is attracted to the activity precisely because of the risks involved.[67] Thus, the consumer's frame of mind lacks the cognitive ability to appreciate the risk of which they are being informed.[68]

D. Liability and Allocation of Risk

There are three major categories of potential parties that would be able to file a claim against the U.S. or a space tourism company.[69] They are, 1. third parties identified as the "uninvolved public"; 2. an SFP; and 3. a foreign State.

1. "Uninvolved Public" Third Party Liability

The U.S. Government has agreed to help promote industry growth by participating in a "liability risk-sharing regime."[70] This regime requires a licensee to purchase insurance for all

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[64] Jane Reifert, CEO of Incredible Adventures, Presentation at 2006 AIAA Space Conference (Sept. 19-21). 2006 Incredible Adventures offers adventure tours such as zero-g flights, shark dives and piloting your own bi-plane rides. *See also* Incredible Adventures website, http://www.incredible-adventures.com/ (last visited Dec. 3, 2007).

[65] *Id.*

[66] *Id.*

[67] *Id.*

[68] *Id.*

[69] Space tourism company, in this context, refers to the holder of the launch or reentry license or the launching company.

[70] *See* Hughes and Rosenberg, *supra* note 20, at 31.

participants[71] of the launch based on the FAA's maximum probable loss (MPL) determination.[72] The MPL determination is a methodology used to analyze and assess the maximum monetary damages that may be suffered by the U.S. Government and any third party.[73] The MPL is based on an evaluation of government and third party property that is at risk of damage.[74] Once a licensee has received an MPL evaluation determining the licensee's financial responsibility; the licensee must provide proof that funds are available to cover the determined amount.[75] Currently the required insurance for a space tourism company is capped at $500 million(U.S.) or the maximum liability insurance available at a reasonable cost in the event they are held liable for a third party claim.[76] The required insurance policy not only protects the space tourism company but includes coverage for the U.S. Government, at no cost to the Government.[77]

2. Space Flight Participants

The U.S. Government has not agreed to indemnify space flight participants. When the bill[78] to amend the CSLA was first proposed, the Committee on Science opined that "space flight participants wishing to ride on board a launch vehicle have chosen to undertake a risky venture of their own accord." As such, they do not merit the financial security provided by the promise of indemnification."[79] The Committee suggested that SFPs should pay for their own insurance and even suggested that the

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[71] H.R. 3752, *supra* note 34. This does not include an SFP. "The Committee (on Science) believes that [an SFP] ...can purchase their own insurance or that licensees or transferees may purchase insurance plans that expressly cover claims against space flight participants." *Id.*

[72] *Id.*

[73] Reusable Launch Vehicle Financial Responsibility Determination, http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/reusable/financial/index.cfm?print=go (last visited Dec. 3, 2007).

[74] *Id.*

[75] *Id.*

[76] 49 U.S.C.S. § 70112 (2007).

[77] *Id.*

[78] H.R. 3752, *supra* note 34.

[79] *Id.*

space tourism company may purchase insurance that covers the SFP.[80]

An SFP raises a new set of potential risks that did not arise previously with professional astronauts. For example, an SFP is susceptible to not only bodily injury– but also financial losses, in the event the SFP is disqualified for medical conditions or dies before the flight.[81] One commentator also raised the issue of political risk which may affect approving the license to fly.[82]

3. Foreign States

The Convention on International Liability for Damage Caused by Space Objects[83], to which the United States is a State-Party, holds the launching state "absolutely liable…for damage caused by its space object on the surface of the Earth or to aircraft in flight."[84] In the event that a claim by a foreign State is made against the U.S. government, the space tourism company's insurance policy will cover the U.S. government.[85]

E. Experimental Permit v. License

Prior to the CSLAA, a license was the only means for authorizing a launch or reentry.[86] With the advent of the CSLAA, the FAA was granted the authority to issue experimental permits.[87] Experimental permits differ from licenses in various ways. First, experimental permits, unlike a license, are not

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[80] *Id.*

[81] Guillaume de Dinechin, *Astronauts in Space: Liability and Insurance Coverage, available at* http://portal.unesco.org/shs/en/files/8474/11224582491deDinechin_paper.pdf/deDinechin_paper.pdf
(last visited Dec.2, 2007).

[82] *Id.*

[83] Convention on International Liability for Damage Caused by Space Objects, March 29, 1972, 24 U.S.T. § 2389.

[84] *Id.* at art. II.

[85] Hughes & Rosenberg, *supra* note 20, at 31.

[86] FAA Guidelines for Experimental Permits for Reusable Suborbital Rockets (May 2005), http://www.faa.gov/about/office_org/headquarters_offices/ast/media/EP_Guidelines_ver1.pdf.

[87] *Id.*

transferable.[88] Second, experimental permits do not allow operation of the vehicle for carrying "any property or human being for compensation or hire."[89] Arguably the most critical difference is that damages incurred during an experimental permitted launch or reentry are ineligible for indemnification. In contrast, damages that result from a licensed launch or reentry are eligible for indemnification, "to the extent provided in an appropriation law or other legislative authority."[90] Lastly, a permit must authorize an unlimited number of launches and reentries whereas a license is not required to do so.[91]

F. Commonalities with International Maritime Law

Although aviation law is more often considered the most relevant analogue to space law, international maritime law may be just as relevant because it consists of similar principles and it has already successfully dealt with some of the same challenges now facing regulators of international space law. For example, the Outer Space Treaty[92] specifically states that outer space "is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[93] Likewise, the Law of the Sea Convention states "the high seas being open to all nations, no State may validly purport to subject any part of them to its sovereignty."[94]

The nature of commercial space tourism is very similar to the cruise industry with respect to the primary purpose of transportation. The product offered by both is a temporary experience that offers more than the mere transportation of a passenger from one destination to another. Like the product offered by cruise ships, commercial vehicles like *SpaceShipOne* offer an

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[88] *Id.*

[89] *Id.*

[90] *Id.*

[91] *Id.*

[92] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. II, Jan. 27, 1967, 18 U.S.T. 2410 [hereinafter the Outer Space Treaty].

[93] *Id.*

[94] Law of the Sea: Convention on the High Seas, art. II, Apr. 29, 1958, 13 U.S.T. 2312 [hereinafter Law of the Sea Convention].

experience while aboard the vehicle as passengers are able to observe outer space while remaining in the vehicle.

Generally speaking, airline passengers have no interest in boarding a plane for the experience alone. They board the aircraft to get to their ultimate destination. The airplane is merely a means of transport. However, the space vehicle is more like a luxury cruise liner in that the "ship [is] the destination."[95] Thus, "the comparison of luxury cruises to space tours appears valid."[96]

Moreover, a major outer space concern that is not exclusive to commercial space tourism is orbital debris. "More than one hundred thousand pieces of space junk are floating in orbit around the Earth and...if no steps are taken to reverse the growth...the likelihood of collisions between pieces of debris or between debris and active space objects will increase."[97] Orbital debris is most concentrated in low Earth orbit which is the primary destination of commercial space tourism.[98] Pollution of the sea, most prevalent by oil spills is an issue that maritime law regulators have been facing for years.[99] Thus, unlike aviation, pollution of the marine and space environments is an issue of equal and great importance.

Lastly, the issue of boundary has arisen in the context of both maritime and space law. Maritime law has addressed the issue by recognizing Nation-States' jurisdiction over territorial waters that extend twelve nautical miles off their coast.[100] Jurisdiction over international waters beyond the Nation-State's territory is governed both by the Convention of the Law of the Sea and international customary law.[101]

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[95] Sarah J. Tomlinson, *Smooth Sailing? Navigating the Sea of Law Applicable to the Cruise Line Industry*, 14 VILL. SPORTS & ENT. L.J. 127, 133. (2007).

[96] Daniel L. Britt, *A Space Access Architecture Supporting Large-Scale Space Tourism*, AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, SPACE 2006, at 9 (Sept. 2006).

[97] Steven A. Mirmina, Note, *Reducing the Proliferation of Orbital Debris: Alternatives to a Legally Binding Instrument,* 99 AM.J.INT'L L. 649 (2005).

[98] *Id.* at 651.

[99] Jason Haile, *The New Age of Conquest and Colonialism: How Admiralty Will Be Used on the Final Frontier*, 29 TUL. MAR. L.J. 353, 365 (2005).

[100] Law of the Sea Convention, *supra* note 94, 13 U.S.T. 2312.

[101] Tomlinson, *supra note* 95, at 137-138.

Jurisdiction over where air space ends and outer space begins has yet to be determined. Maritime law however offers two interesting perspectives for applying it as an analogue. One perspective suggests that the current law regarding outer space is analagous to maritime law as it exists now. The fact that each Nation-State has sovereignty over its air space[102] resembles the notion that each Nation-State is similar to the sovereignty that a Nation-State has over its coastal waters. The fact that outer space is not subject to territorial sovereignty is similar to the notion that beyond a coast's territorial waters, international waters are free also of territorial sovereignty.

A second perspective would be to consider that each Nation-State have its territorial sovereignty over its air space extend beyond the atmosphere to a specified boundary. Anything beyond this boundary would then be considered "international space", free from any claim of sovereignty. This issue related to boundary identification, sovereignty right expansion is not as prevalent in aviation law and thus makes maritime law a very useful analogue in setting precedents.

Despite the many similarities that exist between the two bodies of law; one aspect that raises the most concern is passenger safety. Some commentators argue that maritime law is outdated and, as a result, provides more protection to the cruise line industry rather than its passengers.[103] In maritime law, once the cruise ship is outside the realm of U.S. territorial waters, often unbeknownst to the passenger, there is very little authority the U.S. government has to protect the passenger.[104] Similarly, U.S. space law seems to be heading in this direction as the FAA is more focused on protecting the uninvolved public than protecting the SFP.

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[102] Convention on International Civil Aviation, art. I, Dec. 7, 1944, 61 Stat. 1180 [hereinafter Chicago Convention]. Article I states that "[t]he contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory."

[103] Thomas A. Dickerson, *The Cruise Passenger's Dilemma: Twenty-First-Century Ships, Nineteenth-Century Rights,* 28 TUL. MAR. L.J. 447, 451 (2004).

[104] *Id.* The Athens Convention limits a passenger's recoverable damages to the value of the vessel, so long as the ship has not touched a U.S. port.

G. Jurisdiction I: Determining the Applicable Legal Regime

Since the space vehicle must traverse air space into outer space[105] and likely will travel over water;[106] the object's presence in both geographical realms fosters a debate over which legal regime is applicable. Some commentators[107] suggest that the regime should be predicated on the location of the "aerospace object."[108] Thus, while the "aerospace object" is in air space, aviation law should govern and while the "aerospace object" is in outer space, space law should govern.[109] This approach focuses on physical location of the "aerospace object."

Other commentators[110] suggest the nature of the activity and purpose of the object should be considered.[111] In other words if the object is merely passing through airspace to achieve its primary purpose of reaching outer space, the applicable regime should be based on outer space, rather than associating the object with airspace which is merely a temporary location.

In determining the applicable legal regime, physical presence cannot be overlooked. This is especially true with regard to lawsuits arising out of death or injury. For example, an accident may occur upon reentry. In this case, the space vehicle may

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[105] Outer space in this context is being used to describe the entire realm that exists beyond the atmosphere.

[106] Virgin Galactic is launching out of the Mojave desert hoping to offer its space flight participants a view of the Pacific Ocean. *See* Virgin Galactic, *Where will I fly from?*, http://www.virgingalactic.com/htmlsite/overview.php (last viewed Dec. 2, 2007).

[107] Respondents to a questionnaire posed by the U.N. Committee on the Peaceful Uses of Outer Space (COPOUS) include Chile, Brazil and Fiji. *Compilation of Replies Received from Member States to the Questionnaire on Possible Legal Issues with Regard to Aerospace Objects*, U.N. COPOUS, U.N. Doc. A/AC.105/635/Add.10 (2004), http://www.unoosa.org/docs/misc/aero/aero_compE.doc (last visited Dec. 2, 2007).

[108] *Id.* The term "aerospace object" is used in a very broad sense and was not defined in the questionnaire. The introductory note uses aerospace object in referring to space objects and the questionnaire explores the issue of objects that are capable of traversing both air and space. Respondents varied in their own definition of an aerospace object. Some respondents regarded an aerospace object as an object designed for the exploitation in outer space. One respondent suggested that some aerospace objects have aerodynamic properties that do not allow the object to remain in airspace, thus classifying the object as an aerospace object would be too restricting. The questionnaire asked how to characterize an aerospace object and thus, this term is used in a broad sense to refer to all possible aerospace objects.

[109] *Id.*

[110] *Id.* Respondents to U.N. COPOUS questionnaire include Costa Rica and Benin.

[111] *Id.*