

2013

## Space Entrepreneurs: Business Strategy, Risk, Law, and Policy in the Final Frontier, 46 J. Marshall L. Rev. 1039 (2013)

Michael Laisné

Follow this and additional works at: <https://repository.law.uic.edu/lawreview>



Part of the [Agency Commons](#), [Air and Space Law Commons](#), [Business Organizations Law Commons](#), and the [Law and Economics Commons](#)

---

### Recommended Citation

Michael Laisné, Space Entrepreneurs: Business Strategy, Risk, Law, and Policy in the Final Frontier, 46 J. Marshall L. Rev. 1039 (2013)

<https://repository.law.uic.edu/lawreview/vol46/iss4/3>

This Article is brought to you for free and open access by UIC Law Open Access Repository. It has been accepted for inclusion in UIC Law Review by an authorized administrator of UIC Law Open Access Repository. For more information, please contact [repository@jmls.edu](mailto:repository@jmls.edu).



# THE JOHN MARSHALL LAW REVIEW

**Space Entrepreneurs:  
Business Strategy, Risk, Law, and  
Policy in the Final Frontier**

*Michael R. Laisné*

# SPACE ENTREPRENEURS: BUSINESS STRATEGY, RISK, LAW, AND POLICY IN THE FINAL FRONTIER

MICHAEL R. LAISNÉ\*

## I. INTRODUCTION

Human civilization is on the brink of exploring another frontier. As usual, the super power governments of the world have played a major role in the initial stages. Now, as was the case when brave settlers came to colonize the West, and railroads and financial empires were built, society must rely on the private sector to take civilization to the final frontier. This article will give an overview of the current laws and policies relevant to space entrepreneurship (Part II). The Article explores the road to becoming a space entrepreneur including, a description of startup risks (Part III), an overview of space startup funding (Part IV), and a brief summary of business entity options (Part V). Then, the Article makes the case for the economic development of space (Part VI) and presents critical legal and policy suggestions to help promote the private space industry (Part VII).

## II. GENERAL RULES AND LAWS GOVERNING SPACE

The Treaty on Principles Governing the Activities of States in Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (hereinafter, “The Outer Space Treaty”) lays out the general rules regarding international space laws.<sup>1</sup> It bans weapons from space, mandates that signatories to the treaty aid astronauts who need emergency assistance, and requires

---

\* Michael R. Laisné, Esq., J.D., LL.M. in Taxation (*summa cum laude*). The author wishes to thank Prof. Thomas A. Smith for his assistance, supervision, and guidance in the writing of this article and the author’s parents and family, Michael, Kiki, and Daphne Laisné, for their love and support.

1. LEWIS D. SOLOMON, THE PRIVATIZATION OF SPACE EXPLORATION, 94-96 (2008).

nations to authorize and monitor their own public and private space missions and to be responsible for those activities.<sup>2</sup> The Outer Space Treaty has been ratified by 98 nations, including the U.S.<sup>3</sup> The Registration Convention, adopted by the United Nations (UN) General Assembly (hereinafter, "Convention"), requires signatories to register and maintain a list containing information about the signatory's launched objects, which the UN Secretary-General also maintains.<sup>4</sup>

The foundation for space privatization was established during the Reagan administration; during that time, the 1984 Commercial Space Launch Act, based on Executive Order 12465, made the U.S. Department of Transportation the main agency to facilitate and encourage commercial space activities by the U.S. in the private sector in the area of launch vehicles.<sup>5</sup> With the passage of further legislation, licensing for space launches is now the responsibility of the Federal Aviation Administration (FAA).<sup>6</sup> Another legal consideration is Section 863(d) of the Internal Revenue Code, which states that income originating from an outer space activity will be sourced in the U.S. as long as a U.S. citizen or resident derives it.<sup>7</sup> Thus, future entrepreneurs from the U.S. who run businesses or sell items in space will still need to pay income taxes to the U.S. government.

### III. HOW TO GET STARTED: A DESCRIPTION OF STARTUP RISKS

Risk is a major part of any startup business. This is especially true in the context of the space industry. The following sections describes the risks involved in funding a space startup, licensing issues, and liability concerns.

#### A. *Financing*

First, space entrepreneurship, especially the commercial human space flight sector, is a capital-intensive industry.<sup>8</sup> It is

---

2. *Id.*

3. The Treaty on Principles Governing the Activities of States in Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies, Oct. 10, 1967, 18 U.S.T. 2410.

4. Zhao Yun, *A Legal Regime for Space Tourism: Creating Legal Certainty in Outer Space*, 74 J. AIR L. & COM. 959, 974 (2009).

5. See Solomon, *supra* note 1, at 97-100 (describing the Commercial Space Launch Amendments Act).

6. *Id.*

7. 26 C.F.R. § 1.863-8 (2006); *id.* at 97.

8. See Colin Doughan, *Don't Forget the Angels*, THE SPACE BUSINESS BLOG (Feb. 26, 2010, 9:18 PM), <http://spacebusinessblog.blogspot.com/2010/02/getting-funding-angels-vs-vcs.html> (discussing investment strategies necessary to cover the immense

essentially a requirement that one of the investors be tremendously wealthy.<sup>9</sup> Almost all the firms competing in this industry have an extremely wealthy individual as a top investor.<sup>10</sup>

Commercial human space flight currently looks like a playground for the rich. For example, in June 2010, SpaceX, one of the leaders in the space industry, needed approximately one billion dollars in additional funding to help it towards its goal of putting humans into space on a regular basis; its founder, Elon Musk, had already invested \$100 million of those necessary funds.<sup>11</sup> The price for a space ticket is steep and there can be much gained from public subsidies for space firms.<sup>12</sup> Further, as of 2010, a substantial portion of SpaceX's revenue came from launching satellites.<sup>13</sup> And, as can be seen from SpaceX, having a successful business person as an investor is critical. However, it is no guarantee of success; George French, former CEO of the now defunct space startup Rocketplane, was a successful entrepreneur and Rocketplane received over \$200 million from a contract with NASA.<sup>14</sup> Yet, SpaceX had an advantage over Rocketplane, because SpaceX's founder had significantly greater resources to invest in his firm; even a successful businessperson, such as French, can lack such capital stockpiles.<sup>15</sup> Additionally, one of the biggest risks space entrepreneurs face is the difficult, if not impossible, task of

---

capital necessary for successful funding).

9. See *id.* (discussing the need for multi-million dollar investors at the "angel" level); see also Rocky Persaud, *What Space Startups Really Need*, THE SPACE REV. (Nov. 26, 2007), <http://www.thespacereview.com/article/1007/1> (stating that investments escalate into the millions depending on the business plan and management team).

10. See generally Persaud, *supra* note 9 (reiterating that wealthy investors have put in millions of their own dollars to fund space projects).

11. Andy Pasztor, *SpaceX Illustrates Privatization Risk*, THE WALL STREET JOURNAL (June 7, 2010), available at <http://online.wsj.com/article/SB10001424052748704726104575290604217670696.html>.

12. See Tom Krazit, *Space-The New Summer Vacation?*, CNET (May 16, 2006, 2:30 PM), [http://news.cnet.com/Space—the-new-summer-vacation/2100-11397\\_3-6072973.html](http://news.cnet.com/Space—the-new-summer-vacation/2100-11397_3-6072973.html) (stating that tickets on space tourism flights are priced in the millions); Amy Svitak, *NASA Funding for Private Spaceships Increases by \$40 Million*, SPACE.COM (Jan. 12, 2011, 2:46 PM), <http://www.space.com/10605-post-nasa-boosted-cots-funding-additional-40-million-october.html>.

13. See Camille Ricketts, *SpaceX Profitable Despite CEO's Cash Problems – but is an IPO Needed?*, VENTUREBEAT (June 9, 2010, 11:00 AM), <http://venturebeat.com/2010/06/09/spacex-profitable-despite-musk-being-cash-poor-but-is-an-ipo-needed/>.

14. Rick Romell, *Financial Meltdown Scuttles Dreams of Green Bay's Rocket Man*, JOURNAL SENTINEL ONLINE, (Dec. 11, 2010), <http://www.jsonline.com/business/111734559.html> (detailing the investment by the founder of the company, along with NASA, that were eventually lost when the company failed to reach its goal).

15. *Id.*

estimating costs.<sup>16</sup> As of 2001, estimates placed the cost of launching a space vehicle with payload at a cost of roughly \$299 million.<sup>17</sup> In the context of commercial space flight, the high cost of space entrepreneurship means that only the very wealthy are likely to be able to keep a space startup afloat. This Article will discuss funding options in more detail in Section IV.

### B. *The Licensing Process*

The licensing process for commercial space flight is costly, time-consuming, and complex.<sup>18</sup> The steps to licensing include pre-application consultation, policy review and approval, safety review and approval, payload review and determination, financial responsibility determination, environmental review, and compliance monitoring after the license has been issued.<sup>19</sup> In spite of all these obstacles, in 2010, SpaceX became the first company ever to get a license for reusable space vehicles.<sup>20</sup> The process is burdensome for space entrepreneurs, and its complexities may cause businesses to be unable to obtain a license.<sup>21</sup>

### C. *Liability*

One of the biggest potential liabilities for space entrepreneurs is what happens if a rocket carrying tourists or a satellite falls from the sky. Damages from such a disaster could be tremendous. The following sections summarize the potential consequences of such an incident and examine an entrepreneur's potential liabilities.

#### 1. *Passengers, Informed Consent, and Waivers*

While space tourists must sign informed consent forms, no federal law requires space tourists or crews to waive their rights to sue commercial operators; but, they must waive their rights to sue the U.S. government.<sup>22</sup> However, there is also no law that

---

16. *See id.*

17. LOU DOBBS & H.P. NEWQUIST, *SPACE: THE NEXT BUSINESS FRONTIER* 106 (2001).

18. SOLOMON, *supra* note 1, at 100.

19. FAA, *Launch or Reentry Vehicles*, [www.FAA.GOV](http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/launch_reentry/) (Mar. 17, 2010).

20. Mike Wall, *SpaceX Receives FAA License to Return Spaceships from Earth Orbit*, [SPACE.COM](http://www.space.com/9581-spacex-receives-faa-license-return-private-spaceships-earth-orbit.html) (Nov. 22, 2010, 10:37 AM).

21. *See* Solomon, *supra* note 1, at 100.

22. Rebekah Davis Reed, *Ad Astra Per Aspera: Shaping a Liability Regime for the Future of Space Tourism*, 46 HOUS. L. REV. 585, 598-600 (2009)

prohibits tourists or crews from signing a waiver of their right to sue commercial operators; or that prohibits companies engaged in private space flight from requiring that tourists or crews sign a waiver prior to flight.<sup>23</sup> Commentators have observed that these waivers may or may not be enforceable, especially given the great wealth of the first space travelers, whose estates would likely have the resources to aggressively pursue tort remedies.<sup>24</sup>

## 2. *Third-Party Liability and Indemnification*

Third-party liability for private launch providers in the U.S. commercial space industry is based on a three-tier indemnification system.<sup>25</sup> In the first tier, companies carry the burden of responsibility; they are obligated to buy insurance.<sup>26</sup> The firm itself must obtain insurance coverage for \$500 million or the highest insurance coverage available at a reasonable rate.<sup>27</sup> Under the second tier the U.S. government indemnifies the company for catastrophic losses for what would have been \$1.5 billion in 1988, adjusted for inflation, in excess of the insurance coverage.<sup>28</sup> The final tier mandates that the private launch provider pays amounts over the second tier.<sup>29</sup> In 2009, when the indemnification was set to expire, Congress extended the indemnification for three years.<sup>30</sup> Again, in 2013, Congress extended it for one more year.<sup>31</sup>

While negligence would likely apply to space accidents, it remains unknown whether operators of commercial space vehicles who would potentially be sued for damage to property due to a space vehicle disaster on the ground, in the air, and in space would be subject to strict liability.<sup>32</sup> A single accident may be all it takes to cripple the space insurance market, leaving only Tier II indemnification; this would also harm commercial human space

---

(describing the current insurance and indemnification standards for private launch providers).

23. *Id.*

24. See Yun, *supra* note 4, at 969.

25. Reed, *supra* note 22, at 596-97.

26. *Id.*

27. *Id.*

28. *Id.*

29. *Id.*

30. Jeff Foust, *House Passes Launch Indemnification Extension*, SPACE POLITICS (Oct. 20, 2009), <http://www.spacepolitics.com/2009/10/20/house-passes-launch-indemnification-extension> [hereinafter Foust, *House Passes Launch Indemnification Extension*].

31. Marcia S. Smith, *House Passes Senate Version of Indemnification, INKSNA, Exploration Bill*, SPACEPOLICYONLINE.COM (Jan. 2, 2013, 6:47 PM), <http://www.spacepolicyonline.com/news/house-passes-senate-version-of-indemnification-inksna-exploration-bill>.

32. Michael C. Mineiro, *Assessing the Risks: Tort Liability and Risk Management in the Event of A Commercial Human Space Flight Vehicle Accident*, 74 J. AIR L. & COM. 371, 383-91 (2009).



flight operators, because their insurance would also be impacted.<sup>33</sup> Despite Congress's recent extension of indemnification by one year, the long-term prospect of the government continuing to provide the second tier of indemnification remains uncertain.<sup>34</sup>

### 3. *Manufacturer Liability*

Manufacturers may also be liable under a number of different liability standards.<sup>35</sup> Space flight passengers or third parties could seek damages under the theories of breach of warranty, negligence, and strict liability.<sup>36</sup> Thus, manufacturers are also open to a great deal of risk and uncertainty.

### 4. *International Consideration*

The Outer Space Treaty states each nation is responsible for the actions of its public and private space activities.<sup>37</sup> Fault is the standard of liability used in cases where a space object from one nation causes damages to a space object, from another nation and absolute liability is applied for damages sustained on the earth's ground or in the air.<sup>38</sup>

Only vague reference is made in the Convention to the amount to be paid for damages, thus leaving compensation to be determined by principles of justice and equity.<sup>39</sup> The Convention requires that the nation of the injured party approach the launching nation through diplomatic channels and bring charges in the launching jurisdiction within a year of the accident; after that time the settlement process can begin.<sup>40</sup> If no settlement is reached within a year after the charges are brought, the nations will setup a claim commission, consisting of three members, which is responsible for deciding the merits of the case and awarding damages.<sup>41</sup>

## IV. GETTING STARTED: FUNDING SPACE STARTUPS

As briefly discussed earlier, the capital requirements for a space startup are immense. Funding a space startup can therefore be incredibly difficult. The following section discusses the sources of funding for space businesses.

---

33. Reed, *supra* note 22, at 596-98.

34. Smith, *supra* note 31.

35. Mineiro, *supra* note 32, at 396.

36. *Id.*

37. SOLOMON, *supra* note 1, at 96.

38. *Id.* at 104.

39. S.G. Sreejith, *Whither International Law, Thither Space Law: A Discipline in Transition*, 38 CAL. W. INT'L L.J. 331, 347 (2008).

40. SOLOMON, *supra* note 1, at 105.

41. *Id.*



### A. *Founders, Friends and Family*

Millionaires and billionaires head up the most significant space industry firms.<sup>42</sup> When the founders have access to large amounts of monetary resources, it is much easier to enter the space industry. Friends or family of investors willing to contribute this kind of capital are also useful to space industry founders. Because most people do not have access to these types of monetary resources personally, or through their friends and family, the number of people who can successfully enter the space industry is limited. But, there are funding alternatives beyond the critical wealthy investor or founder.

### B. *Angels and Venture Capitalists*

It is estimated that the initial investment needed for a space startup is anywhere from \$25 million to \$100 million.<sup>43</sup> Whereas the typical initial investment provided by venture capitalists (“VCs”) and angel investors (“Angels”) is less than five million dollars.<sup>44</sup> Moreover, VCs and Angels typically want investments that can ensure large returns, as opposed to space ventures, whose returns are unpredictable.<sup>45</sup> For space ventures, it is likely that only moderate returns will be seen.<sup>46</sup> Additionally, the liquidity event for the ideal startup is within one to three years whereas a space business’s range is likely five to seven years.<sup>47</sup>

Despite these issues, some Angels and VCs invest in the space industry. For example, the Boston Harbor Angels invested in the space firm XCOR Aerospace.<sup>48</sup> Also, the Space Angels Network is a group of investors dedicated to funding worthy space projects; the network’s list of sponsors includes the law firm Morrison & Forrester.<sup>49</sup>

### C. *Government Funding*

In addition to investments from wealthy founders, VCs, and Angels, there are a number of government funds available through NASA, including grants, contracts and co-operative agreements.<sup>50</sup>

---

42. See Doughan, *supra* note 8 (stating the majority of the most successful space entrepreneurs are millionaires or billionaires like Elon Musk, Jeff Bezos, Robert Bigelow, and Richard Branson).

43. *Id.*

44. *Id.*

45. *Id.*

46. *Id.*

47. *Id.*

48. Jeff Foust, *The Challenges of Funding Space Startups*, THE SPACE REVIEW (Jun. 11, 2007) <http://www.thespacereview.com/article/887/1>.

49. SPACE ANGELS NETWORK, <http://www.spaceangelsnetwork.com/about>, (last visited Aug. 2, 2013).

50. NASA, *Guidebook for Proposers Responding to a NASA Research*

For example, in 2011 NASA announced that government funds were available for firms that develop technology that is, as NASA refers to it, “game changing.”<sup>51</sup> NASA planned to offer five to ten awards, the total of which would not exceed five million dollars a year, and single awards would not be worth more than three million dollars over three years.<sup>52</sup> Additionally, NASA offers other funding and has a website named NSPIRES, which lists NASA’s open, closed, and future solicitations.<sup>53</sup>

#### D. Prizes

Prizes represent a proven method for getting more participants into industries where growth is wanted.<sup>54</sup> Historically, prizes have inspired individuals to take extraordinary risks; for example, Charles Lindbergh’s flight across the Atlantic was motivated by the Orteig Prize.<sup>55</sup> Such incentives were also used to promote both minor and massive improvements in the automotive and aviation industries in the early twentieth century.<sup>56</sup> Often much more was spent to win these prizes than the actual prize itself.<sup>57</sup> This is likely because the value of the resulting technical advances often far exceeds the value of the prize. One example, of where this strategy has worked is the X Prize.<sup>58</sup> This prize was funded by the insurance policy of two businesspeople who paid a two million dollars insurance premium.<sup>59</sup> It provides an excellent model for future prizes to help mitigate the risks and funding costs. From a policy perspective, prizes are more efficient than grants and contracts because they award those who successfully reach the goal instead of paying someone with grants or contracts in an area where they might fail.<sup>60</sup>

An excellent resource for both public and private prizes is the

---

*Announcement (NRA) or Cooperative Agreement Notice (CAN)*, D1-2 (Jan. 2013), available at <http://www.space.com/20622-nasa-budget-planetary-science-2014.html>.

51. Colin Doughan, *Funding Your “Game Changing” Space Innovation*, THE SPACE BUSINESS BLOG (Mar. 3, 2011, 4:13 PM), <http://spacebusinessblog.blogspot.com/2011/03/funding-your-game-changing-space.html>.

52. *Id.*

53. *NASA Research Opportunities*, NSPIRES (last visited Aug. 2, 2013), <http://nspires.nasaprs.com/external>.

54. See SOLOMON, *supra* note 1, at 36.

55. *Id.*

56. *Id.*

57. *Id.*

58. *Id.*

59. *Id.* at 37.

60. Clay Stallbaumer, *From Longitude to Altitude: Inducement Prize Contests as Instruments of Public Policy in Science and Technology*, 2006 U. ILL. J. L. TECH & POL’Y 117, 127-29 (2006).

Space Prize blog. This site posts regularly on these prize competitions.<sup>61</sup> Winning a prize allows the winner to leverage the victory into funds, to gain notoriety and, ultimately, to create a potential exit strategy. For example, few people likely knew of Scaled Composites or its owner, Burt Rutan, before the firm, helped by investment from Paul Allen, developed the spacecraft that won the X Prize.<sup>62</sup> As a result of this award, Scaled Composites was acquired by Northrop Grumman.<sup>63</sup> True, Allen's involvement helped Rutan a great deal, but Rutan's role in winning the prize probably played a big part in Northrop Grumman's decision to acquire Scaled Composites.

### *E. Strategic Partnerships*

In the space industry, as in many areas of business, strategic partnerships can be key to growing a company and creating an exit strategy.<sup>64</sup> For instance, XCOR Aerospace and Masten Space Systems teamed up to form a strategic partnership aimed at developing technology for lunar landers.<sup>65</sup> This example does not relate directly to commercial human space flight, but it is an illustration of what is being done in the space industry and what could be accomplished by individuals who wish to enter the field of commercial human space flight.

### *F. Side Businesses*

There are ways to raise funds other than relying solely on commercial human space flight. For instance, SpaceX has managed to stay in business not only because it is backed by Elon Musk, but also because it generated revenue from its satellite-launching business.<sup>66</sup> For the entrepreneur in the area of commercial human space flight, a side business like SpaceX's can be critical to keeping revenue coming into the business without the need to continuously expend personal or investor funds.

Many small businesses have broad goals when they start out. But, early on, startups should try to focus on a select few with the

---

61. SPACE PRIZES, <http://spaceprizes.blogspot.com> (last visited Jul. 30, 2013).

62. Solomon, *supra* note 1, at 10.

63. *Northrop Grumman Acquires Scaled Composites*, SOCALTECH.COM, (Aug. 27, 2007) [http://www.socaltech.com/northrop\\_grumman\\_acquires\\_scaled\\_composites/s-0010876.html](http://www.socaltech.com/northrop_grumman_acquires_scaled_composites/s-0010876.html).

64. See CONSTANCE E. BAGLEY & CRAIG E. DAUCHY, *THE ENTREPRENEUR'S GUIDE TO BUSINESS LAW*, 140-42 (3rd ed. 2008).

65. Doug Messier, *XCOR, Masten Space Systems Form Strategic Partnership for Lander Work*, PARABOLIC ARC (May 25, 2010, 12:37 pm), available at <http://www.parabolicarc.com/2010/05/25/xcor-masten-space-systems-form-strategic-partnership-lander-work/>.

66. Pasztor, *supra* note 11.

goal of securing a market share.<sup>67</sup> Once this is done, they can pursue additional opportunities and projects.<sup>68</sup> In applying this concept to the space industry, it would make sense to start with spaceship components or satellites, so the entrepreneur can have a profitable business, which holds some portion of the market.

As discussed previously, this industry is capital-intensive, and there are no easy answers regarding how much revenue is needed for a small business to succeed. An excellent strategy for a space entrepreneur is to follow the approach taken by Scaled Composites, which worked with an established businessperson who had a great deal of wealth and then competed to win a space contest. Once a contest is won, the business can be sold to a recognized firm in the aerospace industry (or maybe just a giant corporation with eyes on the private space race; after all, Google has not purchased a space business yet). If, on the other hand, the exit strategy is to go public, then the entrepreneur better be ready to slug it out for years, and, thus, a successful side business will be needed, such as, manufacturing other products for other sectors or launching satellites.

## V. GETTING STARTED: SELECTION OF A BUSINESS ENTITY

After considering the intense capital and liability risks that are a prerequisite for space entrepreneurship, there should be little surprise that the best two business forms for entities engaging in activities related to space flight are the corporation and the limited liability company (LLC). Because of the potential liability in this industry, it is rational that investors would hesitate to enter a partnership with no liability protection.<sup>69</sup> Further, investors in these firms can be very wealthy. And, at this stage in the development of the industry, it would seem very likely that great losses will be sustained. The LLC would be attractive to wealthy cash investors, who invest large cash amounts in the company, because it allows, in certain situations, for all tax losses to be specially allocated to such investors.<sup>70</sup> On the other hand, the corporate business entity, which is a C corporation unless an election is made for it to be treated as an S corporation for tax purposes, is also an excellent option because it promises limited liability and, in the case of a C corporation offers the ability to go public.<sup>71</sup>

---

67. Kai Fu Lee, *Top Reasons Why Start-Ups Fail*, LinkedIn (2012) <http://www.linkedin.com/today/post/article/20121008142944-416648-top-reasons-why-start-ups-fail>.

68. *Id.*

69. BAGLEY AND DAUCHY, *supra* note 64, at 57.

70. *Id.* at 63.

71. *Id.* at 53-55, 64-65.

## VI. WHY SPACE?: THE CASE FOR THE ECONOMIC DEVELOPMENT OF SPACE

Space deserves to be the focus of future economic development. The two main targets for extraterrestrial human colonization are the Moon and Mars; in the near term, the moon is the most feasible target.<sup>72</sup> However, there are already plans for a Mars colony.<sup>73</sup> Once a lunar colony is established, it is likely that a lunar tourist industry will arise.<sup>74</sup>

The potential for finding important natural resources on the Moon is high.<sup>75</sup> There is already evidence that the Moon contains a great deal of Helium 3, which is not abundant on Earth, and this is expected to be very valuable in other scientific processes, such as nuclear fusion.<sup>76</sup> Moreover, the Moon also contains significant amounts of water, which can help sustain lunar exploration.<sup>77</sup> The Moon provides an excellent testing ground for future missions to Mars.<sup>78</sup> NASA has already referred to Mars as the perfect place for space colonization.<sup>79</sup> Much of the same benefits that can be seen from Moon colonization would likely also apply to colonization of Mars. Further, colonization could be a starting point for creating habitable environments for future human colonies. Historically, in the U.S. there have been numerous states which were once considered uninhabitable, such as Nevada, Arkansas, Colorado, Kansas, Wyoming, Nebraska and South Dakota; but, technological innovation helped make them places suitable for people.<sup>80</sup> Thus,

---

72. Human Spaceflight Plans Committee, *Seeking a Human Spaceflight Program Worthy of a Great Nation*, NASA 34-40 (2009) available at [http://www.nasa.gov/pdf/617036main\\_396093main\\_HSF\\_Cmte\\_FinalReport.pdf](http://www.nasa.gov/pdf/617036main_396093main_HSF_Cmte_FinalReport.pdf) [hereinafter Human Spaceflight Plans Committee]; Sam Dinkin, *Colonize the Moon Before Mars*, THE SPACE REVIEW (Sep. 7, 2004), <http://www.thespacereview.com/article/221/1>.

73. Melissa Hogenboom, *Applicants Wanted For A One-Way Ticket to Mars*, BBC NEWS (Apr. 16, 2013), <http://www.bbc.co.uk/news/science-environment-22146456>.

74. Dinkin, *supra* note 72.

75. *Moon Potential Goldmine of Natural Resources*, MOON DAILY, (July 16, 2009), [http://www.moondaily.com/reports/Moon\\_potential\\_goldmine\\_of\\_natural\\_resources\\_999.html](http://www.moondaily.com/reports/Moon_potential_goldmine_of_natural_resources_999.html).

76. *Id.*

77. *NASA Finds "Significant" Water on Moon*, CNN, (Nov. 13, 2009, 7:16 PM), <http://www.cnn.com/2009/TECH/space/11/13/water.moon.nasa/>.

78. Human Spaceflight Plans Committee, *supra* note 72, at 34-36.

79. *Id.*

80. 1 KANSAS: KANSAS: A CYCLOPEDIA OF STATE HISTORY, EMBRACING EVENTS, INSTITUTIONS, INDUSTRIES, COUNTIES, CITIES, TOWNS, PROMINENT PERSONS, ETC. 784-785 (Frank W. Blackmar ed. 1912), available at [http://skyways.lib.ks.us/genweb/archives/1912/g/great\\_american\\_desert.html](http://skyways.lib.ks.us/genweb/archives/1912/g/great_american_desert.html); Timothy Egan, *Las Vegas Stakes Claim in 90's Water War*, N.Y. TIMES (Apr. 10, 1994), available at <http://www.nytimes.com/1994/04/10/us/las-vegas-stakes-claim-in-90-s-water-war.html?pagewanted=all&src=pm>.

colonization would boost the need and profitability of the commercial human space flight industry, allowing it to evolve into the equivalent of the railroad or airline industries.

Additionally, there are economic advantages to manufacturing in outer space.<sup>81</sup> In the process of manufacturing silicon chips, pharmaceuticals and other important products, the most important limitations are gravitational.<sup>82</sup> Of course, in space there is no gravity, and this could make space factories a cost saving investment, in spite of the initial startup costs of such an endeavor.<sup>83</sup> Further, areas involving energy and crystal formation may also have growth opportunities as the result of the development of the private space industry.<sup>84</sup> There is also the chance for massive space tourism.<sup>85</sup> Moreover, the materials and resources that can be gained by simply exploring and utilizing the Moon are immense.<sup>86</sup>

Finally, if something were to happen to Earth, colonization of other extraterrestrial bodies would be essential.<sup>87</sup> If humans will one day inhabit the Moon and Mars it is critical to have a private space industry to shuttle people back and forth and to move materials and man or robotic power to such colonies. The creation and nurturing of a substantial private space industry is an important first step to any major expansion of humankind into outer space.

For the above reasons there is a critical need for a strong space industry, and it all begins with commercial space flight. The government must adopt policies to protect this fledgling industry.

## VII. POLICY SUGGESTIONS

From a policy perspective there is much that can be done to support the young space industry. This section begins with a summary of current policy shortcomings in the laws that govern this industry. Following this are a number of legal and policy suggestions that could benefit the industry significantly.

### A. *Policy Shortcomings*

The Reagan administration had the right idea when it set out to provide the legal infrastructure and build the foundation for

---

81. DOBBS AND NEWQUIST, *supra* note 17, at 22.

82. *Id.* at 22-23.

83. *Id.*

84. *Id.* at 22-27.

85. Dinkin, *supra* note 72.

86. SOLOMON, *supra* note 1, at 5-6 (stating that there is the possibility for tourism, and lunar mining). Further, the Moon would make an excellent launching site for a manned mission to Mars. *Id.*

87. *Id.* at 7-8.

space privatization. However, the current administration has rushed the privatization of space exploration without implementing the laws and policies necessary to help support this industry and mitigate risk. The Obama administration has invested in the government by bailing out big banks and purchasing a struggling car company, however it has not been as supportive in producing needed space infrastructure.<sup>88</sup> For example, the Bush administration's plan for a lunar base was scrapped by the Obama administration.<sup>89</sup> While, as discussed previously, there are many government funds available to space firms, the space business remains incredibly risky from a liability perspective; entry barriers are very high, and the licensing system remains tediously long. The Obama administration's handling of space privatization seems, at best, half-hearted. Additionally, both the Obama administration<sup>90</sup> and Congress proposed cutting NASA's budget.<sup>91</sup>

Moving forward, there are a number of things that could be done to help aid the space industry. First, further capital could be invested in building infrastructure to help support the space industry. Second, risks associated with liability could be reduced, further reduced.

### B. Developing Infrastructure

One major activity the U.S. could engage in to further the commercialization of space exploration is the development of new space travel infrastructure including the establishment of suborbital fueling stations.<sup>92</sup> This would assist both the government and private entities in the process of moving both

---

88. Neil M. Barofsky, Op-Ed, *Where the Bailout Went Wrong*, N.Y. TIMES, (Mar. 29, 2011), available at [http://www.nytimes.com/2011/03/30/opinion/30barofsky.html?\\_r=0](http://www.nytimes.com/2011/03/30/opinion/30barofsky.html?_r=0); see also, SFGATE, *Will Government's GM Gamble Payoff?* (May 29, 2009), available at <http://www.sfgate.com/opinion/article/Will-government-s-GM-gamble-pay-off-3296922.php> (describing the bailout of GM).

89. Tariq Malik, *NASA Grieves Over Canceled Program*, NBC NEWS (Feb. 2, 2010, 12:51 PM), [http://www.nbcnews.com/id/35209628/ns/technology\\_and\\_science-space/t/nasa-grieves-over-canceled-program/#.Uexjgxbvw1g](http://www.nbcnews.com/id/35209628/ns/technology_and_science-space/t/nasa-grieves-over-canceled-program/#.Uexjgxbvw1g); John Roach, *Moon Base Announced by NASA*, NATIONAL GEOGRAPHIC (Dec. 4, 2006), <http://news.nationalgeographic.com/news/2006/12/061204-moon-base.html>.

90. Tia Ghose, *NASA Budget Cuts Would Cripple Planetary Science*, SPACE.COM (Apr. 11 2013, 1:34 PM), <http://www.space.com/20622-nasa-budget-planetary-science-2014.html>.

91. Clara Moskowitz, *Proposed NASA Budget Cuts Spark Bitter Debate in Congress*, SPACE.COM (July 18, 2013, 6:20 PM), <http://www.space.com/22023-nasa-authorization-bill-debate.html>.

92. Thomas Brannen, *Private Commercial Space Transportation's Dependence on Space Tourism and NASA's Responsibility to Both*, 75 J. AIR L. & COM. 639, 663 (2010).



people and materials into space.<sup>93</sup> Eventually, it could also help mitigate some of the governmental expenses of space travel.<sup>94</sup> One major problem for new space businesses is figuring out where new space businesses go in terms of a destination. There do not appear to be many options other than the international space station and the Bigelow space station, which will be launched in the coming years.<sup>95</sup> The government, unfortunately, scrapped what would have been both an excellent step for the private space industry and a giant leap for mankind by defunding the Lunar Base Mission.<sup>96</sup> However, if the U.S. government wants to show its support for space privatization a good way to do it is to build a lunar space base.

Fueling stations can help to decrease the cost of governmental and private sector operations.<sup>97</sup> A lunar base could function primarily as a place for research, but also as a destination for space tourists. Further, as previously discussed, the moon would make an excellent launching point for public space exploration and for private space tourism or mining operations. However, these developments will come with significant financial costs. Further, there could be political costs for such a project, given the already high budget deficit and the likely political repercussions from making cuts to other government activities in order to build a space infrastructure.<sup>98</sup>

### C. Reduce Risk

As discussed earlier, negligence would be applied in the event of an accident involving a commercial human spaceflight operator to damages sustained by third-parties, but whether strict liability applies in such a situation is unknown.<sup>99</sup> The laws concerning the early railroad in the U.S. could serve as a guide to the liability regime in this area, while the space industry is in its infancy. To encourage growth of the railroad industry there were exceptions

---

93. *Id.*

94. *Id.*

95. See Kenneth Chang, *In New Space Race, Enter the Entrepreneurs*, N.Y. TIMES, June 7, 2010, available at <http://www.nytimes.com/2010/06/08/science/space/08space.html?pagewanted=all&r=0>; BIGELOW AEROSPACE, ORBITAL COMPLEX CONSTRUCTION, <http://bigelowaerospace.com/orbital-complex-construction.php> (last visited Aug. 30, 2013).

96. See discussion *supra* Part VII (describing how the Obama administration has not invested in space programs at a level necessary to encourage entrepreneurship).

97. Brannen, *supra* note 92, at 663.

98. Suzy Khimm, *Congress at Impasse as Budget Clock Ticks Down*, MSNBC (Jul. 31 2013, 5:00 AM), <http://tv.msnbc.com/2013/07/31/what-me-worry-congress-stalls-as-government-heads-to-shutdown/>.

99. Mineiro, *supra* note 32, at 371-72, 383-91.

made for it because, to quote Justice Shaw “[w]e need to encourage this infant industry of carriage by railroad . . . in my judgment, a special liability as insurer of the safe carriage of goods will operate as a deterrent to the growth of the industry.”<sup>100</sup> Given the strict licensing process in the space industry and the required inspections, one possibility is to not apply strict liability to commercial human spaceflight operators. This would give further protection to the industry while in its infancy. To foster growth in the space industry the U.S. must keep in mind long-term goals such as having a base on the moon. Therefore, to encourage growth there should be greater discussion and, if possible, legislation focused on protecting commercial human spaceflight operators from strict liability.

Congress should also extend indemnification for private launch providers for the long-term, perhaps even indefinitely.<sup>101</sup> The space community was disappointed in 2009 when Congress only renewed indemnification for three years.<sup>102</sup> Once again, in 2013, Congress extended indemnity for only one year.<sup>103</sup> And, as mentioned above, it takes a substantial amount of time to see a profit in the space industry.<sup>104</sup> Renewing indemnification for short periods, such as one, three, or five years, adds even more uncertainty to an already uncertain playing field. Thus, as the former head of the FAA’s Office of Commercial Space Transportation proposed, it would be much better to extend indemnification for ten years or indefinitely.<sup>105</sup> Such a commitment would reduce some of the risk associated with entering the space sector. Additionally, at least one other commentator has suggested, liability should be capped at a reasonable amount, and all space flight participants should have to sign waivers.<sup>106</sup> Further, Virginia has already enacted state law preventing space passengers, their estates or heirs from suing for damages except in instances where gross negligence consisting of willful or wanton conduct was the cause of the injuries.<sup>107</sup>

---

100. ROY L. BROOKS, *STRUCTURES OF LEGAL DECISION MAKING FROM LEGAL FORMALISM TO CRITICAL THEORY* 142 (2004).

101. Reed, *supra* note 22, at 611-13; *see also* Charity Trelease Ryabinkin, *Let There Be Flight: It’s Time to Reform the Regulation of Commercial Space Travel*, 69 J. AIR L. & COM. 101, 135-36 (2004).

102. Foust, *House Passes Launch Indemnification Extension*, *supra* note 30.

103. Smith, *supra* note 31.

104. *See discussion supra* Part IV (describing how it takes longer to see a profit in space ventures and for these companies to become solvent).

105. Marcia S. Smith, *Pattie Grace Smith: Extend Indemnification for 10 Years, At Least*, SPACEPOLICYONLINE.COM (May 20, 2013, 7:41 PM), <http://www.spacepolicyonline.com/news/patti-grace-smith-extend-indemnification-for-10-years-at-least>.

106. Reed, *supra* note 22, at 611-13.

107. Michael C. Mineiro, *Law and Regulation Governing U.S. Commercial Spaceports: Licensing, Liability, and Legal Challenges*, 73 J. AIR L. & COM.

Adopting these policy suggestions would be prudent in order to help mitigate risks in this industry and balance out the lengthy licensing process. The overall cost of these changes would be less than developing infrastructure because they involve little investment, minor political risk, and lower financial costs. The benefits are still very great in that they help to lessen one of the most costly and fragile portions of the private space industry, insurance. The actions noted above would help to reduce the risks and costs for space entrepreneurs.

### VIII. CONCLUSION

The space industry is an extremely difficult industry for entrepreneurs to survive in, much less succeed in. There are tremendous risks including financing, licensing, and liability. These financial barriers can be overcome by attracting a wealthy financier, in addition to other investors, and by winning a coveted prize and, then, selling the firm. In any case the firm will probably require additional income from government grants, angel investors, prize money, and associated profitable business segments. It would greatly assist the commercial human space flight industry and the entire space sector if the government would invest in space infrastructure, such as a moon base and suborbital stations. Currently, potential space entrepreneurs are restrained by the strict licensing process and the looming risk of liability in the event that an accident happens, since an accident could cripple the space insurance industry. The changes proposed in this Article, including development of infrastructure and reduced risk can make the private space industry more attractive to investors. All these activities together, could be just what it takes to help launch the private space industry into orbit.