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THE DIVERGENT AND EVOLVING LEGAL PATHWAYS OF FUTURE SPACE TRAFFIC MANAGEMENT COLLABORATION

ABSTRACT

Collaboration in space traffic management efforts is critical to the successful continued use of the outer space environment, and exploration and utilization of space assets will depend upon structured legal guidance. While STM is notionally evolving at the international level, appropriate attention must also be given to national strategies. This paper will elucidate that extant space traffic management methodologies are developing along two disparate tracks. These pathways, which here are termed the international-collaborative and domestic-sectarian methods, are reflective of the needs of the international community and intrastate interests respectively. The paper will attempt to show that in the near-term, these two methodologies will co-exist as they are developed and begin to mature; moreover, in the near to mid-term, the sectarian method will develop more rapidly in order to accommodate pressing national needs. Furthermore, the paper will demonstrate that as national dependency on space assets continues to grow, pressure will encourage proportional international dialogue on best methods going forward. Though this paper does not attempt to define the precise parameters of truly collaborative international STM, it does suggest that the history of space governance is filled with the cooperative efforts of nations working to resolve pressing international concerns (such as past and ongoing work with the *International Space Station*), and that the STM systems of the future will utilize these legal precedents in their collaborative efforts. Necessarily, the STM systems of the future will include intrastate regulatory schemes designed to effectively service national needs whilst simultaneously respecting developing international standards.

INTRODUCTION

In discussing space traffic management, one cannot help but hear the oft-uttered phrase: congested, competitive, contested. These three C's refer to the increasingly difficult aspect of utilizing the space environment. This essay attempts to show that though the desire for an international STM system is strong, in the short-term, domestic legislation and regulatory authorities serve as the primary STM available for analysis. Indeed, though States have been operating in space since the late 1950's, the concept of developing a unifying operational theory for coordination of disparate national interests took a back seat to more pressing

concerns, such as preventing nuclear weaponry from finding its way into space.¹ Though domestic, State-centric STM is the currently utilized model, it is probable that, in time, the necessity of centralizing the rules pertaining to space traffic management will encourage international STM systems to take their place in the field.

This essay aims to look at diverging paths for managing space by analyzing space actors with a view towards a very specific activity that, if all goes as planned in certain countries, will engage a host of new potentially dangerous traffic, along with a likely concomitant increase in the generation of orbital debris. Below, the emerging field of space mining is the example used to illustrate domestic STM systems, in contrast to the dearth of such regulation in the international community more generally.

Finally, this essay argues that while an international STM scheme would benefit States most in the long run, the parallel construction of new and more comprehensive domestic laws will continue to benefit both industry and governments in the short term. Encouraging both of these systems to develop is complimentary, since what is seen today in domestic systems (like the agency scheme utilized by the United States to govern its space activities) will be useful in informing the structure of future international systems.

¹ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies, art. IV, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter the Outer Space Treaty or OST].

DIVERGENT PATHWAYS

Governance of space activities has been developing along predictable pathways for decades. Ever since its genesis with the United Nations Declaration of 1963², States have been carving out utilitarian methods for key governance of the outer space environment. Yet, what once was predictable is becoming less so, given the increasingly congested nature of outer space.³ Currently, a divergent process exists whereby space traffic management develops along the parallel paths of domestic State law (a sectarian process) and international law (an international-collaborative process). These efforts serve different groups and needs, yet they both aim towards enabling interested parties to maintain the peaceful use of outer space. Maintaining the right, and the concomitant ability to access that right, is of such importance to the international community, that it became the first rule enshrined in the flawed but mighty Magna Carta⁴ of outer space—the Outer Space Treaty.⁵ The OST and its progeny have been successful at establishing many aspects of the proper use of space, some of which have obvious ramifications for space traffic management⁶, and some of which deal with the intricacies of

² Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space [General Assembly Resolution 1962 (XVIII) of 13 December 1963].

³ NASA has noted that there are more than 500,000 space objects being tracked, a number sure to grow with time, http://www.nasa.gov/mission_pages/station/news/orbital_debris.html.

⁴ “The Outer Space Treaty has been rightly recognized as the Magna Carta of space law, but its provisions are just not definite enough to handle the complex issue of space debris and the advancements in technology.” N. Jasentuliyana, *Space Debris and International Law*, 26 J. Space L. 2 (1998), at 139.

⁵ “The exploration and use of outer space...shall be carried out for the benefit and in the interests of all countries...shall be the province of all mankind...shall be free for exploration and use by all States....”, OST art. I, *supra* note 1.

⁶ *Id.* at art. IV (prohibition of military maneuvers on celestial bodies).

space exploration.⁷ However, no current system exists under international law that effectively governs what States and non-governmental entities may do in space vis-à-vis STM. The drafters of the OST regime set the stage, but they did not finish the task, and in turn the very freedom celebrated by the treaties has allowed activities to flourish that now threaten the long-term use of the space realm.

The space traffic management of today is a hodge-podge of domestic legislation and voluntary international collaboration. A great critique of the OST regime (or compliment, depending on the position taken) is that it dared not to establish the rules of the road, beyond what was absolutely necessary to encourage and permit the exploration of space. However, while STM has yet to find its proper home in the halls of international law, there is reason to believe that eventually, the pressure of continued usage of space will encourage States to work together to manage an area of such paramount importance to their myriad needs. Below, this essay briefly examines the possible structure of future international systems. Until that time, current national efforts will continue to reflect the propagating needs of space-utilizing States.

Indeed, in the absence of relevant, well-developed international guidance, States have been left to their own design to launch and manage their space assets. This has resulted in the extant state of affairs, whereby States acting in space have developed their own domestic, or sectarian methods for controlling their space activities. Similar themes may crop up in the

⁷ Id. at art. V (description of astronauts as “envoys of all mankind”).

domestic legislation of the space-capable States⁸, although they are always tailored specifically to the needs of the promulgating State⁹. On the one hand, this produces a dilemma, in that there are STM efforts underway by various States that are externally inconsistent with one another, even though they share the goal of safe management of space assets. On the other, systems in place by space actors can serve as ready-made exemplars of methodologies that could, if properly modified, inform the creation of eventual international STM norms.

As of this writing, there is every indication that space traffic management schemes will continue to develop at both the State and International levels, convergently, until such time as further activity in space is exceptionally difficult, if not impossible, without directed international cooperation. However, the time when such cooperative activity becomes necessary may not be long in coming.

IMPLICATIONS OF SPACE MINING FOR STM

⁸ As an example, the United Kingdom Outer Space Act of 1986 requires any “person to whom this Act applies” to acquire a license in order to launch objects into space (UK Outer Space Act of 1986, Sec. 3.-1). The United States Commercial Space Launch Act as Amended has substantially the same requirements, as found in 51 U.S.C. § 50904(a)(1).

⁹ Every State has its own reasons for entering and utilizing space. In the United States, one such reason is to commercialize activities in space. The same statute that requires a license for space launches is also designed to encourage private space activity: “the Secretary of Transportation...in carrying out this chapter...shall...encourage, facilitate, and promote commercial space launches and reentries by the private sector....” 51 U.S.C. § 50903(a)(b)(1). Directly involving the government in developing a private space launch sector has been a long-standing policy meant to effectuate specific interests of the United States since at least the mid-1980s.

Before ascertaining solutions to the more sophisticated problems of space traffic management, such as orbital debris, orbital navigation, or traffic collision methodology, States will need to answer basic international law questions about their planned activities. Some of these activities have become well-established, if not without controversy, such as orbital slot and frequency allocation for communications satellites.

To illustrate a domestic-sectarian methodology for space traffic management, one can look to the system in place in the United States. The United States utilizes the Commercial Space Launch Act as Amended¹⁰ (CSLAA) to permit, and encourage, its commercial entities to enter into space. This is done for a host of reasons, such as the belief that commercial activity is good for foreign policy interests¹¹, or that private activity in space will have economic benefits for the United States.¹² To achieve these and other goals, the United States established a system whereby minimal licensing would be necessary for private space launches (believing, no doubt, that an overregulated field would discourage private engagement in space), and gave wide authority to the Secretary of Transportation to facilitate space activity.¹³

There are also newer uses for space that have captured the attention of the media, such as the recent proposals by the U.S. House of Representatives to facilitate mining on celestial

¹⁰ Public Law 108-492 (2004). *See also* 51 U.S.C. § 509 et. seq.

¹¹ Commercial Space Launch Act as Amended, 51 U.S.C. 50901(6).

¹² *Id.* at § 50901(2).

¹³ *Id.* at § 50903(1)(a)b)(1).

bodies.¹⁴ It is proposals such as these that require a more basic analysis. Indeed, while the particularity of domestic-sectarian methods for STM can be demonstrated in a number of ways, from orbital debris management policy, to more general space activities management via federal agency¹⁵, encouraging the development of privatized mining operations brings with it a host of conceptual and practical concerns. If this new field of industrial mining becomes a reality, it could provide a model of how other space activities could be managed by governments, and the lessons learned from these endeavors will be invaluable in generating successful STM structures for the future.

While the U.S. does not currently authorize space-mining activities, the efforts of the House of Representatives have been turned towards creating the regulatory structure needed to facilitate the industry. The House bill is designed to give governmental approval to private organizations interested in and capable of mining operations. In a sense, this comports with the spirit of the CSLAA, in that it furthers previous legislative action to serve the various interests of the United States in space by encouraging its commercialization. Predominantly, it requires the President to reduce the barriers to entrants in this field, but it also provides a property right to any *in situ* resources acquired through space mining.¹⁶ If the Senate is able to

¹⁴ Fung, Brian, *The House Just Passed a Space Mining Bill. The Future is Here*, The Washington Post, May 22, 2015, <https://www.washingtonpost.com/news/the-switch/wp/2015/05/22/the-house-just-passed-a-bill-about-space-mining-the-future-is-here/>.

¹⁵ See, e.g., Susan Willshire, *Patch or Rebuild: a Comparative Analysis of Multi-Agency regime vs. Single-Agency Regime within US Domestic Space Traffic Management Regulation*, Embry-Riddle Aeronautical University Scholarly Commons, (STM Conference 2014).

¹⁶ “Any asteroid resources obtained in outer space are the property of the entity that obtained such resources, which shall be entitled to all property rights thereto, consistent with applicable

reach an agreement with the House on this or a similar bill, the President would be able to sign space-mining into existence. For industry, this could be a boon; however, the absence of clear on-orbit authorities to govern how these new participants in the space environment act is of some concern. Even before this problem is addressed, the Congress itself has taken to arguing over the legal validity of the proposed law.

The majority (of members acting to pass the bill) claims sufficient attention and respect is given to international law, but the minority vociferously opposes this viewpoint. The majority claims that the bill not only respects international obligations, but actually *gives effect* to those same provisions. The argument is such that international law that binds the United States must be given substance through domestic legislation—otherwise, the obligation is ineffective within the United States.¹⁷ If this regime becomes a reality, the question of on-orbit authority, and therefor how to manage the additional, possibly significant, space traffic remains. Not having a capable management scheme in place before sending spacecraft towards this new venture could create a host of new difficulties, and it certainly continues the theme of making space more “crowded”, and, in potentially spurring similar economic endeavors from other States, more “competitive”. The “contested” prong of the oft-utilized three C’s phrase is also implicated, and perhaps serves as the greatest source of consternation amongst potential international opposition to the plan. If the mining regime is, in fact, a unilateral attempt to

provisions of Federal law and existing international obligations.” H.R. 1508, 114th Cong. § 51303(a).

¹⁷ See Report on the Space Resource Exploration and Utilization Act of 2015, Report no. 114-153, 114th Congress (1st Session), House of Representatives, June 15, 2015. [House Report].

authorize an appropriation of *in situ* resources on celestial bodies in violation of Article II of the Outer Space Treaty, then permitting the activity to occur under the auspices and blessings of the United States could potentially engender international “bad will”, and complicate future cooperative endeavors involving the U.S. and the rest of the international community.

Another interpretation, contrary to concern above, is that the space-mining operations will not be violative of any international obligations. If the “use” described under Article I of the OST includes extraction of resources found on celestial bodies, then any State attempting to undertake mining procedures would be exercising their international rights. However, this does not solve the issue of mining spacecraft in or on orbit, without a centralized national or international body to govern the actions of the space actor. All that is certain, from the perspective of the United States, is that the FAA’s Office for Commercial Space Transportation would have to authorize the launch and reentry of the vehicle used.¹⁸

The most obvious concern with space mining is that of the permissibility of the activity in the first place. The proposed mining operations could be viewed as unilateral in nature, since they cater to the individual needs of a single State, and are created without direct countervailing international interests to guide formation of new regulation. This is not to say that, necessarily, international law obligations have been or will be ignored in favor of individual State practice, but the level of accessibility those international norms have with

¹⁸ The AST facilitates the required licensing procedure established in chapter 509 of Title 51. See, http://www.faa.gov/about/office_org/headquarters_offices/ast/licenses_permits/.

domestic laws will vary with regard to State respect for those norms and their comparative value to competing State interest. One of the key criticisms of the proposed House legislation is that it fails to follow critical and well-understood international prohibitions on the appropriation of celestial bodies.¹⁹

The Outer Space Treaty clearly and definitively prohibits the appropriation of territory in outer space, or on celestial bodies.²⁰ This is true whether this is done by *use* or occupation, or “by any other means”.²¹ While mining on planetary bodies is likely a distant possibility, there are arguments that such operations on asteroids could exist without offending these strict prohibitions. After all, industry is more concerned with the mineral and other resources to be found than with claims over entire bodies. The House of Representatives has made this very argument in recent bills, starting with the failed ASTEROIDS Act²², and culminating in the now pending H.R. 2262.²³ Some have argued that these bills, despite their claim that only *in situ* resources are to be appropriated, nevertheless fail Article II’s “by any other means” test.²⁴ Determining the legal permissibility of these activities is beyond the scope of this essay, and, in any event, there are already scholarly pieces that address the issue in-depth.²⁵ Thus, the rest of the essay presumes that if such activities did not violate the OST, there would nevertheless be

¹⁹ “Minority Views”, House Report, *supra* note 16, at 20.

²⁰ OST, *supra* note 1, at art. II.

²¹ *Id.*

²² H.R. 1508, 113th Cong. [ASTEROIDS Act].

²³ H.R. 2262, 114th Cong. (This bill is a larger House bill accounting for several space matters for the U.S. government. H.R. 1508 was a smaller bill that was absorbed into this larger one.)

²⁴ “Minority Views”, *supra* note 19, at 20 (citing the advice of Prof. Joanne Gabrynowicz).

²⁵ See, e.g., Ricky Lee, *Article II of the Outer Space Treaty: Prohibition of State Sovereignty, Private Property Rights, or Both?*, 11 Austl.n Int’l L.J. 128 (2004).

other international law concerns that need addressing before proper space traffic management systems can be implemented.

Assuming, *arguendo*, States begin authorizing their agencies or non-governmental actors to mine resources from asteroids, successful operations will require special emphasis to be placed on Articles VI and IX of the Outer Space Treaty. Whatever the problems for STM that could arise from developing the space mining industry, the requirements of Art. VI of the OST are arguably not among them. The United States can claim that H.R. 1508, in conjunction with the licensing provisions of the CSLAA, properly effectuates the rule of law established under OST Art. VI. Indeed, where the OST requires authorization and continuous supervision by a State of its non-governmental entities²⁶, the CSLAA authorizes (via licensing), and supervises (via safety requirements from the Secretary of Transportation), and H.R. 1508 creates another layer of authorization in the way having the President expedite the space mining process. These supervisory activities constitute part of the STM regime employed by the United States—the U.S. knows where and when its actors enter into space, and this enables them to track and monitor the activities, and any potential difficulties they may cause or encounter.

The space mining efforts of the House also trigger an Article IX analysis. That article sets an affirmative obligation for cooperation in space activities.²⁷ It also sets forth the requirements for consultation, where one State must inform another should the former believe

²⁶ OST, *supra* note 1, at art. VI.

²⁷ *Id.* at art. IX.

its space activities might interfere with the latter’s peaceful uses of outer space.²⁸ It may also require States to work together to preserve the outer space environment to ensure their mining activities do not prevent the sustainable use of space as contemplated by Article I of the OST. Each of these factors have obvious implications for STM—preserving the space environment is a primary goal of orbital debris mitigation²⁹, and the conceptual siblings of cooperation and consultation are critical toward that and other STM goals.

Recognizing the historical and legal importance of cooperation and consultation to space law, both domestic and international space traffic management methodologies would do well to integrate the lessons of the past to create efficacious systems for the future. Indeed, the foundations of space law, from the Outer Space Treaty until, at least, the Registration Convention, were created with deference to the process of consent of States through consensus.³⁰ The treaty regime was not set in place by contentious voting, or bedeviled with political infighting over which State would most benefit from its provisions. While disagreements existed, States undertook to engage the spirit of peaceful uses of space, and maintained an orderly, if not always perfect, legislative process. It is that spirit which can guide the next stages of STM management, both domestically, and internationally.

²⁸ For an explanation of what activities constitute “consultation” under the Outer Space Treaty, see generally Michael Mineiro, *FY-1C and U.S.A.-193 ASAT Intercepts: an Assessment of Legal Obligations under Article IX of the Outer Space Treaty*, 34 J. Space L. 321 (2008).

²⁹ See, e.g., the U.S. Government Orbital Debris Mitigation Standard Practices, http://orbitaldebris.jsc.nasa.gov/library/usg_od_standard_practices.pdf; see also NASA Procedural Requirements NPR 8715.6A, available at <http://nodis3.gsfc.nasa.gov/displayDir.cfm?t=NPR&c=8715&s=6A>.

³⁰ See generally, Eilene Galloway, *Consensus Decision Making by the United Nations Committee on the Peaceful Uses of Outer Space*, 7 J. Space L. 3 (1979).

FUTURE CONVERGENCE

The question, then, is when might a future system of STM designed to ameliorate the current ails of the current domestic-sectarian paradigm arise? As indicated in the abstract to this essay, that time will likely come when States realize they have no other viable options that allow them to continue using space. In the near-term, the parallel development of STM via domestic and international pathways will continue, and perhaps both will be furthered by new space activities such as space mining. If the United States, or any other State, begins mining operations on celestial bodies, thereby demonstrating *opinio juris* that such activities are internationally valid, the pressure will be on for other States to do the same. The major concern here would be in yet another space venture that encourages the creation and launch of more space objects, and the possibility of more collisions, on-orbit breakups, or accumulation of orbital debris from normal space activity.

However, this need not be a purely negative development. Indeed, encouraging commercial space providers (both domestically *and* internationally) to compete with one another, monitored closely by individual States at first, and, eventually, by an international body, could stimulate the development of the private sector in space traffic management regimes established for the future, whilst simultaneously engendering a more stable public-private-partnership between States and their commercial providers. Arguably, this could be a driver for the new “space age”, where more and more private actors are engaging in a field

once the exclusive province of national governments.³¹ How exactly that might happen is a subject for another essay, but with respect to space traffic management and commercial activity in space, competition between actors would, of necessity, encourage the development of best-practices. Unlike the normal scenario of the tragedy of the commons³², at the very least States would be encouraged to use on-orbit space wisely, lest they lose the ability to use it at all in the near future. There is no time to wait for the tragedy to occur, and the importance of the potential loss of on-orbit services (and beyond) is one of the primary motivators for the creation of functional STM rules going forward.

Ultimately, this could lead to private organizations taking a role in handling STM. Adding to the idea of the potential benefits of promoting private activity, such entities could be involved that establish priority rights to space traffic, and could effectively purge the issue of the weight of internalized governmental barriers.³³ A non-governmental entity could act as a single point of contact for sighting of orbital debris, and could be responsible for warning the various actors—governmental or private—of potential collisions on-orbit.³⁴ This body could be domestic, allowing a single company to be a clearinghouse of information collected by government and corporate interests alike, and sharing critical information with anyone who

³¹ Where once only the Space Shuttle supplied the International Space Station, now private entities have begun to fill that void. See, e.g., Jason Paur, *ISS Welcomes SpaceX Dragon—First Private Spacecraft at Station*, *Wired*, May 25, 2012, <http://www.wired.com/2012/05/spacex-docking/>.

³² See generally, G. Hardin, *The tragedy of the commons*. 162 *Science* 1968, 1243–1248.

³³ Stephen Hunter, *How to Reach an International Civil Aviation Organization Role in Space Traffic Management*, *Embry-Riddle Aeronautical University Scholarly Commons*, (STM Conference 2014), at 10-11.

³⁴ *Id.*

requires it, but the theory could also be extended to an international non-governmental organization. Similar entities have germinated that engage private resources before, albeit in a different context. Trade organizations, like IATA³⁵, have had noticeable impacts on the behavior of airlines from around the world. Cooperation between various parties, even though they often exist in a state of business competition, has proven critical to enable the assertion of interests beneficial to all involved.³⁶ Given the necessity for developing standards for collision avoidance, traffic guidance, and other on-orbit activities, it should not be inconceivable that a cooperative-minded international NGO could arise to obviate present STM difficulties. This is especially true, should endeavors such as Virgin Galactic's orbital tourism operations, or proposed U.S.-based mining operations demonstrate successful technology and profitable consequences from their activities. Once proven, other corporations, States, and NGOs should quickly become invested in obtaining a measure of that market, and this would hasten the need for a trade body to lobby on behalf of the industry with the world's various space-capable States. Space could very well see NGOs taking the charge towards solving space traffic management woes long before an effective international body is established, especially given the myriad hurdles to creating such an international governing body.

Of course, there are concerns with this solution. IATA, for all of its abilities, does not generate law, or have the ultimate power to bind its members to its decisions or

³⁵ International Air Transport Association, <http://www.iata.org/about/Pages/index.aspx>.

³⁶ For instance, IATA has used its influence to help shape the direction of environmental policy involving the use of aircraft. See, <http://www.iata.org/policy/environment/Pages/default.aspx>.

recommendations.³⁷ Furthermore, trade lobbies will have business interests as a first concern. While avoiding collisions in space, or preventing squabbles between mining entities on celestial bodies are in all parties' best interests (whether they be States or private entities), the furtherance of international law will obviously be removed from their *raison d'être*. In the end, international stability may well require some heretofore non-existent U.N. organ to take the reigns.

Alternatively, a private organization could precede building an international STM body, perhaps something under the auspices of the United Nations, in a similar manner to the ICAO. Given the primitive nature of international attempts at universal STM to date, the exact nature and design of such a global body is largely speculative. However, initially, attempts at constructing an international STM regime will most likely resemble soft-law creatures in effect today, such as the Inter-Agency Space Debris Coordination Committee Guidelines (IADC Guidelines)³⁸, or even the more rigorous United Nations Remote Sensing Principles.³⁹ Both of these have effectively governed their respective arenas with modest success, and show that States are willing to follow systems that are not entirely rooted in the obligations of treaties.

Whatever structure it takes, future international STM collaboration will depend on a new order of three C's: Cooperation, Custom, and Consent. In other arenas of space law, they

³⁷ Clearly, there would be consequences for failing to play-along, but IATA's positions do not have the same force as those taken by, e.g., ICAO, a body generated from the United Nations.

³⁸ IADC-02-01, available at http://www.iadc-online.org/index.cgi?item=docs_pub.

³⁹ United Nations Remote Sensing Principles, A/RES/41/65, 95th Plenary Meeting, Dec. 3, 1986.

have been highly successful. Whether these concepts manage to replace congested, competitive, and contested, depends in part on whether, and when, States realize that there is no longer a moment of delay, and that continued utilization of space will depend on working towards a mutually acceptable, legally binding global superstructure.

CONCLUSION

Domestic legislation designed to reflect, and respect, international norms will serve States well in the near-term. Such laws will not only enable States to maintain proper control over their space assets, but will also prime space-faring nations for more meaningful international STM cooperation in the future. Systems like those of the CSLAA in the United States, coupled with the new era of private space launches to service governmental needs at the International Space Station (and elsewhere), have showcased successful domestic-sectarian methods of authorizing space activities. These regulatory schemes represent one of the parallel strands of STM, along with the less-developed international efforts (such as debris mitigation guidelines). While a centralized, international STM system of governance is appealing, its exact nature and legal authority remain speculative. Furthermore, until States feel the pressure to do so, it is likely they will remain reticent to invest the direction of their space programs in an international body. However, there is hope that out of the currently stagnate international efforts, a useful and globally respected regime, like that of ICAO with aviation, will develop once States realize how greatly their needs call for the stability such an entity could provide. This has happened before, after all, in much the same way that the navigational booms of the renaissance era flourished and helped establish the law of the sea. These laws slowly came

about because of the utility of that realm, and the need of States to discern where in and what manner they could act.⁴⁰ With increasing use of outer space, the very activities causing the celestial regions to become more congested, competitive, and contested will also help establish the need for truly international space traffic management.

⁴⁰ Judge Lachs noted, “The seas became ever more populated and ships crossed them with ever greater facility. Very early the need to establish generally binding principles and rules of navigation became manifest. National claims to exclusive domination of the seas were bound to result in rivalry. To open them to all...connoted the eventual necessity of co-operation.” MANFRED LACHS, *THE LAW OF OUTER SPACE* 12 (Tanja Masson-Zwaan & Stephan Hobe, eds. 2010) (2010).