

INTELLECTUAL PROPERTY RIGHTS IN THE GLOBAL COMMONS OF SPACE

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ABSTRACT

“If you build it, he will come.” Many of us are familiar with this famous line from the movie, “Field of Dreams”, the modern-day utopian fantasy about idealistic dreams and their fulfillment. But we – the tech-focused innovators – do not live in that dream world, but rather in the *real* world. And in the real world (especially in the incredibly expensive world of space), “if you build it” and your customer *doesn’t* come, it’s over: Your company is *done*. Want to ensure your customer *will* come? Offer a high-demand product or service no one else can provide – that is, offer your *competitive advantage* to your customer. To have a competitive advantage, however, you must have intellectual property (IP) rights. Without IP rights, you’re just another “commoditizer” diving with the rest of the pack to reach the price floor – hopefully before all the others. But space is a whole different ballgame for IP rights. Securing IP rights means navigating a host of convoluted international rules and regulations, all of which are increasingly under enormous pressure to change as a result of both the commercialization of space and the population of space with myriad new members, facts which operate to continually morph the topology of evolving space law. This presentation explores the current international IP regime in space and explains why would-be tech entrepreneurs should understand the current rules. The presentation also focuses on the more practical aspects of acquiring, securing, maintaining and sustaining space-related IP, based on modern trends in space IP law, as well as on the specifics of what every space-tech-oriented entrepreneur should know about navigating the still-uncharted-waters of IP law in space.

INTRODUCTION

Whatever “Futurespace” is – “Futurespace” being of course a buzzword for the future of space as well as the planning and execution needed to realize its eventuality – it will simply be an impossible without the incentives needed to get there. The inherent challenges of space as well as its one-shot-to-get-this-right nature means that even with the so-called “democratization” of space, getting to and operating in space are orders-of-magnitude more expensive than terrestrially-bound ventures. To put that much capital at risk the payoff must be big. That only happens if a company knows it holds a profitable advantage over its competitors and can maintain that advantage. And that only happens when the company is assured it will “own the territory” within which it will operate. Securing, protecting and maintaining the company’s IP rights is the most viable path to that end. Space law, however, did not develop in its early stages with IP as a primary focus and only recently – with the advent of the exponential rise of private enterprise in space – has this disconnect been brought into sharp focus. Tension between space law and IP law exists because of the differing historical backgrounds and goals of each area of law, and this conflict will unlikely be resolved in the near term. Even so, the tech-savvy entrepreneur can still navigate these

uncharted waters by adhering to certain IP principles that apply across the spectrum in the international arena.

The rationale underpinning the discussion that follows derives from two related streams of thought: 1) The proverb attributed to Norwegian lore: “Experience is the best teacher but the tuition is high”; and 2) The so-called “parachute” analogy. As to the former, the best IP clients are often those inventors who have paid that high “tuition” at least once, learning the “hard way” the importance of protecting valuable IP. The central focus in this paper is to arm the tech-savvy entrepreneur with the lessons these painful experiences have taught so such tuition is not demanded yet again. As to the second stream of thought, a useful – and accurate – way of thinking about IP protection is, IP protection is like a parachute: If it is needed yet not available, it will never be needed again. In other words, the discussion that follows is designed to provide both context for issues surrounding IP rights in space as well as provide practical steps to protect IP used in the context of space.

INTELLECTUAL PROPERTY

“Intellectual property” is broadly comprised of the fields of “branding” (trademarks, service marks and trade dress), copyrights, patents, trade secrets and licensing agreements. A “mark” simply identifies a company with a service or product. The mark protects a company’s brand. The mark can be a design – say, a mermaid, like the mermaid of Starbucks – or a word, like “Apple” or “Raytheon”. A copyright protects original works of authorship “fixed in a tangible medium of expression” (i.e., written on paper, electronically stored, etc.), while a patent protects ideas that are embodied into tangible forms (i.e., inventions). A useful way to understand the distinction between these two latter forms of IP is this: John and Jane can both express their idea of a rocket engine in a hand-drawn sketch, and each would have a copyright to that expression – that is, to his or her drawing. But the *idea* of how to make a rocket engine – if reduced to usable instructions to make and use the engine – is not protectable by a copyright but rather by a patent. That is, even though John and Jane theoretically could draw the same rocket engine and thus both would have a copyright to their individual depictions of that engine, only one – the first to the patent office, generally, as a worldwide standard – would be able to get a patent on the *idea* of that particular rocket engine invention. This also assumes the rocket engine invention is not already known (or a common-sense variant) within the field of rocket engines – the “field” is also known as the so-called “prior art”, or the “art” existing worldwide at the time the rocket engine invention is filed with a given country’s patent office. Finally, licensing agreements are not really “IP”, per se, but rather, contracts that enable commercial sharing of IP. At its essence, a licensing agreement is simply an agreement not to sue someone for IP infringement, based on the particular type of IP and the scope of the agreement. When, for example, an online software buyer clicks “Accept” on a so-called “click-wrap” end-user licensing agreement (**EULA**) to upgrade the buyer’s computer operating system via a downloaded software update, in essence the company offering the EULA is agreeing not to sue the buyer for IP infringement of one form or another, as long as the buyer agrees to comply with the EULA’s terms of use. Finally, trade secrets protect company information providing a competitive advantage in the marketplace (e.g., secret manufacturing methods, profit margins, client lists, etc.), information which is maintained as secrets. Broadly, a trade secret can be thought of as any information providing an economic “edge” to a company that it would not want its competitors to know. This brief overview of these basic IP areas serves as the foundation for the discussion that follows.

DEPTH-OF-DISCUSSION ANALOGY

This paper and the presentation accompanying it are a “30,000-foot” overview of the present IP- / space-law topology as well as practical considerations to operate within it. For an analogy to this depth-of-discussion level we will use the definition of “Lift”, as used in aerodynamics. Exhibit 1 depicts a basic understanding of this term. Illustrated is a cross-sectional view of a wing. As the wing travels through the air, air pressure is higher on the bottom of the wing than on the top. This pressure difference lifts the wing, allowing an aircraft to fly.

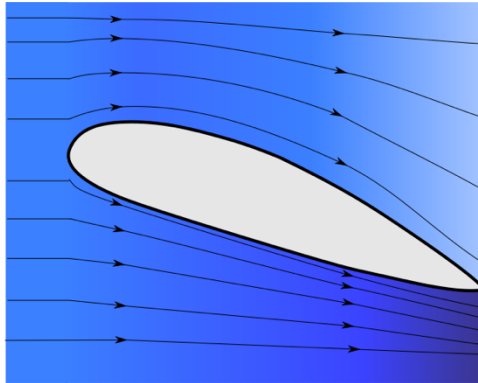


Exhibit 1: “Lift”, Version I.

In contrast, Exhibit 2 depicts the same wing from a different view and presents a computational fluid dynamic (CFD) rendering of the wing’s “lift” with much more complexity (e.g., depicting boundary layer separation, turbulent and laminar airflow regions, vortex behavior, etc.). This introduction to IP in the context of space law is “Version I”, if you will: It will help you understand the issues and arm you with practical guidance for maintaining your IP rights in space. It will not make you a CFD engineer (or, analogously, a “space IP lawyer”).

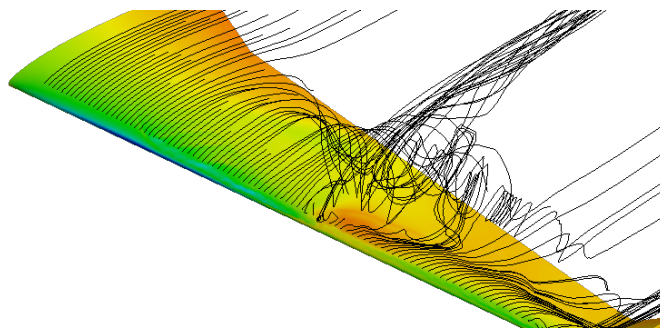


Exhibit 2: “Lift”, Version II.

THE CHANGING LANDSCAPE OF SPACE ACTIVITY

IP law and space law developed from markedly differing backgrounds and with totally different aims. As a result, the legal regimes regarding both are very distinctive. IP law has been around for at least hundreds of years, while space law is the “new kid on the block”, at just over a half-century old.

Historical Perspective Behind the Current Space Law Regime

Amid the Cold War, both the U.S. and the former U.S.S.R. – the prime-movers behind the Outer Space Treaty (OST)* – were concerned about the very real potential of a nuclear-weaponized space. OST addressed not only this very pressing issue, but also the use of space, generally. A foundational tenet underlying the Space Treaty and its progeny treaties** established in the '60s and '70s is that outer space is for the benefit of *all* mankind, meaning no one (state or individual) can claim “space” – either its “celestial bodies” or space itself – as property. In contrast, IP laws are all about the property rights of the *individual* holder to the exclusion of all others. Hence, a tension exists between the two legal regimes, space law and IP law.

Migration of Space Activity to Private Enterprise

Bank of America recently predicted the space industry will “octuple” to over \$2.7T over the next three decades, while startup investments have topped \$16B.¹ Virgin Galactic, SpaceX and Blue Origin – not to mention, Boeing, Airbus and Lockheed Martin – are leading a host of others along the path to “democratization” of space, and along with that, the migration of space from primarily government-centric ventures to commercial ventures. SpaceX alone launched 21 missions in 2018, and that number appears to be rising – along with the commercial space industry, generally – exponentially.² Virtually every authority agrees so-called “commercial space” is rapidly overtaking and will very soon outpace “government space”, and this phenomenon applies generally across the globe, as a result of the voracious demand for data and the bandwidth to accommodate it, along with “space tourism”, remote sensing and a host of other space ventures underwritten by private enterprise.

“First-Mover” Advantages in New Space Law Arenas

As with all evolving law, those with “first-mover” advantages will set the precedents all others will follow. By “first-mover” is meant a party whose interests lie in relatively uncharted legal territory and which has sufficient staying power to last till the end of a costly legal or policy battle which will serve as the legal pathfinder for all future such issues. Such controversies will drive the need to establish better frameworks for IP rights in space. These frameworks will be contoured by legal and policy decisions, international agreements and treaties, and customary international law, as these gradually adapt to resolve the problems posed by parties in conflict. While very few will have the opportunity to be a first-mover, maintaining an awareness of the IP rights trendlines they generate will be key to maintaining the agility necessary to adapt to those changes quickly enough to survive or exploit them.

* The *Outer Space Treaty*, sometimes simply referred to as the “Space Treaty”, is fully titled, “The 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies”.

** The major space treaty “progeny” of OST are the *Rescue and Return Agreement* (“The 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space”); the *Liability Convention* (“The 1972 Convention on International Liability for Damage Caused by Space Objects”); the *Registration Convention* (“The 1975 Convention on Registration of Objects Launched into Outer Space”); and the *Moon Treaty* (“The 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies”).

IP RIGHTS IN SPACE

IP law, like space law, has transform over the years to address the changing landscape of laws related to technology. Neither field has move fast enough to address IP issues imposed by dynamics of space activity within recent decades.

Tension Between Space Law and IP Law

A foundational tenet underlying OST and its progeny treaties established in the '60s and '70s is that outer space is for the benefit of all mankind, meaning that no one (state or individual) can claim “space” – either the natural objects (“celestial bodies”) within space or space regions, themselves – as their property. In contrast, IP laws center on the property rights of the individual holder, to the exclusion of all others. Hence, a tension exists between the two legal regimes. Further, under OST, the national laws of the state in which the space object is registered govern the legal regime of that object, to include IP laws (particularly patents).

Impacts of Space Law on IP Rights

This construct – that the national laws of the registering state apply to the celestial object – works great when only one object and one nation are at issue. Problems arise, however, when more than one nation or object are involved. The ISS, for example – which is a multi-state, multi-registered space object – is comprised of multiple IP law regimes, depending upon the section occupied. That is, the IP laws of Russia apply while in the Russian module, while the IP laws of the U.S., the E.U., or Japan apply in their respective modules. But this is merely the beginning of complications. What happens, for instance, when a multinational consortium launches from a sea-based platform into space? Whose laws govern, then? How is patent protection obtained in such a case – let alone enforced?

Gaps Between IP Rights and Space Law

Beyond the inherent tension between these two fields of law, while OST addresses “celestial bodies”, the treaty is silent about mining activities and other property-related rights. For example, is extracting a resource from a celestial body and then exploiting it for commercial gain the same as a claim of ownership to that celestial body? The unsatisfying answer is, we don't yet know: Signatories to the OST disagree across the spectrum of opinions on this topic, so the international law governing it remains unsettled. For example, the U.S. passed the *SPACE (Spurring Private Aerospace Competitiveness and Entrepreneurship) Act of 2015*, clearing the way for space-mining and other exploitation of celestial bodies short of ownership claims over those bodies. In contrast, Russia considers all space-mining activities to violate the principles of OST, explicit claims of ownership or not. And what about so-called “process” patents: What happens when one or two steps in the process must occur in space, owing to very low microgravity chemical manufacturing requirements? Is the patent still valid under a patenting nation's laws if the object isn't registered by that nation? Prevailing international patent scholar wisdom demurs. These and other gray areas will become a lot more black-&-white, however, as first-movers establish new topographies in these areas where space law intersects IP rights. Ultimately, the question isn't simply, “Who owns the IP?”, but rather, who has an IP right, where is that right valid and how can it be enforced?

THE OLD RULES STILL APPLY

Though IP law as it applies in space is very much unsettled, the terrain isn't wholly chaotic. Certain fundamentals still apply.

Know the Market, the Competition and the Enforcement Options

Though IP protection in space is relatively new, IP protection under international law is not. In that realm, three factors are critical to understand: The desired market, the competitors' market, and the enforcement regime under which IP protection should be sought. Each variable must be considered to have any hope of enforcing IP rights in international markets. Making, selling and importing (under patent law) and production, distribution and use (copyright law) are the key activities that must be evaluated for effective enforcement to be possible, as most nations' IP laws vary across a wide spectrum. That is, knowing the desired commercial market and evaluating that against the competition's chosen geographic market will yield a set of countries. Further evaluating that set against each country's IP laws will yield the most favorable set of nations within which IP protection should be sought. Of course, the evaluation process for each innovation will yield its own unique IP protection strategy. For example, one country may have strong trademark laws and weak patent laws; another may have strong trade laws but weak IP laws, and so on. Thus, the particular IP strategy used will depend upon careful evaluations of the three factors and their interrelationships. Multinational protections can also help, as detailed next.

Fully Exploit Multinational IP Treaty and Convention Protections

Although IP isn't generally protectable under "global IP law" – for example, a "worldwide patent" does not exist – multinational IP protection can be gained through filing multinational applications or multiple national applications among nations in which IP protection is desired. Multinational applications for patents, for example, are filed under the provisions Patent Cooperation Treaty (PCT) application, but the application must be "nationalized" within each nation for which patent protection is sought. Likewise, trademarks leverage the Madrid Agreement's provisions and copyrights are broadly protected under the Berne Convention.

Keep Innovations Secret Until Filing

The U.S. is unique among nations in many aspects of IP law. One of those aspects is the so-called "grace period", a one-year period allowed between a public disclosure of an invention and its patent application filing. Provided an inventor files within that one-year period, a patent can still be sought in the U.S. Not so in most other nations around the world. The general requirement is "absolute novelty", meaning no disclosure of the innovation is permissible prior to filing, without sacrificing patentability.

Defensively Publish If Filing is not Desired

If patent protection is not desired – say, perhaps, the potential invention is not squarely in the innovation "lane" sought – a good, low-cost technique is to "defensively publish". Defensive publication is the publication of a description of an invention in a matter enabling others to make and use that invention, and it is used to prevent patent infringement suits in certain instances. Specifically, this technique permits operations in those collateral innovation fields in which a patent is not needed, yet

freedom to operate while skating the fringes of such fields could be critical. Absent defensive publication, a competitor might bar such operations by seeking patents covering those areas.

REMAINING UNCHARTED TERRITORY

Several areas were not addressed in this brief survey of IP rights in space, but they remain important nonetheless.

IP Law vs Space Law

The conflict between space law and IP law will play out over at least the next decade. Pressure generated by commercial and national interests, along with proliferation of space – let alone IP innovations requiring the *use* of space – will drive the need for harmonization between these two fields, at least to the extent a definable IP landscape can be recognized and traversed by space-faring entities, whether they be nations or private enterprises.

Continuing Impacts of Changing International IP Law

The latest trends in IP law in the U.S. alone – for example, software-related patent-eligibility issues and IP in government contracts – are still “uncharted waters” as far as IP rights are concerned. Moreover, IP rights diverge across the span of the international arena: IP procurement and enforcement laws vary globally, though the trend has been to harmonize such laws. For instance, the U.S. recently aligned its patent filing priority system with that of most of the rest of the world, transitioning to a first-to-file system from the first-to-invent system that had existed from its founding.

IP Procurement and Enforcement Issues

An extensive compare-and-contrast effort among the world’s various IP procurement and enforcement regimes is not possible given the subject matter and scope of this paper. Even so, though the trend is alignment among nations’ IP regimes, such alignment is far from complete. Many nations – even several so-called “developed” nations – have little or no IP procurement or enforcement frameworks. Beyond simply harmonizing IP law with space law, IP law among nations must evolve to meet the demands levied to advance humankind.

The Dilemma of Protecting Innovation

Worldwide, most innovation is done by small companies with limited resources. The dilemma each faces is the problem of “keeping the lights on” while protecting its IP. Unfortunately, many do not recognize the fact that these two aspects are tightly interwoven, especially where the IP is so cutting-edge that its relinquishment would mean almost certain death to the startup innovator. An in-depth discussion of the resolution of this dilemma is likewise beyond the scope of this paper, but the resolution itself is nonetheless critical to any nascent, innovative company.

CONCLUSION

A few “take-aways are important for all space-innovators to keep in mind. Though IP and space law will evolve – and likely co-evolve, to a certain extent – these principles will endure.

Protecting IP Up-Front Has Been, Is and Will Remain Critical

Protecting IP up-front is even more important now, when working in “uncharted territory”, as it has ever been. Put bluntly, some IP protection is better than none. This means having an IP gameplan before disclosing any innovation. In turn, this means getting the company’s legal counsel, its tech unit and its business-development unit aligned to the same IP goals from the start, and periodically revisiting these goals, as innovation is dynamic.

IP Mistakes Are Bet-the-Company Costly

The saying, “failing to plan is planning to fail”, is especially true in the field of IP. A company must know what it is doing or it must be prepared to face the consequences of that ignorance. Unfortunately, those consequences can be often be company-fatal. Thus, having a solid IP strategy founded on basic IP identification and protection principles is crucial.

A Lot of “IP-Play” Exists in the Joints of Modern Space Law

As noted above, uncharted legal topologies will exist for many years to come, especially in the arena of IP rights in space. And while it is also true first-movers are likely to set the terms for all others, knowing the general vector of changes in IP rights in space is important, especially when forecasting the course and business strategy of a company whose operations heavily depend on those rights. Thus, keeping abreast of changing IP rights in space is important.

IP rights in the global commons of space will see dramatic changes over the coming years. If innovation and incentives to reach and exploit space are to continue, these rights must undergo further refinement, strengthening and clarifying. Hopefully, these changes will arrive sooner, not later.

¹ Michael Sheetz, *The Space Industry Will Be Worth Nearly \$3 Trillion in 30 Years, Bank of America Predicts* (<https://www.cnbc.com/2017/10/31/the-space-industry-will-be-worth-nearly-3-trillion-in-30-years-bank-of-america-predicts.html>, last visited April 2, 2019).

² *Completed Missions* (<https://www.spacex.com/missions>, last visited April 3, 2019).