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COMMENTARY

SPACE LAW IN ITS SECOND HALF-CENTURY

*Glenn Harlan Reynolds**

It has now been 55 years since the publication of John Cobb Cooper's seminal article on space law, credited by many as being the first serious scholarly treatment of the subject.¹ Space law has gone through many phases since then, and appears to be entering yet another today. This brief commentary will look at where we have been, and where we just might be heading.

PHASE ONE

The earliest years of space law were years of purest speculation, as the field predates spaceflight itself. For a decade or so after Cooper's article, the questions ranged from basic to speculative: Where did airspace end, and outer space begin? Could nations claim territory on the Moon and other planets? Were spacecraft like ships, or like aircraft? How would space societies be governed? How would Earth nations deal with alien intelligences?

The end of Phase One more or less coincided with the publication of two books: Myres McDougall, Harold Lasswell, and

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¹ John C. Cooper, *High Altitude Flight and National Sovereignty*, 4 INT'L L.Q. 411 (1951). For a good history of space law's early days, see WALTER MCDOUGALL, . . . THE HEAVENS AND THE EARTH: A POLITICAL HISTORY OF THE SPACE AGE 177-94 (1985).

Ivan Vlasic's magisterial *Law and Public Order in Space*,² and Andrew Haley's *Space Law and Government*.³ These two books – each, in its own way, surprisingly magisterial for works in a field barely a decade old – marked the endpoint of the speculative era of space law. The earlier space lawyers had mapped the contours of the territory (though, as with the old maps of Earth, those maps were sometimes inaccurate, or over-elaborate, or both). The next stage was the creation of hard-edged law that could guide nations in their day-to-day activities.

PHASE TWO

The ten years or so following the publication of the McDougall and Haley books were a period of explosive growth – what Barton Beebe has called the “golden age” of space law, that began to take hold as actual space-flight became possible.⁴ During this period, law wasn't just talked about, but made, as various international agreements began to delimit the bounds of acceptable behavior by nation-states in and relating to outer space.

The Limited Test Ban Treaty of 1963 barred nuclear explosions in orbit.⁵ This had the side effect of killing the American *Orion* project, a large spacecraft propelled by nuclear explosions whose developers (including such luminaries as Ted Taylor and Freeman Dyson) considered so promising that they coined the slogan “Saturn by 1970.”⁶ Had *Orion* proceeded, we might have seen spacecraft of the sort imagined in 1950s films, massive craft complete with rivets. In its absence, space travel took a different path.

The most significant achievement of the Golden Age, of course, was the 1967 Outer Space Treaty, which established the

² MYRES MCDUGAL ET. AL., *LAW AND PUBLIC ORDER IN SPACE* (1963).

³ ANDREW HALEY, *SPACE LAW AND GOVERNMENT* (1963).

⁴ Barton Beebe, *Law's Empire and the Final Frontier: Legalizing the Future in the Early Corpus Juris Spatialis*, 108 *YALE L.J.* 1737 (1999).

⁵ Multilateral Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water, entered into force Oct. 10, 1963, 14 U.S.T. 1313, 480 U.N.T.S. 43 [hereinafter Limited Test Ban Treaty].

⁶ GEORGE DYSON, *PROJECT ORION: THE TRUE STORY OF THE ATOMIC SPACESHIP* (2002). George Dyson is Freeman Dyson's son. For Freeman Dyson's firsthand account, see, FREEMAN DYSON, *Saturn by 1970*, in *DISTURBING THE UNIVERSE* 107 (1979).

framework for space law that obtains to this day. In language somewhat less sweeping than the Limited Test Ban Treaty (which forbids any "nuclear explosions" in orbit)⁷ the Outer Space Treaty⁸ forbade placing "nuclear weapons or any other kinds of weapons of mass destruction" in orbit or on celestial bodies.⁹ The Outer Space Treaty also established straightforward rules regarding spacecraft registry and legal personality, national jurisdiction over spacecraft and space travelers, liability for accidents involving spacecraft, environmental responsibility relating to the Earth and to other planets, and a ban on "national appropriation" of celestial bodies such as the Moon and Mars.¹⁰

These provisions were later fleshed out by such later agreements as the 1968 Astronauts Agreement,¹¹ the 1972 Liability Convention,¹² and the Registration Convention.¹³ And by 1975, when the Registration Agreement was finalized, this explosion of space lawmaking came to an end. The *Apollo* program, and the stillborn Soviet moon program, had their last hurrah with the *Apollo-Soyuz* mission that same year, and the space boom turned into a space bust. Not surprisingly, the space law boom was also over, and the space law bust began.

⁷ The Limited Test Ban Treaty prohibits any "nuclear weapons test explosion, or other nuclear explosion" in outer space. Limited Test Ban Treaty, *supra* note 5, at art. I

⁸ Multilateral Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *entered into force* Oct. 10, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

⁹ *Id.* at art. IV.

¹⁰ For considerable discussion of these provisions, see GLENN H. REYNOLDS & ROBERT P. MERGES, *OUTER SPACE: PROBLEMS OF LAW AND POLICY* 62-93 (2d ed. 1997), BIN CHENG, *STUDIES IN INTERNATIONAL SPACE LAW* 215-264 (1997).

¹¹ Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched Into Outer Space, *entered into force* Dec. 3, 1968, 672 UNTS 6577, 19 UST 7570 [hereinafter Astronauts Agreement].

¹² Convention on International Liability for Damage Caused by Space Objects, *entered into force* Sept. 1, 1972, 961 U.N.T.S. 187, 24 U.S.T. 2389 [hereinafter Liability Convention].

¹³ Convention on Registration of Objects Launched Into Outer Space, *entered into force* Jan. 14, 1975, 28 U.S.T. 695, 1975 U.S.T.552 [hereinafter Registration Convention].

PHASE THREE

The next phase of space law was, like the next phase of space activity, much less exciting. Except for the largely meaningless 1979 Moon Treaty, which entered into force among a few countries but to no great effect,¹⁴ there was very little activity on the international front.

On the American domestic law front, things were somewhat more active. The passage of the 1984 Commercial Space launch Act, and its later post-*Challenger* amendments, was part of a general move in favor of commercial space activity. The gradual erosion of monopolies in both international and domestic satellite telecommunications was another part of this process.

Scholars also continued to discuss farther-out issues, like the governance of space societies and contact with extraterrestrial life. There were even draft agreements drawn up on both subjects, and those, at times, attracted significant attention. Nonetheless, the third phase of space law development was less exciting than the ones that preceded it. Fortunately, it is coming to an end.

THE CURRENT PHASE

We are now, by my reckoning, at least, in the fourth phase of space law's development, and it promises to be far more exciting than what has come before. That is because this phase is one in which space activity is once again picking up. This is not so much the result of government - though there are some new government initiatives - as it is the result of the technology and economics of space travel reaching the point at which private enterprises can do things that are interesting and important.

The year 2001 is now behind us, but we're a long way from the space stations, lunar bases, and missions to Jupiter that Kubrick and Clarke made so plausible way back when. The good news is that some people are doing just that. In fact, pri-

¹⁴ See generally Glenn Harlan Reynolds, *The Moon Treaty: Prospects for the Future*, 11 SPACE POL'Y 115 (1995).

vate foundations, private companies, and even NASA itself are waking up to some new approaches.

The X-Prize Foundation, organized by space supporters who were frustrated by the slow progress of government programs, decided to resurrect an approach used in the early days of aviation: a prize. The X-Prize, a \$10 million private award for the first team that privately finances, builds and launches a spaceship, able to carry three people to 100 kilometers (62.5 miles), returns safely to Earth, and repeats the launch with the same ship within 2 weeks.¹⁵

Now that that has been accomplished (by Burt Rutan's Scaled Composites, with its *SpaceShipOne* spacecraft),¹⁶ there are further prizes for orbital accomplishments. The X-Prize approach is based on the historic role played by privately-funded prizes in developing aviation (Charles Lindbergh crossed the Atlantic to win the \$25,000 Orteig Prize).¹⁷ Its founders and organizers hope that private initiative, and lean budgets coupled with clear goals, will produce more rapid progress than the government-funded programs organized by space bureaucrats over the past five decades or so. (Full disclosure: I was a pro bono legal advisor to the X-Prize foundation in its early days).

In particular, they're interested in bringing down costs, and speeding up launch cycles, so that space travel can benefit from aircraft-type cost efficiencies. And so far it looks as if they're having some success.

Scaled Composites, though it won the prize, wasn't the only competitor. In fact, 27 competitors, from a number of different countries, competed for the prize. The ten million dollar prize generated a lot more than ten million dollars worth of investment.

Which is, of course the point. Ten million dollars in a government program won't accomplish much. (By the time paper is

¹⁵ X-Prize, *Homepage*, available at <http://www.xprize.com/> (last visited Jan. 10, 2006).

¹⁶ Michael Coren, *SpaceShipOne Captures X-Prize*, CNN, Oct. 4, 2004, available at <http://www.cnn.com/2004/TECH/space/10/04/spaceshipone.attempt.cnn/> (last visited Jan. 10, 2006).

¹⁷ X-Prize Foundation, *Fact Sheet*, available at http://www.xprizefoundation.com/about_us/fact_sheet.asp (last visited Jan. 10, 2006).

pushed and overhead is allocated, it may not accomplish anything). A ten million dollar prize, however, can attract much more – driven as much by prestige as by the chance of making a profit.

Unlike a government program, too, a prize-based program allows for a lot of failure. By definition, if 27 teams go for the prize, at least 26 will fail. And that's okay. Government programs, on the other hand, are afraid of failure. The result is that they're either too conservative, playing it safe so as to avoid being blamed for failure, or they're stretched out so long that, by the time it's clear they're not going to do anything, everyone responsible has died or retired (in government, or big corporations, it's okay not to succeed, so long as you aren't seen to fail).

Since we usually learn more by taking chances and by failing than by playing it safe or avoiding clear outcomes, in the right circumstances a prize program is likely to produce more and faster progress. This isn't by accident. As X-Prize cofounder Peter Diamandis noted in recent Congressional testimony:

The results of this competition have been miraculous. For the promise of \$10 million, over \$50 million has been spent in research, development and testing. And where we might normally have expected one or two paper designs resulting from a typical government procurement, we're seeing dozens of real vehicles being built and tested. This is Darwinian evolution applied to spaceships. Rather than paper competition with selection boards, the winner will be determined by ignition of engines and the flight of humans into space. Best of all, we don't pay a single dollar till the result is achieved.¹⁸

Bureaucracies are good at some things, but doing new things quickly and cheaply isn't one of them. Prizes like the X-Prize offer a different approach. I wonder what other government programs could benefit from this kind of thing?

¹⁸ *NASA Contests and Prizes: How Can They Help Advance Space Exploration, Hearings Before the Subcommittee on Space and Aeronautics, Committee on Science, U.S. House of Representatives, 108th Cong. (2004) (testimony of Peter Diamandis), available at http://commdocs.house.gov/committees/science/hsy94832.000/hsy94832_0.htm (last visited Jan. 10, 2006).*

Here's one example, involving two cool things. One is that space elevators and power-beaming are coming. The other is the way that they're coming.

Alan Boyle reports:

Borrowing a page from the playbook for the X Prize spaceship competition, NASA has set aside \$400,000 over the next two years for competitions to encourage the development of wireless power transmission systems and super-strong tethers.

The Beam Power Challenge and the Tether Challenge, announced here Wednesday, are the first two of NASA's Centennial Challenges, which aim to provide incentives for technological achievements that could be applied to future space exploration.¹⁹

It's not a lot of money, but – as the X Prize demonstrated – you don't need a lot of money to accomplish a lot if you spend it well, something that NASA hasn't done, historically. And in some ways, that's the real news here. The space field appears to be heading toward a period of dynamism akin to what aviation experienced in the 1920s. Since the last time space activity underwent a period of dynamism, it produced a period of legal dynamism as well, it seems likely that this new wave of activity may produce new legal changes in its wake.

The space law of the 1960s and 1970s was an artifact of the Cold War. Implicit (and sometimes explicit) in its structure and provisions was the belief that space activity would be conducted mostly by nation-states, and in an atmosphere of nuclear-armed hostility. The Outer Space Treaty, for example, was in part a sort of non-compete agreement, particularly with regard to Article II, which bans national appropriation of celestial bodies, and which by itself put an end to the "space race."

Both the United States and the Soviet Union, it appears, were more fearful of their adversary's success than optimistic about their own, and as a result both nations were happy to enter into an agreement that shut down the competition. This

¹⁹ Alan Boyle, *NASA Announces Prizes for Space Breakthroughs*, MSNBC, Mar. 24, 2005, available at <http://msnbc.msn.com/id/7280483/> (last visited Jan. 10, 2006).

provision of the Outer Space Treaty – in many ways its most important – was thus a sort of Cold War collusion, in which both nations agreed to throw the race, or at any rate to forfeit the prize. And, indeed, although the United States continued on to the Moon, the Soviet Union gave up, and the United States' behavior in continuing was almost entirely the result of momentum and general public support; the United States government no longer had any great strategic interest in the Moon.

This may have spared us from a superpower collision that could have produced a nuclear holocaust, which is surely justification enough for Article II. But there is some question whether that provision has the same utility today, when the concern isn't so much a space race as space torpor. Likewise, it isn't clear whether things like the notion that astronauts should be treated as "envoys of mankind," as commanded by Article V will continue to have as much resonance now that astronauts are increasingly likely to be fare-paying tourists, as opposed to bold explorers. It may be that future space law will look more like the private law of maritime commerce and aviation than like the public law of years past.

At the very least, it's time to reconsider those aspects of space law, formed in a different era, that might hold back space development, and to think about ways in which the space law framework, so much a child of the Cold War era, can be adapted to fit the needs of a new century, and a new world.

Article II, after all, bans only "national appropriation," and its impact on the acquisition of private property rights, by private actors, is dubious at best.²⁰ The status of private actors in such settings is thus not entirely clear; not forbidden, but not fully recognized, either. Explicit recognition of such endeavors, along with a not-too-intrusive regulatory scheme, would be very valuable.²¹

The uncertain line between spacecraft and missiles – John F. Kennedy, asked to explain the difference between *Atlas* mis-

²⁰ For an extensive discussion of this topic see REYNOLDS, *supra* note 10, at 101-177.

²¹ For more on this topic see Robert P. Merges & Glenn H. Reynolds, *Space Resources, Common Property, and the Collective Action Problem*, 6 N.Y.U. ENVTL. L. J. 107 (1997).

siles and the *Atlas* launcher that lofted *Mercury* astronauts into space, famously responded "attitude"²² – will make the explosive growth of commercial launch capabilities that things like the X-Prize promise a source of some confusion. Launch technology is likely to follow the path of computer technology: from the preserve of big governments and big organizations to something far more ubiquitous. This, unfortunately, makes the delivery of nuclear weapons, or other weapons of mass destruction, easier.

Space tourism will raise other issues as well. Though it promises to bring useful economic forces to bear on the question of lowering space transportation costs and improving capabilities, it will also change the size and character of the humans-in-space realm. Space tourism is likely to bring issues of liability, contract, immigration, and other similar questions to the fore.²³

Finally, increased interest in space elevators suggests that a core concept in the Outer Space Treaty – the notion of "space objects" that are "launched" – may need some refinement. With space elevators – a superstrong cable reaching from the surface of the earth to a counterweight at geosynchronous orbit – there is no "launch" as such, unless simply pressing the up button on an elevator counts as a launch. And the space elevator itself, being anchored to Earth (or to a floating base at sea) would arguably not be a space object at all, since it would never have been launched by even the broadest definition.²⁴ It would, instead, be analogous to a very (very) tall building.

²² Quoted in Jack H. McCall, "The Inexorable Advance of Technology," *American and International Efforts to Curb Missile Proliferation*, 32 JURIMETRICS J. 387, 426 (1992).

²³ For examples of the sorts of issues that might be involved, see James A. Beckman, *Citizens Without a Forum: The Lack of an Appropriate and Consistent Remedy for United States Citizens Injured or Killed as the Result of Activity Above the Territorial Air Space*, 22 B.C. INT'L & COMP. L. REV. 249 (1999); Lauren S. B. Bornemann, *This is Ground Control to Major Tom ... Your Wife Would Like to Sue but There's Nothing We Can Do ... The Unlikelihood That the FTCA Waives Sovereign Immunity for Torts Committed by United States Employees in Outer Space: A Call for Preemptive Legislation*, 63 J. AIR L. & COM. 517 (1998).

²⁴ For more on space elevator technology, see Bradley Carl Edwards, *A Hoist to the Heavens*, *IEEE Spectrum*, Aug. 21, 2005, available at <http://www.spectrum.ieee.org/aug05/1690> (last visited Jan. 10, 2006).

These kinds of issues – plus some others like the legal regulation of terraforming on Mars and elsewhere²⁵ – fit poorly within the Cold War framework, and are fertile ground for scholarly discussion over the coming years. I look forward to joining in the conversation.

²⁵ See, e.g., Robert D. Pinson, *Ethical Considerations for Terraforming Mars*, 32 ENVIR. L. REP. 11333 (2002).