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Space Resources: First Come First Served

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Abstract

Space is a place, not a government program. Private property rights in space are essential to the rapid and orderly development of space. SpaceDev intends to fly a privately sponsored deep space science mission to a near earth asteroid, assess its characteristics and claim ownership of the asteroid. This action is intended to set an important and historic precedent and to initiate a global, public discussion of private property rights in space.

Near Earth Asteroid Prospector

SpaceDev, Inc. (SPDV), the world's first commercial space exploration and development company, is planning the first commercial deep space exploration mission, the Near Earth Asteroid Prospector (NEAP). NEAP intends to use scientific instruments to perform detailed scientific, geologic and resource assessments of Near Earth Asteroid (NEA) 4660 Nereus. After landing one or more SpaceDev instruments and its spacecraft on the asteroid, SpaceDev intends to claim ownership of the asteroid on behalf of its public shareholders, thereby setting a precedent for the establishment of private property rights in space.

It is important that the SpaceDev NEAP mission be a purely commercial mission with no government subsidies. This claim of ownership of a small planetary body by a publicly owned company could create strong public interest and discussion about the currently undefined issue of private property rights in space. This creation of a powerful precedent for property rights in space could help stimulate dramatically increased space commercialization investments and could create countless new opportunities for working, living and playing in space.

Institutional approaches to managing space resources must be considered now. There are as many interpretations of the Outer Space Treaty and the Moon Treaty as there are people who read those treaties. Many people would agree that the issue of private property rights in space is essentially undefined by any laws or treaties, and that no entity on earth has appropriate legal standing to adjudicate such claims by commercial interests operating in space. Therefore it will be the responsibility and duty of those commercial interests operating in deep space to define private property rights in space, while legislators back on earth attempt to create a system of incentives and rewards for the commercial exploration and development of space.

It is the position of the author that a simple and clear precedent must be set that will focus attention on this most important issue. The most persuasive action that can be taken is for a privately financed resource assessment spacecraft to land its instruments on a small planetary body, thus permitting its parent company to claim that its robotic representative, with its resource assessment instruments, is sufficient to make an ownership claim.

There are currently no legal or regulatory bodies with standing in space to which such a claim can be made, so the claim must be made to the public at large. A publicly owned company with a large number of

international shareholders should help make the controversy international and interesting.

It might be argued that space resources belong to all of humankind, but that argument was historically based on the fear that less developed countries might be left behind in the commercial race to space. It can also be argued that the existence of inexpensive private deep space science missions, such as SpaceDev's Near Earth Asteroid Prospector (NEAP) puts space exploration within the reach of even the poorest country. To assist these countries in becoming space faring nations, SpaceDev is offering inexpensive, all-inclusive and insured rides on its missions for experiments and technology demonstrations, thus permitting smaller countries to immediately begin participating in deep space exploration. SpaceDev also is offering complete, inexpensive commercial deep space missions so these nations can fly insured missions under their own flag.

SpaceDev was founded in 1997 with the purpose of opening the infinite frontier for all of humanity and for the purpose of making money in space, especially beyond earth orbit. SpaceDev management believes that the abundant and rich resources of space can be utilized to lessen the worsening environmental impacts resulting from the current exploitation of ever poorer grades of earth-bound natural resources. It is also believed that very simple and clear property rights must exist in space in order to encourage and facilitate the commercialization of space, and to help foster the coming boom in new job opportunities for a highly trained and skilled space workforce. SpaceDev intends to take actions that will force the issue of private property rights in space into the public arena, to be decided by public opinion.

Our first commercial activity was the initiation of the Near Earth Asteroid Prospector (NEAP). This is intended to be the world's first commercial deep space mission. It is currently planned that NEAP will be launched April 3, 2001. It will make at least six passes over the North and South poles of the moons. SpaceDev intends to fly an ultraviolet spectrometer to look for water ice in the permanently shaded craters near the poles. After about nine months in cis-lunar space, SpaceDev will ignite the kick motor and NEAP will begin a trajectory to rendezvous with 4660 Nereus approximately four months later, in May 2002.

The early NEAP mission and spacecraft feasibility study was performed by University of California at San Diego (UCSD) professors Jim Arnold, Alan Schneider and Mike Wiskerchen, about a dozen students and about six aerospace engineers acting as mentors to the students. Early advisers included Drs. Steve Ostro, Gene Shoemaker and John Lewis. NASA Administrator Dan Goldin was briefed in July of 1997. SpaceDev became a public company in October, 1997 and began purchasing space engineering and products companies. SpaceDev stock is traded on the NASDAQ Over the Counter market under the trading symbol of SPDV.

Today, SpaceDev (www.spacedev.com) owns Integrated Space Systems (ISS) of San Diego and Space Innovations Limited of Newbury, England as wholly owned subsidiaries. ISS (www.spaceinc.com) is an aerospace engineering services company with about thirty engineers, and SIL (www.sil.com) is a space products company with about forty engineers, producing space communications and navigation subsystems and the miniSIL and microSIL satellites. SpaceDev is currently in the process of purchasing a 25 000 square foot building in the San Diego area, with a clean room large enough to simultaneously process three deep space spacecraft, or up to six micro satellites in various stages of assembly. The building will also include the SpaceDev mission control and visitor center. Visitors are welcome.

The SpaceDev Near Earth Asteroid Prospector mission is privately sponsored, and SpaceDev is not seeking and will not accept government subsidies of any kind. In November, 1997, SpaceDev published a commercial price list of NEAP products including prices of insured rides for instruments and the cost of data sets transmitted back to earth from SpaceDev science instruments to be flown on NEAP. In March, 1998, NASA added Missions of Opportunities to its Discovery program, and

defined Missions of Opportunities to include commercial missions. The NASA Office of Space Science then issued a letter saying that NEAP met the requirements of Missions of Opportunity. NEAP was then eligible for scientists to seek NASA Discovery and MIDEX funds for purchasing rides on NEAP for their science experiments.

At this time three science teams, from Carnegie Mellon University, Utah State University and University of California at Berkeley have submitted proposals to NASA seeking funds for flying on NEAP a JPL nanorover, a three dimensional mapping laser altimeter, and a long baseline gamma ray burst detector. SpaceDev is currently negotiating with the University of Arizona and the Southwest Research Institute to acquire three additional science experiments. By selling insured commercial rides for scientific instruments to science teams, SpaceDev avoids becoming a government contractor and is able to maintain control of its own mission and its profit levels.

It is also important for SpaceDev to keep NEAP strictly commercial because of its intent to claim ownership of asteroid Nereus. The design of the NEAP spacecraft includes provisions for up to four ejectable experiments. Upon arriving at Nereus, SpaceDev intends to eject to the surface of Nereus a SpaceDev instrument or experiment that will land on the surface of Nereus, perform some action and transmit the results back to the NEAP spacecraft, for relay to earth. Having landed SpaceDev property on the small planetary body, SpaceDev believes it will be in a strong position to claim ownership of the asteroid. The mission will be purely commercial and not subsidized by any government. The mission will assess the size, mass and composition of the planetary body and will have touched down on it.

No space treaty addresses private property rights in space. No entity on earth has standing in space. SpaceDev believes there is no appropriate body to which it could make its claim. Filing any kind of claim with any entity would imply that entity had standing in space. This leaves only one option, and that is to make the claim to the public. It may help that SpaceDev is a public company and that shareholders will perceive they have a personal interest in making certain the ensuing public dialog over space property rights is resolved in favor of broad property rights that encourage the commercialization of space.

This is a classic example of "first come, first served" and of "possession is nine-tenths of the law." It is anticipated that many will claim that the Outer Space Treaty denies private property rights because no country can claim sovereignty in space or that the Moon Treaty forbids private property rights in space. Both positions are wrong.

This author believes that the mostly unratified Moon Treaty should be thrown on the garbage heap of history, and that the Outer Space Treaty be opened up for modernization and re-ratification. Failing that, countries may want to rescind their previous Cold War motivated ratification of that dated Treaty. It may be appropriate that only those commercial entities, which operate in space, should be the ones to make the rules governing space. Clearly, those in space are the ones with standing in space.

Today it costs less than $50 million (US) to fly a sophisticated deep space mission. This author believes there is evidence for costs to continue declining. Only several years ago, it was believed that deep space missions needed to cost 2 or 3 thousand million dollars, while today the NASA Near Earth Asteroid Rendezvous (NEAR) mission is flying for a total cost of about $250 million – an order of magnitude reduction. The next generation of mini-deep space missions could easily cost only $25 million – another order of magnitude of cost reduction. With rapidly advancing miniaturization, it is conceivable that the next generation after that could see deep space missions in the range of $2.5 million each. There is evidence that cost is declining at about an order of magnitude per generation of deep space missions.

These dramatically lower costs are putting deep space science and resource exploration within the reach of all countries of the world. For example, SpaceDev is

currently offering complete commercial deep space missions for less than $50 million, fully insured. It is expected that this cost will drop to half of that within the next five years. Therefore the argument that less developed countries will not be able to participate in space is today an argument without substance. Any country in the world that wants to participate in deep space exploration can do so today for $12 million or less for an experiment and in a few years an entire mission for only twice that.

It is in the best interest of humanity to quickly establish strong property rights in space. Investors need to know that their risk money can be rewarded through the exploration, discovery, ownership and utilization of abundant and easily reachable concentrated resources in space.

It is important to help foster the development of an industrial infrastructure in space consisting of competitively priced space transportation, space communications and the availability of concentrated energy in space at reasonable cost to the user. With these building blocks in place, and with property rights assured, investors will be more willing to invest in activities that can be profitable, and they will be more comfortable operating in a known and stable business environment, in space.

The discovery and utilization of natural space resources could help lessen the increasingly negative environmental impacts on the earth and the resulting lowering of the quality of life and extinction of important and valuable plant and animal life. The delicately balanced ecological system that evolved over four billion years is now being disrupted in ever widening circles, with measurable effects on the oceans and atmosphere. Utilizing space resources might reduce the increasingly destructive impacts of mining and exploiting ever-decreasing quality of ores and resources.

A large comet or asteroid could hit the earth at any time, and no method of prevention or mitigation is known or even seriously contemplated. After four billion years of progressive evolution, it would be a shame to have the only known life in the universe become extinct. Having self-sustaining settlements in earth orbit, on near earth asteroids and on Mars would increase the odds of humanity surviving any calamity.

The quick establishment of private property rights in space could facilitate the commercialization of space with the resulting new opportunities for working, living and playing in space. We are at the dawn of opening the infinite frontier, and the exponential growth of space related economic activity could easily dwarf the enormous and mostly beneficial effects of the microcomputer revolution of the last twenty years. If we want to go to space to stay, space has to pay.

Space commercialization will benefit those countries that recognize the importance of space the earliest. In the United States, those communities that have been encouraging space-related businesses will become the wealthy "Silicon Valleys" of the space era. It is likely that the creation of new jobs related to space will far exceed those of the communications and computer sectors combined, and will require very large numbers of motivated, educated, trained and experienced workers. The large number of entrepreneurial space commercialization companies will create the demand for these jobs, and will create hugely successful and profitable companies, some becoming the Microsoft of space. These enterprises will generate large amounts of national and local tax revenues from their profits, easily paying back early government investments to encourage space entrepreneurialism.

Private property rights in space will be an important factor in the rapid development of the space economic sector throughout the new millennium.