Contract Incentives for an Open Architecture International Lunar Network Including Google Lunar X-Prize, David A. Dunlop[1], (Moon Society, 410 N. Ashland, Green Bay, WI 54303.

Introduction

There is a lunar community of interest in how an "open architecture" can be designed into "infrastructure" to increase opportunities for entry by commercial providers. This community of interest includes those who would wish to see costs of going to the Moon reduced, the pace of scientific and commercial projects accelerated, and the flexibility of planning and contracting for lunar missions increased.

Now there is interest in creating a commercial paradigm of space transportation providers. The Google Lunar X-Prize competition is the most visible expression of this movement. According to Dr. Pete Worden, Director of NASA AMES Research Center, the cost challenge is to pioneer "micro" lunar lander missions that can perform useful functions "in the low tens of millions range from "perhaps a low of $ 28 M to $ 48M to $ 68M at the high end." [1]

As one example, the NRC final report on the Scientific Context for the Exploration of the Moon mentions the utility of an increased network of laser reflectors on the lunar surface.[2] It would make economic sense for agencies such as NASA, ESA, JAXA, ISRO, Roscosmos, and CNSA to provide potential contracts to any Google Lunar X-Prize teams that would deliver, in this example, a laser retro reflector to the lunar surface. A variety of scientific instruments that are recognized as elements of a lunar science network might be contractually placed in this manner on private landers.

Google Lunar X-Prize Contracts:

Under the Google Lunar X-Prize there are the first and second prizes to be won. When those prizes are won the remaining teams would remain without the financial incentive from the Google Lunar X-Prize. Many teams might simply disband once the financial prizes are gone and even the prestige and recognition of being winners of the competition was secured by others. It would seem to be a tragic loss of capital and intellectual resources to have many teams which have gone in essence through phases A,B, and C of their mission development to fail to realize their goal of achieving a lunar landing and demonstrating innovative technologies by reason of simply not being first. **Contract incentives of equal proportion to the Google Lunar X-Prize by the national funding agencies might create many "winners" in the realm of both education, science, technology, and the ability to demonstrate greatly improved cost efficiency.** For the national space agencies to offer contracts to establish a lunar sensor network may be a way to quickly and cost effectively "harvest" the capital investment and technology innovations of the Google-X Prize competition and develop a more commercial space model in the process.

National space agencies would have to develop their own criteria in assessing the credibility of potential contractors. NASA has in fact proposed something of this sort in conjunction with its ASMO mission proposal. This is a paradigm shift in the way business has traditionally been conducted by NASA. It is also the paradigm followed by the ESMO ESA mission.

Having a known and publicly described set of such instruments with fixed priced contracts also facilitates planning on the part of those who might wish to include the possibility of such contracts in their mission and financial plans.

To propose science contract packages from national space agencies for ILN sensors would create a financial climate equivalent to the Google Lunar X-Prize and create a "commercial market" for such micro landers. $ 150 million represents a third of one NASA Discovery mission. A **$ 25million by each of the 6 major space agencies would be the equivalent of more than 7 Google Lunar X-Prize Competition First prizes or 30 second prizes.** ILEWG might encourage early budget and contract commitments by national space agencies especially if their impact is spread over a 5 or 6 year period or longer.

This contract model could focus on payments for a more complex set of milestones for criteria such as: a. design, b. construction, c. launch, d. deployment, e. data return. Phased contract incentives equivalent to the Google Lunar X- Prize first prize might provide financial sustainability of those teams whose engineering and mission planning credibility warrants such contracts and that remain intact after the fist and second prizes have been awarded.

The aggregation of contracts for a variety of sensors defining a ILN network node would fall into the low range of lunar lander costs projected by Dr. Worden but not preclude other private, commercial, or national efforts and projects on these teams. This could also make "national flag" lunar mission commitments from the 14 ILN signatory nations much more likely and foster financial collaborations between such national flag agencies and commercial organizations.

Collaborative commitments by national space agencies in this model result in a mix of successful public science, "national flag", and corporate lunar landing missions.

[1] Personal communication. [2} The Scientific Context of the Exploration of the Moon:Final Report, NRC, Space Studies Board, 2008, p. 53,65,66.