Innovative Financing of a Large Space Project

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Abstract

This paper addresses the changes to the Space Frontier Operations, Inc. (SFO) Space Exploration Plan, (SEP) that was initially presented at the 37th. Space Congress in 1999.

Progress since last year will be presented briefly and the progress made in finding the correct financing vehicles will be presented in detail.

The SFO Space Exploration Project starts off as an international project that will present unique and difficult challenges to both the space and financial communities. The effects of these challenges will be discussed along with their impact to the process of raising capital for a project of this nature.

The rationale behind establishing a separate but complimentary corporation will be discussed. The relationship between the commercial corporation and SFO will be delineated. It will be shown that complimentary roles are not only possible but also highly desirable.

The way in which the SEP fits into the standard protocols used by the finance industry will be discussed. As the project proceeds to completion the issue of traditional financing with an Initial Public Offering will be addressed along with the possibility of bringing in one or more partners – either commercial or governmental.

Finally, the work of the supporting commercial corporation will be presented and the current status of the two corporations will be discussed.

Introduction

Funding any kind of adventure can be problematic – it does not matter whether it's exploring for oil in the deserts of the world, exploring the deep ocean or Antarctica.

Significant risk is attached to all these endeavours and space exploration is no different. Exploration is usually conducted for one of three reasons:

- To find out what's over the next hill.
- To see if there is new knowledge to be gained.
- To exploit any new knowledge gained from previous exploration efforts.

All phases of exploration have one thing in common, they tend to be accompanied by high up-front costs, high risk and the potential for enormous pay-off. The pay-off may come in one of several forms ranging from increased ease of access to the environment to the discovery of new and exploitable resources. The exploration of space is no exception; it is a dangerous, risk-laden business with very high up-front costs, high risk and probably the most enormous prospect of pay-off so far discovered in the annals of human exploration.

However, like any other enterprise, the exploration of space cannot be approached without excellent planning, considerable knowledge and a constituency of support from a fairly broad cross-section of the population. While knowledge and good planning exist; the exploration of space fails to generate the requisite constituency of support because it has so far been considered the purview of governments and the government's concerned have done nothing to change this perception. Governments do not generally have an exploration mandate and are only in the business of space exploration as a by-product of the cold war. In fact, in the USA and Russia the major Expendable Launch Vehicles are derived from Ballistic Missiles first constructed as weapon delivery vehicles. Several other nations are busily developing rockets but only as a means of delivering various types of weapons of mass destruction. Indeed these programs parallel the development of rocketry in both the USA and the old Soviet Union. So, we may postulate that the development of rocketry is still dependent on a healthy arms race. This appears to be as true today for the USA as it is for the smaller nations just getting into the business.

It is against this bellicose paradigm that the fledgling commercial space industry has to live, work and try to have it's being, constantly being told by the government what it may, or more likely, may not do. It is hardly surprising that carving out a commercially viable industry is very difficult and in some cases next to impossible. To date, the only segment of space that has been successfully commercialized is the telecommunications segment. The military have recently decided that they need to tell the owners of these systems that their systems should be able to meet military requirements to prevent attack and subsequent denial of service. This is done under the guise of "protecting assets" but the military interest is in using these commercial assets themselves. If this really happens then the seduction of the only commercially viable space segment will be complete and the government will control all that happens in space.

All is not lost however, because it is possible to pursue these aims and objectives without reference to any military authority and with minimal government intervention. Against all these problems Space Frontier Operations, Inc. (SFO), developed a plan to essentially duplicate and greatly enhance the world's current heavy lift launch vehicle fleet. Ref.1. This paper addresses the progress in developing both business and financing models for the plan described in Ref.1 over the last twelve months. Progress has been made and we believe that it is possible to finance a project of this size using private money. In the process we have developed some of the ideas further than others but in all aspects we have sought to provide a market driven reason for people and organizations to invest in this program.

Over the past few years other areas of the space business have turned to the venture capital market to overcome the financial problem. While there have been some failures (Iridium) there have also been some successes (Space Imaging, Inc.). SFO believes that a Space Base can be financed through the creative use of venture capital. The trick will be to synchronize the development and monetary schedules.

For a project this large, funding becomes complex. Not only do you have multiple rounds of venture funding but multiple funding vehicles such as bonds and loans. Even more complications arise from the fact that the assets will be both ground and space based. SFO has developed a plan that not only simplifies the complex funding scheme but also synchronizes it with development.

As laid out in Ref. 1, the SFO plan calls for the development of an Exploration System based upon the following components: a Manned Vehicle (MV), a Heavy Lift Vehicle (HLV), the Space Base and Ground Support Facilities.

All engineering and production will occur concurrently where possible and can be broken down into five broad categories: Each component of the program will proceed through the following phases of development: leading to a first flight around ten years after start.

- Feasibility
- Phase 1 Design
- Phase 2 Design and Development
- Test
- Production

This allows the financing of this program to also be broken down into the same five steps.

Step 1. Feasibility

Create a "for-profit" company that has specific goals.

Currently SFO is a "not for profit" corporation and not a suitable vehicle for raising Venture Capital. A "for-profit" corporation has been created, the areas of operation defined, and working relationships determined and documented.

The business model being used here is the same "not-for-profit"/"for-profit" sister corporation business model used successfully in the pharmaceutical and other sectors. This provides a way to clearly define areas of responsibility/authority and it allows the "not for profit corporation" (SFO) to pursue grants and endowments from all sources for research and engineering while the "for-profit" (BRC) pursues Venture Capital, bonds and loans to build infrastructure and vehicles.

The basic points of the business model are as follows:

SFO

- Responsible for all activities in space
- Responsible for all research and engineering
- Will provide all operations, both ground and space
- Will purchase space based assets from BRC
- Will pursue grants and endowments.
- BRC will have exclusive rights to all product/intellectual property except for that which is produce by outside money.

BRC

- Responsible for all ground based activities
- Responsible for the construction of all facilities
- Owns and maintains all ground based assets
- Responsible for the construction of all vehicles and space hardware
- Must provide enough launch capability to meet planned demand
- Will have exclusive resale rights to all excess payload capacity

Secure Seed Capital

Using the Business Plan that currently exists, BRC will secure approximately $1 million from a seed fund or investor. This money will be used to pay SFO for a feasibility study as well as the internal effort to create and market a complete business plan.

Develop Launch Site Agreements

SFO will have to be in negotiation with the preferred Launch Site provider and have an agreement to use the site in place towards the end of this phase.

Feasibility study of complete project

SFO will perform a feasibility study looking at revenue streams, costs and time lines. It will also identify areas that require more research and/or development. This information will be used in the business plan and in the generation of an overall cost and time estimates.

Development of Exploration Business Plan

After SFO completes the feasibility study BRC will incorporate the results into an Exploration Business Plan and market it to prospective Venture Capitalists.

Step 2. Phase 1 Design

First round of Venture Capital

BRC will secure $7 to $12 million in the form of Venture Capital. This will allow SFO to be paid to continue their research into systems configuration and develop the specifications and characteristics of individual systems. This is the point at which the systems will be partitioned for power, reliability, errors etc.

SFO will pursue grants and endowments in areas that have been identified in step 1 as needing more research. This will give SFO a dual funding source allowing for more resources to be applied.

Systems Configuration

For each of the systems that are being brought into existence the optimal configuration will be determined and the necessary engineering analyses completed. Once this data is available then overall system specifications will be issued and then exhaustively modeled at the system level to ensure satisfactory performance. Feedback developed during this process will be added to the final specification and any new areas of concern will be identified and investigated.

Step 3. Phase 2 Design and Development

Second round of Venture Capital

The second round of financing will be in the amount of $30 to $40 million. This will be used to finance the detailed design phase and the pursuance of money for step 4. This includes the marketing of technology developed by SFO as it becomes available.

Detailed design

During this period the designs will be developed and tested to the point where they can be frozen and detailed RFQ's developed for passing to industry for Bid Preparation purposes. Additionally, selected components may be realized in hardware form and subjected to rigorous engineering test. This may include "full up" sub-systems and systems from the various vehicles. Tests may be electrical or mechanical. Some of these tests will be developed to check out software.

Step 4. Test

Third round of Venture Capital

Financing this step will be accomplished through a third round of Venture Capital licensing of developed technology and possible construction loans. Total worth from $510 to $625 million.

Start construction of ground based assets

BRC is tasked with the construction and maintenance of all ground based assets, which includes manufacturing and launch facilities. Depending on the market conditions, Venture Capital, construction loans or a combination thereof may be used to finance the construction. It may even be possible that the government of the area where these facilities are going to be constructed, will defray all or part of this cost because of the huge positive economic impact that a spaceport will have on the country's economy.

Licensing

BRC will establish an income stream through the licensing of SFO patents and designs. It may also derive income from the production and sale of products based on SFO engineering, if the sale of the product generates enough new resources to significantly assist the overall plan.

This licensing strategy provides a dual benefit to the plan; 1) it begins to demonstrate the viability of the proposed income stream. 2) it is a profitable means for the new technology and information to be incorporated into industry for BRC use during the production phase.

Systems test/Training

Testing accomplished here will be aimed at "full up" system test including "end to end" tests of both Ground and Space Based assets. This period will also see the start of the Training Process for the first crews that will be involved with this program. It is anticipated that they will be deeply involved in the system level tests.

Step 5. Production

Fourth Round of Venture Capital and Bond Issue to build first working portions of the station, first three flight vehicles of both the MV and HLV .

As the manufacturing facilities come online, construction of the HLV, MV and station components will begin. All required vehicles and station components for the first three construction flights will be manufactured before the first Base construction flight. This effort will be financed by BRC through a bond issue worth between $1 to $2 billion.

Partnerships

As part of its innovative finance scheme BRC is planning to offer a special partner program. It is anticipated that if we reach this stage then we will have the interest of many organizations. Some of them will probably see the benefit of partnering in a system where the establishment of the capability to explore has been largely set in place. Some of the benefits of partnership will be:

- Seat on the Board of Directors
- Preferred access to the space environment and the training systems etc. that are established for crew personnel.
- The opportunity to position their organizations to benefit from exploring and using the space environment free from Earth based government controls.
- Preferred rates on services, both ground and space based
- First right of refusal on all excess payload capacity. Excess capacity not used by the partners will be placed on the spot market.

In exchange the partners will contribute material, tooling, manpower, etc. totaling between $8 to $12 billion.

IPO to coincide with the mating of the first two station segments

The successful completion of the first station construction flight will culminate with a small but fully functional space station. Having BRC IPO at this time will take advantage of the resulting media blitz. Between this media and BRC's marketing campaign the desire by investors to own BRC's stock should be at a local high, thus ensuring a excellent return for BRC's investors and providing a good source of capital for continuing operations.

Although financing a plan of this scale will be difficult, it is not impossible. By using standard financial mechanisms, such as venture capital, bonds and loans, sufficient amounts of capital can be secured. Following the plan as outlined, SFO/BRC will have a working space station and selling on-orbit services/storage within ten years of starting the process.

References

1. Exploring and Using the Space Environment; A Different Approach. Andrew W. V. Clark, 37th. Space Congress.