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Paper Session II-B - Commercial Launch Services - The key to the Capital Markets for Space Projects

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COMMERCIAL LAUNCH SERVICES - THE KEY TO THE CAPITAL MARKETS FOR SPACE PROJECTS

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ABSTRACT

Space projects have been experiencing crippling difficulties in getting access to private capital markets. As launch operations move from public management to the tougher 'real world', competition will generate increased access to space, better launch operations and lower project costs. These changes will dramatically improve the cash flow projections and risks of space projects, enabling them to gain access to capital.

This paper will give examples of how launch delays can devastate the rate of return on a project. It will also illustrate how fast turnaround can be used to reduce costs and the effect of competition on payload prices.

INTRODUCTION

All in the space industry agree that, eventually, space will be filled with activity fueled by self-sustaining commercial enterprises. Such a shift is desirable -- in fact, essential. Lack of public support for the space program has made Congressional support increasing tenuous. The ability of the government to finance space activity in the face of the budget cutting is in question.

But while public financing stumbles, private financing concludes spectacular deals. Kohlberg Kravis Roberts & Company put together a $24.53 billion buyout of RJR Nabisco Inc. The deal quite likely took less than a year. Who in our industry would not like to be able to pull together $24 billion committed dollars in under a year?

The resources needed for space are there and we are already seeing the power of the purse change hands from the government to the private sector. Unfortunately, the transition has been a rough one. There is a tremendous amount of money to be made in space, but relatively limited amounts of private capital have been put forth. This is because space ventures have never really operated under business standards. Costs are astronomical relative to function. The growth rate of those costs is equally unacceptable -- easily surpassing the 11% per year that aviation has been posting since World War II. No commercial industry can stand this kind of cost growth and stay competitive. Nor would any commercial industry put up with the cavalier treatment of schedules that we see in aerospace. The aerospace industry has been able to get away with this mode of operation because it has been living in a federally funded wonderland where real-world costs don't matter. As federal funds dry up and aerospace companies search for private money, the aerospace industry is going to have to change its ways.

Fortunately, the continuing commercialization of the launch industry has given the industry a leg up. Competition among the private launch services should induce three keys changes in the industry: greater access, improved operations, and lower costs. These changes are sufficiently powerful to change the cash flow projections of space projects and enable then to compete successfully for private capital.

INCREASED ACCESS

The advantage of increased access is obvious. Private space facilities like CDSF are worthless without the sure ability to get there. With Space Industries' Industrial Space Facility the question of whether there would be transport available at all was one of their biggest barriers to getting funding. No project will get funding if the access is even in question.

What many people fail to realize is that just being able to get to space is not good enough.

Transportation must also be reliable. Launches must be made on time, consistently.

IMPROVED OPERATIONS

To understand clearly why this is so important you need to look at the costs a payload customer incurs when he is delayed. Waiting costs in two ways: you are either paying someone to help you wait or someone is not getting your services and, therefore, is not paying you. For a typical Delta class communications satellite with 24 transponders a delay would cause out-of-pocket expenses that include storing the satellite, insuring it while in storage and paying the staff while they wait. There is also lost revenue -- approximately $100,000 a day.

ESTIMATED COSTS OF DELAY

DIRECT OUT-OF-POCKET EXPENSES	
Storage (ref 1)	$ 12,000
Insurance (ref 2)	52,500
Staff (ref 3)	$1,200,000
Financing Charge (ref 4)	132,800
LOST REVENUE	
1 yr at $100,000/day (ref 5)	$36,500,000
TOTAL LOSS IN ONE YEAR	$37,897,300

References
1) Storage estimated at $1,000 per month
2) Per industry spokesman, estimated premium would be .015% of the value of the hardware. Hardware estimated to be worth $35 million
3) Staff estimated at 10 man-years at a fully loaded rate of $120,000 per man-year (i.e. salary + benefits, overhead, rent etc.)
4) Prime rate of 10.5% and total expenses of $1,264,500
5) For a 24 transponder, Delta class satellite

The direct loss is $37.9 million. This is certainly substantial. It does not indicate, however, the true impact of the delay. That impact is better shown by the change in the project's expected rate of return.

THE EFFECT OF DELAY ON RATE OF RETURN

Investments have many features and those looking for opportunities shop around much like they would for a car. The rate of return indicates the level of profit an investor expects to make and is the primary selling point. There are always more people looking for money than there is money available. So a company must offer enough of a profit -- a high enough rate of return -- to beat out the competition for funds.

The rate of return required to coax an investor into a deal is determined by the risk he runs of losing his money. The higher the risk the higher the rate of return. For example, on an insured savings account you might earn 5% per year. Thirty year treasury bills, also a very safe bet, presently pay 8.8%. Stocks have an average risk return which translates to about 18% today. Venture capitalists -- the reasonable ones -- may ask 35%.

Rates as high as 50%-70% have been suggested for this industry. This may well be true for less established segments of the industry such as materials processing. Our example falls in the well established telecommunications industry. A reasonable, though highly simplified, guess at the rate of return for this project is 42%.

At high rates such as these the money you get in the beginning is worth a lot more than the money you get later on. This growth so powerful that a 1 year delay on this project reduces the return from 42% to about 31%. With a two year delay the return drops to around 25%. It would actually be better to lose several years off the life of the satellite entirely than to permit a year's delay in launch.

As noted, higher rates are required for less proven segments of the industry. This is part of a double handicap for materials processing efforts -- one of the greatest potential growth areas. They must pay higher rates to get investors and they, more than any other segment of the industry, are subject to delay. Much of what the companies want to do must be preceded by direct experimentation. Thus, before they have a chance to generate any revenue, they have to launch a number of times -- and every launch carries the risk of pushing back the entire time table. 3M found itself with a 21 month gap in its experiment schedule because of the Challenger accident.

Delay presents other problems as well. It increases the risk of proprietary data leaks or competitive technological progress. At least one materials processing venture was abandoned because of concern about protecting proprietary data. McDonnell Douglas, after years of space research, found its achievements outstripped by bioengineering.

Investors are quite aware of the problems and, with very few exceptions, there is no capital to be found for materials processing right now -- and for precious few other space ventures as well. What activity there is being internally financed or financed by individual investors with a personal interest in space. The institutional investors, where the really big money is, are waiting on the side lines.

Fortunately, as the aerospace industry shifts to commercial operation, the demand for on-time launches and shorter lead times is making itself felt. We are seeing the beginnings of time-conscious operations with commercial launchers now using scheduling to competitive advantage. At least one of the three large launch service companies is operating with forfeitable money incentives for on-time launches. Among the smaller firms, lead times as short as 6 months for a launch are being attempted.

My firm Third Millennium Inc., also known as MMI, places special emphasis on launch operations. Though we do not feel that we will need any help in competing on a cost basis, we are working on a special time-conscious approach to manifesting. This approach, called an open manifest, has programmed gaps for back-up flights. Should a launch be delayed for any reason the payload is shifted into one of these gaps. Emergency flights are possible and last minute payloads can be fitted in -- almost like flying stand by. In this case, however, you can launch a full payload of 1,500 to 3,000 kgs not just a Get-Away-Special.

This level of operation is, of course, not possible with an expendable launch vehicle. The Space Van system is a fully reusable shuttle system. First launch is set for 1994. The Space Van is entirely privately funded and is not connected with the NASA shuttle program. The system uses off-the-shelf hardware and a proprietary heat shield in a design specifically geared toward fast turnaround. We will be starting off with three sets of launcher/boosters each with a turnaround goal of a week.

Such dramatic drops in lead times can lead to unexpected new ways of doing business. For example, if you can get an emergency launch, it would likely be more cost effective not to launch a back-up satellite until it is needed. You save the cost of the launch up front. You also save on launch insurance. Rates for launch insurance have run as high as 20%. If the satellite in our example cost $35 million that is an insurance premium of $7 million. If your launch cost was $50 million that's a total $57 million saved if you never have to launch.

Interruptions in broadcast service can be covered by business interruption insurance or lease arrangements for back-up transponders. We may eventually see satellite companies provide themselves with back-up capability by joining together to finance a single extra satellite.

REDUCED LAUNCH COSTS

The backlog of payloads has made life easy for the launch companies. As competition, gets tougher, however, they will be forced into tighter and tighter operation. Competition, particularly from overseas, will also force launch prices down. Further reductions will be possible with the introduction of new vehicles.

The new vehicles -- proposed by MMI, Amroc, SSI and others -- hold the real promise. They are not old missiles refitted for new jobs but are specifically designed for commercial needs and operations. MMI believes it is possible to drop launch costs to $1,300 per kilogram to LEO and $12,000 per kilogram to GEO (1989 dollars). After having interacted with several of the major aerospace companies on our designs, we are sufficiently confident in our project to offer those prices on fixed price contracts. For our satellite example, such a drop in GEO launch costs would boost the rate of return to 62%. Even the stuffiest investment house should be interested in that.

Nearly all of the proposed new vehicles are small and plan to achieve economies through high flight rates. From a launcher perspective this approach is desirable because small vehicles are easier to finance. From a user perspective this approach will provide many fight alternatives and considerable flexibility. A single very large launcher would have to wait to gather enough payloads to make a launch economical. Every delay for every payload becomes a delay for them all. At the present level of activity it would take considerable time to fill a flight making it even harder to sell.

Being able to fly when you want is extremely valuable, especially if what you want to do is fly more frequently. The cost of capital is so high that the sooner you can get your project done the better off you are. Our sample satellite project experienced a loss of 11% and tens of millions of dollars because of a one year delay. If you could complete the same project one year in advance, you would get just as significant a gain. Moving schedules up for materials processing projects would generate comparable gains. The jump in the rate of return is tremendous. When you combine the ability to fly frequently with the low costs offered by the new launch services, you have the tool you need to pry open the capital markets.

REDUCING PAYLOAD COSTS

The drop in launch costs should help in another significant way -- it should finally force a drop in payload costs. The cost per kilogram of payload is already out of line with the cost per kilogram of transportation. Far too much is being spent to lighten payloads and provide for reliability through redundancy. We all know that you pay by the pound for overnight mail. But would you pay $5,000 dollars to save a few pounds and $50 dollars on the shipping fee? Of course not, but that is what is happening in aerospace programs where payloads can cost over $100,000 per kilogram. Payload designers are still working as if they were going to launch on Vanguard; even on today's most expensive vehicle it doesn't make sense.

If allowed to use heavier, less expensive materials it is possible to build spacecraft at a tremendous savings. For example, beryllium structure is presently favored over aluminum structure for spacecraft because it weighs only half as much -- unfortunately, it costs ten times more. Using MMI's launch cost to LEO, the price to launch one kilogram is approximately $1,300. If beryllium structure costs $40,000 per kilogram and aluminum structure $4,000 per kilogram, could you do better building a 1,000 kg beryllium spacecraft out of aluminum?

Yes. Even with the additional launch cost, doubling the weight of the spacecraft saves $28 million.

This argument extends to the system level as well. Assume that the stated goal is to provide satellite communications services with 99.99% percent reliability. You have a $5 million satellite in hand that is only 99% percent reliable. The present approach to achieving that last ninety nine one hundredths of a percent is to augment the existing satellite, increasing the cost of that satellite by a factor of ten. Total spacecraft costs have now become $50 million. With a Space Van launch of $24 million, the system has a total price tag of $74 million.

MMI's suggestion is to launch a second satellite -- a copy of the first. This brings reliability to the stated goal, but total spacecraft costs are now only $10 million. Two Delta class geosynchronous launches on the Van would cost a total $48 million. In summary, the old way of doing things will cost $74 million for spacecraft and launch; the new way of doing things will achieve the same goal for $58 million. You're $16 million ahead of the game.

As launch prices drop and the cost of delay is addressed, we will see more and more small players able to enter the industry. Small companies are known for creative cost cutting and payload costs should be forced down further. One company has successfully substituted equally reliable, inexpensive marine instruments for aerospace instruments. The Amateur Satellite people and their creative technical solutions are legendary -- including using a carefully folded $10 metal measuring tape as deployable antenna. Payload prices should drop and drop considerably.

CONCLUSION

Though this discussion has been about the needs of the user community, it is important to remember that their problems are also problems for the launch industry. This is what Gordon Woodcock of the Boeing company refers to as the N-squared problem. To get investors, launch services must prove that the vehicle offered is sound and the service proposed realistic. Proving oneself is the first N, the first variable. Then you must also prove that there are going to be customers to buy your launch services. That's the second N. In an investor's eyes the two variables aren't just additive -- they multiply into a much greater problem or N-squared. If the user community has problems, we have problems. The way launch companies do business directly effects their customers' ability to get capital. If the users can't break out of the capital trap, neither can the launchers.

Fortunately, launch companies are not entirely at the mercy of circumstance. They will continue to move away from their public sector roots with competition providing both the carrot and the stick needed for change. We will see increased access, improved operations and lower prices. Project time will be compressed and payload costs forced down. As risks and costs go down the private capital markets -- who already recognize the potential -- will jump in for a piece of the action.

The launch companies hold the answer. If allowed to operate without interference in a truly competitive arena, they will change to meet the demands of the marketplace. Not every company will be successful. But the industry as a whole will be stronger. The payload companies will finally be able to latch onto the capital they need helping, in turn, the launch companies.

Some time ago industry observers predicted that commercial space would boom into a $60 billion industry. A great many folks were disappointed when that did not happen and, in a few places, heads rolled. Some decided that, since the industry wasn't performing as predicted, space was not and never would be a place for business. That is not true. The time line may have been estimated incorrectly, but not the potential. The transition from federal stepchild to commercial industry takes time. Given time, and room to grow freely, innovative businesses will create an industry that not only meets previous expectations, but surpasses them.