

The Lurio Report

News and Analysis of the 'New Space' Enterprise

"Thanks for all YOU do for the industry -- you cover it all, very well and very thoughtfully ... [and] you probably have the best mailing list of all."

-- Mr. Rick Homans, *Former New Mexico Secretary for Economic Development and head of the New Mexico Spaceport Authority*

Hidden Precedent for the Google Lunar X-Prize, Spaceport Politics

Vol. 2, No. 24, September 21, 2007

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Notes:

Computer Problem:

Some problems with this system at the moment - solutions may have nontrivial requirements in time and effort. Every effort is being made to avoid any delays or disruptions to this newsletter.

Avoiding 'spam' filters:

Due to the increasing fussiness of spam filters confronted by variations in fonts, etc., you may not have received particular issues of this newsletter. From this end it's usually impossible to tell if an issue reached you. Check the issue number sequence (with particular attention to the August 24th issue, No. 20). If you get this issue, but find a gap in earlier one(s) received, please let me know AND try to set up a 'allowed' path on your ISP, server and/or mail reader for mail from this address.

Contents:

Quick Updates:

- Musk's Hopes, Falcon 9 GEO Contract, and How to Talk About Your Rocket Company
- Lunar Lander Challenge Dropouts
- Political Challenges & 'Spaceport America' - Tax District Dispute
- Political Challenges & 'Spaceport America' - New Authority Budget Needs
- Singapore Spaceport Troubles
- Space Tourism: A Boost for the Third World?

Dear Acquaintances

Lunar X-Prize Solicits Rules Input From Prospective Competitors

Special Report: The Hidden Precedent for the Google Lunar X-Prize

- Why It Can be Done (Because it Almost Was by "BlastOff! Corporation")
- The Team, and What Was Accomplished
- The Denouement of 'BlastOff!' and the Precedent for the Google X-Prize

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Quick Updates:

Musk's Hopes, Falcon 9 GEO Contract, and How to Talk About Your Rocket Company:

Back in my August 24th issue (No. 20) the 'Quick Updates' included discussion of developments at SpaceX. It noted that the company hoped that the Falcon 9 might even fly by the end of 2008. (See Elon Musk's message at

<<http://www.spacex.com/updates.php#Falcon9Update081507>>.)

'Florida Today' reported on September 20th that Musk had repeated - with considerable caution - his hope that a Falcon could fly from Cape Canaveral as early as next year. (See <<http://www.flatoday.com/apps/pbcs.dll/article?AID=/20070920/NEWS02/709200345/1007>>.) Meanwhile, SpaceX had announced on September 14th that it had gotten its first Falcon 9 contract for a launch to geosynchronous (GEO) orbit, for the HYLAS communications satellite from the UK's Avanti Communications Group (<<http://www.spacex.com/press.php?page=29>>).

In slight revision to what I stated on August 24th, I find SpaceX's ambitious aims and schedule to be a reasonable strategy for presenting the company to the public *because of the context used*: Significant openness about hardware and testing and advising caution for unforeseen problems. At least as valid (and particularly suited to a company without a 'mega-angel') is the approach taken by XCOR Aerospace. There, forecasts are not made about such things as when a vehicle will be operating, but a realistic, 'ground-up' business plan and openness about the company's acquisition of solid skills and needed technologies have built public and investor confidence.

Lunar Lander Challenge Dropouts: Back in June there nine entrants (one anonymous) announced at the X-Prize Foundation's website for this year's 'Lunar Lander Challenge' at the X-Prize Cup (<<http://space.xprize.org/lunar-lander-challenge/>>). Over the past several weeks at least three teams dropped out, including the 'mystery' team. Perhaps most disappointing was Masten Aerospace's decision to exit the competition, forced by a supplier who was three weeks late in deliveries. (See <http://masten-space.com/blog/?p=126>).

Aside from Armadillo Aerospace, it's not clear what others will be at Holloman AFB for the competition. Some of these teams play things very quietly; either that, or they're not really serious entries and don't want to admit it (often even to themselves) until the last minute.

Update: A preview article on this year's X-Prize Cup and surrounding events appears at <http://www.space.com/business/technology/070920_xprize_rocketsroar.html>.

Political Challenges & 'Spaceport America'- Tax District Dispute: New Mexico's Doña Ana County is the only one of the three needed (the others are Sierra and Otero) that has approved a sales tax to help fund New Mexico's 'Spaceport America.' To spend the money also requires a spaceport 'tax district' to be formed. Despite the urgings of the state Spaceport Authority, the county commissioners recently voted to delay negotiating the details of this district with the other counties until they set dates for their own votes on the tax. (See <http://www.lcsun-news.com/news/ci_6866895>.)

There was a dispute with the Authority about interpretation of a state law that the commissioners said required two or more county governments to approve the tax *before* the district was formed. **Local officials said that by pushing for early work on the tax district the state was merely enlisting them in 'free marketing' to help push the other counties to set their sales tax referendum votes.**

The state apparently was urging the County to act because the Authority has budgeted County taxes for the spaceport, and wants to get the needed mechanisms in place for providing the funds as soon as possible. **However, the Authority's pressure, while legitimate, also provided a chance for county commissioners to strut their independence.**

In the end a Spaceport Authority spokesman asserted that the commissioners' vote would not stop or slow down the progress of FAA licensing and the design work on the spaceport. [At least for the moment(?).]

Update, Sept. 21st: It's now reported that Sierra County Commissioners have voted to allow the county manager to work toward a spaceport tax district. The article says that the "...Spaceport Authority has argued the [state]statute allows a county to join a spaceport district before an election, though voters eventually would have to approve a tax to remain in the district." <http://www.lcsun-news.com/news/ci_6952166>.

Political Challenges & 'Spaceport America'- New Authority Budget Needs: Virtually

simultaneously with the above events, Spaceport Authority Chairwoman Kelly O'Donnell was speaking to members of the State Legislature from the Finance Oversight Committee. She said that the Authority needed extra staff and thus a budget increase from \$365,000 now to \$1.5 million next year. Presently it is using contractors for much of its work and O'Donnell said that could only lead to delays and increases in construction costs for the spaceport. (See <http://www.lcsun-news.com/fastsearchresults/ci_6875956>.) **The budget increase request raised the hackles of several legislators.**

A few days later, the Las Cruces Sun-News blamed the hostility to the increased budget on, "...lawmakers from up north who are unable to see the statewide benefit that the spaceport would bring....Albuquerque-area legislators have seen this as a southern New Mexico project. [They] will take a close look at the level of local support for the spaceport. If officials in Sierra County, where the spaceport is located, are unwilling to ask taxpayers there for a hike, it will make it extremely difficult to win the support of [those] lawmakers from north of Socorro." (See <http://www.lcsun-news.com/ci_6897301?source=most_emailed>.)

These Spaceport items remind me of Tip O'Neill's old dictum that, "All politics is local."

Singapore Spaceport Troubles: From a September 11th AP report, it seems that the effort by Space Adventures to create a \$115 million facility for suborbital tourism from that city -state is stalled for now. In the article, company President and CEO Eric Anderson was quoted as saying that, "It's not a done deal. We have a plan, we don't have financing, there's not enough local support." But the item also stated that he'd expressed "confidence" in the success of the project and that he mentioned that the company was also looking at locations in China, Korea and Japan. Is this called 'political pressure'?

Space Tourism: A Boost for the Third World?: Malaysia is about to fly its first astronaut to space, on a Soyuz going to the International Space Station in October. But Norul Ridzuan Zakaria says that space tourism rather than government paid-for and developed spaceflight is the most beneficial road to space for developing nations. Zakaria has been promoting space tourism since resigning from the Malaysian Space Agency over a decade ago, and started a Space Tourism Society about a year ago. (See <http://www.islamonline.net/servlet/Satellite?c=Article_C&cid=1189959273508&pagename=Zone-English-HealthScience%2FHSELayout>.)

He argues that space tourism will benefit the Third World in the near term by requiring new support services for its wealthy patrons, while in the farther term its volume of activity will greatly reduce prices to orbit, allowing developing countries to be much bigger participants in spaceflight for their own economic and other benefits.

Unfortunately, he also falls into the conspiratorial thinking so prevalent in the Islamic world, claiming that the major existing space agencies are 'secretly' developing their own economical spaceplanes. .

Dear Acquaintances

Lunar X-Prize Solicits Rules Input From Prospective Competitors

I've already spoken to more than one company that intends to pursue the Google Lunar X-Prize, and other prospective participants have been reported. Companies are already filling out short 'letters of intent' and a full registration package will be available later.

I hear that those applying for the prize are being invited to submit suggestions on the final competition guidelines. One hopes this will aide the X-Prize Foundation in tailoring them to the real - world conditions faced by the competitors. There is also

speculation that rules and participants will be finalized by the end of the year.

Special Report: The Hidden Precedent for the Google Lunar X-Prize

Why It Can be Done (Because it Almost Was by “BlastOff! Corporation”)

The other day Clark Lindsey posted a response countering those asserting that it would take *hundreds of millions* of dollars to fulfill the requirements of the new X-Prize. (See ‘Low cost lunar projects,’ 9/15, <<http://www.spacetransportnews.com/>>.) Among the projects he pointed to were Ames Research Center’s 2006 studies of a Mircrosat Lunar Lander (see simulation at <http://www.digitalspace.com/projects/dss/microsat/index.html>). Recall also my note last week about Raytheon Missile Systems’s study of a lander which would cost on the order of \$35 million for a ‘first copy’ of the basic system (and less thereafter).

Clark also mentioned what was by far the closest (and it got quite close indeed) to an ‘end-to-end’ proof of the feasibility of developing, launching to, and operating a small rover on the Moon for under \$100 million. This was the little known - and, I’ve been told, intentionally ‘stealthy’ - project in the 1999-2001 period under what was formally known as the “BlastOff! Corporation.”

Indeed, ‘BlastOff!’ may reasonably be considered the direct ancestor of the Google Lunar X-Prize.

Rex Ridenoure is currently the head of Ecliptic Enterprises Corporation (a corporate subscriber to this newsletter) which has done fantastic work with its miniature ‘RocketCam’ systems on everything from ELV launchers to the Shuttle to SpaceShipOne. **He’d spent over 11 years at JPL on pioneering robotic probes and became one of the first employees and Chief of Mission Architecture on the ‘BlastOff!’ project** (<http://www.eclipticenterprises.com/bio_ridenoure.php>).

We had an extended conversation the other day about that project. As well, Rex had responded to a question about it during a 2006 “Space Show” interview (at about 52 minutes in, <<http://thespaceshow.com/detail.asp?q=493>>) and Peter Diamandis discussed the project and his own experience with it at <<http://www.diamandis.com/blastoff.html>>.

What follows is a personal synthesis based upon my communications with Rex, Peter’s posting and Rex’s responses on “The Space Show.” While some data on the project is public, not all has been released. So while I’m trying to avoid mentioning anything coming with a ‘caution flag,’ any breaches of confidentiality, while unintentional, are at my doorstep.

Bill Gross was the billionaire originator of the ‘Idealab’ in Pasadena, California, which was spinning off dozens of companies at once as the dot.com bubble expanded in the nineties. With the approach of the 30th anniversary of the Apollo 11 lunar landing in 1999, Gross was recalling how that mission had inspired his interest in technology and spaceflight, and wondering where similar inspiration would come from for his son’s generation.

He decided to do something about it.

Gross took advantage of his location near such talent pools as JPL and Caltech. He found a very experienced engineer who’d been thinking about low cost space missions. Backed up by others, this person was able to make a convincing case that a lunar rover mission could be done for well under \$100 million dollars.

By later in '99, Idealab was able to kick off such a project with about \$12 million in funding. Remarkable things were accomplished from that start until technical work was finally forced to shut down in January 2001 due to the burst of the 'bubble.'

The mission was to land a rover several miles from one of the Apollo landing sites, along with two smaller rovers that would 'scout ahead' as the main rover moved cautiously closer to the site and elsewhere nearby. All the rovers would provide (apparently binocular) standard video and high definition still imaging.

People such as James Cameron aided in creating a mission concept with an inspiring 'story-line' that would attract investment from Hollywood, 'participation' via internet from the public, from various governments and from other entities and investors. The mission outline, the rover concepts - given extra design 'pizzaz' by the Hollywood influence - and some mockup hardware can be seen in a set of illustrations linked from the very bottom of Peter Diamandis's above noted page about the project.

The payload was to fly a direct ascent trajectory from the Earth to the Moon - i.e., no stops in Earth or Lunar orbit. To the baselined booster, stages were added to head for the Moon and to provide the largest part of deceleration to the surface. The final increment of 'delta-V' for a soft landing came from the main rover itself, using an integral liquid propulsion system.

The dry mass landed totaled about 105 kg, of which the main rover's portion was about 100 kg with the two smaller rovers splitting the rest.

The Team, and What Was Accomplished

After work on the project had begun, the company went through several names before settling on the "BlastOff! Corporation." Rex Ridenoure spared no praise in lauding the quality of the technical team that worked on the project. Employment reached a sustained level of forty persons and a peak of fifty.

From January through August of 2000 the team ran through some 32 iterations on the main rover design alone, ultimately settling on the concept shown by the mockups in photos 11 and 12 of the Diamandis link noted above. The final *_small_* rover designs are in frames 17 and 18 of the same sequence.

By technical shutdown the status of the project was as follows:

- Critical Design Review (CDR) had been reached and passed some six months before;**
- Prototypes of all hardware had been working in both lab and 'field' conditions;**
- All hardware for assembly of a prime and backup flight set were on order and were a month or so from delivery;**
- Monthly payments had been made since August 2000 on a Lockheed -Martin Athena II launch vehicle on contract for the flight.**
- Rex estimates that as of January 2001 they were 15-18 months from launch.**

The Denouement of 'BlastOff!' and the Precedent for the Google X-Prize

Ridenoure believes that even with the bursting of the dot.com bubble, had the project started only six months earlier it could have had the momentum to proceed to completion. In addition to the initial funding from the 'Idealab,' Steven Spielberg had put in around \$1 million. As noted on the Space Show discussion, it had been possible to 'pitch' the anticipated payout/payback from the mission as an entertainment project at a time when film backers were paying just under \$100 million to finance the average movie.

By the time of shutdown the 'burst' had taken its toll. An additional \$40 - \$50 million had been needed to complete the project, but only a small fraction of that could be found.

What does this all mean for the Google Lunar X-Prize?

First, the experience with the 'BlastOff!' project makes quite clear (as I said last week) that the new Prize is - at least technically - "eminently doable."

Second, depending on the how many capabilities the contestant wants to include, the aims may be a bit less complex that that for 'BlastOff!' (While that project included the two additional small rovers, these were reportedly 'in the noise' of system cost.)

Third, inflationary costs and increases in even 'cheap' expendable launcher prices since 2000-2001 mean that that instead of about \$55 - 65 million, today's total cost for 'BlastOff!' would probably be in the range of \$75 - 100 million.

Thus, taken together, it's likely an *upper end* estimate that winning the Google Lunar X-Prize would take \$75 - 100 million.

I underscore 'upper end' since with the incredible publicity for winners and the motivations provided by prize competitions even serious competitors may be able to boost efficiency and reduce labor costs significantly. So needed upfront investment may be lower than that range.

The Ansari X-Prize inspired one set of engineers and a sector of the public with the promise of private enterprise spaceflight. The Google Lunar X-Prize promises to do the same, but starting from a slightly different - though partly overlapping - engineering community.

Yours very truly,

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