The Lurio Report

(See <www.thelurioreport.com> for Subscription Prices and Information)

Virgin's Space Terminal, Encouraging Space Business, Armadillo, Masten & 'CRuSR', the 'unCCP'

Vol. 6, No. 16, November 14, 2011

==========

Winner of the 2009 Award for NewSpace Journalism

- Space Frontier Foundation -

"There is so much new material out in the ether of space reporting that it is refreshing to receive a distinct and realistic assessment of events and themes in the industry. In those regards the Lurio Report nails it every time....an indispensable read."

-- Will Whitehorn, President, Virgin Galactic, 2007-2010

"In the ever shifting landscape of the New Space market place, the Lurio Report shines out like a beacon of clarity with its focus on the big picture and on the detailed facts alike."

-- Christopher Stott, Chairman & C.E.O., ManSat LLC, <www.spaceisle.com>

==========

Contents:

Quick Updates:

Armadillo, Masten and 'CRuSR'
Becoming the "un-Commercial Crew" Program?
Caught in a Dilemma on the Hill
Work It, or Quit It?
Hindering or Helping Commercial Within NASA
Increasing Funding in The Worst Possible Way
... And Ending It?

Dear Acquaintances,

- Virgin Galactic in New Mexico (and Distant Footsteps) -

Putting on a "Really Big Show"
Flights for Experiment Payloads and Researchers
"Hearing Footsteps" from Curaçao?

- Promoting Space Business Development -

Space Angels Network, an Event and Update
VLAB Meeting

© Copyright 2011, Charles A. Lurio. All rights reserved. Quotations with proper citation are welcomed and encouraged.
==========

Quick Updates:

Armadillo, Masten and 'CRuSR': Armadillo Aerospace and Masten Space Systems had each won contracts to carry payloads under the "program formerly known as CRuSR" as a result of an announcement of opportunity first issued in 2010. (This was a different solicitation than that which led to the wins by Virgin Galactic and UP Aerospace announced in October and cited below.) Armadillo was to use its "SuperMod" vehicle to fly several times to at least 30 km, while Masten was to use its "Xaero" to fly to 5 - 30 km.

Recall that back in May and June of this year, Armadillo's "Stig" and SuperMod each suffered flight failures (see Vol. 6, No. 10, June 28, "Lessons From Armadillo's Two Vehicle Crashes"). But - from data relayed by Clark Lindsey on October 29 and November 3, respectively - I'm encouraged to see that the "Stig A-2" is expected to attempt a flight from Spaceport America in coming weeks and some photos of the hardware preparations.

Not long ago I heard that the Armadillo CRuSR flights cited above had been dropped. My understanding after looking further is that that contract for flights using SuperMod have been cancelled "by mutual agreement" between the company and NASA. But Armadillo (as well as Masten, Virgin, XCOR, etc.) was one of the seven companies designated in August as potential suppliers of suborbital reusable system flights in future under the later Flight Opportunities contract. So I wish them much better fortune with the "new" Stig. Requirements to win a contract for carrying suborbital experiments under that newer "supplier" framework include first demonstrating a system's ability to meet the basic flight profile.

Meanwhile Masten's original "CRuSR" contract is still in effect. In a posting dated November 4 Colin Ake, the company Director of Business Development, provided an encouraging update while admitting that there's been a long gap since the last one. I mentioned in Vol. 6, No. 8, (June 6), that some "tweaks" were needed before Xaero's CRuSR flights. Clearly that took longer than originally anticipated, but as Ake now writes, they have been very active indeed:

"We get a lot of questions on where we're at on our CRuSR flights and the answer there is 'we're still cooking.' We've been flying Xaero a lot. As in multiple days a week, multiple flights per day. We've been doing lots of tweaking GN&C algorithms before we take the leash off. We're getting close, but there are still some variables to isolate and test.

"We've also been flying [the older] Xombie quite frequently as we work to expand her capability."

Among the other news items, Ake mentions that they've hired three new full-time employees and started using an additional building. Significantly, he says that, "We signed additional contracts with non-governmental entities ...[and are] making steady progress on our client projects."

Back in my June 6 report I mentioned several major Masten development projects. Ake now says that qualification of the flight weight 300-1100 lb thrust "Scimitar" engine is nearly complete, calling it "a beauty," that uses new technologies. He adds that they are making progress towards firing their other new engine, the 3000 lb thrust "Katana." Scimitar will be used in Xaero once deemed ready, while Katana is intended for the "Xogdor" vehicle, similar to Xaero but with larger tanks to enable ascent to 100 km.

Becoming the "un-Commercial Crew" Program?:
Caught in a Dilemma on the Hill - In my October 17 issue I noted that some elements were **threatening to turn the Commercial Crew Program (CCP) into what I now dub the "un"-**

Commercial Crew Program (uCCP): one with readiness dates slipping so far and operational costs increasing so much as to let "traditional NASA" and Hill pork-masters claim that "commercial" human spaceflight systems can do no better than "government" ones.

Most of the Members of the House Committee on Science and Technology (an authorizing panel) who spoke at a hearing on October 27 behaved like players in an "un-Commercial Crew Show." Some complained that NASA had said that commercial crew systems wouldn't be ready until 2017. So, they continued, why not "hurry up?"; or that by 2017 there would only be three years left in the presently projected life of the International Space Station (ISS), so why fund CCP at all? - just continue to pay Russia.

Yet the first group of witnesses - from companies involved in the present CCDev2 program - all projected commercial crew readiness dates of the order of 2015. **Of course, the disparity was from comparing a fully funded program with one provided funds at Congress's own heel-dragging pace.** Absent language like "heel-dragging," this was made clear later at the hearing by William Gerstenmaier, head of the recently formed Human Exploration and Operations (HEO) "superdirectorate" at NASA. For the requested $850 million for Fiscal Year (FY) '12 he cited a 2016 *_operational_* date; with the $500 million voted for by the Senate (the *_higher_* of the numbers from the two sides of the Hill) that moves to 2017. Of course one only does that "well" if Congress goes back to fully funding requests *_after_* 2012 (!). You must further add a $480 million penalty from paying for Soyuz services per year of delay. (And: I hear that internal NASA views of the feasibility of proceeding using the present RFP at that $500 million level are less optimistic than the public ones.)

There remained the unquantified extra costs imposed by using Federal Acquisition Regulations (FARs) instead of Space Act Agreements (SAAs).

Rep. Dana Rohrabacher spoke strongly about the preferability of SAAs, inviting response from the industry panel. The *_initial_* reaction of myself and others was dismay that the company speakers were cowed from expressing outright support of that position, leaving Rohrabacher embarrassed. As well, what I indicated in my October 17 Report remains true, and most of the companies represented don't want the penalties from FARs imposed by the present dRFP ('draft' Request For Proposal).

Yet if the witnesses had "come out swinging" to match Rohrabacher's fervor, they'd have been criticizing their essential first customer - NASA - and at a very tough forum to boot.

Work It, or Quit It? - At one point during the hearing Elon Musk of SpaceX indicated that perhaps FARs were workable if sufficiently modified. **But he also fundamentally made the case for returning to full SAA flexibility.** As his written testimony states (section III, p10), the present dRFP would leave a contractor signing a commitment *_before the documents driving vehicle design_* are in hand. **He said at the hearing that, "It's important that if the price is fixed, the terms must also be fixed."** (From this Popular Mechanics item.) Otherwise there would be room for costly unforeseen demands and changes to be imposed by the Agency.

Going further, in the Popular Mechanics article he suggested that without sufficient repairs to the dRFP, SpaceX might not even bid on the Commercial Crew Program.

Actually, almost every witness spoke favorably of the SAAs while keeping the committee mollified by not outright denouncing the use of the FARs. I particularly recall the comments by Mr. Lindsey of Sierra Nevada (developers of the "Dreamchaser") about how very rapidly they'd been able make progress under the CCDev program because of their SAA's flexibility. He also indicated (as I've said myself) that the question was not *_if_* traditional contracting should be used at some point, but *_when_* it should.

The right answer is to wait until NASA is contracting for actual operational services, per the CRS contracts for unmanned ISS supply deliveries that are following the COTS capability development program. Pushing the change back into the systems' development phase during

CCP only skyrockets costs now and during operations while limiting options. We don't have the money for such added expenses, even were they desirable, which they are manifestly not.

Musk's written material shows at least another point of concern. He notes that as well as a NASA "oversight team" at the contractor, the dRFP proposes a, "NASA insight team ...to be given full access to the contractor's activities while being specifically precluded from providing any NASA resources. **As a result, the insight team is tasked to 'audit and report' and thus becomes a _*second*_ oversight team" [emphasis mine].**

Hindering or Helping Commercial Within NASA - Outsiders such as ex-Administrator Griffin, Congressional pork interests, and older companies that "love" for its own sake that endless, traditional chow-down of funds are trying boost CCP costs or destroy it for the sake of their usual menu. Then there's the traditionalist contingent within NASA that, against the history of other technologies, believes that high cost is magically inherent in all spaceflight forever.

A third group consists of those NASA insiders who may support commercial crew systems in principal, but whose dedication to the "institution" prevents them from pushing strongly enough. Good intentions can come to nothing. **I understand that Mr. Gerstenmaier still wants to find a way to let CCP work, but the bureaucracy and political factions may have gone too far down the present road for he and others to back down from a slow-motion, "uCCP" train wreck.** (E.g. as in the suggestion of tossing out the present CCP management framework by returning to "COTS-D," the original plan for commercial crew development as an extension of COTS.)

Increasing Funding in The Worst Possible Way - **On a "lighter" note... there was a recent case of "pork-in-action" - albeit in a positive direction from my perspective - so blatant as to make one laugh out loud.** On November 1 the Senate passed its NASA CCP Appropriation at that $500 million level. The day before Boeing had held a ceremony announcing that it would use a former Shuttle hangar for its CST-100 capsule effort, potentially bringing over 500 jobs to the Cape. As Jeff Foust noted, that was, of course, *"Pending the continued selection of Boeing for future Commercial Crew development and service contracts, and sufficient NASA funding…"*

The follow-on was noted in the Orlando Sentinel (again via Jeff's blog): Rep. Sandy Adams (R-FL), previously an at best tepid supporter of Commercial Crew, on November 3 urged Conference committee support of CCP at the $500 million Senate level, rather than at the House's own total dead-end $312 million.

... And Ending It? - Of course, even the "uCCP" may be dead if the Federal budget "Supercommittee" mandates - or more likely, its automatically triggered massive cuts - take effect.

If the mutation of the program into an "uCCP" continues, we may have again been taught that _*nothing*_ can justify the poisonous effects to entrepreneurs of getting into a major-money, high profile relationship with NASA - particularly if the end point challenges one of its core existential areas of self-confidence. The "moral" has long been some version of: "Stay outside the fence and you may not get the big money, but neither will you get chains put on innovation."

==========

Dear Acquaintances,

- Virgin Galactic in New Mexico (and Distant Footsteps) -

Putting on a "Really Big Show"

On October 17, Virgin Galactic dedicated its hangar/terminal facility at Spaceport America with patented Richard Branson panache. Dancers strung from ropes performed, exuberantly bouncing off the curtain of windows. Sir Richard then rappelled down among them,

a huge bottle of champaign was dropped into his hands, and he proclaimed the "Virgin Galactic Gateway to Space."

The building is about 95% finished, far closer to completion than when I visited in October 2010. With the main window installation and erection of its brown tinted hangar doors, it really looks like a grand-scale sculpture, one both emerging from and echoing the spirit of the stark but beautiful surroundings. Governor Martinez of New Mexico, who was sworn in early this year, appeared at the event with evident enthusiasm. Recall that around the same time that "funereal" views about her support for the facility were being indicated by the New York Times, I stated in Vol. 6, No. 3 (February 28, 2011) that her first actions relating to the project were more likely part of "[a political] 'Kabuki dance' to rebrand the project as _*hers*_ " than something of ultimate concern.

Well, I was right.

I wasn't able to be at the dedication, but I'm encouraged by how far Virgin's come. It's possible that they won't be the _*first*_ company to carry commercial payloads and passengers on a suborbital reusable vehicle. But I think that at this critical early stage for the new industry, their commitment, level of investment and visibility could make their eventual success pivotal for the entire field.

Competition is healthy, however, and as several observers noted, at the Spaceport event Virgin representatives made a couple of veiled pokes at XCOR Aerospace and its venture with Space Expedition Curaçao (SXC). The most explicit came from Branson himself, judging by Doug Messier's blog "Parabolic Arc." (See the section below entitled "'Hearing Footsteps' from Curaçao?" the title adapted from this reference.)

Flights for Experiment Payloads and Researchers

At and just preceding the dedication there were announcements related to using SpaceShipTwo (SS2) for suborbital science and engineering research, reflecting the growing interest in, and rising profile of, those applications for the new suborbital reusables.

Back in February of this year the Southwest Research Institute (SwRI) had announced its purchase of six suborbital research flights (and options for three more) on the XCOR Lynx Mark I, with a payload specialist in the passenger seat. In the same document it announced purchase of two seats on SS2, with, "plans to later fly a dedicated six-seat research mission in Virgin Galactic's SpaceShipTwo." On the much smaller, lower cost/flight Lynx, the flights are set to carry entirely SwRI's own experiments. But SS2 can provide room for, "up to 1,300 lb. of science equipment, enough to accommodate as many as 600 experimental payloads on a single flight." (From here, at Aviation Week & Space Technology.)

SwRI's Dr. Alan Stern indicated in New Mexico and told me in a later note that, "The news is we're well on our way to filling up the [SS2] charter flight with diverse institutions each using their own funds, showing there is a non-NASA market out there for research and education missions."

That's an encouraging data point for the new industry.

(*Update, November 3:* Stern's point was underscored a few weeks later when the "Space Florida" agency approved spending up to $400,000 for the equivalent of two seats on SS2. One seat will carry a doctoral-degree level researcher, while the other slot will be dedicated to a rack of eight experiment compartments. At least half of those will be filled based on a statewide university competition; the remainder may be set aside to offer high schoolers a similar opportunity.)

Just a few days before the Spaceport event, on October 13, Virgin had announced an agreement with NASA for at least one - worth $1.5 million - and up to three charter flights on SS2. The purchase is for that "program formerly known as CRuSR," now under the Flight Opportunities office at the Dryden Flight Research Center.

The award stems from a solicitation that NASA issued last spring for "Flight and Payload Integration Services for Suborbital Reusable Launch Vehicles" as an Indefinite Delivery/ Indefinite Quantity (IDIQ) contract, linked from <https://www.fbo.gov/index?s=opportunity&mode=form&id=ef7a0725b5aa79d754fc60892884cb57&tab=core&_cview=1>. (Note: *This link doesn't work if I use the same format as with other references in this issue of the Report*). In Vol. 6, No. 12 (August 18) I noted that under this solicitation NASA had selected an initial pool of seven companies for possible flight purchases. There is presently an initial $10 million, two-year allocation, and a company's selection for the pool guarantees a minimum payment of $10,000. An IDIQ contract can extend for many years, and under this one the Agency later issued its first (also) two year "task order." I understand that this was for either "Flight Level L2" (20-100 km above sea level) or "Flight Level L3," (100 km and higher), both as defined in the "Performance Work Statement," which is also linked from the above "FedBizOps" ('fbo') page.

On page 5 the solicitation indicates that payments under the contracts are to be provided by NASA upon performance of each of four "Milestone" increments, starting with reservation of the payload slot and concluding with a report on flight data.

Will Pomerantz, Virgin's VP for special projects, notes that to win the contract under the present Task Order, bidders had to have flown either a "prototype" or the "qualified" (operational, commercial) vehicle to the required altitude; SpaceShipOne (SS1) was accepted as Virgin's prototype for SS2.

As well as Virgin's win, under the same program "UP Aerospace," announced on October 5 a contract from NASA for two flights with options for up to six more. The company has been conducting suborbital unmanned vehicle flights from Spaceport America for some time. Though their systems closely resemble conventional sounding rockets, the contract requires incorporating significant reusability. (I was unable to find UP's specifics on this in time for this issue.)

One might be concerned that there could be slips in SS2's operational flight date, particularly given the start of rocket powered tests. Even if technical issues cause that to extend beyond the _*nominal*_ two-year NASA window for task execution, performance extensions or a re-bid might be possible. One must underscore that virtually all the new suborbital reusable systems are in various stages of development and test: e.g., after multiple free-flights of SS2, just recently there were some hair-raising moments when the vehicle entered an excessive pitch-down condition, causing a stall and rapid descent. But it testifies to an asset of the design that by "feathering" (i.e. rotating up the tail, as in a suborbital descent) stability was "instantly" restored. (See this report from Jeff Foust.)

"Hearing Footsteps" from Curaçao?

This year's International Symposium for Personal and Commercial Spaceflight (ISPCS) - which I also wasn't able to attend - was held in Las Cruces on October 19-20, another part of "Space Week" in New Mexico. Apropos to comments earlier in this issue it's worth looking at an interview by Doug Messier of "Parabolic Arc" at the conference with Harry van Hulten, co-founder of Space Expedition Curaçao (SXC).

Recall that SXC recently made a seven figure payment to XCOR Aerospace towards eventual wet-lease of a Lynx Mark II (see Nos. 14 & 15 of this year's Report). In the interview, van Hulten outlined some aspects of SXC's hopes and progress.

The fundraising that led to the first payment to XCOR actually elicited an _*oversubscription*_ of 50% above their goal. That is, investors offered half again as much money as the target. However, my understanding is that from this SXC accepted the same total investment originally planned for this stage. In the case of such oversubscriptions, one strategy is to accept contributions from all offered, but reduced "pro rata" (proportionally) for each to maintain the original total. The idea is to maintain goodwill for the future among responders by allowing all to participate. **I've no idea if that or another approach was taken here, but one thing's certain; an "excess" response is a good "problem" with which to be "burdened!"**

At the time of the interview van Hulten had just visited XCOR and he said that everything looked good, particularly citing the engine work. He spoke to Doug of a "rollout" early in the year (preceding "hops" from the runway hoped for by late 2012, see Vol. 6, No. 14), but I'm not sure that that will be a formal event. Certainly major parts of the fuselage are expected to arrive in January, and by November 7 Rand Simberg at "Transterrestrial Musings" cited an item indicating that a full-scale model of the Lynx will appear in Los Angeles in May at the "Spacecraft Technology Expo."

Hulten's reasons for choosing the Lynx followed XCOR's own strongest selling points: the "experience" of the wide-angle view and of sitting next to the pilot, the rapidity of reflights, propulsion maturity, etc. He also noted the three phases that SXC is pursuing to establish their "all-up" wet-lease operation, the total cost of which he put at $75 million. Each phase is expected to be a revenue generator in its own right.

Lynx flights from Curaçao will take place from their international airport, and as SXC indicates this reduces cost of infrastructure development. Phase I consists of initial commercial flights, projected for some months during 2014; Phase II would add a purpose-built hangar/ spaceport to the site; and Phase III adds a "Space Experience Center" providing information and interactive demonstrations to those "from 8 to 80" who are "just visiting."

So perhaps Branson should indeed "worry" about some friendly competition creeping up on him, but I put the emphasis on the word "friendly." It's important that the new industry have as many credible entrants as possible.

- Promoting Space Business Development -

Not all commercial spaceflight developments have as high a profile as the Spaceport America opening or - on the other side of the ledger - the dismaying situation relating to NASA's

Commercial Crew Program (CCP). But as in so many other entrepreneurial areas, the ventures and developments that _*appear to*_ spring from nowhere may result in the most significant players of the decades to come.

Space Angels Network, an Event and Update

On October 20 I spoke with Robert Jacobson, who had just come from a networking lunch held by the Space Angels Network in Palo Alto. He's a New Space investor and principal in the group, which brings accredited investors together with firms seeking resources for aerospace-type projects. I last mentioned them in Vol. 6, No. 8, (June 6) in connection with a seed-stage investment by the Orrery Group in Altius Space Machines that was announced in May.

The meeting Jacobson had attended featured Steve Jurvetson, Managing Director of Draper Fisher Jurvetson, who addressed actions that both entrepreneurs and investors need to take. Altius presented an update and money "pitch;" recall their "sticky boom" technology project to greatly ease space operations by eliminating the requirement for traditional costly and heavy "controlled collision" docking mechanisms. Among other things this could allow small, low cost boosters to deliver payloads to space stations (Vol. 6, No. 7, May 16 and Vol. 6, No. 8, June 6).

On September 21 the Network had announced an investment in Lasermotive by member Brad Fleury, Director of Edge Consulting. They won the first prize of $900,000 in the 2009 NASA "Power Beaming Challenge," and have received considerable attention from the Agency and others due to the breadth of applications for their technology, from long duration Unmanned Aerial Vehicles (UAVs) to spacecraft propulsion and providing them with onboard power. Their work was discussed in the October 24 issue of Space News (p. 16) where Space Angels' managing director Joe Landon spoke about reasons for the Network's interest in the company, underscoring the importance of the nearer-term applications. LaserMotive also presented an update at the lunch.

Long time readers may recall my discussion about the company in Vol. 5, No. 7 (May 17, 2010), based upon a presentation at the annual Space Access meeting by Dr. Jordin Kare, one of the firm's cofounders and a frequent attendee at that conference. There he cited technologies such as photovoltaic cells "tuned" to a particular laser output frequency, allowing very high (50%) conversion efficiencies. He'd also noted the applicability of the technology to powering UAVs, referencing a "White Paper" on the topic.

A third company, Hansen Sanders LLC, also presented at the networking lunch. While I understand that they're looking into certain space data services, they told me that they presently wish to keep their intentions and strategy confidential.

I later spoke with Amaresh Kollipara, another principal in the Network (and US CEO of Earth2Orbit, LLC). He notes that it presently has about 24 investor members and 100 companies that have signed up to seek investments. It has facilitated three investments during the year to date and Amaresh indicated that another is imminent. He commented that while it was still difficult to find investment dollars for space enterprises, the situation has improved because of the increased visibility of successful commercial space ventures such as SpaceX, as well as positive results from NASA involvement with the new sector.

The third Network-facilitated investment so far this year was in Sorian, Inc. (announced September 1) which has technology to create "virtual" flaps on airfoils. Initial applications are to increasing wind turbine efficiency. The Network does not restrict itself exclusively to space-related technology. I assume that casting this wider net helps build its overall credibility while exposing new segments of investors to space ventures.

Finally, back on September 6 the Network announced a collaboration with "eSpace: The Center For Space Entrepreneurship" located in Boulder. I may have mentioned that group some time ago. They are an incubator for space startups based upon a non-profit partnership between the University of Colorado and Sierra Nevada Corporation, the developers of the "Dreamchaser" vehicle. In the press release, Landon said that, "Companies that get their start at eSpace can take the next step, finding additional outside investors, with the help of Space Angels Network."

VLAB Meeting

In my September 12 issue (Vol. 6, No. 13) I commented that Moon Express, "appears to have given a boost to legitimizing and engaging the entrepreneurial culture of Silicon Valley with space ventures." In the previous issue I'd noted that Dr. Sean Casey and the "Silicon Valley Space Center" are also trying to accelerate that process.

During the summer Dr. Casey had been contacted by the local organizing committee for "VLAB," the MIT/Stanford Venture Lab, self-described as, "the San Francisco Bay Area chapter of the MIT Enterprise Forum [for]... leading entrepreneurs, industry experts, venture capitalists, private investors and technologists to exchange insights about how to effectively grow high-tech ventures amidst dynamic market risks and challenges."

VLAB had become interested in doing a forum on commercial space, which occurred the evening of September 20 at Stanford's Graduate School of Business as an event entitled "Space Exploration: Not Just for Billionaires Anymore," It was divided into networking session and a presentation/panel forum; there were also about a half-dozen company display tables.

Casey told me that the some 400 registered attendees set a new record for VLAB, with about 80% of them new to such events. Admittedly this may have been facilitated by using a new, larger venue, but he and others who were there made it clear to me that the crowd was not a mere gathering of a "space fan club." It included a cross-section of Silicon Valley technologists and entrepreneurs, including people associated with early stage investments and with major computer firms.

Rich Pournelle, NanoRacks' Senior VP for Business Development and the official program "Presenter," praised the organization of the event and said that there was definitely new interest in commercial space in the Valley. But he still sees problems such as the lack of a lot of "comparables" for entrepreneurial space ventures reaching "exit points;" but he notes that if SpaceX "goes public" that issue may be eased. Because NanoRacks can offer low-cost experiment opportunities on the ISS, it provides important opportunities to entrepreneurs like those who attended the Stanford meeting. Given those low costs, among the promising areas is providing services for early stage projects that are funded by SBIRs.

Amaresh Kollipara was the "Moderator" for the Stanford event, and Virgin Galactic's Will Pomerantz was a "Panelist" on the program. Pomerantz told me that he was encouraged by the level of interest from people who came up to speak to him and other program participants

afterwards. The roster of panelists was filled out with Moon Express's CEO, Bob Richards, and a VP from comsat manufacturer Loral. It's likely that the latter's inclusion had more to do with geographic proximity to the campus than with any prospective extension of interest by the company into areas beyond its traditional scope.

Yours very truly,

Charles A. Lurio, Ph.D.

The Lurio Report - News and Analysis of the 'New Space' Enterprise
Winner of the 2009 Space Frontier Foundation Award for NewSpace Journalism!
(<www.thelurioreport.com>)
Charles A. Lurio, Ph.D., Writer/Publisher
charleslurio@thelurioreport.com
services@thelurioreport.com (subscription queries)
617.480.0755 Business, Cell & Voicemail