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News and Analysis of the 'New Space' Enterprise

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Falcon 1 Marks Second Success in a Row, New Space in the UK and Europe

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Special Updates:

FALCON 1 MAKES IT TWO IN A ROW!

Let's all cheer for SpaceX!

(... and for the New Space idea!)

In the middle of the night of July 13-14, ET, a Falcon 1 rocket perfectly carried its first commercial payload to orbit, deploying it at 685 km altitude and 9 degrees inclination. The Malaysian-built RazakSAT was said to be working well as it starts its mission of Earth observation for resource management in that Asian nation (<http://www.spacex.com/press.php?page=20090715>).

SpaceX has skewered the arguments of its most inane critics with this second-in-a-row successful flight to orbit.

I (im)modestly claim that I knew the company had a good chance - really, a great chance - of becoming a success from the time a few years ago when I first met their topflight personnel and saw the quality of the work they were doing.

Mind you, I never gave up criticizing where I thought it was deserved. I often pointed out that by using a rocket design that was fundamentally a throwaway, they could not incrementally test once the vehicle was but a millimeter off the ground. Compare that for a moment to the hundreds of test flights planned for systems reusable from the start, such as the Virgin Galactic and XCOR suborbital vehicles.

But that makes all the more remarkable that, starting from scratch, and making virtually all the parts by itself, SpaceX lost only three vehicles before these two richly deserved successes.

Of course, the present milestone doesn't mean that all possible problems and failures are past them. Forthcoming in a few months is their first attempted launch of the massive Falcon 9 from Cape Canaveral, then next year, of the Falcon 1e with upgraded payload capabilities. And the company must consistently deliver success at their promised lower costs than other comparable systems.

But what happened this week is a blow to a pernicious and refractory mythology, one that has permeated world perceptions since the hurried but astounding accomplishments of the early 'space age.' Consciously or not, among the public (and an embarrassing fraction of the engineering community), so-called "rocket science" was cut off from the possibility of gradually becoming more practical and lower cost, the normal path with so many other technologies. Movement to such practicality was instead often seen to require near-miraculous 'super-science." That was always just a negative form of "magical" thinking rather than being based on reality.

A couple of weeks ago I was standing in the forecourt of Westminster Abbey in London. There, atop a pillar, stands a sculpture of St. George slaying the dragon. SpaceX has just contributed a wound to the dragon of a mythology that has kept _*all*_ humanity from the limitless promise of space. The outcome of the struggle is not certain, but as it has before, the New Space community will continue this battle as long as it can.

In the meantime, join with me to celebrate the personal dedication, skill and determination of all at SpaceX, who created this week's accomplishment.

Travel Note - At New Space -'09, July 17-21

This is about as tightly as I've ever scheduled business trips. I expect to be at the Space Frontier Foundation's "New Space '09" taking place at the NASA Ames Research Center (see program at <http://newspace2009.spacefrontier.org/agenda.php>).

I will NOT have a computer with me during the trip.

No other travel is in prospect for at least a couple of months after, so when I get back I'll finally be able to schedule some time to come to grips with previously mentioned computer problems, the need for a car that isn't rusted out, etc. Somewhere in there I will take off a few days to relieve stress from the recent demands of these and business matters as well as family items.

Which again emphasizes why your subscription payments are so crucial.

I will, of course, work to keep up the accustomed relevance and flow of newsletters.

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Quick Update:

Jurvetson's Fundraising for SpaceX and 'New Space' Venture Capital: Around June 25th, there was an announcement that Silicon Valley's DFJ (Draper Fisher Jurvetson) venture capital organization,

"...ha[s] agreed to lead a major investment in space transportation provider SpaceX... The round could be worth upwards of $60 million, and would include existing SpaceX backer Founders Fund."

[From a comment by 'Observer' at <http://hobbyspace.com/nucleus/?itemid=13332>; the original publication's report requires subscription.]

There has been some discussion among New Space insiders about this as a potential breakthrough into venture capital funding that could benefit the situation of the whole field. As 'Observer' noted, Steve Jurvetson is himself a "rocket aficionado," but for DFJ as a whole to have confidence enough to raise dollars for this kind of investment is notable. Surely the second Falcon 1 success will make it easier to complete the SpaceX round of funding, and for DFJ or others such firms to see value in the wider field as well. Still, with the lousy economy I'm not betting on any miracles.

(I met Jurvetson at one of the Space Investment Summits and he's been on the mailing list for this newsletter since then.)

Washington, NASA and New Space:

COTS Stimulus Dollars in Limbo, Falcon's Flight, Congress's Perceptions: The last time we left this saga, Senator Shelby of Alabama had frozen NASA stimulus dollars, "...because _*some*_ of them would go for COTS and a 'lead-in' to COTS-D type human flight demonstration - rather than _*all*_ of the money being added to Constellation and the Ares 1 development," (Vol. 4, No. 10). Around the same time he had been making some derogatory remarks about the ability of a private company such as SpaceX to fly humans to orbit at all.

The reality was that he was weighing the heavily overhead-laden job count from Ares vs. the lower (immediate) potential numbers from the less costly EELVs - Delta IV or Atlas V - suggested substitutes for lofting the Orion spacecraft. Also, as pointed out in various places, while the Delta IV is currently assembled in Alabama, the Boeing/Lockheed-Martin United Launch Alliance (ULA, <http://www.ulalaunch.com/>) is planning to, but has not yet, moved Atlas assembly to the same plant.

Events since have been chronicled in such places as spacepolitics.com, and summarized

as part of an article by Rand Simberg at <http://pajamasmedia.com/blog/a-giant-leap-for-commercial-spaceflight/>. At one point, Shelby seemed to have taken back for Ares 1 $100 million of the $150 million from the stimulus allotted by NASA to those COTS/COTS-D type activities. Then, local newspapers in Texas (where SpaceX does much testing and more dollars for it mean more jobs there) started complaining, along with the Texas congressional delegation (<http://www.wacotrib.com/news/content/news/stories/2009/07/09/07092009wacSpaceX.html>).

As Rand put it in his July 15th article, "...now the fate of the funding seems to be in limbo."

After the second Falcon success, New Space advocates were speaking gleefully of making Shelby watch the recording of the flight over and over. Adding to the hope of a 'comeuppance' for the Senator, there are signals that the Augustine Commission *_might_* be considering sending Ares 1 towards a quick burial. (See <http://blogs.orlandosentinel.com/news_space_thewritestuff/2009/07/by-robert-block---spaceeditor---cape-canaveral---members-of-the-presidentially-appointed-panel-reviewing-the-future-of-americ.html>.)

Believe me, I share the hopes and emotions, but we must be realistic. Shelby's doing what he thinks will benefit his voters the most. As Bigelow Aerospace's Mike Gold told me, "...we just have to make a better case." I'll add that that's so also because in Congress it's much better in the long term to create friends than enemies - if at all possible.

Another note: With all the unhesitating praise I've heaped upon SpaceX, I've also consistently advocated funding that would allow *_competitive_* development of human orbital access development capability to the International Space Station (ISS). That not only makes sense for developing new market capabilities, it also would prevent the plea for dollars for such a capability as being seen on the Hill as a special favor for SpaceX alone.

Indeed, my fears of that perception have been backed up by others: Since unlike Orbital Sciences (the other COTS *_cargo_* provider), SpaceX has been pushing for human access development, terms such as "COTS-D" have become almost solely associated with SpaceX on the Hill. That leaves out proposals by other firms, almost all using EELV boosters, for developing such capabilities.

This doesn't change the the inanity of Shelby's actions, but I hope it adds some useful context.

Dear Acquaintances,

- The UK, Europe and New Space -

Gaining a New Perspective

My visit to the UK, June 24 -July 1, confirmed many previous impressions about Europe's and Britain's relation to New Space. But in almost all cases, the experience provided a degree of nuance I'd not obtained from afar. In others, there were distinct shifts and/or increased depth in my understanding.

Certainly, the visit confirmed my previous estimations on this: Despite being somewhat behind in becoming coherent and obtaining a legal framework, there is a core of interest, undoubted technical competence, and a pool of economic savvy that could create a vibrant New Space 'takeoff' within Europe.

As planned, I visited in turn Reaction Engines <http://www.reactionengines.co.uk/> and Surrey Satellite <http://www.sstl.co.uk/>, culminating with the Royal Aeronautical Society's (RAES's) meeting on "Space Tourism." The present issue will focus mainly on the last of these

three. More about the others may be provided at a later date.

Again, my appreciation to all those in the various organizations who made these visits possible, taking the time to show me around and answer questions. The greatest thanks, however, are due to Dean Filipovich, who in addition to providing a place to stay assisted in numerous other ways.

Conference Circumstances and Hopes in the UK

The UK government has long held a less than positive view toward participating in human spaceflight (e.g.,<http://www.bnsc.gov.uk/5974.aspx>). However, one could argue that the very weakness of strong, established government "Old Space" frameworks in this area, combined with 'points of excellence' such as Surrey Satellite, _*could*_ allow the country to become a big New Space player. Indeed, I believe that I overheard Richard Garriott (who recently flew to the International Space Station, ISS, under the aegis of Space Adventures) make a similar argument during the rooftop reception after the RAES meeting. This was greeted with some astonishment by a British attendee, giving the impression that there's an entrenched disbelief in the _*possibility*_ of change even among the self-selected group that came and paid to attend the conference.

It was undoubtedly more because of perceived practicality than because of fabled British reserve, but John Loizou, the Chairman of the meeting, reacted analogously when I suggested that it would greatly help if the RAES held a similar meeting more frequently than once every three years.

Certainly no such reserve was evident in the speaker or among the attendees (and Loizou) when Will Whitehorn, President of Virgin Galactic, called for people to help to, "...take the UK Space Act into the 21st century." At the forefront of this was a plea to urge and work with Members of Parliament, the present government and the prospectively incoming Tories to create enabling legislation analogous to the US's Commercial Space Launch Amendments Act (CSLAA) of 2004.

Whitehorn underscored his points dramatically by stating that, "The UK has a successful space industry _*despite*_ government policy."

In parallel to Whitehorn's plea, during all my space-related visits in Britain there was a good deal of interest in the intentions of Lord Drayson (commonly referred to as the 'Science Minister' of the present Cabinet). On the day after I left for Europe, he initiated a space Innovation and Growth Team (IGT) study to identify critical areas for government support of space over the coming two decades. This is supposed to result in a draft output by the end of the year and a final report in early 2010.

Granted, Drayson is clearly a space enthusiast, and some of that may already run through New Space channels. At Surrey I was told that he's believed to be a fan of air-launched satellites (as in Virgin Galactic's and XCOR's proposals), and he's already visited the visionaries at Reaction Engines seeking a reusable vehicle for space access (<http://www.reactionengines.co.uk/pr_22_may_09.html>).

Yet as noted in an item about the IGT in the June 29th Aviation Week & Space Technology, the study is to "draft" top space industry officials and the expectably interested government departments. Realistically, how many of those voices will push a message required for the fundamental - though not costly - 'game-changing' of policy needed for New Space to flourish?

A person in the UK half-jokingly referred to the Virgin Group as consisting at its core of, "five mates in marketing." **It seems clear to me that those interested in a future for New Space enterprise of all kinds in the UK could take a tip from those "mates" and create the multi-partisan, ongoing push through all possibly relevant entities that Whitehorn recommended**.

RAES Conference Structure and Overview

Certain aspects of the progress presentations on "Space Tourism" were more fundamental than one might see in the US, presumably due to the dearth of New Space meetings in the UK as well as the brevity of the RAES event. This did not dampen intense audience interest. Still, there were many Europe/UK-unique topics that emerged as well as ongoing news about the progress of various well-known projects.

Some (generally) good-natured barbs were tossed between Virgin Galactic and XCOR on the relative merits of their systems. But that was matched by mutual praise, as when Virgin's Will Whitehorn cited XCOR as a possible provider for a future generation launcher from WhiteKnightTwo (WK2), and when XCOR's Andrew Nelson praised the huge boost in credibility to the field provided by the Virgin Group's initial and continuing commitment to it.

During my visit I encountered several people who said they would have attended the meeting had the entrance price been lower. Others would have like to have seen appearances from more entities, such as Germany's 'Project Enterprise' (see, e.g., Vol. 4, No. 6 of this Report) or Armadillo Aerospace. I was told later that until quite late it had been hoped that the 'Enterprise' people would come.

Despite any reservations about the meeting, it was an important event that filled nearly all the seats in the hall.

The conference nominally had three sessions:

1) "Operational Space Tourism" (suborbital and orbital systems);

2) "Gateways to Space for the Private Traveler" (spaceports);

3) "Business Models and Institutional Matters" (insurance and regulatory frameworks).

These were further divided by networking breaks.

The conclusion was a Keynote Address by Richard Garriott on his spaceflight experience last fall. His presentation was so compelling that Dr. Loizou bumped out an open forum session that had been planned for the close - without the faintest objection.

Space Adventures and XCOR

Space Adventures' Vice President for Marketing and Sales Tom Shelley reviewed some basics of what his company has accomplished with individual Soyuz flights to orbit; six persons sent to date on seven flights (Simyoni twice) with Guy Laliberté going up this fall. The next flight planned is the dedicated Soyuz mission with two spaceflight participants. The target date for that is now 2013, given the 30-36 month lead time required after a contract is finalized with Russia.

But in my view his most important comments were those emphasizing the need for success by one or more of the private suborbital vehicle firms, to (one hopes) open the market for of tens of thousands or more to experience spaceflight. In parallel, SpaceX, assuming an anchor human flight customer with NASA, could more modestly increase the number of orbital fliers. Shelley made a point of how ludicrously economically impractical were either NASA's Ares 1/Orion or a potential vehicle based on the European Space Agency's (ESA's) supply system for ISS, compared with the SpaceX/Dragon or analogous commercial systems.

Andrew Nelson, COO of XCOR Aerospace, focussed on the technical strengths of his company's methodology, and its accumulation of proofs of mastery of the skills needed for the Lynx suborbital. This included the total of 66 flights with two rocketplanes using restartable engines, demonstrated turnaround times of under ten minutes (much more severe than the Lynx requires), and hundreds of incremental rocket development and reliability tests.

As well as pointing to the targeted systems innovations that had made this possible, he emphasized that "space tourism" is only a fraction of their projected market, for which present flight sales stand at 30. (My thanks to Andrew for later clarifying some data in what follows.) Operations with 'tourists' may start in 2011, though science/technology payloads could be carried before. They estimate the markets that their Lynx (Mark 1 and then Mark 2) _*flights*_ could draw from by 2014 as follows:

-- People ('tourism'), $800 million;

-- Payloads (experiments, technical testing for others, etc.), $1.1 billion;

-- Small satellite launch, $1.4 billion.

Adding to these flight system markets ($3.3 billion), their estimates of opportunities to sell XCOR technology and services, they get a market potentially serviceable by XCOR of $7.5 billion.

The satellite launch mass from Lynx Mark II would be about 11 kg to 400 km from 28 degrees inclination, or 7 kg to the same altitude but at polar inclination. Cost would be under $500,000 and possible with two days notice or less.

Addressing the path to dedicated, two stage reusable orbital systems, he noted that they had much of the technology near if not completely at hand. Jeff Greason and Chief Engineer Dan DeLong have two possible systems in mind, both of them "revolutionary" and "very low cost to operate" (though low cost is of course itself revolutionary). Which design they would choose is as yet undecided, which was Nelson's excuse for illustrating them with a blank slide (we do understand IP). Estimates are that later versions of the orbital (after 2018), might carry 12,000 kg to orbit at a cost of $100/lb.

EADS Astrium and Virgin Galactic

Along with others, I've asserted that with an estimated development cost as much as a factor of ten higher than others,' EADS Astrium's proposal for a suborbital vehicle was a nonstarter. And so it has proven to be, with the company's initial technology testing and design work now confirmed to be 'on the shelf.'

Hughes LaPorte-Weywada, the firm's deputy chief technical officer, recognized that he

was in an unenviable position, saying that he felt a bit like the 'black sheep' of the meeting as the representative of a non - New Space company still trying to prove that it could take on a New Space type project. It was difficult to see that his presentation made any progress on that point, since it recycled good arguments for suborbital capabilities without coming to grips with the economic cul-de-sac on the matter that the company has created for itself (at least for now).

Paralleling Andrew Nelson's remarks about the scope of potential markets for XCOR, the talk by Will Whitehorn of Virgin Galactic was entitled, "It's Not Just About Space Tourism." He emphasized the WK2 as part of an "open architecture," that includes launching payloads to orbit (when using a hybrid motor upper stage, this comes to about 200 kg); doing science both on the aircraft and on SpaceShipTwo (SS2), which can go higher than the nominal 100 km for such purposes; and, further on, initial tests of point-to-point services.

Whitehorn said that Virgin was in communication with over 20 major academic and scientific institutions regarding use of the system. He called it "probable" that there will be a major outside investor in Virgin Galactic within 12 months and noted that Scaled Composites is in the early stages of building the second of the presently planned three WK2s for Virgin. As has been noted elsewhere, he expects the first tests flights of SS2 in combination with the White Knight before the end of the year.

In addition to his remarks about UK space policy touched upon above, he noted that he expected the first flights of WK2/SS2 outside the US to be from the Swedish Kiruna site. He would clearly also like to be able to fly from UK sites such as Lossiemouth in northern Scotland, but that's contingent on those policy changes. As others have, he confronted concerns related to the present world economy by noting that the pioneering air vehicle and service organizations made some of their greatest strides during the Great Depression.

Spaceports - Lossiemouth Speaks, Kiruna Strides (More Literally than You'd Think)

RAF Lossiemouth is a very active air base dating back to 1939 in Moray County in the north of Scotland. Dr Thomas McCallum is the strategic development manager for the support group to create a 'Spaceport Scotland' there, and pitched both the direct and indirect tourism and technical opportunities of the area (<http://www.spaceportscotland.org/index.asp?pageid=127423>). Like Sweden's Kiruna site, one might fly a suborbital through the aurora. Certainly the rugged terrain of northern Britain and beyond would provide a great view (see the map linked on the website). On the ground there are the beach, fishing town and other scenic opportunities.

McCallum noted that the locale has also been a "center of excellence" for tailoring equipment to extreme environments, and noted there are space-related technology firms in the area. While admitting he had an incomplete familiarity with space-related matters, McCallum tried his best to push the Lossiemouth opportunity. **Of course, his whole case turns upon the appearance of a useable UK regulatory framework**.

Spaceport Sweden near the town of Kiruna is making great strides, evident from the presentation by Director of Business development Mattias Abrahamsson. My appreciation to him for providing very helpful added data and clarifications in several conversations after my return - any errors are mine. At least representatives from Sweden were at the conference to represent the Swedish Space Corporation (SSC), the Spaceport, and the Esrange Space Center.

Readers of this publication received some insight into what has permitted the Swedish developments in an item in Vol. 4, No. 2 (February 1st). That was based upon conversations with the then-director of the Spaceport, Olle Norberg, whom I'd met at the ISPCS

meeting in Las Cruces, NM. In London I learned that Norberg has since moved on to being the head of the Swedish National Space Board (SNSB). As Abrahamsson told me, that development by no means removes all possible future obstacles to the Spaceport's realization - but it sure doesn't hurt.

The big advantage that both Abrahamsson and Norberg cited are the precedents provided by the Esrange facility, which for over forty years has been flying sounding rockets and balloons into the aurora. It's also been involved in uplink/downlink activities with various satellites, both during initial flexing of their capabilities and for ongoing tasks such as earth observation.

The suborbital activity is expected to start from the airport at Kiruna. That has a 2.6 km runway and hangar capable of accommodating a 747. The major infrastructure it needs are the fuel and oxidizer handling and storage facilities for SS2. It's located about 20 km from the Esrange Space Center and has abutting airspace.

Organizationally, 'Spaceport Sweden' has recently become a corporate entity with these stockholders (<http://www.ssc.se/?id=9512>):

--The state-owned Swedish Space Corporation. Among many other activities they operate the Space Center at Esrange (<http://www.ssc.se/?id=5070>).

-- The famed 'Ice Hotel,' which is about 12 km from the Kiruna airport. See <http://www.icehotel.com/Winter/> and note that they are promoting the SS2 as a forthcoming part of their offerings.

-- The LFV Group, a state-owned company that operates Kiruna's and other civil aviation airports (<http://www.ssc.se/?id=9659>).

-- Progressium, the regional investment promoter for Kiruna (<http://www.ssc.se/?id=9660>).

Recall also that Spaceport Sweden has a Memorandum Of Understanding - MOU - with Spaceport America to be 'sister spaceports' in development.

Esrange's unmanned sounding rocket activity has allowed the Spaceport people to argue that, at least for third party liability, a controlled human flight vehicle such as WK2/SS2 will of necessity be inherently safer. Back in November of last year they'd queried the SNSB about extending that third party liability framework to conducting human suborbital flight from Kiruna, and didn't received a reply. By May they sent to the Board a note that basically said, "This is the framework we intend to use based on our unmanned flight precedents. Any objections?"

It turned out that their 'proactive' suggestions were welcomed (though there's as yet no final answer). Something similar was driven home to me by the fight for the enabling legislation for the suborbitals in the US: don't assume that an initial lack of response means a negative. Often what is needed is to walk in to meet and educate authorities and politicians with a set of reasonable suggestions, and in turn to have an open attitude to finding a creative solution to meeting their real needs along with your own.

The advances being made in the Spaceport-Esrange region now includes discussions with SpaceX on flying polar orbit flights of Falcon 1 from the area. Earlier orbital launch vehicles would have dropped their first stages into Norway. The Falcon's instead can be dropped into uninhabited regions of Sweden itself (see interview from the RAES meeting at <http://www.flightglobal.com/blogs/hyperbola/2009/06/sweden-considers-spacex-falcon.html>).

The town of Kiruna's unusual circumstances provide an opportunity for adapting

the airport and wider infrastructure to growing Spaceport activity. Until 1890 there had been only a small village there, but then a mine opened to extract iron ore. Gradually, that mine is extending under the town, so there is a plan to relocate much of it over the next 50 years. (It's expected that the airport proper won't need to be moved for perhaps 150 years, so you can stop worrying about that for a bit <grin>).

The upshot of this situation is evidently that the master plan for the area is being continually updated, and "change" is inherent to the town's future. That clearly makes it easier to accommodate the needs of a growing set of Spaceport facilities.

Insurance and Regulations - Will Europe's Stasis be Broken by FAST20XX?

Despite uncertainties about the evolution of regulations, potential tort actions, and related matters once suborbitals start flying in the US, I'm grateful that we have gotten so far as to be able to worry about such 'details' here.

When I reviewed my notes from this section of the conference, I was struck by the fact that both the presentation on insurance (Cedric Wells, Claims Manager, SCOR in Paris) and on ESA's view of private suborbital flight (André Farand, head of the Launchers/Exploration Legal Matters Office) leant upon studies and papers dating back more than a year. In particular, they referenced papers presented at the International Academy of Astronautics Symposium on private human access to space back in May of 2008 (<http://iaaweb.org/content/view/296/435/http://iaaweb.org/content/view/296/435/>).

So I called Conference Chairman John Loizou and bluntly asked if in the broad picture this represented European reality - have the discussions of regulatory and other governing frameworks truly been static over the past year? The answer: Yes.

That's not to say that these presentations were irrelevant. Wells made many points about liability questions and regimes that would be familiar to those of us in the US. I saw it as somewhat bizarre that Farand's presentation included questions about what private suborbitals could do to help publicize ESA programs, but he also asked what entities should be involved in regulation and if ESA could be in a supportive partnership with New Space Efforts. **Their study had concluded that ESA would, "show, 'cautious interest and informed support' for the (sic) space tourism activity."**

As Loizou told me later, there has been continuing uncertainty about who will ultimately regulate. It _*could*_ be the pan-European Aviation Safety Agency, EASA (<http://www.easa.eu.int/ws_prod/g/g_about.php>), but not necessarily. Sweden is so far ahead that it may end up at first depending upon its national laws even for passenger (first party) liability questions. That has a certain appeal to me, and I can envision Swedish real-life experience leading to a realistic passenger waiver-of-liability regulatory framework across Europe, similar to that in the US today. Such a result would certainly be preferable to endless bureaucratic theory being ground out of various EU bodies.

But at the RAES and in further discussion after, Abrahamsson noted that there is a parallel development that could shortly spur movement on pan-European regulation - and also inject experience from the fast - developing situation at Spaceport Sweden.

Some of you may have heard of the EU's Future High-Altitude High-Speed Transport ('FAST 20XX') project (see, e.g.,<http://www.flightglobal.com/articles/2009/01/28/321749/europe-aims-for-2015-spaceshiptwo-competitor.html>. This is a modestly funded program whose most publicized

parts are studies of hypersonic propulsion for 'antipodal' transport vehicles - perhaps operating by the year 2075 - and of suborbital systems, with the less daunting possible date of 2015.

What's not as well known is that there is a _*third*_ work package to the project. That one is to cover other prerequisites for such vehicles, not only safety and ground handling but regulatory frameworks. This is also the only part of the package where the Swedish Space Corporation is involved.

Let's hope that this results in timely and realistic results, though I'm always cautious about trying to make a dish - particularly the first time - with too many cooks. In this case the 'cooks' are many countries and distinct agencies, each tossing in its own agenda(s).

After the European presenters of this section of the conference, Loizou introduced Dr. George Nield, head of FAA/AST (Office of Commercial Space Transportation) to speak on the state of US regulatory frameworks. Loizou said how much everyone had been looking forward to this presentation, pretty clearly framing it as an exciting view of regulatory, technical and economic progress actually moving in some concert.

I won't say that I heard sighs of longing from the audience, but there was certainly a stark contrast between Dr. Nield's presentation of how far we've come in the US vs. the still unanswered broad questions in Europe. He emphasized that the role of AST in the new industry was to both regulate _*and*_ promote (this may have been when I imagined those sighs). Yet he also stated that the next few years are going to be critical for the industry's future, and that while his organization sees New Space as a good thing, it goes into this new venture realistically, with eyes open. Fortunately, that also applies to the vast part of the new industry itself.

During "Q&A" for this section, the European contingent said that they saw the regulatory situation there as, "much more complex and involved [than in the US]," adding that they didn't see a great deal of pressure for a resolution of it. Nield made it clear to an audience member who asked about formally harmonizing US and European regulations that that wasn't in the cards. (To a US observer such as myself, asking for such formal, detailed agreements up front means asking to export the European complications to the US.) But he emphasized that the AST was more than willing to talk to foreign agencies about having _*compatible*_ rules and about the US model. In this he cited meetings that had begun with the UK, Japan and others.

A 'Concorde Effect' and Private Spaceflight in the UK?

A cautionary note arose in a conversation with Dr. Loizou after I'd returned home.

I'd been remarking that I hoped that advocates of private space in the UK would do the legwork to push the politicians to pass enabling legislation for private suborbital spaceflight. Loizou commented that there might be a particular problem with that in Britain arising from the history of the supersonic Concorde jet program, which people have framed as the costly creation and maintenance of a service only for the wealthy. The enabling of the suborbital systems, he indicated, would likely be seen as an analogous act and thus not worth any political risk. **This evidently would be so even without any substantive public moneys being involved; the perception, he opined, could be of subsidizing a "fairground ride" for those wealthy enough to pony up $100-200,000 for it.**

As Loizou put it, in the UK, politicians would have to be convinced that _*allowing*_ the suborbitals would bring a sufficiently general benefit. At that point I was thinking that in the US, the question had instead been whether allowing them to operate would _*bring any harm*_.

But of course, the question about who benefits from sub(orbital) private flights is legitimate on this side of the Atlantic as well, though perhaps with some different emphases. For this infant industry, the climate for the US companies is aided if they are not misperceived as _*exclusively*_ there to benefit the wealthy, as much being seen as highly safety conscious for both passengers and uninvolved persons. Also, the wider and deeper the potential pool of markets for the vehicles, the more more attractive they can be to investors. Then there are the instances such as that of Spaceport America, where for hope of ground-level job multiplication people have decided to increase their own taxes.

In the US there has indeed been an increasing emphasis on alternatives to the space tourism (or, as preferred, spaceflight participant) markets. As can be seen from the potential market breakdown in an earlier section, and as chronicled in the pages of this Report for some time, there is a growing possibility that these other markets may even dominate, at least until seat prices are driven down significantly by flight rates.

Apropos to the UK scene, Britain's 'Times Online' of July 9th reported a compliant by the Tory 'Shadow' Science Minister. Evidently a four year old, unpublished government-commissioned report, "urged the British National Space Centre to 'establish precise responsibility for sub-orbital manned flight with the Civil Aviation Authority,' and to review licensing procedures and insurance requirements," (<http://timesonline.typepad.com/science/2009/07/space-tourism-tories-accuse-government-of-dropping-the-ball.html#more>). The Times item made extensive reference to a BBC report on Whitehorn's comments at the RAES meeting (<http://news.bbc.co.uk/2/hi/science/nature/8126934.stm>).

Overviews and Opportunities from Richard Garriott's Visit to the ISS

Richard Garriott provided a rousing and appropriate conclusion to the conference with the story of a journey with a high point (to date) of his flight to the International Space Station (ISS). Garriott was born in the UK but grew up in the US, surrounded by neighbors who were astronauts and those who helped them to fly. His father, Owen, flew on NASA's Skylab station in the early seventies and on Spacelab 1 ten years later.

In such an environment, he'd thought of going into space as something quite natural, so when a NASA doctor gently told him that his poor eyesight would disqualify him, he decided to do something about it: build his _*own*_ space program instead. This became a long road, along which he became a famed and wealthy entrepreneur in role-playing games (RPG's). He ruefully noted that he'd made perhaps 30 years of investments in spaceflight ideas, learning along the way that astronauts' skills rarely extended to this sort of entrepreneurship.

A key turning point was when he met Peter Diamandis, several of whose projects he's helped support, and Eric Anderson of Space Adventures, of which Garriott became the largest shareholder (<http://www.richardinspace.com/index.cfm?fuseaction=About_Richard.welcome>). His original hope to become the first private space traveler was derailed by the dot-com bubble's collapse, leaving that laurel for Denis Tito.

Garriott's discussion about the medical and other training for his flight was by turns hair-raising and hilarious. Here's one recommendation: Don't dine at a Russian Air Force base if you're looking for variety in cuisine.

Nonetheless, he was full of praise for the "Russian way to space" and said he'd been disappointed that there was still a certain feeling of superiority among the professional American

astronaut contingent in Russia. He found it a bit disconcerting but also remarkable that 48 hours before his flight the booster rocket was still divided into large parts in the assembly hall; yet a day later it was fully assembled. Working in that clockwork-like fashion on an even faster schedule is essential to sufficient utilization of reusable vehicles being developed by firms such as XCOR and Virgin Galactic.

As the Soyuz's non-specialist, he had to be able to operate all basic spacecraft systems. That included being the person who turned the vehicle "on" at the pad. He had huge praise for it. Later, at the reception, I mentioned to him that some thought of Soyuz as the rugged "Kalishnikov of spacecraft," but he noted that the vehicles are built in pairs and that with each new pair some improvements are made. The real point is that the Russians don't replace a system that works *_well and reliably enough_* for its task. He cited some valves that would likely have been replaced by something lighter by US space engineers. But since they work well enough and the payload gain from changing them would be minimal, they stay in the Soyuz.

Garriott had set himself a busy schedule on the ISS. Some tasks were humorous, some educational (he praised the help of the British National Space Center) some profitable, and others both sobering and inspirational. One thing he got paid to do was grow protein crystals in zero-g. I've mentioned the market that Astrotech/Astrogenetix sees in this, and Garriott noted that with the lack of convection such crystals can be grown stably and large enough to get much smaller resolution of the atomic bond structure when they're back on the ground.

Several of his tasks were intentional updates of what his father had done on Skylab. One of those was photographing the same sites on the ground 35 years later. For such photography 'Garriott the Younger' had developed software to predict site flyover times. This was so superior to the imprecise directions given to the 'pros' onboard that they ended up swiping it for their own analogous tasks.

Seeing Earth from space firsthand, Garriott said, one knows in one's gut the true finiteness of our planet, adding that *_everyone_* should have that experience. He spoke of almost being able to 'see' the crash of continents at fault lines and of observing the huge amounts of soil washed into the sea at river basins. The smoke from fires in the Amazon are as pervasive as they were decades ago. Yet, looking downward is also an intimate experience. One can see the Golden Gate bridge, and that the atmosphere remains but a thin skin preserving all life on the planet.

Such words expressed that perceptual shift known as the Overview Effect. In reply to my query during the Q&A section, he said he'd heard of it, but not of the 'Overview Institute' (<http://www.overviewinstitute.org/index.htm>). Previously, I've written about that and the 'Starport Cafe' proposal for using special techniques to transmute a measure of that space experience into something that people can taste on Earth (<http://www.starportcafe.com/index-enter.htm>). See, e.g. "Impetus For and Fallout From a New Space Business: The 'StarPort Cafe'" in Vol. 4, No. 2.

But it's important to state that the 'Overview' does *_not_* imply a 'limits-to-growth' approach to human prospects. Garriott, for one, is an ardent conservationist, but believes that the right and desire of former third world nations to achieve first world living standards cannot be denied. Reaching that may have to depend upon fossil fuels for a while, but Garriott foresees Solar Power Satellites (SPS) as a key to providing enough clean energy for sustainable high living standards worldwide. The example he cited was to use that power to create enough usable water by desalinization.

So, ultimately, creating the high reliability, low cost access capabilities essential for 'space tourism' and other near-term New Space markets can also be a step to unlocking the

resources required for humanity to be sustained and to prosper - on Earth and beyond.

Yours very truly,

Charles A. Lurio, Ph.D.

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