

The Lurio Report

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

Pivotal Times and Progress at the ISPCS, Spaceport America, and Beyond

Vol. 5, No. 18, November 10, 2010

=====

Winner of the 2009 Space Frontier Foundation Award for NewSpace Journalism!

“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

“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:

CCDev 2 Announcements

Solicitation and Funding

Requirements Note

Virgin Galactic's Entry

New Reference for CCDev 1 Results

Falcon 9/Dragon Flight

Progressing, With Care

UPDATED (November 8) on Launch Date and Influencing Factors

Uniform Budget Cuts Threatening New Initiatives

A Frustrating Situation...

... But a Baseline Perspective

Bob Richards Joins “Moon Express,” a NASA ILDD Winner

From Scaled Composites

Second SpaceShipTwo (SS2) Free Flight

Burt Rutan To Retire

Dear Acquaintances,

- ISPCS/Spaceport Runway Dedication: Selected Topics -

This Issue of the Report
The ISPCS at a Pivotal Hour
Bigelow's "Coming Out" Event, MOUs and Perspectives
Space Processing - What's New About It?
Spaceport America Dedication

© Copyright 2010, Charles A. Lurio. All rights reserved. Quotations with proper citation are welcomed and encouraged.

Quick Updates:

CCDev 2 Announcements:

Solicitation and Funding - As anticipated in my previous issue, on Monday, October 25, NASA released a "CCDev 2" solicitation for competitive proposals (<http://www.nasa.gov/home/hqnews/2010/oct/HQ_10-277_CCDev.html>). In the cover memo, this program is explicitly stated to be for the prospective award of Space Act Agreements (SAAs), "... for the continuation of NASA's Commercial Crew Development (CCDev) initiatives [previously] begun." Proposals are due at 1:30pm CST, December 13 and the "Pre-proposal Conference" by telecon and web took place on October 29. Projects under this "Round 2" of CCDev are to be concluded no later than May 2012.

As I gleaned at the International Symposium for Personal and Commercial Spaceflight, ISPCS, making the program an extension of "CCDev 1" allows work to proceed under the condition of a "Continuing Resolution" with the NASA budget overall held to FY 2010 levels. Of course, one hopes that an Appropriation for 2011 *not below* those levels will appear before the targeted award date in March 2011.

Congruent with what sources told me earlier given no Appropriations finality to date, the anticipated funding in the solicitation is stated as, "*approximately* \$200 million in fiscal year 2011..." [my emphasis]. I wondered a bit at the political wisdom of "setting the bar lower" than the \$312 million maximum for commercial crew in Authorization at this crucial moment before Appropriations. But I later recalled that the Senate Appropriations panel with charge of NASA had already sent to the floor a bill (S.3636) which provided a maximum of \$250 million for commercial crew (<<http://thomas.loc.gov/cgi-bin/bdquery/z?d111:SN03636:@@L&summ2=m&>>>).

Moreover, with the huge political wave for deficit-cutting after the fall election, the "approximately \$200 million" may be the *best* that we can hope for - after applying a great effort and with considerable uncertainty even then. The change in control of the House is emboldening those there who have wanted to cut commercial crew to virtually zero funding, and/or to entangle it in a maze of rules that would effectively kill it anyway.

Requirements Note - At least one point in the Announcement underscores that CCDev 2 aims at starting to focus more closely on moving to operational transport systems: the provision that work on maturing subsystems and components, "...will be considered if shown to accelerate the availability of an identified element of a CTS [Crew Transport System] concept... *Proposals to work on stand-alone lower level subsystems or components would not meet the goals of this Announcement,*" [all emphases mine].

What then of options for companies such as Paragon Space Development, which won a CCDev 1 award for an air revitalization system tailored to a 'generic' commercial crew transport vehicle (e.g., <<http://www.paragonsdc.com/docs/SpacePioneersHome.pdf>>)? Presumably they could participate in CCDev 2 as partners with those proposing entire crew transport systems.

Virgin Galactic's Entry - It was virtually stated at the Spaceport America Runway dedication on October 22, and later confirmed, that Virgin Galactic will be among those making a CCDev 2 bid for commercial crew transport to orbit (<http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=space&id=news/asd/2010/10/26/02.xml&headline=Virgin%20Galactic%20Eyes%20NASA%20Commercial%20Crew%20Program>).

In that reference Branson states:

"There's about four companies that are seriously looking at [CCDev Phase 2]...Two of those companies we're in discussions with about teaming up with. ... Over the next month, we're going to make a decision as to whether to team up with one of those two companies or go it alone, but we plan to be in orbital travel within the next few years."

Looking back at my files, I believe I may have a fair idea of the general direction of such a proposal. Back around 2005, Scaled Composites was among the "Transformational Space Corporation ("t/Space") partners. They proposed a system using a two-stage, air-dropped booster capable of carrying a capsule with 4-6 crew to orbit for a then-estimated price of \$20 million flight. (At a later date I walked through the stored mock-up of the proposed capsule.)

But we'll have to see what emerges.

New Reference for CCDev 1 Results - The Commercial Spaceflight Federation put together a press release (November 8) on progress by the CCDev 1 companies, see <<http://www.commercialspaceflight.org/?p=1373>>.

Falcon 9/Dragon Flight:

Progressing, With Care - On October 23, SpaceX announced that their target date for launch of the second Falcon 9 with the first active Dragon capsule had moved to November 18, with backup dates extending through the 20th. **They underscored in an October 26 article that they will fly when they feel ready, even if that requires more delays** (<<http://www.spaceflightnow.com/falcon9/002/101026launchdate/>>). By November 3 the earliest flight date had moved to the 20th, "in order to conduct additional tests of the space capsule," (<http://www.spacenews.com/venture_space/111005-spacex-awaiting-faa-approval-license.html>).

As I've said before, while these are early days for the Falcon's flight history *_any_* flight anomalies would instantly be seized upon as a blunt instrument by opponents of commercial crew programs in particular and of NASA's use and encouragement of commercial opportunities in general. So there's hardly any *_less_* pressure on SpaceX for this more complex Falcon 9/Dragon flight than for the first Falcon 9's. A comment quoted in one of the articles above states, "We would like to do more integrated system testing including another in-depth round of hardware in the loop mission simulations to see if we can uncover any corner case problems [i.e., ones under less than obvious possible flight, equipment and software conditions and combinations thereof - C.L.], ... **So far, it looks good, but we want to triple check.**" [Emphasis mine.]

That item also points out that this is the first time that SpaceX will be working at Launch Complex 40 with the highly toxic hydrazine and nitrogen tetroxide propellants required by the Dragon's maneuvering thrusters. (My understanding was that they were planning for a single Dragon orbit before its reentry, but evidently there could be as many as three.)

The Falcon 9/Dragon will be rolled out to the pad and erected for a short main engine test several days before the flight. A "wet dress rehearsal," including everything *_up to_* main engine ignition, took place at the pad on September 15.

UPDATED (November 8) on Launch Date and Influencing Factors - A tweet by Michael J. Laine from "SpaceVision 2010" on November 5th quoted SpaceX President Gwynne Shotwell indicating that Shuttle launch date uncertainty was a wild card in scheduling the Falcon 9 (my thanks to Clark Lindsey's posting at spacetransportnews.com).

SpaceX spokeswoman Kirstin Brost later told me a bit more about that, noting that they use "Shuttle assets" for possible first-stage recovery and that the Shuttle keeps those systems

occupied for a time both before and after any given projected launch date. She also underlined their desire to use extra time to make sure that the Dragon is as ready as possible, stating that, “There is more testing that would yield a meaningful improvement in [probability of] mission success.”

Finally, in a general message to the press on November 8 Brost said, “SpaceX is targeting December 7th for the first-ever flight of our Dragon spacecraft, with the 8th and 9th as backup dates. We are submitting our request to the Air Force today.” Later that day she sent me the note that, “...we are targeting December 3rd for [the static fire test at the pad.]”

Uniform Budget Cuts Threatening New Initiatives:

A Frustrating Situation... - We appear to be facing a tidal wave of momentum for across-the-board federal budget cutbacks in ‘discretionary’ spending.

Even before the election, items noted that the incoming Congress might cut NASA FY 2011 spending to 2008 levels (\$17.3 billion) rather than raise it to the \$19 billion assumed in the Authorization compromise, <<http://www.orlandosentinel.com/news/space/os-nasa-budget-woes-20101030,0,7466533.story>>. That article expressed concern about cancelation of the extra shuttle flight added by the Authorization, noting also that the new technology efforts are among the candidates for elimination. **Rumors are that the federal Deficit Commission report will recommend a NASA budget cut down to \$15 billion - a 21% reduction** (<<http://www.fiscalcommission.gov/>>).

As said at the ISPCS Conference, deficits are the enemies of *_all_* possible future paths for NASA, and I agree, but would ask: **Guess what gets cut if push comes to shove - pork with vote-getting precedence such as the Orion capsule and a near-term, too-heavy lifter, or technology investment and a commercial crew program likely essential to Bigelow Aerospace’s future and to similar commercial expansion in the nearer-term?** In a rational policy world, even at lower budget levels NASA programs could be wholly restructured to follow efficient paths and help create a vigorous future in private and public space endeavors. But that world is precisely the opposite to the toxic brew of decades-old misperceptions and pork interests that rule the Hill.

Added to general budget pressures, as I allude to below (in “Bigelow’s ‘Coming Out’ Event, MOUs and Perspectives”), while we may have dodged one bullet (with Mr. Shelby *_not_* becoming the head of the Senate subcommittee with NASA appropriations oversight), we may now be in the path of another projectile with Representative Wolf (R-Va) taking up the corresponding House position (<<http://www.space.com/news/election-obama-critics-nasa-committee-101103.html> >).

In a world where Republicans thought beyond zombified mythologies about NASA spaceflight as an element of national security, they would be the first ones *_pushing for_* the very modest commercialization investments needed rather than against them, and would be eager to slice through rather than tighten any ‘Gordian’ rules entangling commercialization. But as Rand Simberg pointed out on November 5, it’s best not to place any bets on such hopes (<<http://pajamasmedia.com/blog/with-nasa-budget-time-for-republicans-to-be-republicans/?singlepage=true>>).

They and many of their Democratic colleagues on the Hill would rather feed a frontier-opening policy - encouraging such sensible and farsighted ventures as Mr. Bigelow’s - to the zombies.

... But a Baseline Perspective - I’ve recently been reminded of my long-time fallback position: That in the end, as long as the government doesn’t create overbearing rules hampering the New Space private sector, any cash from the public sector should be seen as a bonus - *_assuming_* that that doesn’t bring along such rules also. I still hold that view.

Yet it remains painful to see the new ideas and opportunities that emerged from the Augustine panel gradually be eroded away, perhaps to the point that their work is wholly ignored. *Your* communications to Congress this fall and beyond may be the only thread of hope for preventing that fate.

Bob Richards Joins “Moon Express,” a NASA ILDD Winner: On October 26 “Moon Express Inc.” announced its official entry into the Google Lunar X-Prize, GLXP (<[http://www.moonexpress.com/index.php?option=com_k2&view=item&id=3:moon-express-enters-the-\\$30-million-google-lunar-x-prize-competition&Itemid=162](http://www.moonexpress.com/index.php?option=com_k2&view=item&id=3:moon-express-enters-the-$30-million-google-lunar-x-prize-competition&Itemid=162)>). Following up the item in Vol. 5, No. 17, Bob Richards, formerly with “Odyssey Moon,” is now Team Leader with Moon Express.

As I anticipated, NASA announced its initial “Innovative Lunar Demonstrations Data,” (ILDD) awards late on the date of that Report issue (October 15). Moon Express was one of the six GLXP entrants (or entrant team partners) to win, <http://www.nasa.gov/home/hqnews/2010/oct/HQ_10-259_ILDD_Award.html>.

The company is shortly to announce a press conference about its efforts.

From Scaled Composites:

Second SpaceShipTwo (SS2) Free Flight - SS2 performed its second glide flight test after release from its WhiteKnightTwo (WK2) carrier aircraft on October 28 (<http://www.scaled.com/projects/whiteknightrightwo_spaceshiptwo_test_summaries>). As indicated in that Scaled summary, the ‘flight envelope’ was expanded compared to the first such test on the 10th. I also note that this combined vehicle log has separate entries for the flights to and from Spaceport America on the 22nd, the former listed as, “First SS2 cross country flight.”

The SS2 pilot for its second free flight is listed as, “Stucky,” and in my photo of him from the New Mexico event his name badge reads, “Mark ‘Forger’ Stucky.” Co-pilot of WK2 on the 28th is listed as “Nichols” - his first name is “Clint” from my photo at Spaceport America. Nichols also wore a patch labeled “Scaled Flight Test” with the motto, “Interrogo Haud Defenso.”

Using a web translator, an interpretation of the Latin might be, “Examine, don’t avoid,” which sounds like a good philosophy for testing, testing... and testing again.

Burt Rutan To Retire - On November 3, Scaled Composites announced that company founder Burt Rutan is to retire in April of next year (<http://www.scaled.com/images/uploads/news/Burt_Rutan_Announces_Retirement_Plans_03Nov10.pdf>). As referenced by Clark Lindsey of spacetransportnews.com, reports are that Rutan is selling his home in Mojave and moving to Idaho.

It’s almost impossible to say enough about how Rutan’s creative genius has brought great accomplishment and new horizons to aviation - and more recently, spaceflight, with SpaceShips One and Two. I recall when his innovative “VariEze” and “LongEze” designs shook up the home-built aircraft world in the ‘70’s. He made history with the designs of the “Voyager,” which was the first airplane to perform an unrefueled circumnavigation of Earth, and the “Virgin Atlantic GlobalFlyer,” which later did it with one pilot and in a third of the time.

I hope that he can still aid future advances, but for now I say:

“Ave atque vale, Burt.”

Dear Acquaintances,

- ISPCS/Spaceport Runway Dedication: Selected Topics -

This Issue of the Report

There was a great deal of data, discussion and news from the ISPCS (International Symposium for Personal and Commercial Spaceflight) and the Spaceport America Runway Dedication. I selected a few items for detailed focus in this issue as emblematic topics and am holding others for possible later review. That's not to say that the latter are necessarily less important, but some prioritization is required.

The ISPCS at a Pivotal Hour

I'd not attended an ISPCS since 2007, and can't speak for what transpired at the intervening meetings, but this was perhaps the most exciting and invigorating space-related conference I've attended in years.

Why?

Because it was attended to bursting by a large cross-section of the space community? - A big part. Because there were many opportunities for networking from beginning to end? - Of great importance. Because Pat Hynes and her associates in Las Cruces have the ability to devise forums that illuminate issues and developments? - Huge.

But as Dr. Hynes and others commented throughout the meeting, in numerous areas we stand at a tipping point for a possible new era of opportunity in space. That was, on the one hand, symbolized by the anticipated Spaceport dedication and on the other by the murky mix of great hopes and uncertainties about Washington's future actions. Such factors supercharged the atmosphere in New Mexico this year.

Or: In the language of the October 15 issue of this Report, the "enriching fires" of space development were evident. Whether their potency will be realized or retarded is at a crucial moment.

Bigelow's "Coming Out" Event, MOUs and Perspectives

A great highlight of the ISPCS was the appearance of Bob Bigelow and several of his employees in what he called their "[corporate] coming out," which also included a large and elaborate display in the exhibit area. Posters illustrated concepts for using combinations of the expandable modules under development or consideration in several applications, and some of these were also shown as models. Beautifully detailed cross-sections of individual modules were also displayed. I was told that all models had been created in-house using 3D printers.

The fate of Bigelow Aerospace's plans may depend crucially on results of efforts to get enough funding for the CCDev 2 program and a formally titled 'commercial crew' effort beyond that. SpaceX, for one, has spoken of needing several more years to develop a crewed Dragon capsule should money from a 'commercial crew' program not be available. Critically, as a Bigelow representative underlined, without that initial government development support a firm making crew vehicles would have to charge significantly higher transport prices for some time. In turn, it would then be (at best) questionable whether Bigelow's charges for using his modules could be at marketable levels.

Recall Bigelow's recent comments that once the first two stations were established (perhaps by 2017) he would need the equivalent to the capabilities of 24 Atlas V/Delta IV flights a year for crew and cargo transport. That's after about seven flights of varied payload requirements to establish the first station, and ten to set up the second.

He added during a panel that he's also "kept awake at night" by whether sufficient and sufficiently flexible launch facilities will be available. What he doesn't want are ones operating under NASA or DoD - type oversight constraints, but those of the FAA commercial spaceflight office (FAA/AST). He cited the Soyuz as the safety standard needed for commercial crew transport. As discussed here many times, private sector human spaceflight would be utterly impractical under heavy-handed, very costly oversight in classic NASA style. Such constraints - embedded by the Cold-War era Apollo 'show' and bureaucratic inertia - promise more safety than they can deliver. Vehicles that are practical and affordable to fly and test are in the end the *only* way to really learn how to improve safety and further lower cost.

In accord with what I've heard from others, Bigelow came across as unassuming and approachable. He's well aware of the political obstacles that a commercial crew program faces in Washington, and one purpose of his recent visit to the United Launch Alliance (ULA) plant in Decatur, Alabama (where they manufacture Atlas V/Delta IV boosters) was indeed to try and convey the *new* opportunities for jobs and economic expansion to a 'traditional' space community. Perhaps along the same lines, by October 28 there was a story that SpaceX has now opened an office in Huntsville, not all that far from Decatur and the home of the Marshall Space Flight Center, MSFC, (<http://blog.al.com/space-news/2010/10/spacex_opens_office_in_huntsvi.html>).

I note that Senator Shelby of Alabama (the ranking Republican of the subcommittee with NASA appropriations oversight) has unfortunately been a determined advocate of keeping pork dollars pouring into MSFC for the usual high overhead, too costly rocket projects and a determined opponent of a commercial crew effort and other new proposals that might divert dollars from those habitual channels. While the Republicans did not take the Senate this fall, in the House, Representative Wolf (R-Va) is now slated to become head of the corresponding appropriations panel, and his record on 'commercial crew' is not at all good (<<http://www.spacenews.com/policy/101103-election-brings-new-leadership-nasa-oversight-committees.html>>). **Perhaps Wolf is unaware that Orbital Sciences (for one) could end up launching payloads and crew to orbit from Virginia's Wallops Island** (<<http://www.marsspaceport.com>>).

Bigelow's interest in spaceflight existed long before he made his millions. Though he views what he's doing as merely extending to space the "general contracting in all areas of real estate," that he's performed so well on Earth, many at the meeting clearly had their eyes opened by the idea of transferring these and related common-sense business skills directly to the development and operation of orbital facilities. He spoke of providing the services and equipment that experimenters and others would want, and of packaging them in financial options that make them a good opportunity for the broadest possible base of businesses and sovereign clients. Just as an earthbound company might seek a location with a favorable legal anchor, he commented that his stations may end up as LLCs headquartered in states such as Maryland or Delaware.

I find that it's still all too easy for 'space geeks' even from the newer companies to get so entranced by the glamor that - at least outside their own slice of work - they still don't think about something like space stations in terms of 'ho-hum' business principles. But such

principles don't change their validity with a facility's velocity vector and position in the gravity well of the Earth, Moon, or beyond.

Some of Bigelow's thinking was noted in articles that appeared the week of the conference. Longtime space writer Leonard David revealed the names of the countries with whom the company has signed Memoranda of Understanding (MOUs) - hinted at previously - for possible use of Bigelow stations (<http://www.space.com/business/technology/private-space-station-first-clients-101019.html>). **These are the governments of Japan, the Netherlands, Singapore, Sweden, Australia and the UK.**

As Bigelow states in that reference, "These are countries that do not want to be hostage to just what the International Space Station may or may not deliver." Depending upon how the transportation situation evolves, he hopes that they will be among those able to make deposits by 2012 (http://www.spacenews.com/venture_space/101022-bigelow-modules-interest-six-governments.html). He noted that about 80% of the astronauts on the International Space Station (ISS) are allocated to the US and Russia, "So 20 percent, roughly, isn't a lot left for the rest of the world."

Bigelow has been revising leasing and pricing options so that smaller governments and organizations can participate. In the later reference he comments that, "I cut it down to one-year leases, six-month leases, three-[month] leases, so people can get their feet wet and decide, 'Is this for me?' before they commit more money."

A new leasing guide is scheduled for mid-November release, and at the Conference Bigelow said that it will include 18 leasing options. Customers can escape any new cost or interest-added charges with payments fixed but spread out over time.

As Bigelow stated on the first day of the ISPCS, "We do have Lunar ambitions," and the company displays included modules combined with propulsion systems and other components, not only for lunar bases or resupply/transport there, but for a Mars transfer/orbiting base system. Just as for Earth orbit, he foresees "aggregating clients" for establishing a Lunar base and beyond.

Later, listening to someone from Lockheed-Martin attempt to defend funding of the over-heavy, over-capable and over-costly all-up Orion capsule for transportation to orbit and for flight beyond, I scribbled in my notes this: "*Blah, blah, your program's only eating commercial crew money right now.*" Bigelow was on the same panel ("Crew Transportation Systems: The Game Changer in Human Spaceflight"), and in parallel if a bit more diplomatic terms said that *this* Orion was redundant for deep-space missions - use his roomy modules or the like for living space - while for Earth to orbit and back one should just use simple space taxis.

Of course, one must note that even within the Earth-Moon system, using exclusively space-based modules for space transport requires establishing fueling depots and perhaps using large-diameter aerobrakes as an interim or permanent tool. **But so what? That path would create the most affordable, extendable, and expandable (in *activity levels* here - no pun on the Bigelow modules) systems for exploration and commerce.**

By far the loudest expression of Bigelow's ambitions during the Conference came with the repeated demonstration firing of a 5 lb thrust gaseous oxygen/hydrogen maneuvering rocket for the Forward Propulsion System (FPS) of his "Sundancer" module. The propellants can be derived from water, sweat or urine in the module's environmental control system. It was

developed by Tim Pickens and his team at Orion Propulsion, which delivered two “shipsets” of thrusters around the time Orion was acquired by Dynetics in 2009 (<<http://www.dynetics.com/descriptionpage.php?id=AerospaceSundancer&from=space>>). Pickens told me in early November that they’re ready to provide more of these or other variants that they’re experimenting with as soon as Bigelow needs them.

But as Pickens said, what holds up such opportunities is what holds up Bigelow’s station deployment: lack of transport to orbit for station users.

Space Processing - What’s New About It?

I’ve characterized the elements required to bring about reliable, low cost space access and activity as, “pushing with fundamental technologies, pulling with initial demand,” (e.g. in Vol. 5, No. 3, March 8). Bigelow’s efforts along with the hope for a ‘commercial crew’ program are among the examples of such “pushing.” The Thursday, October 21 panel on “The Microgravity Market” showed that we are just starting to explore that sector’s potential for providing “demand pull.”

Panel chairman Dennis Stone of NASA aptly put it when he noted that many people say of microgravity’s utility, “been there, tried that, what’s changed?” Indeed, until recent years my own attitude towards it had been molded by a perception of the faded (and over-advertised) promise of early experiments. But it appears that those tests were not broad, nor deep, nor frequent enough to reveal the new levels of opportunity.

Stone’s own response to the question was that in parallel with new avenues for regular, repeated scientific and engineering tests in microgravity - using fast turn-around suborbitals, or in orbit on ISS, “Dragonlab” and other systems - there is increasing demand for using these environments to unmask biological and physical processes.

The most dramatic and enthusiastic expression of such new potentials was provided by Professor Cheryl Nickerson of the Biodesign Institute at Arizona State University, whose work includes significant collaboration with scientists at the Johnson Space Center (JSC). I appreciate her assistance in trying to clarify this work to a non-specialist such as myself given our respective time constraints, and I take responsibility for any errors that may remain in what follows.

Professor Nickerson’s “headline” statement was that there are many important biological responses in microgravity that *cannot be mimicked on the ground*. These can provide insights into factors in human and microbial cells that are pivotal to the transition from a normal to a diseased state; preventative vaccines and therapeutic treatments for infectious diseases could then follow.

This is entirely consistent with biological research precedents on the ground, where the use of extreme environments (e.g., in pH level or temperature) is part of the “toolkit” that has unmasked mechanisms that have led to major advances in human health. So, too, gravity can hide the nature of certain pathogen behaviors and cellular responses to them.

There is a massive yearly worldwide toll in health and mortality from new and emerging infectious disease, including that from pathogens that have developed robust resistance to antibiotic agents. But as Nickerson underscored, it now typically takes over a decade and some

\$1 billion to bring a new drug to market. So insights that can speed this process have literal life-or-death importance.

Nickerson cited five separate experiments that her group has performed on the Shuttle or ISS using a variety of (the notorious food-borne) salmonella and other infectious agents. Results show how spaceflight uniquely alters pathogens' gene expression, resistance to environmental stress factors and virulence in attacking cells. Regarding the last, published material to date references mice infected on Earth with salmonella that was grown in microgravity. The animals were less able to produce an effective immune response and thus died more quickly at lower doses compared with those exposed to Earth-grown salmonella.

(Recently, tests were done on human cells infected with salmonella *_on orbit_*, but that data is still being evaluated.)

Another interesting result has been the identification of a regulatory protein that is a "master switch" for gene expression in zero-g across several different pathogens. Once identified, such regulatory proteins can then be targeted for new vaccine development. Yet another discovery was that while spaceflight enhanced the virulence of salmonella, that was counteracted by modulating ion levels in growth media. **Thus, therapeutic techniques as well as preventative vaccines may be derivable from such experiments.**

In sum, infectious disease research to date is a powerful example of microgravity work revealing unique, important and literally unpredictable results, something that we cannot now help but expect across a range of other fields as well.

Spaceport America Dedication

Talk about a 'Field of Dreams'...

The Mojave Air and Spaceport may be the pulsing heart of much vehicle research and development for many years to come, but Spaceport America is a wholly new entity, an assertion of the new space dreams of recent years made vast and tangible. It's set in a stark wilderness, one so arid that the traverse of it was labeled by the Spanish the "Journey of Death." The sun seems to reflect off the Terminal Hangar Facility's (THF's) apron, the taxiway, and the 42 inch thick, 10,000 ft long runway with a fierceness hardly less than its direct rays. The THF springs up dramatically from a slope of earth that will be integral to its temperature regulation, appearing like a huge, elegant new species of bird being birthed from the soil.

Virgin Galactic put on its usual deft and dramatic show at the runway dedication on Friday, October 22nd. Richard Branson's jet flew in from Las Cruces, doing a near-acrobatic performance at the hands of pilot and former company COO Alex Tai before landing.

You might somehow have gotten the idea that I'm usually a cynic when it comes to politics (!). But given departing Gov. Bill Richardson's centrality to pushing for the Spaceport, I found no flaw with the announcement that the New Mexico Spaceport Authority (NMSA) had voted to designate the runway the "Governor Bill Richardson Spaceway."

Speaking at the event, Richardson expressed hope that in a decade there would be many launches each day from the facility, citing that analogy that I'm so fond of between the new space potentials and the explosive growth of the personal computer industry. Among the flights

he foresees are orbital launches - for an inland spaceport that's contingent upon fully reusable craft (RLVs) - and point-to-point transport that could reach their "sister spaceport," Spaceport Sweden. (The orbital task is actually likely to be more easily achieved than the latter.)

Of course many people have been part of the great progress to date, starting with Richard Branson and Virgin's dedication to working with the state and to developing the WhiteKnightTwo/SpaceShipTwo (WK2/SS2). Area residents stepped up to the plate by providing backing to bond issues at a difficult time for the economy; local ranchers and community leaders worked with the NMSA; and the state legislature provided essential Liability Protection legislation (Vol. 5, No. 4, March 22). First and current NMSA head Rick Homans and previous Authority leader Steve Landeene have tackled the many tasks needed to move from parched ground to operating Spaceport. Then there are the contractors and workforce continuing to finish the THF and the other necessary installations and services that will be either up front or invisible to future visitors.

The WK2/SS2 made repeated fly-arounds and dramatic flyovers of the THF, 'chased' by first commercial astronaut Mike Melville (SpaceShipOne, 2004) in his home-built, Rutan designed aircraft. Branson teased the crowd about encouraging the WK2/SS2 to land ... which of course it finally did, rolling to a perch at the end of the taxiway.

I managed to pick up a few (*possibly* exclusive) items about the combined vehicles' roundtrip flight from Mojave:

-- Operational personnel only got the final word that the landing was a "go" about 48 hours before the flight;

-- The White Knight's wheels were locked down during the roundtrip, a continued caution until complete resolution of the recent landing gear incident (Vol. 5, No. 13, August 27 and Vol. 5, No. 15, September 27);

-- There was a truck "hidden" at the end of the runway, which allowed topping off the WK2's fuel tanks before returning to Mojave, just as a precaution.

I hope that the spaceport brings new prosperity to the region. During the ISPCS Mayor Miyagishima of Las Cruces spoke of attracting some 600,000 visitors/year to the southern part of the state and \$250 million/year to the local economy. The present ride to the spaceport from Las Cruces and the south requires over two hours and a big loop north through Truth or Consequences - a town that could clearly benefit from multiplied economic activity. The route then passes by the scenic Elephant Butte Dam and reservoir, then onto the two lane, only presently paved road to the Spaceport, recently completed.

Not long ago, plans and funding were approved for paving a second road to the facility from the south that will connect to I-25 (<<http://www.mveda.com/blog/2010/09/spaceport-construction-chugging-along/>>). That's supposed to cut travel time from Las Cruces to under an hour. But while riding in the media bus from Las Cruces, the sun-baked landscape and straight-line train tracks paralleling part of the route evoked a daydream of a high speed rail connection bringing great numbers of people to and from the Spaceport. That's one possible future.

The day's experiences were, I think, best put into perspective by the contrasts between two people whom I met:

-- *One was a young photographer on the media bus*, who said he'd always thought of the Spaceport as some kind of political joke ("Ha! A *_space_port_!*") and was visibly having difficulty coming to terms with the idea that it's becoming a reality;

-- *The second was a retired auto worker from Detroit*, hardly containing his excitement as he walked about the taxiway. He'd moved to the southwest to train as a technician for the new generation of sub/orbital spacecraft, whether they fly from Spaceport America, Mojave, or other locations to come.

Inevitably there will be unexpected problems and obstacles on the path to expanding the realm of humanity beyond Earth. But the people and progress on display in the New Mexico wilds that day reminded us that, one way or another, those can be overcome - if we work hard enough and our minds are open enough.

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