SMALL SATELLITES
BIG BUSINESS

The 22nd Annual AIAA/USU Conference on Small Satellites

Presents: *The McLogan Group*

Panel Moderator

Bob Meurer - Conference Technical Chairman

AUGUST 11–14, 2008

22ND Annual AIAA/USU Conference on Small Satellites

VISIT THE CONFERENCE WEBSITE WWW.SMALLSAT.ORG

SMALL SATELLITES

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- A dialog among recognized experts from the small satellite community on the business of small satellites.
- Discussion topics include the current status of the small satellite industry and relevant trends and indicators.

Small Satellites-Big Business – Growing or Stagnant?

The Small Satellite Value Proposition – What Really Counts?

ITAR – Good, Bad or Indifferent?

Access to Space

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Panel Ground Rules:

- Panelists are asked to express their convictions on each issue (reason & logic) with clarity and passion.
- The opinions expressed in this panel represent those of the panelists and may not represent the opinions of their agencies or employers.
- After the initial round of questions and answers, panelists are free to interrupt other panelists to make a point – an active dialog is the objective.
- The moderator is allowed to take all sides.

Audience Participation

- Again this year we are using an Audience Feedback Device.
  - Buttons to select Answers A-E
  - Remove the Battery Tab (if not already pulled)
  - Activate the unit
- When a question is projected you will have ~20 seconds to register your vote.
- You may change your vote during the 20 second period, but the system will only register one vote per device.
- After you vote, the system will project the results of the poll.

Panelists

- **Brett Alexander,** Exec. Director
  - X PRIZE Foundation

- **Debra Facktor Lepore,** President
  - Air*Launch*

- **Richard Bailey,** Director
  - Andrews Space

- **Amnon Ginati,** Special Advisor
  - European Space Agency

Panelist Biographies

- Bretton Alexander:
  - Brett Alexander joined the X PRIZE Foundation in May 2007 and is Executive Director for Space at the X PRIZE Foundation, leading the $30M Google Lunar X PRIZE competition to land privately funded rovers on the Moon and the X PRIZE Cup, a space exhibition demonstration.
  - Brett also serves as President of the Personal Spaceflight Federation, the industry association of businesses and organizations working to make commercial human spaceflight a reality. Brett is also Senior Advisor to Transformational Space Corporation (t/Space).
  - Brett served as the Senior Policy Analyst for space issues in the White House Office of Science and Technology Policy where he served both Presidents Bush and Clinton. While at the White House, Brett played a central role in development of the Vision for Space Exploration, announced by President Bush in January 2004.

Panelist Biographies

- Debra Facktor Lepore
  - Debra is president of AirLaunch LLC, a small business based in Kirkland, Washington that is developing the QuickReach™ Small Launch Vehicle (SLV) and its innovative Vapor Pressurization (VaPak) propulsion system under a joint program funded by the Defense Advanced Research Projects Agency (DARPA) and the U.S. Air Force.
  - Prior to joining AirLaunch in 2005, Ms. Lepore was vice president of business development and strategic planning for Kistler Aerospace Corporation. She previously served as chief of Moscow operations for ANSER's Center for International Aerospace Cooperation in Moscow, Russia, and as project leader and senior engineer at ANSER in Arlington, Virginia.
  - She is the recipient of the Women in Aerospace (WIA) "2007 International Achievement Award" and is a member of the WIA Board of Directors. Ms. Lepore was the 2007 Chair of the Aerospace Industries Association (AIA) Space Council and is currently serving as its Past Chair as well as on the AIA's Board of Governors.

Panelist Biographies

- Jason Andrews:
  - President and Co-founder of Andrews Space, Inc. (Andrews Space). He also serves as a member of the Andrews Space Board of Directors.
  - Oversees the company's daily operations including P&L responsibility, customer relations, business development and marketing ventures. He directs the program, staffing and engineering management for the company.
  - Under his leadership, the company has experienced consistent growth since its inception and Jason continues to drive the company's expansion into new markets diversifying its customer base and building the company's presence on the national level.

Panelist Biographies

- Richard Bailey:
  - Richard manages all subsystem and component programs at Andrews Space, and has over 25 years of experience in design, space and development. Teamed with a variety of leaders in the field of avionics, Richard was the founder and Chief Technology Officer of his own company, Automated Controlled Environments (ACEi) before joining with the Andrews Space team.
  - Prior to establishing his own company, Richard served as the Avionics Lead for the Kistler K-1 Reusable Launch Vehicle and as Vice President for Guidance Dynamics Corporation. Richard began his avionics pursuit with Space Vector Corporation as the manager for their Advanced Systems Group.

Panelist Biographies

- Amnon Ginati:
  - Special Adviser to the Director General (DG-F) Head of Inter Directorate Task Force, Integrated Application Promotion Program (IAP), European Space Agency
  - Professor Ginati worked from 1990-2000 at OHB-System, Germany as Head of the Satellite Department, and was key in the successful development of satellite, launcher, satellite communications, science and earth observation missions.
  - In Oct 2000 he joined the European Space Agency (ESA, ESTEC) as Head of the Earth Observation Future Programs Department, in charge of the EO future programs and Earth science explorer missions and Earth applications missions preparation.

ISSUE #1

Small Satellites – Big Business

Small Satellites are Big Business

- At the onset of the modern microspace era, small satellites were commonly viewed as the folly of a few academics, renegade defense researchers (yours truly included), and disbelievers in the laws of physics.
- Today, small space systems have proven their ability in a broad spectrum of missions and carved out a notable portion of the space market with continuing signs of growth over the coming decade.
- The world's largest space companies have initiated nano-satellite research projects to experiment and explore radical spacecraft design concepts they would not have considered a decade ago.
- Entire national space programs have been built on the foundation of small satellites for communications, Earth imaging, and national technology development. In the U.S., the DoD and other agencies have established long term budget plans for systems that are based principally on smaller, more rapidly developed space platforms.

Audience Question

- Are Small Satellites Big Business Today?
- In your estimation, is it…
  A. Unequivocally, Yes!
  B. Marginally, Yes
  C. Not Yet, but Developing
  D. Undecided or Marginally No
  E. Absolutely Not
- Audience – Vote Now

Panelist Questions

- **Richard Bailey:** Andrews Space, Inc. was founded in 1999 to be a catalyst in the commercialization and development of space as an affordable integrator of aerospace systems and developer of advanced space technologies. Where do you come down on the question of whether small satellites are big business today?
- **Debra Facktor Lepore:** AirLaunch has made a significant bet that launch services for small satellites are a compelling business case – 1,000 lbs to Low Earth Orbit, within 24 hours at a cost of less than $5 million. Are small satellites big business today and if not when will they achieve that status?

Panelist Questions

- **Amnon Ginati:** Similarly, Europe has been investing in a small launch vehicle, the Vega rocket, for a number of years. Is the small satellite market developing as you expected to make that launch system viable?
- **Brett Alexander:** The Google Lunar X PRIZE is a $30 million competition for the first privately funded team to send a robot to the Moon, travel 500 meters and transmit video, images and data back to Earth. This will undoubtedly be achieved using a small space system. What is the big business prospect behind the Lunar X Prize?

Follow-up Questions

- What are the keys to fostering even greater growth in the small satellite market?
- What obstacles do we need to overcome to help make this market explode?

Issue #1 Audience Wrap-up

- Multiple Choice Question…
- Compared to today's market, how big will the small spacecraft market be 10 years from now as a percentage of the overall space market?
  A. Smaller than today
  B. About the same as today
  C. Double what it is today
  D. The dominant market sector
- Audience – Vote Now

ISSUE #2

The Value Proposition

Do Small Satellites Offer High Value?

- "The barriers for entry into space, which were so high during the Cold War, have eroded due to technological advances. No longer is space reserved for superpower nations alone. The emerging small satellite market and the existing commercial space segment now allow third world countries, non-state actors and individuals to tap into the power derived from space.[1]"
- Is it simply this reduced barrier to entry that makes small satellites attractive, or do they offer a better 'value proposition' that large space systems cannot match?
  - Value proposition is effectively - what the customer gets for what he pays?

[1] High Frontier, Vol. 1, No. 4; 2005

Issue #2 Audience Question

- What is the leading factor that makes small satellites attractive?
  A. Low cost enabling a reduced barrier to entry?
  B. A value proposition large space systems cannot match?
  C. Both of the above?
  D. None of the above?
- Audience – Vote Now

Poll the Panel

- The audience thinks it is …
- Panelists: What do you believe is the leading factor that makes small satellites attractive? And in your answer, please describe what you consider to be their 'value proposition'.
  - Amnon Ginati…
  - Brett Alexander…
  - Debra Facktor Lepore…
  - Richard Bailey…

ISSUE #3

International Traffic in Arms Regulations

The ITAR Dilemma: National Security vs. Profit

- The U. S. State Department position on ITAR is that it is "an integral part of safeguarding U.S. national security and furthering U.S. foreign policy objectives."[2] But has it done that?
- ITAR today controls satellites and all specifically designed or modified systems or subsystems, components, parts, accessories, attachments, and associated equipment for satellites as well as many dual-use technologies that are vital for satellites and launch vehicles.
- America's commercial space industry historically has been dominant, but other countries are gaining market share and many small suppliers maintain that ITAR threatens their survival while protecting the position of larger suppliers with the clout to operate within the rules.[3]
- How does a superpower strike a balance between the needs of its national security system and its need to trade?

[2] Department of Defense Trade Controls; Getting Started with Defense Trade; http://pmddtc.state.gov/docs/ddtc_overview.doc
[3] Via Satellite; ITAR Dilemma: Finding The Balance Between Regulation and Profit; Richard Kusiolek; July 1, 2008

Panelist Questions

- I ask you, **Brett Alexander…**
- **Follow-up to Brett:** In a recent Via Satellite article, Don MacDonald, staff director of the subcommittee on Terrorism, Nonproliferation and Trade and legislative aide for U.S. Rep. Brad Sherman (D-CA) is reported to have said "Export controls can and often do benefit American industry and workers." But Congressman Tom Feeney (R-FL) in an April 2008 roundtable talk said it is crucial for the United States to ease restrictions laid out in the ITAR when it comes to cooperating with other countries on space science programs. In your opinion, who is right?

[4] Via Satellite; ITAR Dilemma: Finding The Balance Between Regulation And Profit; July 1, 2008; Richard Kusiolek

Panelist Questions

- **Amnon Ginati:** While other nations impose export restrictions on their corporations for militarily sensitive technology, the limitations do not appear to be nearly as restrictive as ITAR regulations. David Logsdon, Executive Director of the U.S. Chamber of Commerce, Space Enterprise Council, recently testified that foreign competitors leveraged their country's more relaxed regulatory climate in marketing their products as "ITAR-free" directly affecting U.S. companies, especially the ability of lower tier suppliers to compete. What he said in effect is that U.S. companies are even losing opportunities with our allies who have sought to avoid cumbersome U.S. controls.
- Is that the case in Europe and is it true that some overseas space agencies and firms may not wish to have U.S. companies participate in joint projects, because an American firm brings ITAR restrictions with it?

Panelist Questions

- **Debra Facktor Lepore:** What is the effect of ITAR on the U.S. launch industry? Is one of the unintended consequences of ITAR an increase in the utilization of foreign launch vehicles for small satellite launches because foreign users do not want to deal with the U.S. regulatory régime?
- **Follow-up to Debra:** Would you go so far as to say that the shift to utilize foreign launch systems has in fact reduced the pressure in the U.S. to develop more affordable launch systems of our own?

Panelist Questions

- **Richard Bailey:** Isn't the big question here "How can you build a business that is profitable both globally and at home?" What is the impact of ITAR from your perspective?

Audience Question

- On a scale of 1 to 10, one being little or no negative impact on U.S. competitiveness and ten being tremendous detriment to the U.S. space industry, what has been the impact of ITAR?
- Is it…
  A. 1 – Little or No Negative Impact on Export Business; Good Policy
  B. 3 – Some Negative but Manageable Impact to Revenues; OK Policy
  C. 5 – Moderate Reduction in Exports With Some Foreign Policy Plusses
  D. 7 – Considerable Negative Impact on U.S. Export Business; Bad Policy
  E. 10 – Catastrophic Impact With Significant Unintended Consequences
- Audience – Vote Now

Poll the Panel

- Is the audience correct? If not, what is your score?
  - Richard Bailey…
  - Amnon Ginati…
  - Debra Facktor Lepore…
  - Brett Alexander…

ISSUE #4

Launch Availability

Access to Space – Is this the Achilles Heel of the Small Satellite Industry?

- Transporting a payload into space currently takes years of lead-time and costs a great deal. Today, entrepreneurial U.S. companies are investing significant private capital to enable a space transportation revolution.
- Of course, the Entrepreneurial Space Transportation (EST) industry hasn't succeeded yet. But when [if] some of these firms do succeed, the space access revolution they produce [could] dramatically benefit U.S. national security, economic competitiveness, and create a vibrant new aerospace industrial base and talent pool that will pay off for generations.[3]

[3] Industry Consensus Statement; www.spacepolitics.com

Audience Question

- Is access to space the leading impediment to more rapid growth in the small satellite industry?
  A. Yes
  B. No
  C. No Opinion
- Audience – Vote Now

Panelist Questions

- **Debra Facktor Lepore:** Two years ago, Space News wrote "Air*Launch* LLC expects to learn by year's end whether the Pentagon will continue funding the development of the company's QuickReach™ booster and keep the low-cost satellite launcher on track for an early 2009 test flight." I know that maintaining steady progress in an entrepreneurial launch vehicle company is highly dependent upon adequate resources. How does one successfully manage the politics and funding to bring such new capability to the market?

Panelist Questions

- **Amnon Ginati:** Two years ago, Space News also wrote "Europe's Vega small-satellite launcher, long ridiculed as an expensive Italian folly, is beginning to win converts as its Italian-led contracting team passes successive program milestones and the global launch market offers increasing opportunities." ESA recently published an announcement of flight opportunity on the second flight of VEGA planned for mid-2010.
- So I have a similar question for you. When will Vega first fly and will it be priced competitively to secure enough market share to survive?

Panelist Questions

- **Brett Alexander:** To win the Ansari X Prize, famed aerospace designer Burt Rutan and financier Paul Allen led the first private team to build and launch a spacecraft capable of carrying three people to 100 kilometers above the Earth's surface, twice within two weeks. Now Scaled Composites and Virgin Galactic have joined forces to offer suborbital spaceflights on SpaceShipTwo. In your opinion, what has enabled them to succeed?
- **Richard Bailey:** You have avoided the temptation to steer Andrews Space into the Entrepreneurial Space Transportation (EST) club. Assume for the moment that one of the three current launch vehicle developers called you for advice…what would you tell them?

Closing Predictions

Panelist Predictions:

- What has been the most memorable event of our first 50 years in space and what will be our next crowing achievement in the coming 50 years?
  - Poll each panelist for their prediction.

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X Prize Foundation:
Inspiring a new generation of private investment in cost-effective space technologies.

Air*Launch*:
Developing the innovative QuickReach™ launch vehicle for affordable space lift.

Andrews Space:
Specializing in enterprise and technology development for emerging space markets.

ESA:
Pushing back the frontiers of space to ensure that Europe can meet the challenges of the 21st century.

Thanks to the Audience as Well