

UNITED STATES OF AMERICA

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DEPARTMENT OF TRANSPORTATION

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FEDERAL AVIATION ADMINISTRATION
ASSOCIATE ADMINISTRATOR FOR
COMMERCIAL SPACE TRANSPORTATION

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SIXTH ANNUAL COMMERCIAL SPACE TRANSPORTATION
FORECAST CONFERENCE

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TUESDAY,
FEBRUARY 11, 2003

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The conference was held at 9:00 a.m. in the Ballroom of the Fairmont Hotel, 2401 M Street, NW, Washington, D.C., Patti Grace Smith, Associate Administrator for Commercial Space Transportation, presiding.

PRESENT:

ERIC ANDERSON
RAYMOND G. BENDER
CHRIS DRAPER
JEAN-MICHEL EID
MARY FALLIN
KEN HODGKINS
TIM HUDDLESTON
MICHAEL KELLY
GIL KLINGER
ROGER D. LAUNIUS, Ph.D.
JACOB LOPATA
JEFFREY MANBER
PAMELA MEREDITH
ROSCOE MOORE
FRANCESKA SCHROEDER
PAULA TRIMBLE
ROBERT TRIPLETT

PRESENT FROM FAA:

PATRICIA GRACE SMITH

CHRIS DRAPER

JAY GARVIN

LAURA MONTGOMERY

MICHON WASHINGTON

KEN WONG

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9:12 a.m.

MS. WASHINGTON: On the record. I would like to welcome everyone this morning to the sixth annual conference. I'm glad you could all be here this morning. Without further adieu, I would like to introduce our Associate Administrator, Ms. Patti Grace Smith.

MS. SMITH: Good morning. It is my pleasure to welcome you to the FAA's Annual Commercial Space Transportation Forecast Conference. Can you believe this is the sixth annual conference? We're so excited about that. I want to say right up front what an outstanding job Chuck Kline, who has lead this effort for the last six years, has done in putting together yet another conference. Chuck has done a great job.

(Applause.)

MS. SMITH: It is a sad and difficult time for our nation and especially for those of us in the space community due to the recent space shuttle Columbia tragedy. The tragic loss of the shuttle Columbia in the words of President Bush, "Seven lives of great courage and achievement" casts a shadow over this gathering while magnifying the challenges that face life, the risk and cost of space travel and exploration present.

1 While we don't yet know the root cause of
2 this failure, we know that there is a greater risk in
3 the unknown than we recognize when Columbia blasted off
4 into space on January 16. Bill Readdy, the Deputy
5 Associate Administrator for the space flight at NASA
6 said, "We must find what happened, fix it, and move on."

7 This is what we know. This is what we must do.

8 We at AST will do our part.

9 Dr. Paul Wilde, AST's reentry and debris
10 specialist, has joined the investigation team in Texas.

11 I would like to dedicate this conference to our fallen
12 heros, Colonel Rick Husband, Commander William McCool,
13 Flight Engineer Kalpana Chawla, Payload Commander
14 Lieutenant Colonel Michael Anderson, Mission Specialist
15 Physicians, Astronauts, Captain Laurel Clark and Captain
16 David Brown, and Israeli Colonel Ilan Ramon, and to a
17 future of continuing exploration, utilization, and
18 commercialization of space.

19 Given the events of the last ten days, it
20 is not surprising that last Friday, Science Committee
21 Chairman Sherwood Boehlert, who has appeared at this
22 conference for two years straight in the last two
23 conferences, had to cancel his appearance this morning.

24 Mr. Boehlert's committee, who has oversight of NASA as
25 well as AST, is deeply involved in the investigation

1 into the accident and will be co-chairing a joint
2 Congressional hearing tomorrow morning with Senator John
3 McCain, Chairman of the Senate Commerce Science and
4 Transportation Committee.

5 While it is a big disappointment that we
6 will not be hearing from the Chairman this year, his
7 legislative and oversight responsibilities take
8 precedence. We are fortunate to have people of this
9 caliber to lead the Congressional -- into this tragic
10 event. Given the time now available this morning, we
11 will get an update from Bob Triplett, Chairman of the
12 Oklahoma Space Industry Development Authority, on the
13 activities of the Aerospace States Association followed
14 by Tim Huddleston, Chairman of the National Coalition of
15 Spaceport States will report on a meeting that they had
16 last night and a plan for the coming year.

17 First, I want to address our significant
18 events for the year since we last met. Perhaps the high
19 point of the year for commercial space transportation
20 was a successful flight of the Atlas V and Delta IV
21 evolved expendable launch vehicles. This had great
22 significance for the national security and international
23 competitiveness of U.S. space transportation
24 capabilities.

25 National security, because the Air Force

1 sponsors the development of these two vehicles to
2 provide increased capability and flexibility for the
3 launch of national security payload and competitiveness
4 because increased payload capacity and lower cost means
5 U.S. launch providers can now compete for launch
6 contracts for the larger, heavier satellites that
7 account for a significant share of the international
8 launch market, something the U.S. companies did not do
9 prior to the production of Atlas V and Delta IV to the
10 marketplace.

11 The lean times all launch providers have
12 experienced over the last few years resulted in part
13 from the depressed, global economy, the cyclical nature
14 of the launch market and the slump in the communication
15 segment of the economy. Each of these rockets had
16 picture perfect first flights. We are confident that
17 U.S. companies will now be able to compete on a more
18 even footing in what we optimistically expect will be an
19 improving market for our services in the coming years.

20 In roughly the same time frame, the FAA
21 approved its capability to serve its commercial space
22 transportation customers for the national launch ranges
23 and work in partnership with the Air Force through the
24 establishment of our very first field office will a
25 full-time staff at the Eastern Range, Cape Canaveral,

1 Florida.

2 The FAA Commercial Space Transportation
3 Safety Office opened at Patrick Air Force Base on
4 November 4 with Al Wassel of my staff manning the
5 outpost. Later this year the Air Force will reciprocate
6 by assigning an Air Force officer as a full-time
7 representative in my office here in Washington.

8 We are already experiencing the benefits of
9 this arrangement with increased communications, a
10 heightened appreciation for our partnership and
11 facilitated decision-making. The working relationship
12 is enhanced greatly by the fact that Al is himself a
13 former Air Force officer and rocketeer with previous
14 service at the Cape overseeing launch safety. He has
15 already established an excellent working relationship
16 with the leadership at Patrick and the Cape. I am
17 convinced this arrangement will significantly increase
18 our effectiveness by bringing the mission of the FAA in
19 space transportation in closer touch with the Air Force
20 as we support the commercial space industry.

21 I would also like to mention a recent
22 decision I have made in regards to the on-going
23 rulemaking for licensing and safety requirements for
24 launch. As many of you know, we published a Notice of
25 Proposed Rule Making in October 2000 and a Supplemental

1 Notice of Proposed Rule Making in July 2002.
2 Publication of the Supplemental Notice resulted in a lot
3 of good exchange, a number of comments between the FAA
4 and the public. Publication of the Supplemental Notice
5 resulted in a lot of comments that came in even after
6 the Supplemental Notice was published. We did have a
7 public meeting where we went through every aspect of
8 that Notice and the critical areas of concern that the
9 public, the industry stated their concerns about.

10 We have made a decision to issue a Second
11 Supplemental Notice in order that the dialogue may
12 continue. The FAA hopes that this Second Supplemental
13 Notice will advance our understanding of industry's
14 concerns and industry's understanding of the road we
15 propose to take.

16 Two significant changes have taken place in
17 our office since our conference last year. I'd like to
18 just highlight those. Joe Hawkins, who served as my
19 deputy, has moved on to take another leadership role in
20 the new Transportation Security Administration where we
21 wish him continued success. They have relocated from
22 the GAO Building to Pentagon City in their new
23 headquarters there.

24 Ron Gress, who was in the Commercial Space
25 Transportation Office almost from the beginning in 1984

1 and was Manager of the Licensing and Safety Division
2 since 1997, took his well earned retirement and moved
3 back to the West Coast to be closer to his family. Ron
4 made tremendous contributions to our office over its
5 history. We miss him greatly, but Ron is having a great
6 time. Retirement is definitely agreeing with him.

7 Dr. George C. Nield has been selected for
8 the post of Deputy Associate Administrator for
9 Commercial Space Transportation. Let me tell you a
10 little bit about Dr. Nield. He is a graduate of the Air
11 Force Academy. He earned a Master's and Doctorate in
12 Aeronautics and Astronautics from Stanford University
13 and recently completed an MBA from George Washington
14 University.

15 He served 15 years in the Air Force
16 including a tour of duty at NASA's Johnson Space Flight
17 Center in Houston. He spent more than 12 years with
18 NASA serving as Manager of the Flight Office, Technical
19 Manager, and Payload Manager. Most recently, he has
20 been the Senior Scientist at Orbital Sciences
21 Corporation. I'm extremely pleased to have a person of
22 his experience, his capabilities and accomplishments as
23 my deputy.

24 George is wrapping up his work at Orbital
25 this week, so he will not be able to join us because he

1 begins at AST on Tuesday of next week. I know that we
2 will definitely enjoy working with him. I encourage you
3 to engage him on his first several days in our office
4 and in the days going forward.

5 Mr. Jay Garvin has assumed the post of
6 Manager of our Licensing and Safety Division. He has
7 over 30 years of experience in safety and space systems.

8 Mr. Garvin comes to our office after having served as
9 the Chief of the Systems Safety and Reliability Office
10 at NASA Goddard Space Flight Center. He previously was
11 Chief of the Quality Assurance Engineering Branch for
12 the U.S. Air Force and in a variety of capacities for
13 the U.S. Navy.

14 He is a graduate of the University of
15 Pittsburgh with a background in Civil Engineering. AST
16 is very fortunate to have a man of his stature in this
17 critical safety post. The leadership of our Licensing
18 and Safety activities is once again in excellent hands.

19 I would invite you to spend time with Jay, and I'll ask
20 Jay to stand now, during the conference and in the days
21 ahead.

22 (Applause.)

23 MS. SMITH: Now I would like to introduce
24 Bob Triplett, an indefatigable booster of commercial
25 space, frequent contributor to this conference, and a

1 real supporter of AST, to greet you on the Aerospace
2 States Association. Thank you.

3 MR. TRIPLETT: Thank you and good morning.

4 These times, as Patricia pointed out, are troubling.
5 The loss of Columbia was just like losing part of our
6 family, the prospect of war, and the prospect of
7 terrorism are not too happy or pleasant thoughts. I
8 would like you to take a moment right now. Let's do
9 something that's really nice.

10 Let's turn to the left and the right and
11 shake the hand of the person next to you and tell them
12 it's really good to know you. Do that right now. Peace
13 to everybody. I'll make you a deal. If everybody here
14 today will pray for me, I'll pray for all of you.

15 I want to thank Patricia so much as our
16 Associate Administrator. We are in good hands. We have
17 good leadership in this nation for commercial space.
18 The FAA's job is to encourage and promote, in my eyes,
19 the space launch commercialization. I think this
20 conference right now is indicative of that encouragement
21 and that promotion. I appreciate so much her efforts to
22 this conference.

23 The Aerospace States Association is a
24 consortium of 42 states. This organization was founded
25 in 1990. We currently have a make up of officers that

1 include Lieutenant Governor Mary Fallin from Oklahoma,
2 newly elected. The Vice Chair is Lieutenant Governor
3 Lucy Baxley of Alabama. Another Vice Chair is
4 Lieutenant Governor Frank T. Brogan of Florida. Another
5 Vice Chair is Lieutenant Governor Olene Walker from
6 Utah.

7 The Secretary is Ivan Somers from Virginia.

8 I am the Treasurer from Oklahoma as well. We have
9 committees that are comprised of an executive committee,
10 aeronautics, space flight, education, policy, research
11 and development, grants, and spaceports in which all 42
12 states are participants in our endeavors and our
13 efforts.

14 One of our two primary missions is
15 education. ASA member states are committed to
16 encouraging diversity and to enhancing educational
17 opportunities at the state and local level through using
18 aerospace education resources in the K through 12
19 classroom, advocating sufficient funding for college and
20 university research, advocating continued federal
21 support of the Space Grant College and fellowship
22 program in aerospace sciences and engineering,
23 disseminating aerospace information to the general
24 public, and developing and implementing state based
25 aerospace education programs.

1 Our second area of efforts in the mission
2 is economic development. We believe that as America
3 transitions from an industrial to an information based
4 economy changes in economic development strategies will
5 be required to successfully compete in the global
6 marketplace. Technological innovation will be America's
7 niche in the world market. In order to ensure a viable
8 economy, states must identify and capitalize on job
9 growth and opportunities in emerging high technology
10 industries where as much as 70 percent of our new jobs
11 will be created.

12 In short, Aerospace States Association is
13 alive and well and becoming much more active. We are
14 under new leadership. We also put out each year an
15 annual scholarship. It is called the Edward A.
16 O'Connor, Jr. Founder's Scholarship. We will be
17 awarding that at the next meeting.

18 Our meeting will coincide immediately
19 following this meeting. This meeting will convene at
20 approximately 2:30 on Wednesday at the offices of
21 Cadawalder, Wickersham & Taft, Attorneys at Law. All
22 the Lieutenant Governors have been invited because their
23 conference starts as well Thursday, so many Lieutenant
24 Governors will be there at a reception Wednesday.

25 I would invite any of those who are present

1 that would like to become involved in the ASA
2 organization as an affiliate. We would love to have you
3 attend that reception and get to know you better. Thank
4 you for this opportunity to tell you about ASA. If
5 there are any questions, I would be happy to take them
6 at this time. If not, I'll sit down and let Tim come
7 up. Thank you very much.

8 (Applause.)

9 MR. HUDDLESTON: Good morning. I'm not
10 going to ask you to shake anybody's hands or anything. I
11 want to note one thing though. Those of you who know me
12 know it's very hard for me to do what the agenda says,
13 that is brief remarks. It's going to be pretty hard for
14 me. So with that, I thank you and hope you have a great
15 conference. No, I will actually give a few remarks but
16 they will be brief.

17 Patti asked that we report to you about the
18 annual meeting of the National Coalition of Spaceport
19 States. NCSS was established three years ago officially
20 at this conference, so we chose this conference to be
21 our annual meeting every year. That includes the
22 election of officers and re-establishing each year what
23 the priority and agenda of the association would be.

24 We had our election of officers last night.
25 I was re-elected as the Chair which concerns me a

1 little bit, but we did re-elect also the Honorable
2 Andrea Seastrand from California as the Vice Chair and
3 also elected Major General Jay Edward from Oklahoma as a
4 Vice Chair. He's a retired Air Force General. It's
5 good to have Jay working with us in that capacity. Dr.
6 Billie Reed from Virginia is the new association
7 Secretary. George French from Wisconsin is the
8 Treasurer of the organization.

9 We looked at where we were last year at
10 this point, the work we did last year, and where we need
11 to be going as a nation with respect to space and space
12 access and space commerce. First of all, we quickly
13 realized that there is some key legislation that will be
14 introduced in the 108th Congress. You will recall in
15 the 107th Congress there was some space legislation that
16 a lot of us had really hoped would pass, but we knew
17 that it was always tough in a first Congress go around
18 for a bill of that type to really get the support that
19 it needs.

20 So we saw several of those bills expire.
21 You have to pass those bills within the Congress that
22 you are in or they will automatically expire and have to
23 be reintroduced. In fact, as we speak, Andrea Seastrand
24 and Janice Dunn are On the Hill trying to get some of
25 the legislation that we're very interested in

1 reintroduced by some sponsors and trying to get some
2 sponsors together to do that. So we will track
3 legislation this year.

4 We are also hopefully encouraging new
5 legislation that will be important to the industry,
6 important to promoting space commerce because that's
7 what it is all about. We feel, particularly in light of
8 the Columbia accident, that we need to help refocus our
9 nation and our nation's leader on what the mission
10 really is. The mission really is commerce.

11 We are so blessed that we have AST and
12 Patti Grace Smith leading AST to promote that message.
13 One of the charters of AST has been to promote the
14 industry. Patti has done the best that she can do, but
15 we quickly realized that as an advocacy organization
16 representing the states we need to do more for AST and
17 more for Patti in helping deliver that message.

18 We're pleased in what you do, Patti. You
19 do a wonderful job. You have our commitment. Last
20 night without any hesitation, we said we are there to
21 help you and work with you and we intend to do so.
22 Thank you so much for your leadership.

23 (Applause.)

24 MR. HUDDLESTON: We also looked at a
25 message that we adopted two years ago. We said that we

1 need to re-emphasize that message. Transportation is a
2 mode. Transportation is a system. Transportation in
3 space must therefore play in that arena. As Jay Edwards
4 said, transportation fuels commerce. Space
5 transportation is a mode that we have to establish with
6 the American people and with Congress as an essential
7 part of America's commerce. We're going to do that.
8 We're going to work hard with that.

9 So we ultimately realized that we have a
10 message that sums it up perfectly as to what we are
11 going to do this next year. We are going to push back
12 to the future. Back to the future is the message.
13 Almost 50 years ago in the mid-'50s we were developing
14 suborbital vehicles. The X-15 actually flew 110
15 kilometers I believe or perhaps even a little bit
16 higher. It didn't have orbital velocity, so it didn't
17 orbit. But it was a suborbital vehicle.

18 We were approaching a concept that had we
19 continued today we would have at least a suborbital
20 capability and most likely an access to space capability
21 that is cheap, reliable, and safe. Of course, America
22 responded to the Cold War and to the challenge of the
23 space race. We won that and did a great job. But now
24 it's time for us to refocus our whole mission.

25 The astronauts of Columbia dedicated their

1 lives to the work they did for us as a nation and a
2 world. They were up to the challenge. If you ask them
3 why they did what they did, they would say it's because
4 of the excitement of exploration and the benefits it
5 brings to people and the challenge and the thrill and
6 the Mount Everest answer of because it's there.

7 But we as their benefactors say it is about
8 fueling the economy. Ladies and gentlemen, we all know
9 in this room that space can fuel the economy. It can be
10 another tier from which our economy can be based. You
11 are the leaders that can make that happen. So the
12 National Coalition of Spaceport States intends to step
13 up to the plate and help deliver that message. That is
14 what we are there for and what we strongly believe in.

15 Ultimately, we said there are three key
16 goals that have to be adhered to; access, access and
17 access. If you can't get there, you can't go anywhere.

18 That's what we want to do. So it all equates to
19 commerce. That means taking that first logical step,
20 the next stepping stone. We think suborbital space can
21 do that.

22 The U.S. Department of Commerce came out
23 with a report that we think will help us pass that
24 message on that we don't have to build huge systems and
25 huge investments. We can take baby steps if you will.

1 We can progress into accessing space. Those 24
2 companies competing for the X prize are trying to do
3 that very same thing. There are people in this room
4 that are a part of that or a part of other efforts. We
5 intend to be your advocate.

6 With that, ladies and gentlemen, I thank
7 you for your time. I want to say as the Chairman of the
8 Coalition in my third and final term I've enjoyed
9 working with everybody in this room. I look forward to
10 working with you over this next year. We need to
11 accomplish a lot of things in the 108th Congress. We
12 need to make a lot of things happen for our nation and
13 the American people. You are the leaders. You are the
14 ones that can do it. Let's all work together and make
15 it happen. Thank you very much.

16 (Applause.)

17 MS. WASHINGTON: I'd like to thank Bob and
18 Tim for their organizational updates. Our next
19 discussion will be perspectives on the loss of the Space
20 Shuttle Columbia. Jay Garvin, our new Manager of the
21 Licensing and Safety Division will facilitate that
22 discussion.

23 MR. GARVIN: Good morning. You have all
24 heard a little bit about me. I come from the Goddard
25 Space Center where I was in charge of the safety for the

1 shuttle and all the missions that went on at the Goddard
2 Space Center. It was a challenging job. The shuttle
3 was not easy. There were a lot of requirements. It was
4 very tough to make sure that we didn't injure the crew
5 or the astronauts.

6 Goddard was a frequent flyer. We had
7 payloads on almost every single mission. When the space
8 station flights took over, we went on a space-available
9 basis. But we did always try to fly high school,
10 university, and some industry experiments. They were
11 somewhat on the challenging side.

12 One of our bigger projects was the Hubble
13 space telescope. We launched the telescope from the
14 Shuttle Discovery and then set about to fix the problems
15 with it. I'm sure most of you watched the footage of
16 the astronauts repairing the shuttle; fixing the
17 aberration in the mirror and then keeping the telescope
18 modern.

19 The connection of Goddard with the
20 astronauts. The astronauts spent a lot of time at
21 Goddard working with the mechanical and electrical
22 simulators, working in the wet-up tank in the Johnson
23 Space Center. The crew became like family at Goddard.
24 It gave the Goddard people a connection with a manned
25 space flight program that we don't normally achieve.

1 Goddard is mostly remote sensing and robotics, so having
2 a shuttle astronaut crew there really did connect us
3 into the manned program.

4 The loss of the shuttle is going to pose a
5 lot of challenges for NASA. They have to figure out
6 what they are going to do, how they are going to get
7 that access to space, but there is a lot to be learned
8 from the accident. I think the manned program will be
9 stronger because of the activity. We will take the time
10 to figure out what the technology needs to be and how we
11 continue to have the access.

12 It does bring into focus the reason that we
13 have the AST-200. Space is risky business. We can do
14 this. We know how to get people into space, but we have
15 to remember it is risky and can cause death. At
16 Goddard, I was determined to make sure everybody was
17 safe. I have that same perspective here. I do have an
18 open mind. If people want to do risky things, I'm
19 willing to listen to you. My job is to make sure you do
20 it right.

21 On our panel this morning, we have Mr. Mike
22 Kelly. Mr. Mike Kelly was the founder of the Kelly
23 Space and Technology Company. He has a Master's Degree
24 and a Bachelor's Degree in Mechanical Engineering from
25 Purdue University. He is a member of the COMSTAC and

1 the Chairman of the recently formed Reusable Launch
2 Vehicle Committee. Most recently, he was instrumental
3 in the development of the rocket jet engine test site at
4 San Bernadino Airport.

5 Also, we have Dr. Roger Launius from the
6 Smithsonian. Dr. Launius is the Chair of the Space
7 History Division at the Smithsonian. He has been there
8 since 1990 until 2002. He also served as Chief
9 Historian for NASM. He got his degree from Graceland
10 College in Lamoni, Iowa with a major in History. He
11 also received a Master's Degree and Doctorate Degree in
12 1978 and 1982 from the Louisiana State University in
13 Baton Rouge.

14 After completing his Ph.D., Dr. Launius
15 became a civilian staff historian with the United States
16 Air Force. He served in a variety of historical
17 positions within the Air Force. Between 1987 and 1990,
18 he was the Chief Historian for the Military Airlift
19 Command in Saint Louis. Each of them has a presentation
20 and then at the end we'll take questions.

21 MR. KELLY: Before I begin the brief
22 presentation, I wanted to make some remarks in the light
23 of some things that I've heard in discussions over the
24 last several hours. I participated in several ICBM
25 flight failure investigations. One thing that I learned

1 is that one cannot start to preconceive notions. It's
2 disturbing therefore that the Columbia incident is
3 already saddled with a preconceived notion whenever it's
4 called an accident.

5 Military flight failure is not called an
6 accident until the cause is determined and it's known
7 whether that cause was accidental or deliberate. I have
8 little data beyond what is available to the public.
9 What I have gathered in my expert opinion is that there
10 is very little evidence pointing to an accidental
11 failure. I wouldn't mention this at all if it were not
12 for the fact that the belief that this was an accident
13 has spawned a search for scapegoats.

14 Topping the list is a good friend of mine,
15 Mr. Dan Goldin. Accusing Dan or others with being lax
16 on safety is really ludicrous. If anything Dan was
17 almost overly concerned with safety. I believe that if
18 we want to start the search with scapegoats we shouldn't
19 begin with our own citizens but our sworn enemies. We
20 should look to the people that killed 3,000 Americans on
21 rolling soil two years ago and have promised more to
22 come. I think it's beneath us as a people to
23 immediately seek the blame on the people at NASA,
24 especially the greater of the two greatest
25 administrators that agency has ever had.

1 The perspectives on Columbia from the
2 standpoint of commercial space is a turning point or a
3 potential turning point for an industry that's been in
4 malaise since September 11, 2001. What I wanted to do
5 is say that this is an opportunity for us to move
6 forward. In order to move forward, we need to learn the
7 lessons of history and how we got to where we are in
8 commercial space.

9 We got here from an activity of the Cold
10 War and the space race with the Russians. Everything
11 that is done in space today is done on the same model
12 that was used to beat the Russians to the moon in an
13 expeditious fashion. None of it is leaning towards
14 commerce. As a result, space transportation differs
15 from all other modes of transportation today. It's
16 basically a matter of riding on munitions.

17 We also need to compare space
18 transportation with how other transportation systems
19 evolved and based on the above established policies
20 which allow space transportation to emerge as a real
21 sector of the economy. When I say establish policies, I
22 actually have no proactive policies to propose. What I
23 do propose however is that the United States not have a
24 government civil space program. I think we absolutely
25 have to have a military space program as soon as

1 possible.

2 However, the act of the United States
3 government, and I'm not demonizing them, is that they
4 propose that any time to develop a civilian commercial
5 space transportation system automatically dries up
6 venture capital and any other capital for private
7 companies that wish to develop a similar system. No one
8 wants to compete with the government. As long as the
9 government persists in saying that it's going to develop
10 such systems, they will never be developed.

11 This is a rehash. The key elements from
12 history of space transportation resulted and is still
13 dominated by the race with the Soviet Union. That all
14 ties back to using intercontinental ballistic missiles
15 and their derivatives as launch vehicles and the result
16 and design of satellites as self-contained units that
17 are launched on a single shot. These things have slowed
18 progress in space greatly.

19 Manned space flight is a national program
20 only. This is one of the things that is significant
21 about Columbia. An accident in a national program
22 becomes a national tragedy and rightly so. However, if
23 a plane load of people goes down, the whole nation
24 doesn't go into mourning. Those people are more
25 identifiable with you and me than the seven astronauts.

1 The seven astronauts were actually heroic figures.
2 Their loss is tragic.

3 But it was the fact that they are national
4 figures that made this such a shock. A private space
5 program is no different from a private transportation
6 system. Losses of this type which will happen
7 inevitably will not be to the magnitude of tragedy that
8 we've seen with Columbia.

9 There's no parallel between space
10 transportation today and any other mode of
11 transportation from a historical perspective. All of
12 the modes of transportation developed as a result of
13 private activities. Consequently, we need to spawn
14 policies that would be the development of the private
15 space transportation.

16 When I say policies have genuinely
17 stimulated private space ventures, the only one that I
18 know of is a negative one and that is to prohibit the
19 government from developing civil space transportation
20 systems. Encourage development of multiple reusable
21 launch vehicles and do so supported by a rational
22 structure to the market.

23 One of the things that was advocated in the
24 late '20s by the early space pioneers and continued all
25 the way up until the Apollo program was to manufacture

1 the one thing in orbit that can be manufactured in orbit
2 better than it can be on the ground, that is space
3 craft. This requires frequent flying RLVs carrying
4 small payloads and is really the only way to start and
5 maintain a long term presence.

6 One of my sayings is that when life hands
7 you lemons you make lemonade. This is my final
8 perspective on Columbia. Every tragedy results in
9 progress. One of the things that we've addressed over
10 the past several years in the RLV working group is the
11 possibility of a failure, either on ascend or descend of
12 an RLV.

13 Columbia was the first RLV coming back from
14 orbit that broke up at hypersonic speed over the CONUS
15 and scattered debris over 25,000 square miles. There
16 were no injuries on the ground, no known property
17 damage. The hardest part is finding all of it. That is
18 a big surprise to a lot of people, but it's a good thing
19 that we now have hard data on the risk of RLV's and no
20 longer need to calculate or guess. This should make
21 things such as the licensing for RLV flights much easier
22 in the future.

23 I switched gears there, but I wanted to end
24 on a note that we do have some positive that came out of
25 this despite the tragic loss of life. I'll take

1 questions during Q and A. Thank you.

2 (Applause.)

3 DR. LAUNIUS: Well, good morning everyone.

4 My name is Roger Launius. I am the Chair of the Space
5 History Division at the National Air and Space Museum.
6 Before that, I spent almost 12 years at NASA as the
7 Chief Historian. You may be asking yourself what is a
8 historian doing here talking about Columbia. That's
9 probably a good question and maybe I shouldn't even be
10 here, but I do have a few comments that I would like to
11 make.

12 One of the things that I was asked to do
13 early last week was to develop some ideas and concepts
14 for what are some of the policy questions arising out of
15 the Columbia accident, tragedy, however you choose to
16 characterize it. I think that there are some things
17 that we need to think about in this context. There's
18 been a lot of policy statements made by talking heads,
19 pundits and so forth in the last week.

20 As I'm sure you are aware if you had any
21 knowledge whatsoever you were being called by any number
22 of media folks to go on television to talk to them on
23 background or directly or whatever. A lot of this
24 discussion has led to rush to judgement for several
25 things associated with Columbia. I like to think of

1 much of this talking heads stuff as a little bit like my
2 grandfather's longhorn steers that he liked to raise.
3 There's a point here and a point here and a lot of bull
4 in between.

5 It seems to be the case to be perfectly
6 honest. Maybe the more you speculate and the more you
7 feed the beast of the media, the more wild the
8 speculation becomes. I have my top ten list of policy
9 issues, policy questions that I think should arise out
10 of the Columbia accident. I say ten. It could be five.

11 It could be three. I could roll these together in
12 various ways, but ten is a nice number.

13 The first question I would ask is should
14 there be an independent or a series of independent
15 accident investigations. There are already technical
16 investigations under way. NASA is running them. There
17 are internal studies. There are external studies.
18 Should there be other sorts of things that are
19 undertaken as well, what form should they take, and to
20 whom should they report, and by whom should they be
21 empaneled?

22 As you will probably recall, immediately
23 after the Challenger accident the White House empaneled
24 the Rogers Commission. William Rogers chaired an
25 outside commission made up of a lot of luminaries to

1 look at that particular accident. They obviously
2 focused at some level on the technical questions, but
3 the Rogers Commission is most famous not for its
4 technical findings but for its analysis of an
5 institutional failure at NASA, the inability of
6 information to get to the right places at the right time
7 to make good decisions, and a cultural problem that they
8 said was present in NASA that prohibited people from
9 bringing forward these sorts of things.

10 There are obviously technical issues
11 associated with Columbia. I would suggest to you that
12 there are institutional issues that also need to be
13 discussed in the context of this particular tragedy.
14 Who is going to undertake that analysis and at what
15 level should it be undertaken?

16 I can guarantee you that there will be
17 hearings On the Hill. Whether or not those are of depth
18 and insight or are theater is an open question as yet.
19 But nonetheless, they will take place. It's a serious
20 issue that needs to be focused.

21 My second question is should there be an
22 overall review of access to space focusing on the
23 realities and trade offs of ELV, RLV, and SSTO. As you
24 are all very well aware, shuttle is a vehicle that was
25 conceived in the `60s, developed in the `70s, and flown

1 since the early `80s. It is technology that in most
2 instances, and there have been upgrades, is pretty
3 outdated in many respects.

4 What are we going to do for the future?
5 What are the proper roles of ELV, RLV, and what I like
6 to refer to as the holy grail of space flight, SSTO,
7 single stage to orbit? It may be about as achievable as
8 the holy grail in myth is. That's an open question.
9 Should there be a full-fledged review of all of this?
10 My third issue is what about macro-level review and
11 access to space associated with human space flight.
12 Again, this is closely related to the second question.

13 Number four, should there be also a review
14 of the space shuttle's operational capability and
15 decisions made about whether it is time to retire the
16 fleet and to move on to an new launcher or to upgrade
17 the shuttle. I have heard pundits come on the air and
18 say there's no role for human space flight, we should
19 retire the shuttle fleet, and send the astronauts home.

20
21 I can guarantee you that is a political
22 decision no President will make. There is also this
23 question of whether or not we build a new orbiter.
24 That's fairly ridiculous. I'm not sure we could or
25 would or would even want to. Then what do you do beyond

1 that?

2 Number five, what about our emphasis on
3 human space flight? Is it over? Are we over committed
4 in this arena? Should we be doing more? Should we be
5 doing less? What are the questions that we need to look
6 to for the future along these lines, and how should we
7 try to analyze it?

8 What about long-term goals in space? There
9 has been a bubbling for the last seven, eight, nine
10 years focused beyond earth orbit about what we should do
11 in space. Bob Zubrin, and I'm sure most of you know
12 Bob, has advocated let's go to Mars, let's do it now, we
13 can do it on the cheap, it will be successful. He has
14 successfully I might add changed the debate into what I
15 like to refer to as a debate between the lunatics and
16 the martians; those who want to go back to the moon and
17 those who want to go to Mars and basically not much
18 else. There are other options and those have not been
19 discussed in any serious way in the policy world.

20 I'm very intrigued by who should conduct
21 any reviews of national space policy. Should NASA be
22 doing this? Should the National Academy of Sciences?
23 Should some outside blue-ribbon commission appointed by
24 the White House or Congress or some other entity?
25 Should organizations like AIAA or some of these other

1 professional organizations be overseeing these
2 activities? Should Congress do so?

3 All of these are interesting to explore.
4 Who empanels them, to whom they report, and what their
5 particular task is will dictate the final report. I can
6 guarantee that. And also who sits on them.

7 I'm very concerned and very interested in,
8 and you probably know a lot more about this than I do,
9 what impact Columbia might have on the commercial,
10 military, scientific, and international space
11 activities. In the context of international, there's
12 obviously going to be a serious set of repercussions
13 down the road with the space station.

14 We'll have to see how those shake out. The
15 Russians are already positioning themselves to extract
16 funds from NASA for the purpose of building more Soyuz
17 capsules to supply and resupply the station. We'll see
18 how this continues. But it's an interesting question to
19 explore.

20 What about the impact of the Columbia
21 tragedy on other NASA programs and especially the ISS?

22 I have had numerous people, demonstrating their
23 fundamental lack of knowledge about anything space
24 related, say what about those poor people that are up on
25 the International Space Station, aren't they dead now or

1 won't they be dead because they can't come home. They
2 have no knowledge of the fact that there is a Soyuz
3 capsule up there.

4 They can get in it and come home anytime
5 they wish. They can be resupplied using Progress
6 modules. They can be rotated using Soyuz capsules for
7 the foreseeable future. The long-term consequence of
8 course is can we build a space station if we don't have
9 shuttles flying. So that's an interesting question that
10 we have to debate.

11 Finally, the big enchilada, the last
12 question. What is the future of humans in space? I
13 have a chart that I didn't get onto in this particular
14 presentation, but there are fundamentally five reasons
15 that I've been able to determine for flying in space, no
16 more, no less. The first one which NASA talks about a
17 great deal and the shuttle is sold as a vehicle to
18 achieve this in is scientific discovery and
19 understanding. The second one is national security.
20 You have to defend yourself.

21 The third reason is economics. Does it
22 pay? I think mostly that's what most of the folks in
23 this room are the most concerned about. Can you make a
24 profit doing these sorts of activities? The fourth
25 activity is one that I like to call and is popularly

1 conceived as human destiny, survival of the species.

2 Carl Sagan used to talk about what he
3 referred to as the last perfect day on earth. In the
4 best case scenario, some time several billion years in
5 the future, there will be a last perfect day on earth
6 and the sun will then begin to destroy what life as we
7 know it exists on this planet. We have to be somewhere
8 else if we as a species are to survive. That's the best
9 case scenario.

10 I might add that it's very difficult to get
11 members of Congress excited about something that might
12 happen ten billion years from now. But this human
13 destiny issue is a serious one. There's a paper that's
14 been circulating from John Young, maybe you have seen
15 it, the famous Gemini Apollo shuttle astronaut. It
16 deals with some of these issues associated with human
17 survival.

18 He has a take off on the Pogo comic strip
19 in which he says "I have seen an endangered species and
20 it is us" in the context perhaps of nuclear holocaust or
21 the kinds of natural and unnatural calamities, meteors
22 that might hit us and so forth. No, Bruce Willis and a
23 bunch of oil riggers from Gulf are not going to be able
24 to save us in that context.

25 Finally, the fifth reason beyond all these

1 other four is prestige. We do it because it makes us
2 feel good. It makes us look good. It makes us look
3 good vis a vis the other nations of the world. That was
4 the reason we started flying. We started flying in
5 space in the 1950s very early and with humans in the
6 1960s. That's the reason that we went to the moon and
7 for no real other reason.

8 We may have done good things. We may have
9 developed technology. We may have enhanced our
10 economic position. We may have learned scientific
11 knowledge. But we went there for prestige. Prestige, I
12 might add, is the fundamental reason why no President
13 will say we're going to send the astronauts home.

14 One of the reasons that Richard Nixon
15 approved of the shuttle, and John Erlichmann said this
16 in no uncertain terms, was that he was waffling on this
17 in the White House in 1971 time frame. Erlichmann said
18 he went in and talked to him. He said "Mr. President if
19 you do not approve this program you will go down in
20 history as the President that said we can't afford to
21 fly astronauts in space and they are heros." Nixon said
22 "you are right and I am not going to be that person." I
23 would suggest to you that's going to be the case today
24 as well.

25 So do we have an opportunity here to

1 reconsider all of the policy implications that human
2 space flight brings to the table? I might also suggest
3 out of those five reasons that I gave you only two of
4 them require humans in space; the human destiny,
5 survival of the species argument and the prestige
6 argument. You can do science without people. In fact,
7 you may be able to do it better without people.

8 You can do national security without people
9 up there. You can do the economics at some level
10 without people. If we're talking about asteroid mining
11 and mining the moon and some other things like that,
12 maybe down the road we're talking folks. But remote
13 sensing, communication satellites, navigational aids and
14 a lot of the other stuff that is economically viable
15 doesn't require anybody up there. I think with that
16 I'll quit. We'll have some questions if that is
17 appropriate. Thank you very much.

18 (Applause.)

19 MR. GARVIN: If you have questions, would
20 you please go to a microphone to make sure we get it on
21 the record? Are there any questions for any of the
22 panelists? There don't seem to be any questions. Thank
23 you very much.

24 MS. WASHINGTON: I'd like to thank those
25 speakers for their insightful perspectives on Columbia.

1 We're going to take a break now. There are
2 refreshments out in the main area. We will reconvene at
3 about 10:30. Off the record.

4 (Whereupon, the foregoing matter went off
5 the record at 10:06 a.m. and went back on
6 the record at 10:32 a.m.)

7 MS. WASHINGTON: On the record. Hello. We
8 need to get started. I have one announcement. I've
9 been asked to remind people to either turn your cell
10 phones off or put them on vibrate so we don't disturb
11 the panelists as they are speaking. Also, I understand
12 that there were some people who had questions from the
13 last panel. Is there anybody who had a question and did
14 not get an opportunity to ask? Okay.

15 This morning's presentation was an
16 appropriate lead in to our next panel which is "Human
17 Presence in Space: Considerations." This panel will be
18 facilitated by Mr. Ken Wong who is a Senior Engineer in
19 the Licensing and Safety Division. He's been leading
20 human space flight safety team within AST to identify,
21 research, and evaluate issues associated with the
22 carrying of humans on board commercial space
23 transportation vehicles. Therefore, it is quite fitting
24 that he is the moderator for this panel.

25 MR. WONG: Thank you, Michon. Good morning

1 and welcome to the conference and to this panel which I
2 believe you will find quite interesting. Before we
3 start with the panel, I'd like to acknowledge one of the
4 audience members. It's Dr. Kubota who is from the
5 University of Tokyo.

6 He's a professor in the Department of
7 Aeronautics and Astronautics. In his department, they
8 are working on concepts associated with human space
9 flight. I just wanted to welcome him from the
10 University of Tokyo.

11 (Applause.)

12 MR. WONG: To put everything in context,
13 there are a couple of things I first want to do for the
14 subpanel. First of all, I want to briefly describe the
15 purpose and focus of this panel. The second thing I
16 want to do is discuss briefly the significance and the
17 reason why we're having this panel.

18 First of all, the focus of this panel will
19 be to discuss issues and areas of consideration that
20 both industry and government will have to address in the
21 field of commercial human space flight. I make a note
22 that the focus is on commercial human space flight and
23 government human space flight which is associated with
24 NASA or the Air Force.

25 So the focus will be on the commercial

1 aspects of it. The reason we're focusing on the
2 commercial aspects of it is because AST licenses and
3 regulates commercial space launch activities. Some
4 people might question why are we concerned about humans
5 in space from the commercial world today, why now.
6 People might say I don't see any commercial RLVs flying
7 today carrying passengers.

8 The reason we're having this panel today
9 and the FAA is addressing issues in areas related to
10 commercial human space flight is because commercial
11 companies have approached the FAA, AST in particular,
12 and also has been in consultation with AST where these
13 commercial companies are proposing to carry passengers
14 or humans aboard the commercial reusable launch vehicles
15 as an example. That's the reason why the FAA is
16 currently and has been addressing issues related to
17 commercial human space flight.

18 As most of you are aware, X-Prize is an
19 example. We have had X-Prize potential contestants who
20 have come to the U.S., come to the FAA and potentially
21 may need to be licensed by AST. That's the reason why
22 we're having this panel and the focus on commercial
23 human space flight.

24 As far as commercial human space flight
25 today, another reason we're addressing it is to date AST

1 has licensed commercial space launch activities that
2 have not involved humans. The majority of the launch
3 activities that AST has licensed and regulated to date
4 have involved expandable launch vehicles where no humans
5 have been aboard the vehicle. There's a paradigm shift.

6 The primary responsibility of AST has been
7 to ensure public safety. When I talk about public
8 safety, I'm talking about the people uninvolved with the
9 launch activities. Now, if you have humans aboard, then
10 it throws into issues and considerations. Are those
11 passengers the uninvolved public or are they getting on
12 these commercial RLVs voluntarily? So there are a lot
13 of issues and policy decisions that will ultimately have
14 to be made once these commercial RLVs start carrying
15 humans aboard.

16 It also gets into the risk level. What
17 should be the acceptable risk levels for passengers,
18 especially for fare-paying passengers? What should be
19 the role of the government? Should the government be
20 concerned about the safety of the fare-paying passengers
21 on these RLVs or should it be similar to today where
22 voluntary risk is involved?

23 We always hear people climb Mount Everest
24 in which a lot of risk is involved. Unfortunately, a
25 lot of people lose their lives climbing Mount Everest.

1 So there are questions about should the FAA and what
2 level of risk should the FAA be concerned about once
3 these humans start flying aboard these commercial
4 vehicles. One thing for sure I can say the role of the
5 government is, the FAA will at least, as a minimum,
6 continue to ensure the safety of the uninvolved public.

7 As Michon mentioned earlier, I'm leading an
8 IPT or a team within AST. This team is identifying,
9 researching, and evaluating issues related to commercial
10 human space flight. This team is looking into a lot of
11 these issues which eventually may have a bearing on
12 policy decisions that will have to be made.

13 The next thing I would like to do is to
14 introduce our distinguished panelist members. Today we
15 have three panelists. They are from the government and
16 the industry, so we'll be able to hear from the
17 government perspective and the industry perspective and
18 also some perspective from the international side
19 related to commercial space flight.

20 Our first speaker is Ken Hodgkins. He's
21 from the Department of State. He's the Deputy Director
22 for the Office of Space and Advanced Technology. His
23 office represents the Department of State in national
24 space policy, review, and development. Mr. Hodgkins
25 also serves as the U.S. representative to the UN

1 Committee of the Peaceful Uses of Outer Space.

2 Our second speaker is Jeffrey Manber. He's
3 the President of Mir-Corp. Mir-Corp is an international
4 firm. Mr. Manber has been involved with several high
5 profile commercial space projects which have involved
6 the Russians and the Americans.

7 Then our third speaker is Jean-Michel Eid
8 of Aon Space. He is the Managing Director of Aon Space.

9 Aon Space is an insurance broker and also specializes
10 in risk management.

11 I would like to also acknowledge that
12 initially the panel was going to have four panelists.
13 The fourth panelist was going to be Brian O'Connor from
14 NASA headquarters. He's the Associate Administrator of
15 Safety and Mission Assurance. He was really looking
16 forward to being part of this panel, but unfortunately
17 due to the shuttle accident and his work committment
18 subsequent to that he was unable to participate in this
19 panel, nor was he able to find a replacement for him.

20 I'd like to say our thoughts are definitely
21 with the Columbia astronauts and their families. Before
22 we hear from the panelists, I'd like to describe briefly
23 the format of the panel. Each of the speakers will give
24 their presentation and talk for roughly 15 to 20 minutes
25 each. After each of the panelists have spoken, we will

1 have a question and answer period. I encourage the
2 audience to participate in the question and answer
3 period.

4 Our first speaker is Ken Hodgkins of the
5 Department of State. He is going to discuss some of the
6 international treaties that relate to humans in space.
7 I have asked him to relate these treaties to see what
8 bearing they could potentially have on commercial human
9 space flight.

10 MR. HODGKINS: Thank you, Ken. I'd like to
11 express my appreciation to the FAA for inviting me to
12 speak today. My talk will be keeping with the theme of
13 these conferences which is forecasting out into the
14 future. My presentation is in your loose leaf binder.
15 You are going to see that many of these questions are
16 not of immediate concern but will eventually have to be
17 addressed in some form if we are going to have a truly
18 commercial RLV human-rated program.

19 As I go through the presentation, I want
20 you to bear in mind a couple of things. I'm going to be
21 addressing the 1968 agreement on the rescue of
22 astronauts, the return of astronauts, and the return of
23 space objects. I'll also be discussing briefly the
24 current debate about the need or lack-there-of for a
25 definition or delimitation from outer space.

1 Both would have a bearing on commercial RLV
2 programs. If it's government programs, the treaties are
3 quite clear and the policy debate is quite clear. What
4 we are addressing today is what I would consider to be
5 strictly a commercial RLV program that may or may not
6 involve international participation.

7 The other thing I would ask you to bear in
8 mind is that all of the outer space treaties were
9 negotiated in the `60s and `70s during a time when
10 states were pretty much the exclusive users of outer
11 space. There was some contemplation that there would be
12 private activity, but certainly the drafters of the
13 treaties did not take into account every situation that
14 could conceivably come up in the future.

15 So in this particular case, it's going to
16 be an interesting analysis, and I'll leave it up to you
17 to come to your own conclusions, as to how would we
18 apply the current treaties to humans in space under
19 strictly commercial or private terms, no government
20 involvement other than the licensing. Then the third
21 thing to bear in mind as I go through this is the RLV
22 concepts that you are considering now.

23 My proposition is the following. If you
24 can stage a human-rated commercial RLV program from the
25 United States, return to the United States, you

1 contemplate no need for emergency landing sites around
2 the world, and you contemplate no possibility that you
3 may be landing and launching from foreign territory or
4 that you would be traversing through the air space or
5 that you would not be traversing through the air space
6 of another country. Then probably this is not
7 applicable because we could certainly argue that there
8 would be no need to discuss with other countries our
9 private human-rated RLV program if there was going to be
10 no international involvement contemplated, again,
11 whether it's having emergency landing sites or staging
12 launches or reentries on foreign territory.

13 The 1968 agreement on the rescue of
14 astronauts and return of space objects was first
15 contemplated in 1959 when the ad hoc UN outer space
16 committee met and suggested that there needs to be some
17 international agreement dealing with objects that might
18 unintentionally return to space to territories other
19 than to those of the launching state.

20 In the second idea, we said we would need
21 some sort of international agreement dealing with
22 assistance to astronauts in distress or astronauts that
23 may have landed unintentionally on territory other than
24 the territory of the launching state. Again, this is
25 all in your handout. These are fairly straight-forward.

1 The United States and the Soviet Union
2 obviously at the time had a strong interest in this
3 particular agreement as they did with the other
4 agreements. What we are seeking is some predictability
5 on how we operate in space, transparency as well. It
6 took an exchange of letters between the U.S. and the
7 Soviet Union to agree on some of the fundamental aspects
8 of the '68 agreement in order to get the negotiations
9 moving along.

10 Once we had this fundamental agreement,
11 things seemed to proceed quite rapidly. We were able to
12 conclude an agreement in 1968. Presently there are 88
13 states parties and 25 states that have signed the rescue
14 and return agreement.

15 For the agreement, I'll run through the
16 basic elements dealing with the return of objects and
17 then the return and rescue of astronauts. There is some
18 nomenclature that is quite specific in this case. We
19 have the launching authority as opposed to the launching
20 state. You can see the definition is fairly clear that
21 encompasses not only states that might be launching
22 objects and astronauts into space but international
23 organizations.

24 The next few slides will deal with the
25 return of objects. I raise this because if we have an

1 RLV program and there was an unintended reentry of your
2 RLV and this object had to land on foreign territory,
3 you would want it back. The U.S. would want it back.
4 The U.S. government would want it back. So these next
5 series of slides simply outline the terms and conditions
6 under which states cooperate on the return of objects
7 that might have unintentionally landed on territory
8 other than the territory of the launching state.

9 For us currently, we have pieces of debris
10 that do reenter that are discovered. We have sought to
11 have them returned to the U.S. We've returned several
12 items back to a country of origin as well. They are
13 primarily second stages. We had a nose cone from an
14 Ariane launch vehicle that washed up on the beach in
15 Corpus Christi, Texas a couple of years ago. But I
16 would submit for a commercial RLV operator if you had an
17 accident or an unintended reentry, you would want your
18 object back.

19 Essentially if a contracting party or party
20 to the treaty finds an object that they believe to be a
21 space object in another state, they seek to identify
22 that object and contact the launching authority. If
23 there is a reason to believe that object is hazardous,
24 the contracting party will seek from the launching
25 authority information on the harmful nature or perhaps

1 non-harmful nature of the object that has been
2 discovered.

3 The treaty contemplates a certain level of
4 cooperation between the contracting party, that is the
5 party that discovers the object, and the launching
6 authority in terms of locating and identifying the
7 object. In the event that the launching authority wants
8 the object back, and they aren't required to take it
9 back, then they are obliged to reimburse the contracting
10 party for any expenses that might have been incurred in
11 the return and recovery of the object.

12 The other part of the agreement deals with
13 astronauts. In this 1967 outer space treaty, astronauts
14 are treated quite specifically and they are given a
15 special status. Basically the state parties shall
16 regard astronauts as envoys of mankind and then shall
17 render to them all possible assistance in the event of
18 an accident or emergency landing on territory of another
19 state or on the high seas.

20 When astronauts make such a landing, they
21 shall be safely and promptly returned to the state of
22 registry of their space vehicle. In carrying out the
23 activities in outer space, the astronauts of one state
24 shall render assistance to the astronauts of other
25 states parties.

1 Finally, should the state parties to the
2 agreement learn of any phenomena in outer space or on
3 the moon or other celestial bodies which could
4 constitute a danger to the life or health of astronauts,
5 they should make that information available. So in the
6 basic outer space treaty of 1967, states parties take on
7 certain obligations to help astronauts in a variety of
8 circumstances.

9 From those provisions of the `67 treaty, we
10 have in the `68 treaty very specific provisions dealing
11 with rescue and return of astronauts. In there, there's
12 an obligation for states that receive information that
13 personnel of the space craft are in distress to notify
14 the launching authority or immediately make a public
15 announcement if they don't know who the launching
16 authority is. They will notify the Secretary General of
17 the United Nations.

18 In the event of an emergency or unintended
19 landing, if the personnel of a space craft is in
20 territory under the jurisdiction of a party, that party
21 shall render them all necessary assistance and inform
22 the launching authority and the UN Secretary General of
23 the steps its taking and their progress. Under this
24 particular provision, the launching authority is asked
25 to contribute substantially to the effectiveness of the

1 search and rescue operations of the contracting party.

2 The launching party shall cooperate fully
3 with the contracting party upon request. Interestingly
4 enough, the operations shall be conducted under the
5 direction of the contracting party if these search and
6 rescue operations are taking place on the territory of
7 the contracting party as opposed to the launching
8 authority directing the rescue operations.

9 This provision deals with the question of
10 what happens if you have astronauts landing on the high
11 seas or in territory that's not under the jurisdiction
12 of any one state. Again, it asks that contracting
13 parties to the agreements provide all possible
14 assistance to help the astronauts.

15 This one is quite straight-forward. If an
16 astronaut lands in your territory, you have to return
17 them. You can't keep the astronaut. This is a product
18 of the Cold War, but I think it would still be true
19 today. The U.S. and the Soviet Union were very
20 concerned about operations that might lead to the
21 astronauts landing in the territory of one another and
22 either not giving them back or allowing the astronauts
23 or in this case cosmonauts to choose not to return to
24 the Soviet Union and seek asylum.

25 It was never really fully resolved as to

1 what would have happened in that instance whether we
2 would have forcibly handed over the cosmonauts if for
3 some reason they had landed in territory under the U.S.
4 jurisdiction. But the general concept is that these are
5 envoys of mankind and they should be returned to their
6 homeland should you assist them in the event that there
7 is an emergency or that they were in distress.

8 So it's very specific concerning how
9 contracting parties to the treaty will handle
10 astronauts, will handle space objects. What you have to
11 think about is under a strictly commercial human-rated
12 RLV program do we consider those people, private
13 individuals, to be astronauts for the purposes of the
14 treaty.

15 Are they envoys of mankind? Are they to be
16 given special rights and privileges that the average
17 citizen would not have on an international basis? It's
18 quite clear that as an astronaut you have very specific
19 privileges that aren't necessarily extended to other
20 forms of exploration or transportation.

21 The next issue that would have some bearing
22 on commercial RLV operations internationally is the
23 question of the definition and delimitation of outer
24 space. This is a very academic question in many
25 respects. It was first raised in 1967 and has been

1 debated within the UN context since that time. There
2 are basically two schools of thought.

3 One is there needs to be a definition. The
4 other school of thought is there doesn't need to be a
5 definition. Within the context of the view that we need
6 a demarcation, those countries tend to feel that there
7 needs to be a clear indication of where air space ends
8 and the rules governing air transport and where space
9 law would begin in order to protect sovereignty,
10 national independence, non-interference, and domestic
11 affairs.

12 In addressing the question of a need for a
13 definition or delimitation, there are two approaches
14 that this body of thought would take. One is a direct
15 approach in which you would make a clear demarcation at
16 a certain altitude. This is where one legal regime
17 applies. This is where the other legal regime applies.

18 The other approach is an indirect approach in which
19 space would be defined in terms of the devices employed
20 or the activities carried out.

21 In the first case, some have suggested that
22 space higher than 100 to 110 kilometers above sea level
23 should be considered outer space and that space objects
24 should maintain the right of flight over the territories
25 of states at lower altitudes when they went into orbit

1 or returned to earth. But that would not imply that the
2 altitude of 100 to 110 kilometers above sea level would
3 automatically be adopted as the ceiling for air space.

4 The question of the regime of space below
5 that altitude would continue to be the object of further
6 discussion up to the moment when a final agreement was
7 reached and a boundary established between air space and
8 outer space. So you have the view that you could set a
9 demarcation at a certain altitude where one regime would
10 take the place of another regime.

11 Within even that context, there is another
12 view that is taken which is if you can't set that
13 demarcation then we'll just take a functional approach.

14 If it's a space object, then space law applies solely
15 to it. If it's an aircraft, then it's just air law. If
16 it's in between, what they call aerospace objects, we
17 probably will need to come up with some other way of
18 approaching that. Again, you would have to look at the
19 question of RLVs and their properties to determine
20 whether or not we would need another regime to deal with
21 those operations.

22 The alternative view to all of that, and
23 the one that we share, is that the definition of outer
24 space is neither necessary or feasible. There have been
25 no practical difficulties, no scientific or technical

1 justification for this. An arbitrary definition could
2 lead to complications because of the inability of most
3 countries to observe and control a designated boundary.

4 Delimitation of outer space could impede
5 technological development. The outer space law has been
6 successfully developed and applied. The establishment
7 of a definition could cause more problems than it would
8 solve. Interestingly enough, this question of the
9 definition and delimitation has been addressed from a
10 legal standpoint by the government of Australia.

11 I'm not sure if they have actually done it
12 or are in the process of doing it. But for the purposes
13 of their space act and for regulating private activity
14 in space conducted from Australia, they've told their
15 companies that they will apply the space act to
16 activities that are contemplated to take place above 100
17 kilometers. That's not without prejudice to air space
18 actually begins or air space actually ends. They feel
19 it adds a bit of transparency and predictability to the
20 activities of their potential commercial operators in
21 space.

22 That concludes my discussion on this. I
23 look forward to any questions that you might have. I
24 know I ran through these slides fairly quickly, but as I
25 said they are fairly complete and you get a good idea of

1 what the treaties deal with in terms of space objects
2 and astronauts. Thank you.

3 (Applause.)

4 MR. WONG: Thank you, Ken. That was quite
5 an informative and quite an interesting discussion and
6 presentation. Our next speaker is Jeffrey Manber of
7 Mir-Corp. Mr. Manber will provide both an industry and
8 international perspective on issues and considerations
9 related to commercial space flight.

10 MR. MANBER: Thank you, Ken. Good morning
11 everyone. It's a pleasure to speak here before such a
12 distinguished audience and distinguished panel. Like
13 many of you, I have been rethinking where we're going
14 and where the industry is going, so I ripped up a lot of
15 the view graphs.

16 But I want to begin on a very optimistic
17 note. Those of us at Mir-Corp have seen your future and
18 it works. There is a market for commercial manned space
19 activities. There is a demand. There are a lot of
20 hurdles. There are hardware hurdles. There are
21 technical hurdles. There are psychological hurdles.
22 But there is a market. We've shown that. We're living
23 that. That's the optimistic comment for this morning.

24 Commercial space exploration as all of you
25 know has been a mixed success at best. It's been a

1 failure for investors. There has not been in the
2 satellite market a success story to date. No one can
3 walk away and say I've made a lot of money from
4 investing in manned space activities. It's been a
5 failure for program development, and that's your job to
6 try and change that and get us more hardware. We need
7 more hardware. We need to lower the cost. We need to
8 make it more routine.

9 To date, however, we've really been focused
10 on the Russian hardware because it's commercially
11 available and the price supports a limited market. So
12 we are driven completely by commercial considerations.
13 If there was another hardware that we could use at a
14 price that's market supported, of course we would use
15 that. But our decision purely as commercial people is
16 to go with the hardware that has been available.

17 We're very proud of the fact, and I'll
18 touch on this in a few moments as well, that we have
19 played a role in changing the public's perception on
20 space exploration. You can take the following statistic
21 as an achievement or as a symbol of the status of our
22 educational programs in high school today. A recent
23 poll showed that a majority of young Americans couldn't
24 name a single astronaut that's gone to ISS. They
25 thought that Lance Bass had gone to ISS. They could

1 name Dennis Tito as well.

2 So we've played a role in showing the
3 younger generation that there is a value for going to
4 space for the Dennis Titos, the Mark Shuttleworths, the
5 Lance Bass, the James Cameron, the people who are non-
6 professionals who dream of going to space.
7 Unfortunately as the "San Francisco Chronicle" recently
8 said NASA has made space exploration boring for the
9 American public. That's a tragedy as well. That's a
10 tragedy for all of us.

11 We were created to solve the structural
12 limitations in the manned commercial space market. At
13 Mir-Corp, it's our belief and what we follow is the
14 aviation model. We believe that the immediate future
15 for the space industry, and when I say "space industry"
16 I always mean the human space exploration or human space
17 program, we should follow and we need to follow the
18 aviation model.

19 In aviation today, there are two major
20 manufacturers; Airbus and Boeing. They make hardware.
21 They don't sell tickets. Boeing and Airbus would never
22 consider selling tickets to you and to me. When you
23 flew to Washington, when you fly home, when you go
24 somewhere, it's on Virgin Air or British Air or American
25 Airlines or U.S. Air. Those people don't make the

1 hardware. They don't know how to make the hardware.

2 The president of U.S. Air or United
3 Airlines doesn't know how to fly the planes, doesn't
4 know how to make the hardware. But that company knows
5 how to sell tickets. They know how to market. Not only
6 that, the hardware manufacturers understand it's better
7 to have more than one person marketing. It's good to
8 have two or three or four or five companies out there
9 selling tickets for their hardware.

10 So Mir-Corp was created. We reached an
11 agreement with what we consider the best, the only
12 commercial space hardware manufacturer in existence
13 today, and that's RSC Energia. We didn't go to them
14 because they are Russian. We went to them because they
15 make a good product at a good price and they are
16 available. So we are in essence the part of that
17 manufacturer that sells the tickets.

18 It's a rough analogy, but it's an analogy
19 of why we were created, how we were created, and how we
20 view the industry today. It's my personal feeling that
21 if the government was running the aviation industry the
22 way they run the space program we would probably have
23 about five flights a week to Europe, the cost would
24 probably be \$10,000 a ticket, there would probably be
25 about five or ten studies every year showing that

1 there's no need to invest in further hardware because
2 there's no market to go to Europe because the price is
3 too high.

4 So we're extremely leery of government
5 involvement in operations. We have seen and we believe
6 time and time again it is not the proper function of
7 government to be involved in operations.

8 We've used existing Russian hardware. It's
9 proven. We would be delighted to use different
10 hardware. If any of you have something today or soon
11 available, we're delighted to use it. Again, it's very
12 important to us to tap into the public excitement of
13 manned space exploration. That is why we're doing it.
14 You can define all of these reasons; economic
15 justification, political. It's exciting. There's
16 nothing wrong with that even in today's turbulent era.
17 There's nothing wrong to say we're doing it because it's
18 simply exciting.

19 Also, we use awkward language here. "Use
20 of non-government funds for budgeting." It's also
21 extremely important that we have brought into the space
22 program a significant amount of non-government money.

23 A brief history. We leased, as many of you
24 know, the MIR Space Station for several years. During
25 that time, we supported the only mission to ever go to

1 space with no taxpayer money. We sent two human beings
2 to space to a space station for 77 days at a cost to us
3 of roughly \$25 million. There was a lot of argument at
4 the time. There was a lot of controversy. Dan Goldin
5 testified before Congress that we had somehow used a
6 trick to get the low cost.

7 It wasn't a trick. We had a relationship
8 with our hardware manufacturer. The hardware
9 manufacturer, Energia, got rewarded three ways. First,
10 we paid them as a contractor for the Soyuzes and the
11 Progresses and the crew training. Second, they had a
12 percentage of the shares of stock of Mir-Corp. As a
13 company, we hoped that they benefitted. Later it turned
14 out they didn't, but at the time we were all hopeful
15 that they would benefit from their owning part of Mir-
16 Corp. That's risk versus reward.

17 The third part in which Energia benefitted
18 was a future profit if they existed. It's an
19 embarrassment for me, and I don't mind saying this to
20 you, to have to explain over and over to people like Dan
21 Goldin and to some of the folks On the Hill the concept
22 of risk versus reward, the concept of appreciation of
23 shares of stock. That's why we got a better price for
24 the Soyuzes. That's why in the future we will get
25 better prices for hardware.

1 Our hardware manufacturer is taking a risk.
2 They are doing that for certain reasons that they best
3 understand. We might call that here in the states
4 vendor financing. But for some reason when it involves
5 manned space, everybody got into an uproar that we were
6 getting a better price than NASA was getting. It really
7 was a wonderful example of the Russians understanding
8 our system of profit.

9 When we announced the leasing of the MIR in
10 London, we said one of our markets was to have private
11 citizens fly. Everyone laughed at us. Even the
12 reporters laughed. They said you'll never find people
13 who will go to space. Of course, we found Dennis Tito.

14 Subsequently, we have learned that there are others;
15 others that have flown, Mark Shuttleworth, others that
16 want to fly, whether it's Lance Bass, James Cameron and
17 others who have gone public and have not gone public.

18 I want to make an important distinction
19 here, especially in the post-shuttle tragedy period.
20 When we talk about commercial, it just doesn't apply to
21 non-professionals. It's overlooked in the media time
22 and time again and in the industry that the European
23 Space Agency has entered into a commercial relationship,
24 a commercial contract with RSC Energia, with
25 Rosaviacosmos to fly their professionals, but it's a

1 commercial contract. If they did not enter into that
2 commercial contract, there would be no European
3 astronauts in space until their module was up there.

4 They did a wonderful thing. They went to a
5 private company, RSC Energia, and said can we get into
6 the station sooner than our government to government
7 relationship would otherwise dictate. The Russians said
8 yes, we will give you a flight opportunity, the second
9 seat, for you to fly your ESA candidates. So when we,
10 all of us in this room, talk about the value of
11 commercial, when we talk about if there was a market
12 there, we're not just speaking about non-professionals.

13 We're also speaking about government space agencies.

14 I'm very pleased that there has already
15 been a model, the European Space Agency, that has shown
16 that governments can behave commercial. I think that
17 model should be more studied by NASA, by the folks On
18 the Hill. It's a very good model for us to think about
19 and how NASA behaves in flight opportunities in the
20 future.

21 Here is the other point I'd like to make
22 this morning. Roger in the first panel was talking
23 about all those phone calls some of us have gotten. One
24 of the points that I made continually when we got some
25 of those phone calls was we never referred to Dennis

1 Tito or Mark Shuttleworth or any of these folks as
2 tourists. They are not tourists to us. They were
3 citizen explorers. They were some name that we tried to
4 come up with to talk about something that is different.

5 They are not professionals, but they are
6 not tourists. It was the media that loves to focus on
7 these things, and the media that called them tourists,
8 and the media that called space hotels. It does a
9 disservice, as we are reminded so tragically today, to
10 the dangers that exist in space exploration. Once
11 again, there is not a contradiction in having a non-
12 professional go and the dangers that exist.

13 So we believe that there is a future for
14 non-professionals. We believe there is a future for
15 commercial. In fact, I'll even go further and say this
16 morning to me there was a greater public value in Mark
17 Shuttleworth's mission. For those of you who are not
18 familiar with it, it was a wonderful mission where this
19 Internet businessman from England and South Africa
20 elected to do a scientific program.

21 From what I understand, he really
22 electrified Africa and gathered a lot of attention to
23 using space for a lot of good purposes. In my mind,
24 that is better for our program than risking the lives of
25 seven astronauts for cargo delivery let's say. We have

1 learned that lives are precious. We know that space
2 exploration is dangerous and difficult. Yet, when I
3 look at a scale of justification, when I look at a scale
4 of sending humans into the dangers of space, I would put
5 Mark Shuttleworth's mission up there as a wonderful
6 example of what a non-professional can do.

7 Again, there are many in this community who
8 will dismiss a Shuttleworth mission because he wasn't
9 and isn't a professional. So the reason I raise that
10 this morning is I think we need to rethink several of
11 the ways we regard space exploration and our space
12 program. The first obviously is that at times non-
13 professionals can contribute more or not less than a
14 professional. Secondly, a government can behave
15 commercially.

16 Those are two proven facts. If I was
17 addressing a body like this one two or three years ago,
18 both of those facts would be unproven. There would be
19 many of you in the audience or many at the government
20 space agencies who would take exception to it. But
21 we've proven that, not Mir-Corp. All of us in this room
22 have proven that in the last few years that it can be a
23 commercial human space program. You can have non-
24 professionals fly. There is a market.

25 Now given all that, what do we do to expand

1 this market? Of course, we want to make sure it's safe.

2 What's the role of government? One of the things we're
3 most proud of is that in our mission with the two
4 cosmonauts we conducted dozens of scientific
5 experiments. Again, there's a perception somehow that
6 because it's commercial it's only going to be movies or
7 something like that.

8 We were extremely delighted with these
9 imaginative ideas that some of the Russians, French, and
10 Germans had for which they had no funding. We flew them
11 at no cost because we were trying to make the point that
12 there is not a conflict between commercial and
13 scientific research. There's not a conflict between
14 long-term R&D and short-term.

15 One of the projects we flew was a French
16 perfume company which wanted to remain anonymous and
17 secret at the time. They continue their space based
18 research. They were delighted that they could fly on a
19 Russian space station that was at that time operated by
20 a Dutch company. There's nothing wrong with that. It's
21 good in my view.

22 It's the future for everyone who is
23 thinking of doing RLVs. I would say, and it's not my
24 expertise and I don't know your backgrounds, some of you
25 will have hardware backgrounds and we have a marketing

1 background. It sounds like a good partnership. Don't
2 try and do both. Don't be the Boeing selling the
3 tickets. Don't be the NASA trying to come up with the
4 market before it exists.

5 We've learned that the market moves in
6 unpredictable ways. We never thought that certain
7 things would be markets. We're in discussions on some
8 things that we never thought of but there seems to be a
9 market for it. I guess I can conclude it in several
10 thoughts.

11 The first is there is a market for what you
12 are doing. We need to develop that commercial market.
13 Customers can be government space agencies. Customers
14 can be governments. They can be Hollywood egotistical
15 horrible people. That's the customer. At one point,
16 one of my Russian colleagues turned to me and one of the
17 perspective clients and said on one sense we like the
18 government driven model more because we can say no to
19 someone who comes in the door. In your capitalist
20 structure, the customer is the customer even if we don't
21 like them. There is truth to that.

22 We've learned there's a lot of problems
23 with commercial. We've learned that you can't control
24 the customer as much the way you can a NASA astronaut or
25 an ESA astronaut or a Russian cosmonaut. But the beauty

1 is that this commercial path has excited the public.
2 This commercial path has shown us that space still has
3 some intrinsic value deep within all of us whether it's
4 school children in America or Europe or South America or
5 Russia. There is something special about this place.
6 The job for all of us here is to figure out how to solve
7 these structural impediments.

8 A couple of thoughts if I may as we are all
9 thinking about the future of the shuttle program. I
10 remember after the Challenger tragedy, Ronald Reagan's
11 people launched an interagency review for several
12 months. I think it was in about June of that year that
13 the President signed the decision pulling the shuttle
14 out of the commercial satellite and limited that to
15 unmanned.

16 It's clear to all of us that although space
17 is a dangerous place there are gradients of danger. The
18 shuttle is a temperamental vehicle. I'm hopeful in all
19 of the policy discussions and all the hearings we will
20 not ignore the fact that today after this second tragedy
21 America is not grounded in space. The space shuttle
22 fleet is grounded. America is not grounded.

23 We have astronauts up there. Astronauts
24 can fly again. We were joking before, I remember the
25 battle of '93 when the inclination of the planned space

1 station was changed. At that time, there were a lot of
2 people who fought those of us, if I may include myself,
3 who wanted the higher inclination in order to get the
4 robustness that we would have the ability to send crews
5 to and from the station using the Russian hardware and
6 cargo.

7 There were a lot of people at that time who
8 said no, our future is the shuttle. I think all of us
9 in this room, as business people who have business plans
10 and have to convince investors to give us money for
11 projects, know you're not going to get the money if
12 there is only one way to space. You're not going to get
13 the money if we remain dependant on any one hardware
14 system.

15 So we should take a moment and realize that
16 sometimes policy is ugly and sometimes it doesn't work,
17 but the correct decision was made for the \$100 billion
18 space station program for the future of America in
19 space. Today, we have another way to go to space.
20 Should, God forbid, a tragedy happen to the Russian
21 hardware in a year or two years or five years, maybe
22 your RLVs, maybe the space shuttle will be the way to
23 get the crew down and continue exploration.

24 The thought I want to leave you with is
25 that there is no easy answer to how to develop this

1 market. Mir-Corp was one experiment. It worked in some
2 ways. It failed in others. As you launch your programs
3 and your ambitions keep in mind that we have to solve
4 some very basic problems, but we should also be aware
5 that we've already made extraordinary progress. Thank
6 you.

7 (Applause.)

8 MR. WONG: Thanks, Jeffrey, for covering
9 both perspectives from industry and also from the
10 international side. Our final speaker is Jean-Michel
11 Eid of Aon Space. Mr. Eid will touch on insurance
12 related to humans aboard commercial space transportation
13 vehicles. I think you will find it interesting.

14 MR. EID: Thank you, Ken. Thank you for
15 inviting me here today to address the challenges facing
16 the insurance community when rating new access to space.

17 I thought first I would borrow a format used by a
18 famous talk show host to discuss how the insurance
19 community looks at rating new technologies without the
20 benefit of actual flight data, in accordance with Jeff's
21 statement, to help overcome the many technical hurdles
22 facing this new industry.

23 I'm approaching today's speech by sharing
24 with you a collection of insurance misconceptions that
25 have accumulated over the 20 years. First and foremost,

1 no two RLVs are alike. Hence, the first challenge in
2 establishing an appropriate insurance approach.

3 Each is driven by different technologies
4 and business plans. Is it an airplane? Is it a
5 balloon? Is it a rocket? Is it an elevator? Is it a
6 combination of some parts? There certainly has been no
7 lack of imagination in the design concepts of these
8 RLVs.

9 Each company is driven by different
10 philosophies on testing and quality assurance. Each
11 boasts a design reliability greater than the other. Even
12 at 0.99999999, anomalies still occur that can only be
13 discovered through the review of actual flight data.
14 Each company has different financial requirements that
15 need to be protected. Each has different, varying
16 thresholds of losses.

17 Launch contracts, for you attorneys out
18 there, for paying passengers are 15 pages long. They
19 describe all sorts of definitions and terms of
20 conditions as opposed to the E ticket that we get in the
21 aviation with its implied limiting liabilities. The
22 bottom line is we as an insurance community cannot
23 standardize an insurance product as we have to recognize
24 the individual merits and differences to help us lead to
25 an insurance solution for the RLVs.

1 The next challenge facing us is that the
2 law of large numbers, the most fundamental of principles
3 in insurance, doesn't seem to apply with launch
4 vehicles. I'm sure most new companies would be elated
5 to have more than ten launches per year. Therefore, the
6 sampling of launches isn't large enough today to allow
7 us to establish a statistical baseline with a high level
8 of confidence.

9 The automobile industry or the life
10 insurance sector know almost with certainty how to
11 structure their insurance programs so that the premiums
12 of the fortunate pay for the misery of the few. To
13 boot, the claim amounts are potentially large. Any one
14 loss can easily wipe out years of premium reserves.

15 So in light of all this, how does one
16 establish a relationship with the space underwriters?
17 We first need a desire for a long-term relationship. In
18 other words, can a company survive a loss? My advise is
19 certainly not to view insurance as an investment
20 opportunity. Very quickly, people realize that premium
21 is a small percentage of a potential large claim. So
22 this is not an opportunity not to address the moral
23 hazard this implies.

24 A company cannot use insurance as a safety
25 net. On the other hand, it has to embrace the scrutiny

1 by underwriters of their due diligence process. In
2 order to mitigate these issues and demonstrate
3 confidence in the technology, underwriters will no doubt
4 initially look to companies to share in the risk they
5 are insuring for at least the first three to five
6 launches.

7 Risk sharing is not uncommon with early
8 launches as a means to lower premium and to draw
9 capacity to the rest and can be achieved in many ways.
10 If risk sharing is not an option, there are established
11 barometers of risk assessment which include a complete
12 review of the business plan and the launch commitments
13 this company might have; a complete review of the
14 technology at all levels including design margins,
15 redundancies, component and subcomponent, flight
16 heritage and reliability, quality assurance and test
17 plans, and maintenance plans to mention some.

18 Furthermore, underwriters will look at
19 management's experience and administrative procedures
20 relating to the operations of the launch mission. How
21 were anomalies addressed and corrected? What resources
22 will be brought to an anomaly review board?

23 What lines of communication have been
24 established between the management and the launching
25 team as well as for the underwriters? What is the

1 ability to recover from an emergency aboard situation?
2 All in all, an open line of communication and complete
3 visibility into design reviews and testing are key
4 ingredients in establishing successful relationships
5 with the insurance community.

6 One of the biggest misconceptions in
7 insurance is that it's completely unavailable for new
8 technologies. Often the insurance industry is called
9 upon to insure flights of new rockets or new
10 technological breakthroughs for satellites. We have
11 seen this year's examples of such which included the
12 Delta IV flight and the first Atlas V launch. We've
13 also seen insurance placed on the Sea Launch and Ariane
14 5, not to mention first satellite types and missions of
15 all kinds. Capacity can always be obtained.

16 Space insurance had its debut in the late
17 '70s as most of you know with an available capacity of
18 approximately \$50 million. Through normal cyclical
19 patterns caused from market successes and failures, and
20 a tough skin I should add, insurance has always managed
21 to be available with capacities sufficient to cover
22 several losses in any given year. Today, the space
23 capacity has approximately \$700 million which no more
24 than on average \$250 million is ever at risk per launch.

25 This capacity resides amongst a handful of

1 underwriters worldwide, each subscribing to different
2 ways of looking at a risk. It is therefore the job of a
3 broker, like myself, to get a consensus in line with the
4 coverage being sought and at acceptable terms.

5 This is the most fun misconception. Space
6 insurance offers no coverage. I can tell you it's true
7 that collecting a claim is no easy task. Recently,
8 underwriters have restricted and even excluded a lot of
9 coverage, but still in the policies there maintains a
10 lot of coverage to cover any types of incidents during
11 any type of phases.

12 Specifically during the pre-launch, launch,
13 docking, in-orbit maneuvers, reentry, landing, post-
14 launch operations, passenger liability, third party
15 liability, war, terrorism, and even political risk
16 contract frustrations are all available policies that
17 could respond to any type of situation whether to
18 protect the insured from a loss of revenue perspective
19 or its assets or simply for extra expenses such as
20 providing a first class ticket to the astronauts back
21 home in case of an emergency landing anywhere else in
22 the world. Should the rate associated with the risk not
23 be commensurate with the perception of the risk, there
24 are other markets outside the traditional space
25 insurance market that can be explored.

1 Insurance brings little value to the
2 program. That has to be one of my favorites. Insurance
3 is typically the second or third largest cost component
4 to a program. The values that it brings are numerous.
5 It is foremost and utmost an enabler of financing as it
6 can be used as a stamp of approval for the technology in
7 question leaving the marketing risk the only portion to
8 be evaluated by the financial community.

9 It can indemnify a company for its assets
10 lost as well as for its revenue faster and cheaper than
11 it would take otherwise to raise the equivalent amount
12 of capital to correct the problem. It certainly is
13 meant to provide business continuity when confronted
14 with an unexpected setback with the company's
15 technology. It can also be used as a marketing tool to
16 warranty products based on some financial returns to its
17 clients due to under performance of the contract.

18 That all being said, there's no doubt in my
19 mind that despite its risks space tourism will thrive
20 one day, hopefully very soon. But it will require a
21 launch history laden with successes, a broker who is
22 specialized in space and understands not only the
23 technology but also the insurance market dynamics to be
24 able to structure and successfully place an insurance
25 program that responds to all the requirements an RLV

1 company might face.

2 It also would require a strong commitment
3 from the financial community as well as a strong support
4 from government. I thank you for your attention. As
5 they say, I hope to see you in orbit one day.

6 (Applause.)

7 MR. WONG: Thanks, Jean-Michel, for
8 providing the insurance aspects with relation to
9 commercial human space flight. Now we're going to begin
10 the question and answer period. We'll open up questions
11 to the audience. I think we're going to be handing out
12 microphones. Before you state your question, if you
13 could state your name and your affiliation, it would be
14 appreciated. Are there any questions from the audience?

15 MR. GIBBS: Graham Gibbs from the Canadian
16 Space Agency. I have a question for Ken. Do the UN
17 treaties cover the obligations of the launching state or
18 organization with regard to damage that might be caused
19 on the ground or environmental clean up due to hazardous
20 materials that might have been dispersed in an accident
21 or crash for example or is it a cross-waiver?

22 MR. HODGKINS: Yes, we do have a 1972
23 agreement on liability for damage caused by a space
24 object. That covers damage that might occur to an
25 object in space, on the ground air craft, or third party

1 individuals. So there is no cross-waiver unless
2 governments among themselves waive liability.

3 That agreement applies to damage to third
4 parties. If you are a citizen of the U.S. and a U.S.
5 space object causes damage to you or to your property,
6 that convention does not apply in those instances, only
7 the third party damage.

8 MR. WONG: I would just like to follow up.

9 For today, launch vehicle operators that require a
10 license from AST are required to have insurance coverage
11 or financial responsibility requirements associated with
12 third party coverage. That is a requirement of the
13 license from AST. Were there any additional questions
14 for us?

15 MR. GREASON: Jeff Greason from XCOR
16 Aerospace. I also have a question for Mr. Hodgkins. I
17 think I can best phrase this as a hypothetical.
18 Envision that you have a private operator that's flying
19 a reasonable launch vehicle system, just to have a
20 picture in your mind, not dissimilar from a space
21 transportation system, the space shuttle.

22 You take off. You have a down-range abort.

23 The orbiter lands in someplace not terribly friendly
24 like Libya. They stand up and say you can't have that
25 back because it's not a space vehicle. It's an

1 airplane. It's got wings. It flies in the air. It
2 looks like it was meant to land on a runway. I don't
3 see any airworthiness certificate. That means under air
4 law I can keep it. How do they know it's supposed to be
5 a space object?

6 MR. HODGKINS: Thank you. That's a very
7 good question because there are whole number scenarios
8 that I didn't run through or hypothetical scenarios
9 where there are still questions. In the one that you
10 are raising, that's probably one of the more obvious
11 scenarios that would need to be looked at because I
12 think probably Libya is a party to the treaties.

13 But where we would have a question in our
14 own minds is what do we do to protect that private
15 operation and make sure the rest of the world recognizes
16 that vehicle is a space object for the purposes of the
17 treaties and that the people on that object should be
18 treated as astronauts. It's not entirely a foregone
19 conclusion that everybody would reach the same view.
20 There would be a difference of opinion as to whether or
21 not that particular operation has the same rights and
22 privileges that the space shuttle has.

23 The space shuttle is quite clear. It's
24 really unambiguous. If another country chose not to
25 cooperate with us, it would be for all of the wrong

1 reasons. I'm suggesting in the RLV community you need
2 to look at the protections there. I just would like to
3 add another scenario.

4 A number of years ago there was a movie
5 called "White Knights" with Mikhail Baryshnikov and
6 Gregory Hines. It was about Baryshnikov who had
7 defected to the United States. He was on an airliner
8 that was traversing Siberia. It lands unexpectedly. He
9 didn't have any right to go back to the United States.
10 The Soviet Union at the time considered him to be a
11 Soviet citizen so they kept him.

12 You could easily have a similar scenario
13 with a commercial RLV. Do we want to extend those
14 rights to the people on the RLV, or do we treat them
15 like we would treat airline passengers?

16 MR. DINERMAN: Hi, Taylor Dinerman, Space
17 Equity. This is for Jean-Michel. Jean-Michel, you said
18 that companies like yours need transparency from RLV
19 manufacturers or from anyone you want to insure. Today,
20 under these circumstances and under ITAR regulations,
21 giving transparency to insurance companies that are
22 based in nations such as France is going to be very
23 difficult and it's going to be very difficult in the
24 future I believe.

25 MR. EID: Thank you. First of all, I'm not

1 French. That's a very good question. We have steps
2 already in place with the State Department and the ITAR
3 office to allow us to transport technology to
4 underwriters overseas. These have to be on a pre-
5 approved list. The technical package that is sent to
6 them has to be reviewed by DTRA for approval of
7 exportation. This is in place. It adds to the process
8 maybe four to five weeks, so that has to be planned
9 ahead of time.

10 MS. BRECHER: I'm Aviva Brecher with the
11 DOT Volpe Center. This is a question for Mr. Manber. I
12 was curious how you can call this a market when the MIR
13 vehicle was state developed, state operated and owned.
14 The launch site was state developed, state operated and
15 owned. The launch vehicle was likewise. So the market
16 we're talking about is incremental to a very large
17 investment. How large do you think this commercial
18 market for space exploration by private individuals is,
19 and how would you ensure that? How did you ensure Mr.
20 Tito against a mishap at launch, in orbit, or on
21 reentry?

22 MR. MANBER: Those are interesting,
23 philosophical questions. When I refer to "market," I'm
24 talking about the customer-driven side. You are correct
25 that MIR was developed by the government. You are of

1 course correct about the vehicles. The important thing
2 from my view point as a business person is that I can
3 get that opportunity at a cost for which there is a
4 market. If we can lower the cost and do a multiple buy
5 of Soyuz, the market would increase. That way, we can
6 offer private flights.

7 When I speak of market, I'm speaking of the
8 demand side. As a business person, it's utterly
9 unimportant to me how that hardware was developed. I
10 leave that generally to the state and others to make
11 sure it's all in international agreements. The analogy
12 once again with the aviation community may be that the
13 early Boeings came out of the military side and the
14 hardware was developed because of the U.S. government's
15 need to have certain military aviation. How that
16 transfer took place in Boeing is not a concern when you
17 buy your ticket.

18 With regard to Dennis Tito, the Russians
19 routinely provide insurance for their people and the
20 people who fly in the Soyuz. It's routinely available.

21 They have very good rates. He could have handled that.

22 It's not an issue. It's an accepted statistic. They
23 are comfortable with a certain price of insurance.

24 Actually, I believe with Tito he did take
25 insurance but it was an extremely unimportant part to

1 him because he has a certain amount of wealth and he
2 doesn't say I'm not taking care of my kids. To answer
3 the basic part of your question, where that hardware
4 comes from is less important to the business community
5 than market demand.

6 MR. WONG: Are there additional questions
7 from the audience? I guess I have a few questions for
8 the panelists. For Ken Hodgkins, you mentioned about
9 the outer space treaty and the rescue of the astronauts.

10 So I guess there are still some questions about fare-
11 paying passengers, these non-professional astronauts,
12 and whether or not they would fall under the treaty.
13 What is it going to take to decide whether or not they
14 fall under the treaty?

15 MR. HODGKINS: I don't want to prejudge any
16 final decision. In the case of Mr. Shuttleworth and Mr.
17 Tito, it was quite clear, at least in my analysis, that
18 they were astronauts for the purposes of the treaties
19 because they were sponsored by the Russian government in
20 some sense. If you have a strictly commercial
21 operation, from my standpoint, it doesn't matter what we
22 conclude.

23 It's what the rest of the world things
24 because it's the rest of the world the you would need
25 cooperation from. So if the United States says for the

1 purposes of this RLV program all it takes is an FAA
2 license and we consider them to be astronauts for the
3 purposes of the treaty, from my standpoint, that's
4 almost meaningless if the rest of the world or countries
5 that you need help from say we don't consider them to be
6 astronauts so we're not obligated to do the things that
7 are suggested in the treaty. We're going to treat them
8 like U.S. citizens or citizens of another country who
9 happen to be on an air craft.

10 So I think what you have to look at is
11 should we take steps to ensure that the RLV industry and
12 commercial passengers on RLVs are given the maximum
13 amount of protection under the law because you don't
14 want unpredictability. That's going to kill a business
15 plan. If we gave you an answer we just don't know, how
16 are you going to attract investors? Jeff can speak to
17 that.

18 One other aspect of this which I hadn't
19 mentioned is under maritime law if you abandon a ship
20 and somebody takes it, then there are certain salvage
21 rights that you as the rescuer of that ship are entitled
22 to. Under the outer space treaties, space objects
23 remain the property of the launching state regardless of
24 where it is. Again, that's another aspect that you as a
25 commercial operator would want to look at.

1 Do I want to make it clear that under the
2 treaties we own this object forever, or if for some
3 reason I had to abandon the ship or space craft and
4 another country takes it, does it become the other
5 country's property or not? That's another thing that I
6 think you should be considering.

7 MR. WONG: I have a question for Jean-
8 Michel. You mentioned that the insurance companies or
9 firms do provide insurance for maiden flights. You
10 mentioned Delta IV and Sea Launch. These vehicles that
11 you had mentioned are based on the ELV which has a long
12 history provided there are some changes to these maiden
13 voyages that it has a lot of heritage and history. How
14 would you compare that to RLVs where you don't have as
15 much heritage besides the shuttle? How would you
16 respond to that in terms of the insurance?

17 MR. EID: Right. Well, there's no short
18 answer for that one. We certainly have to take a look
19 at an entire review of the technology for one and the
20 business plan and the management concepts. So it's a
21 complete review of the business plan, the technology,
22 and to assess through statistical baselines, through
23 Monte Carlo simulation or some other type of actuarial
24 format. That's how it's done.

25 MR. BROTEMARKLE: I'm Dave Brotemarkle from

1 Space TEC. This is for Mr. Manber. What do you see as
2 a market for education for the future? I never hear
3 anyone talk about creating an infrastructure.

4 MR. MANBER: I'm not sure exactly what you
5 mean in the sense that NASA seems to launch Foundation
6 of NASA as their educational programs. There are space
7 camps throughout the United States. Certainly this
8 latest commission that ended in tragedy as I understand
9 it had a large component of education for school
10 children on board. I even understand that some of the
11 payloads have been recovered which gives one pause to
12 think about that.

13 So I think that education remains the
14 reason why so many people remain fascinated by space.
15 When they were younger they were introduced to it as
16 something wonderful. Unfortunately, today I think the
17 video games have surpassed the reality. A lot of kids
18 would rather spend time on the video games than
19 understanding a 12 day shuttle mission. So I think of
20 all the things we think about of NASA, they have done a
21 superlative job in my view of educating and getting the
22 kids excited. That's just my opinion.

23 MR. BROTEMARKLE: Almost all of your
24 operators are military trained.

25 MR. MANBER: Yes, and that's an interesting

1 point. In fact, everyone has spoken about Sea Launch.
2 I remember when it was first introduced. Boeing had the
3 website on its military page. It's just an
4 extraordinary thing. My colleagues in Moscow sent me a
5 fax saying could you please speak to Boeing, why are we
6 on the military page. So you are correct. It's the
7 heritage of this industry. So what can you do?

8 MR. WONG: And just as a follow up, I
9 believe tomorrow there's going to be a panel on space
10 education. Any further questions?

11 MS. WASHINGTON: Thanks, Ken and thanks to
12 our panelists. We are going to break for lunch now.
13 Lunch is going to be in the Colonnade Room upstairs. I
14 would like to remind everyone your badges need to be
15 clearly displayed. There will be no media participation
16 at the luncheon today. We will come back from lunch and
17 reconvene at about 2:00. Have a good lunch. Off the
18 record.

19 (Whereupon, at 11:56 p.m., the above-
20 entitled matter recessed to reconvene at
21 2:03 p.m. the same day.)
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2:03 p.m.

MS. WASHINGTON: On the record. Good afternoon. Can everyone please begin to take their seats so we can start the afternoon session? We're going to go ahead and get started now. I hope everyone enjoyed lunch and the luncheon speaker. I would like to take this opportunity to invite Bob Triplett back up to the podium to say a few words to us.

MR. TRIPLETT: It's a real pleasure to see

1 you all again. I'm going to take the opportunity now to
2 introduce the new Chair of the Aerospace States
3 Association, the Honorable Lieutenant Governor Mary
4 Fallin from the great State of Oklahoma. I'm a little
5 partial to that of course. She has previously served as
6 the Vice Chair and was newly elected to Chair in
7 November of this last year.

8 Mary Fallin has been making history in our
9 great State of Oklahoma since 1994 when she was elected
10 the state's first woman and first Republican Lieutenant
11 Governor. She was reelected in 1998 by a margin of
12 nearly three to one. In 2002, voters returned her to
13 office for a third term.

14 Not content with the traditional ribbon-
15 cutter role of a Lieutenant Governor, Fallin has worked
16 to advance an aggressive agenda focusing on economic
17 development, education, health care, government reform,
18 and creating opportunities for Oklahomans. In the
19 current cabinet level position of small business
20 advocate, Lieutenant Governor Fallin has championed the
21 cause of small business in Oklahoma and taken on issues
22 such as the rising cost of health insurance and
23 alleviating excessive government regulation.

24 Lieutenant Governor Fallin is credited with
25 initiating major reforms to address Oklahoma's sky

1 rocketing worker's compensation costs, government
2 purchasing, and technology development. Lieutenant
3 Governor Fallin also serves as the President of the
4 Senate, a position she has used in 2000 to bring the
5 issue of right to work in our state to a vote of the
6 people for the first time in 25 years.

7 The protection and future of Oklahoma's
8 children is at the heart of many programs initiated by
9 Lieutenant Governor Fallin. She formed a task force to
10 rebuild the child care center lost in the 1995 bombing
11 of the Murrah Federal Building in Oklahoma City that I'm
12 sure you all can recall.

13 Fallin's concern over gun violence and gun
14 safety prompted her to initiate Project Home Safety, a
15 program which to date has distributed more than 80,000
16 free cable gun locks to Oklahomans. In September 2002,
17 she launched the child safety initiative which provided
18 8,000 free child identification kits to Oklahoma
19 families.

20 Throughout her many years of service and as
21 Lieutenant Governor, Mary Fallin has been a true
22 ambassador for our state representing the best of the
23 state to the nation and international business leaders
24 and dignitaries. Perhaps this is why she has been
25 elected Chair of Aerospace States Association. She has

1 put a beautiful face on Oklahoma government traveling
2 the state's 77 counties to meet with communities and
3 citizens to address their concerns and to help them make
4 dreams for Oklahomans a reality.

5 She is a graduate of Oklahoma State
6 University. That is the other university other than
7 Oklahoma that David graduated from. One of her greatest
8 accomplishments in her life is she is the mother of her
9 daughter Christina and her son Price. I now introduce
10 Lieutenant Governor Mary Fallin, my friend.

11 (Applause.)

12 LT. GOV. FALLIN: Well, thank you so much,
13 Bob, for that very kind introduction. If my mother
14 would have been here, she would have been very proud.
15 If my dad had been here, he would have believed
16 everything you said. So I appreciate that very generous
17 introduction. Bob has been a wonderful asset to the
18 Oklahoma aerospace industry, and we appreciate his
19 enthusiasm and love for this industry. I appreciate him
20 getting me involved even further with the Aerospace
21 States Association.

22 Is Patti Smith in the room yet? What a
23 treasure you have. There she is. Patti, I can't tell
24 you what a fan club you have in Oklahoma with all the
25 members of the ASA and this organization and how highly

1 they speak of you. It's been a real pleasure to be able
2 to meet you and to be able to see the work that you are
3 doing here with this organization, AST. So thank you
4 for allowing me just to come here and spend some time to
5 be with you. I met many of your staff people today.
6 They are all very nice and cordial and professional.

7 As the Chairman of the Aerospace States
8 Association, we're starting our meeting tomorrow with a
9 full agenda with speakers on aviation and space and NASA
10 and technology. So I wanted to come today and give you
11 a real brief overview of what our future plans are with
12 ASA throughout our nation. No matter what roles we play
13 in this room, I think we all have some common goals.
14 Our common goal is that we want to create a robust,
15 sufficiently funded, national aerospace program in the
16 United States to support commercial space innovation, to
17 support transportation, and also to support our
18 businesses.

19 We certainly had a wonderful speaker at
20 noon with Mr. Klinger from the White House. He gave a
21 tremendous overview of where our space programs are with
22 the White House and what we can expect in the next
23 coming months and the next coming years. I want to
24 personally thank AST and all your divisions for the
25 guidance and the leadership that you provide to the

1 states and to the members of ASA to ensure that we have
2 a healthy growth within our space transportation and our
3 commercial space transportation industry.

4 From ASA's perspective, a strong aerospace
5 program provides our states with a way that we can boost
6 economic development. That's where we are coming from
7 as members of the ASA. To that, I believe it is very
8 important that all of us working with this association
9 and with our association work in a spirit of cooperation
10 together whether we're in business, whether we're in
11 education, whether we're in government. We can all work
12 together to booster this industry and to help further it
13 along. We may even have to work with a couple
14 politicians along the way too.

15 So I know it's going to take all of our
16 efforts, especially all of our efforts as a nation to
17 help our space program after the horrible tragedy that
18 we just suffered with Columbia. I know that it hurt
19 many of us. My spirits were particularly lifted when I
20 heard the President reaffirm his commitment to the
21 country's space program and also say that we need to
22 help that program move forward and not to stop now.
23 There is no better way to honor the men and women that
24 we lost in Columbia than to continue their work and also
25 continue the work of the men and women who have gone

1 before them.

2 So we're very heartened to hear the
3 President make his commitment to the program. Of
4 course, as an Oklahoman, I'm very inspired by how
5 Oklahoma has embraced the space industry and so many of
6 our Oklahomans that have been involved in space
7 exploration. In fact, over the past 40 years, we have
8 had an Oklahoman involved in every space manned program.

9 I don't know whether you knew that or not.

10 We have had pioneers like Gordon Cooper. I
11 was telling Bob Triplett I can remember as a child when
12 Gordon first went up into space. His mother lived
13 across the street from my grandmother. My grandmother
14 is 97 and still alive. I can still remember as a child
15 when the television satellite trucks came and parked in
16 front of his mother's house. I was sitting at my
17 grandmother's house saying what is going on. What an
18 excitement it created in me as a child.

19 Of course, we also have General Thomas
20 Stafford who I visit with frequently, Shannon Lucid and
21 so many others who have come from Oklahoma. They have
22 really pushed our imaginations and our limitations into
23 space. We're also thankful for those who have been in
24 the space program who have just turned their eyes to the
25 stars, turned their eyes to the sky and said not what

1 now but what if, what can we do.

2 I think it was mentioned earlier at lunch
3 that this year we will celebrate 100 years of flight in
4 our country. I don't think that we can actually
5 comprehend where we would be today as a nation if it
6 hadn't been for that flight so many years ago that left
7 the ground at Kitty Hawk. I know that the Aerospace
8 States Association is very proud to carry forth the
9 dream of the Wright Brothers into the 21st Century.
10 We're also committed to nurturing the nation's aerospace
11 industry.

12 I want you to know that. We support the
13 efforts of the states to attract space related
14 businesses. We are pushing for developing different
15 initiatives and furthering education of aerospace and
16 also our outreach programs. We have many different
17 education outreach programs. I heard that mentioned at
18 noon too how important that education is for our young
19 children to keep the dream alive.

20 The possibilities for the next 100 years of
21 flight in the United States will be set in motion by the
22 actions that we take today, by the reports that you hear
23 today, by the discussions that we have today. ASA,
24 along with it's education, along with its business
25 partners, along with its government partners is

1 dedicated. We are dedicated to making sure that the
2 United States is the leader, not the follower, in all
3 aspects of space and exploration and aerospace
4 development in the world.

5 Of course, we all know that we have other
6 nations that are nipping at our heels, that are
7 following right along behind us. So I believe it is
8 time that we renew our commitment of being number one in
9 space in both government and commercial levels. As the
10 commercial launch market diminishes especially in the
11 area a communication satellites I believe that we must
12 devise new and expanded space applications and use them
13 for the benefit of mankind whether we use it in research
14 for health, education, whether it's in business
15 research.

16 When the Columbia came down the other day,
17 we actually had some experimental research from Oklahoma
18 for the Oklahoma Medical Research Foundation that was
19 lost on that particular flight. So we even felt it back
20 home.

21 Of course, the time is right also for us to
22 develop suborbital opportunities for commercialization
23 in space. I know that Oklahoma has been very excited
24 about that possibility. The suborbital market has not
25 even begun to take off I believe. As we all know, there

1 is a demand in space transportation and even tourism. I
2 heard one of your speakers talk about whether a person
3 who went up in space was a tourist or whether they were
4 a non-professional going up into space. But there is
5 room for even tourism and space transportation in
6 orbital and suborbital modes.

7 This also creates a unique opportunity in
8 all of our states. The space industry has been confined
9 mainly in the past to coastal states. Of course, by
10 suborbital activity, it dramatically expands all states
11 to have the opportunity to be into this business and to
12 be able to take people into space, take our businesses
13 into space throughout our country.

14 Since suborbital activity requires emphasis
15 on reusable launch vehicles, we are fortunate that we
16 have technology that's just on the cutting edge of
17 making this matter possible and helping us to develop a
18 very untapped market. So with the help of the FAA and
19 with the Space Transportation Division, many states like
20 ours can benefit from all of your expertise in this
21 area. We look forward to working with you to cultivate
22 new opportunities in space.

23 The eyes of the nation, the eyes of the
24 world are focused right now on our space program. The
25 national debate has been waged to decide where do we go

1 from here, decide what if anything will be done
2 differently, and be assured that the members of the
3 Aerospace States Association have a renewed commitment
4 and will continue their commitment to obtain strong
5 incentives in our individual states to support
6 commercial space innovation and also to support
7 entrepreneurship.

8 We continue to advocate for cutting edge
9 research and development of NASA. Because the
10 scientists, the astronauts, the engineers, the
11 entrepreneurs who will guide the United States for the
12 next 100 years in the area of transportation development
13 are sitting in our classrooms right now, we also believe
14 in strong educational programs that will help our
15 children understand the importance of math and science
16 and technology literacy as they go through our schools
17 and our universities.

18 I just want to say thank you on behalf of
19 ASA for your support to the Aerospace States
20 Association. I know that you have many wonderful
21 speakers at this conference. We look forward to getting
22 your results and continuing to be a partner with you.
23 Thank you so much.

24 (Applause.)

25 MS. WASHINGTON: And thank you to the

1 Lieutenant Governor for sharing some of her time with
2 us. We will move on to our next panel. The next panel
3 is titled "Harvest Moon: Legal Considerations for
4 Private Lunar Activity." This panel will be moderated
5 by Ms. Laura Montgomery. She is a Senior Attorney with
6 FAA's Office of Chief Counsel. Ms. Montgomery's areas
7 of expertise include launch safety, environmental
8 treaties and other issues as they relate to
9 administrative law.

10 MS. MONTGOMERY: Thank you, Michon. Good
11 afternoon and welcome to our panel "Legal Considerations
12 for Private Lunar Activities." I have with me three
13 attorneys who are very knowledgeable in different areas
14 of space law. Pamela Meredith, who is an Adjunct
15 Professor at the American Universities College of Law,
16 teaches space law, is a practicing attorney at Zuckert,
17 Scoutt and Rasenberger. Over the years Pamela has
18 advised and counseled a wide variety of space ventures
19 and helped them obtain authorization for their space
20 projects.

21 Next to her is Franceska Schroeder. She is
22 a partner at Pillsbury Winthrop here in Washington.
23 She provides advise and counsel to space segment
24 manufacturers, satellite and launch operators and users,
25 terrestrial communications companies, and investors in

1 aerospace, communications, and high technology projects.

2 Since 1993, Franceska has served as legal counsel to
3 the American Astronautical Society. In that capacity,
4 she was appointed by the U.S. Department of State as
5 private sector advisor to the U.S. Delegation to the
6 Legal Subcommittee to the UN Committee on the Peaceful
7 Uses of Outer Space.

8 Next to her is Ray Bender. He is a partner
9 in the law firm of Dow, Lohnes and Albertson. He
10 represents numerous business enterprises including
11 Fortune 50 companies, mid-sized businesses and
12 entrepreneurs in a wide range of sectors. He has
13 developed a particular expertise on domestic and
14 international legal issues affecting the
15 telecommunications business including satellite
16 communications, fixed and mobile wireless systems,
17 broadband technologies, and other communications related
18 enterprises. He also has a special expertise in the
19 international telecommunications issues which we will be
20 exploring today.

21 In the spirit of looking into the future,
22 in the spirit of forecasting, and in the spirit of the
23 fact that I hope one day to be a space tourist, and I
24 think it's a noble term, we wanted to highlight today
25 some of the legal considerations that would face a

1 venture planning to operate commercially on the moon.
2 The first such venture would face a number of
3 interesting questions that have so far yet to be tested.

4
5 In order to focus our discussion, we
6 decided to explore one hypothetical situation. It's a
7 hotel that would set up shop on the moon. Many hope to
8 see space tourism become a growing concern. I certainly
9 include myself in that category. Space tourism will of
10 course eventually require hotels. Someone will have to
11 be first.

12 I have asked my panelists today how they
13 would counsel such a hotel client who intends on setting
14 up shop so far away. Their client would face a lot of
15 questions for the first time. This would include how to
16 obtain approval, would the hotel even require approval,
17 and if so, from whom. We did not decide on whether it
18 would be a bed and breakfast or a luxury resort, but I
19 don't think that matters. Either kind of operation
20 would face some of the same basic questions.

21 It would need land for one thing. Do the
22 outer space treaties let a private venture own land on
23 the moon? Do they let it sit on land on the moon for a
24 respectable length of time, long enough to make some
25 money? The hotel would have other needs when

1 operational. One of those needs would be that it would
2 have to communicate with its travel agents, its earth
3 partners and its customers. Some of its communications
4 would thus be interplanetary back to earth.

5 The communications would also be intralunar
6 as it were because at the very least our hotel would
7 have to be able to communicate with the local moonport
8 so it would know when to send its in-house taxi for its
9 customers. What kind of licenses or permits, if any,
10 would it require? Do our current laws and treaties
11 cover this situation? Do they need to or could we let
12 the situation grow organically, as it were, and see what
13 happens?

14 We will briefly describe the framework for
15 these issues and then explore some questions in a
16 discussion amongst ourselves of how these issues might
17 play out. I then would like to invite questions from
18 the audience as well. Pamela Meredith will address some
19 of the initial procedural and treaty issues that this
20 hotel venture might face. Franceska Schroeder will
21 describe the treaty provisions that address
22 appropriation of property outside of the earth. Ray
23 Bender will discuss the telecommunications issues.
24 Thank you.

25 MS. MEREDITH: Speaking about the moon.

1 Right? Beethoven's "Moonlight Sonata" was first
2 performed in 1801 just to give this some perspective.
3 Thanks, Laura, for putting on this interesting panel and
4 topic. I thank you for inviting me. You asked a
5 question of whether a hotel project on the moon would
6 need government authorization. Sure, it will. We have
7 to look at why that is and what form that would take.

8 Our client is an international -- venture.
9 They are doing business and headquartered in Memphis,
10 Tennessee. They planned to be in Mississippi, but with
11 the recent political changes they changed their location
12 to Tennessee. We want to take a look at the hotel that
13 our client is building. They engaged Hunts Juergen of
14 the Dutch Academy of Architecture to design a lunar
15 hotel. This is the hotel that you can see right here to
16 the left. (Indicating.)

17 Any nation that's a party to the Outer
18 Space Treaty, and the Outer Space Treaty is the
19 constitution of outer space, will need to license and
20 supervise private activities in space. That's Article
21 VI of the Outer Space Treaty that says that "The
22 activities of non-governmental entities," and that means
23 private entities, "in outer space including the moon
24 shall require authorization and continuing supervision
25 of the appropriate state party." That means licensing

1 and regulation. So by international treaty, there is a
2 requirement on states to make sure that their private
3 enterprises are licensed and regulated.

4 I hope you can all see that. We were
5 trying to sort out what color would go with the moon in
6 the dark background. We came to red. While a project
7 like this would require authorization or licensing, the
8 problem is there is no law, legislation or policy today
9 providing for licensing of lunar enterprises. That
10 doesn't mean that a lot of agencies of the U.S.
11 Government wouldn't have jurisdiction over one or more
12 aspects of the lunar enterprise.

13 In fact, there are a whole lot of them.
14 The State Department, as you can see up top here, of
15 course has jurisdiction over all foreign affairs, treaty
16 obligations and exports. So they would definitely have
17 a say. The Department of Defense has all national
18 security matters. For example, would such a hotel
19 interfere with military planning? How would the
20 military get access to this facility on the moon, and on
21 what terms? Would they be paying guests?

22 Other departments. What about Homeland
23 Security, Immigration and Naturalization? When these
24 guests return from the moon, are they immigrating? Then
25 we can go on down the list. For example in order to

1 launch a payload that hasn't been licensed by any other
2 agency, the FAA in addition to its licensing of its
3 launch vehicle will do a payload review. NASA of course
4 with a de facto monopoly on space would have at the very
5 least an interest in this venture. We can go on and on.

6 Of course, state regulation even here is an
7 issue. The State of Tennessee where this hotel venture
8 is incorporated has hotel business rules that they would
9 want to apply to the venture perhaps. How do I know all
10 of this? How do I know that multiple agencies would
11 claim jurisdiction? How do I know that it would be a
12 nightmare and a time consuming effort to go through
13 getting the approval of all of these agencies in order
14 to put a hotel on the moon?

15 Space Services was a small entrepreneurial
16 company in the beginning of the '80s wanting to launch a
17 launch vehicle. It was a private company wanting to
18 launch a launch vehicle. They had to get permission
19 from a multitude of government agencies in order to do
20 that. It was time consuming. This was of course before
21 the Department of Transportation was designated as the
22 focal point and as the agency for licensing and before
23 the Commercial Space Launch Act. So now that's not a
24 problem anymore.

25 That was the problem, all these different

1 agencies claiming jurisdiction. How do we fix that?
2 What do we do? We're counseling a client wanting to put
3 a hotel venture on the moon. What should they do in
4 dealing with the U.S. Government and all the various
5 agencies? The first thing they should do is seek a
6 policy in support of private enterprises on the moon.
7 All other private space activities; satellite
8 communication, space transportation and remote sensing
9 have been preceded by strong national policies promoting
10 the particular enterprise.

11 For example, back in '62, President Kennedy
12 promoted the creation of COMSAT which later on became
13 part owner of Intelsat. In 1970, President Nixon
14 promoted a creation of a domestic satellite industry.
15 Of course, President Reagan promoted remote sensing and
16 launch industries.

17 So all of these space industries that you
18 see today have been preceded by strong national
19 policies. That's what we need. We need a "Lunar
20 Enterprise Policy" maybe in the form of an executive
21 order. What would that kind of a policy do? It would
22 have a statement of national interest. It is a national
23 priority and international interest to have a U.S.
24 business on the moon.

25 In addition to that, this type of policy

1 would appoint maybe one agency in the government of that
2 multitude of agencies that I showed you as the focal
3 point for licensing so that the lunar venture wouldn't
4 have to go through all those different agencies to get
5 approval. Of course, there would be minimum regulation.

6 You don't want to over-regulate a venture like that.
7 Minimum regulation consistent with the national
8 interest.

9 The next step after the policy, and again
10 this was the case also for all of the space enterprises
11 that we have today; satellite communication, space
12 transportation and remote sensing, is authorizing
13 legislation. We would need authorizing legislation. We
14 could call it the "Lunar Enterprise Act." That act
15 would confirm the U.S. national interest in an
16 enterprise on the moon, would create or designate
17 formally the licensing agency for this type of venture,
18 and would set forth the criteria for getting the license
19 to operate a business on the moon.

20 That just gives you an idea of what you
21 would have to do in order to go through with this kind
22 of an enterprise. Of course, another great challenge
23 for this type of an enterprise is getting the funding.
24 But that's for the venture itself to handle. We will
25 leave that for somebody else for now.

1 MS. SCHROEDER: Thanks, Pamela, for setting
2 a very entertaining stage and certainly for covering all
3 of the bases. Laura asked me to address the issue of
4 appropriation or non-appropriate. Frankly, it's a very
5 easy question to address because the issue of
6 appropriation is addressed as one of the fundamental
7 principles of international public law that governs
8 outer space. As soon as we get my slide up, we'll see
9 that it's contained in the text of the Outer Space
10 Treaty which is the fundamental document that governs
11 our public international law in outer space.

12 I will be very brief in that I only wanted
13 to display for you today the three basic principles that
14 are contained in the Outer Space Treaty that deal with
15 appropriation and how governments are responsible for
16 the activities of their nationals in outer space. I
17 wanted to put these three principles on a slide for you
18 because as we continue the panel and Laura engages us in
19 a dialogue amongst ourselves and then with you it's very
20 important to remember these three fundamental points
21 that are contained in the Outer Space Treaty.

22 First is that exploration and use of outer
23 space shall be for the benefit of all mankind. Second
24 is outer space is not subject to national appropriation
25 by claim of sovereignty. Third is each state shall

1 authorize, supervise, and be responsible for the space
2 activities of its nationals.

3 So as Pamela's lunar hotel venture gets
4 going, the government that has jurisdiction over that
5 venture and if it's an international joint venture, as
6 Pamela said, all of the governments whose citizens are
7 involved in this venture have to be cognoscente of their
8 activities, have to recognize the constraints of public
9 international law when venturing into this lunar hotel,
10 and they also have to make sure that what they do is
11 consistent with international principles so that their
12 venture has any chance at all of succeeding. Thank you.

13 (Applause.)

14 MR. BENDER: You know, I was telling a
15 friend about this panel today. I was explaining that we
16 had a hypothetical about the moon and we were going to
17 posit the idea of having a hotel on the moon and there
18 was a panel of lawyers who were going to address the
19 various regulatory and legal issues that would come up.

20
21 My friend's first reaction was that's
22 really a great idea, why don't we just send all the
23 lawyers to the moon. I'm usually pretty thick-skinned
24 about these kinds of things, but in this case I have to
25 confess my feelings were a bit hurt because it was my

1 wife who made the comment.

2 (Laughter.)

3 MR. BENDER: I'm going to speak today about
4 telecommunications issues as they relate to our
5 hypothetical. First, I'm going to look at and explain
6 the existing framework we have for dealing with
7 communications and preventing interference from one
8 system interfering with the other. Second, I'll look
9 and see at our existing framework and how it might apply
10 to interplanetary communications or under our
11 hypothetical, communications between the moon and the
12 earth. Thirdly, I'll look at how these existing
13 frameworks we have might relate or deal with the concept
14 of intralunar communications between the hotel and the
15 space port or whatever.

16 As for the existing telecommunications
17 framework, fundamentally we have an international
18 dimension and a domestic dimension as to how we regulate
19 and deal with international telecommunications.

20 Internationally, the principal agency or body that deals
21 with international telecommunications is the
22 International Telecommunications Union which is
23 headquartered in Geneva, the so-called ITU.

24 The ITU has its roots in the formation in
25 about 1865 among 20 European nations of the

1 International Telegraph Association or Union. At that
2 time, telegraphy was becoming important and growing.
3 Various European countries had to deal with issues such
4 as how they interconnect their systems, how they
5 standardize the equipment, how there would be accounting
6 rates and tariffs for those systems, and certain other
7 operating rules.

8 So that was basically the formation of the
9 ITU way back then. Later on, of course, it expanded to
10 include and cover telephony and to include the notion of
11 wireless communications. In 1947, it became an official
12 arm of the United Nations. So that's where we are today
13 in terms of the regulation of international
14 telecommunications.

15 The ITU for our purposes does principally
16 two things in dealing with radio communications. Number
17 one is it allocates assigned spectrum frequencies among
18 the various services that use frequencies. So for
19 example, it will allocate spectrum for broadcasting. It
20 will allocate spectrum for terrestrial services that are
21 fixed and mobile services. Of course, as you all know,
22 it allocates spectrum to satellite services for the
23 deployment of satellite systems.

24 Indeed, the ITU looks at it at even a lower
25 level. It will allocate specific spectrum for fixed

1 satellite services such as your Ku-band, C-band, and Ka-
2 band. It will allocate spectrum for mobile satellite
3 services such as were used by Iridium, by the little
4 LEOs and today's two gigahertz systems that are being
5 planned. It will allocate spectrum to DBS and to earth
6 exploration, remote sensing, and so forth. So the first
7 function of the ITU is to allocate spectrum.

8 The second principal function of the ITU is
9 to prevent systems from interfering with one another.
10 It is a framework or overlay in which nations abide by
11 certain rules and processes to make sure their systems
12 don't interfere. The classic example of course is the
13 satellite world where the ITU maintains a framework or
14 process for filing notifications when you want to use
15 spectrum at a given orbit location.

16 So if you want to use Ku-band spectrum at
17 97 west or 144 east, you would make a filing with the
18 ITU. For other nations, if they were nearby or made the
19 similar findings, there would need to be a coordination
20 under the ITUs auspices to make sure that systems were
21 not interfering with one another. Those are the basic
22 international rules for telecommunications.

23 Domestically, each nation decides similar
24 issues. The United States has the function performed by
25 the Federal Communications Commission here in Washington

1 which decides fundamentally how spectrum is allocated to
2 the given services. The ITU may decide that given
3 spectrum in the regions of the world can be allocated to
4 multiple services. It's up to the individual nations
5 and regulatory agencies like the FCC to decide actually
6 how you are going to use that spectrum within the
7 confines of the United States.

8 The second thing that the national
9 regulators like the FCC will do is to decide which
10 parties, which commercial entities will get to use the
11 spectrum. So if Lockheed Martin or Hughes or Boeing
12 wanted to deploy a satellite, they would apply to the
13 FCC and they would get spectrum to do so. It's similar
14 with broadcast stations, cellular telephone stations and
15 so forth. So the second function of our national
16 regulators is to effectively decide who has the right to
17 use spectrum and orbital locations in the case of
18 satellites.

19 How might we apply these particular
20 existing frameworks to the notion of interplanetary
21 communications between the moon and the earth? First of
22 all, I guess you would have to have one station at least
23 on the moon and multiple, huge earth stations on the
24 earth's surface in order to have communications between
25 the moon and the earth. I suppose people going to the

1 hotel in our hypothetical situation would want to
2 certainly have voice communications with the earth,
3 phone home. They would want to have data communications
4 so they could send emails and check out the Internet.
5 Presumably if you are at a hotel, they would want to
6 have video communications as well.

7 So to posit the theory, because of the moon
8 rotating the earth, we would have to have multiple earth
9 stations throughout the world, maybe three, four, or
10 five, so that communications would be constant and going
11 on at all times. For example, you would have an earth
12 station in the United States, perhaps one in Spain,
13 perhaps one in India to facilitate those communications.

14 From the standpoint of the relevance of the
15 treaties to this kind of framework, I would say that the
16 space treaty today and its provisions would really
17 relate to these interplanetary communications. For
18 example, the space treaty in Article III requires the
19 activities in exploring and using outer space including
20 the moon to be in accordance with international law.
21 There is a whole body of international law certainly at
22 the ITU level for dealing with communications and making
23 sure that systems don't interfere with one another.

24 The space treaty also states that parties
25 to the treaty shall bear international responsibility

1 for their national activities in outer space, including
2 on the moon. Therefore, there's a sense under existing
3 frameworks of liability. Nations can be liable if they
4 do something to interfere.

5 Article VIII of the space treaty says that
6 the parties to the treaty shall be guided by the
7 principle of cooperation and mutual assistance and it
8 should conduct all activities with due regard to the
9 rights of other parties. The space treaty also states
10 fundamentally that if parties to the treaty have reason
11 to believe that their activities are going to cause
12 potentially harmful interference to the activities of
13 other states that they need to consult and coordinate to
14 prevent those activities.

15 So there is a treaty-based existing body of
16 law when you are dealing with radio communications to
17 suggest that parties, when they undertake activities
18 including a hotel on the moon and when they are
19 communicating with the earth, need to abide by these
20 governing principles. How would the ITU fit into this
21 process? If communications are going to hit the earth
22 as in our example, then the ITU would have jurisdiction.

23 The ITU would make sure of course that
24 there is not interference. They would have a mechanism
25 to make sure that nations will not interfere so that

1 when signals come down or go up they will not interfere
2 with satellites, broadcast stations, or other
3 terrestrial facilities. The ITU has in its constitution
4 an article which basically says that all stations,
5 whatever their purpose, must be established and operated
6 in such a manner as not to cause harmful interference to
7 the radio services or communications of other member
8 states.

9 So even the ITU recognizes and doesn't
10 limit when we're dealing with interplanetary conditions
11 because to the extent the signals are landing on the
12 earth then the ITU would have jurisdiction. As for
13 national regulatory authorities in the United States and
14 in Spain and in India in our example to the extent there
15 are earth stations there and they are communicating
16 directly with the moon those jurisdictions, the FCC and
17 other agencies in those other countries, would have to
18 license those communications, would have to allocate and
19 reserve the spectrum, and would need to license the
20 specific parties. In this case, it would be the hotel
21 or the party that was providing the communications.

22 Finally, in the case of intralunar
23 communications, I think we need new thinking on that
24 score because we really don't have regulatory processes
25 set up at the moment to deal with the question of

1 intralunar communications. I suppose the space treaty
2 does work and the principles that we talked about before
3 saying that there is international liability, that you
4 have to conduct activities in outer space including on
5 the moon with due regard for the rights of other nations
6 and the activities of other nations.

7 Clearly I think in the telecommunications
8 context the space treaty would apply to intralunar
9 communications between the hotel, the moon port and
10 other facilities that may develop on the moon. On the
11 other hand, I really don't think the ITU under its
12 current existence would have much relationship on the
13 moon. I doubt that it would extend to the moon and
14 purely intralunar communications. So I think we need to
15 do some thinking there.

16 As for whether any national body would have
17 any right to regulate communications on the moon, I
18 would say in the case of the FCC which is the U.S.'s
19 regulatory agency that I don't think that their
20 jurisdiction extends to the moon. Under the statute in
21 which they operate, the Communications Act of 1934,
22 their communications generally run to communications
23 which are to/from or within in the United States. So
24 there would have to be new legislation to expand the
25 jurisdiction of the United States if we were going to

1 gain any ground and have the United States regulate on
2 the moon.

3 With that, I think I will end by saying I
4 don't think we should send all lawyers to the moon. But
5 probably because of these issues, over time I think
6 we'll have to send some lawyers to the moon. Thank you.

7 (Applause.)

8 MS. MONTGOMERY: This is all very lovely.
9 It certainly warms the cockles of a government lawyer's
10 heart to hear all of these plans for compliance and new
11 legislation and everything. I think I'm going to remove
12 my government lawyer hat and put on a client hat
13 instead. I think I'm going to make it a cowboy hat. I
14 have lots of money. If I don't get moving now, I will
15 start losing money. I want to go. I don't want to wait
16 for space policies. I don't want to wait for
17 legislation. I have launch contracts. How much trouble
18 will I get in if I start launching?

19 MS. MEREDITH: Are you asking me that?

20 MS. MONTGOMERY: Yes.

21 MS. MEREDITH: Well, I think you'll get in
22 a lot of trouble. I don't think you'll get off the
23 ground for one. I think some of the national security
24 informed policy implications of this hotel venture are
25 such that you would never get off the ground. First of

1 all, you would get no one to launch you. Right?

2 MS. MONTGOMERY: The people I've contracted
3 with have a launch operators license from the FAA. It
4 covers going to the moon. It doesn't seem to limit what
5 would go on on the moon. So I think that under the
6 terms of my contractor's license it does cover at least
7 getting to the moon. Maybe I'd have to go through
8 separate payload review from the FAA. Who would stop
9 me?

10 MS. MEREDITH: What about your payload
11 review, Laura? This is exactly what you do. Right?
12 You test for the safety of public health and safety of
13 property. That might go fine. But what about national
14 security and foreign policy? You would have to deal
15 with the State Department and Defense Department in
16 consultation. Wouldn't you?

17 MS. MONTGOMERY: Yes, but I'm constantly
18 told that we have to have a reason if we're going to say
19 no to someone. This is someone who wants to do a very
20 benign activity on the moon. We're a transportation
21 agency. We're not a hotel regulator Does the FAA's
22 jurisdiction extend to this lunar hotel?

23 MS. MEREDITH: I think I want to throw this
24 over to Ray. I want to say that the FCC would
25 definitely want to make sure that they had authorized

1 any communication that was going to go on with this
2 venture before it took off.

3 MR. BENDER: I'd basically say that from
4 the telecommunications standpoint it depends on what
5 kind of communications you are talking about. There's
6 an overriding principle at the ITU that if you are
7 deploying a system in space and if you are not going to
8 interfere with anybody and you are selecting frequencies
9 and selecting technical parameters where you are not
10 causing interference to any other system, then from an
11 ITU standpoint you are permitted to do that.

12 So I think there if you just decided under
13 Laura's theory that you would just get up and do this,
14 you would probably not have ITU problems if you were not
15 causing interference. From the FCC standpoint if you
16 are talking about interplanetary communications and
17 those that are coming down to earth and hitting the
18 United States, then I think you would have FCC problems.

19 They would not countenance the use of earth stations or
20 other communications devices which are emitting
21 electromagnetic energy without having those licenses
22 approved.

23 So you would get in trouble by just doing
24 that. However, if you are talking about communications
25 on the moon, then I don't think you would have those

1 problems with the FCC or anybody else, especially if you
2 are not interfering with anybody because up on the moon
3 it's a brave new world. I think anything would go as it
4 was in the early days with telegraphy union in Europe.
5 I think people would work it out. But I don't think
6 there would be government problems just by dealing with
7 intralunar communications.

8 MS. SCHROEDER: Laura, just for fun, can I
9 take a contrary view to Pamela's position?

10 MS. MONTGOMERY: Sure.

11 MS. SCHROEDER: First of all, I think that
12 so long as you have whatever U.S. domestic licenses you
13 need to transport yourself and your venture from the
14 earth to the moon and so long as you have whatever FCC
15 licenses you need to communicate from the moon to the
16 earth and from the earth to the moon, then no one can
17 stop you because public international law is only as
18 good as the domestic law that has been enacted to
19 implement the international principles.

20 So long as there is no U.S. domestic law
21 that is prohibiting you from establishing this presence
22 on the moon which I will add is not a claim of
23 sovereignty over that piece of land on the moon it's
24 simply a use of that piece of land on the moon just like
25 we used a piece of the moon when we planted the U.S.

1 flag on the moon back 30 some years ago. So unless and
2 until you can show me that there is a domestic law that
3 says you cannot have a hotel on the moon, so long as I'm
4 holding a license issued by Laura's office that will let
5 me get there, so long as I'm holding a license from the
6 FCC that will allow me to communicate, I'm going.

7 MS. MONTGOMERY: Franceska, could you
8 elaborate on this? We have a treaty that says the
9 states parties to the treaty have a responsibility for
10 supervising and authorizing the acts of their nationals
11 in outer space. The United States has signed that
12 treaty. We have absolutely no legislation governing
13 lunar hotels. How can you go?

14 MS. SCHROEDER: Because the law that exists
15 in the United States is the law with which I will
16 comply. If you don't want me to go, then you have to
17 show me why I can't because there's nothing expressly in
18 the treaty that is prohibiting me from having a presence
19 on the moon. There is nothing in the treaties that
20 prevented the Apollo astronauts from visiting the moon
21 and planting a flag.

22 If there were a law enacted that said a
23 United States citizen cannot build a hotel on the moon,
24 then I would have to comply with that. Right now, I
25 have two very important domestic laws with which I must

1 comply, the Commercial Space Launch Act which says that
2 I must have a license if I'm going to launch a payload
3 from U.S. soil, and then I have a law called the
4 Communications Act of 1934 as amended that says I have
5 to have a license to engage in communications using the
6 radio frequency spectrum.

7 My ability to hold a license under the
8 Communications Act must be first coordinated through the
9 International Telecommunications Union regulations that
10 Ray has so ably described. For the purposes of this
11 hypothetical, I have those licenses. I have the CSLA
12 license and I have the FCC license. Who is going to
13 stop me? Why should they stop me? What is the legal
14 basis for stopping me?

15 MS. MONTGOMERY: Well, as a citizen of the
16 United States which has signed this treaty, aren't I
17 supposed to be supervised and authorized so shouldn't I
18 stay put? Pamela has me all nervous now. I'm wondering
19 whether I should throw my money down this tube here.

20 MS. SCHROEDER: Like I said, I have
21 complied with the laws that will enable me to go, show
22 me a law that says I can't go.

23 MS. MEREDITH: Well, first, Franceska, I
24 don't understand why you want to talk yourself out of a
25 job here as a lawyer but that's besides the point.

1 MS. SCHROEDER: Because I don't want to be
2 one of those lawyers sent to the moon.

3 MS. MEREDITH: Well, maybe I'm ready to go.
4 Those who don't learn from the mistakes of history are
5 bound to repeat them. Right? What about Space Services
6 back in the beginning of the '80s? They wanted to do
7 just what you said. They wanted to go. They were ready
8 to go. They were a private entrepreneurial company.

9 But they were confronted by all these
10 agencies that claimed jurisdiction over some portion of
11 that launch, whether it was the Coast Guard, the FAA,
12 the FCC, the Department of Transportation, Department of
13 State, Department of Defense. They were stopped right
14 in their tracks from doing that until finally there was
15 a strong enough national policy behind them to let them
16 go. Right?

17 MS. MONTGOMERY: I want to shift over to
18 Ray. Now that I've been hanging out with lawyers so
19 long my cowboy hat is sitting over here and I'm becoming
20 very risk-averse. I have learned that there are going
21 to be other people who are thinking of going to the
22 moon. They are not just other hotels, although there is
23 one competitor that's really bothering me.

24 They are going to be using the spectrum as
25 well. Suddenly my plan to just use lots of power and

1 broadcast as I see fit is starting to seem less than
2 ideal. So if we were to enter into a very casual and
3 informal agreement, should we follow the ITU model or
4 should we do a first come, first serve?

5 MR. BENDER: Well, that is the ITU model
6 actually as it relates. I think the way it would play
7 out in the early days of moon development would be for
8 nations, and it would probably be done by nations and
9 not private enterprises, who were staking claim to
10 portions of the moon and developing hotels or other
11 commercial enterprises would probably have to come to
12 some mutually agreed process. Again, under the space
13 treaty, there's a requirement that on the moon or in
14 outer space if you are going to take steps and enter
15 into activities that are going to cause interference to
16 other people you need to consult, you need to
17 coordinate, you need to basically work it out.

18 So I think in the early days of development
19 that's the way it would be done. Ultimately whether or
20 not the government agencies would make it as formal as
21 the ITU would depend on the pace of development. I
22 think early on, like the Telegraphy Union in Europe, it
23 would be something that was framework agreement and then
24 it would build depending on how much communications were
25 being used on the moon.

1 MS. MONTGOMERY: Let me indulge my
2 curiosity here. Before the Communications Act was
3 passed, did people just start broadcasting?

4 MR. BENDER: There might have been a
5 predecessor. There was a predecessor act, I think, a
6 radio act or something which started off in the radio
7 field. People would use low power radios and so forth.

8 Then as radio developed there was a need for a
9 government mechanism to ensure that people operating on
10 the same frequencies were not interfering with one
11 another. Obviously the notion of technical mutual
12 interference doesn't serve anybody.

13 So I really don't know in the history of
14 the United States. It started out early with government
15 officials regulating the radio waves. Before that, I
16 guess it was just mutually done and agreed to by private
17 parties who were using that, either that or they were
18 suffering interference.

19 MS. MONTGOMERY: Now that I've finished
20 living out my fantasy of being a client rather than
21 having them, I would like to open the floor to questions
22 from the audience. If anyone has any questions, please
23 go to the microphone.

24 DR. REED: I can't resist, Laura.

25 MS. MONTGOMERY: Sorry. We have two of you

1 here. Mike.

2 MR. KELLY: You mentioned those who don't
3 learn the lessons of history are doomed to repeat them.

4 I see nothing but that in this discussion. If you are
5 talking about regulatory jurisdiction over someone who
6 goes to the moon and whether it's in compliance with an
7 international treaty or with a local Tennessee hotel
8 law, regulation is only effective if there is an
9 enforcement. Whoever gets to the moon first is in a
10 position to stop everybody else from ever getting there.

11

12 How are you going to enforce these
13 regulations, and what makes you think that the United
14 States is going to be the one that gets there and that
15 the legal system will have any significance over what
16 happens on the moon at all? Just to go back to my
17 opening statement, every colony in history has become a
18 sovereign nation in and of itself. To expect anything
19 different from lunar and planetary settlements I think
20 is violating every precept in history.

21 MS. MEREDITH: Well, Mike, I guess that was
22 part of the regulations and policies that I proposed.

23 Right? I understand the perspective you are coming
24 from. You are a true entrepreneur. You are probably
25 one of those who are going to want to go to the moon. I

1 think that you have been up here in Washington long
2 enough to know that there are political aspects to
3 almost everything you do. A project of this nature has
4 so many political implications that I don't think you
5 can do anything in terms of getting off the ground
6 without getting some policy support and probably some
7 authorizing legislation.

8 MR. KELLY: Think of it in the terms of the
9 only country today that has the capability of launching
10 humans into space is Russia, not the United States. The
11 only two people who have ever paid for a ride into space
12 did so in Russia. They were not allowed to do so in the
13 United States. Forget the United States. The point of
14 origin won't necessarily be here. What happens in that
15 case?

16 MS. MONTGOMERY: Well, I think you have
17 raised a question that certainly provides food for
18 thought. I know that I had envisioned this hypothetical
19 as involving an American-based company. That was
20 skewing my thinking until Bob Walker said last night
21 what if we're not first. Suddenly the first come first
22 serve principle seemed less appealing. I think it is
23 something we should keep in mind certainly as other
24 nations get ahead of us. In the current situation, it
25 is certainly very sobering. I think you are raising a

1 very valid point.

2 MR. BENDER: If I could comment, I would
3 just like to say that treaties, international agreements
4 by nations, are entered into all the time. Oftentimes,
5 and probably more often than not, they are abided by.
6 Sometimes clearly they are not abided by. They are
7 broken. They are breeched because a country decides
8 it's in its interest to do that.

9 In this case of going to the moon and
10 dealing with outer space, there has been a good deal of
11 forethought. That's in the Outer Space Treaty. They do
12 address these very issues in terms of the fact that the
13 moon is there for everyone, the fact that you can't
14 interfere with people if your activities are interfering
15 with other nations. So there are a bunch of principles.

16
17 Now again, I'm not naive to think that if
18 some other nation with evil purposes were to get there
19 first that it would necessarily be guided by those
20 treaties. But to some extent the international legal
21 community has addressed some of these issues by passing
22 this and other treaties.

23 MS. MONTGOMERY: Billie, did you have a
24 question?

25 DR. COOK: He took the microphone.

1 MS. MONTGOMERY: Oh, give it back to you.
2 Any other questions? Hugh?

3 MR. COOK: Hugh Cook with the FAA. Maybe I
4 missed this part. The establishment of an eminent
5 domain in the form of your structure is not
6 appropriation.

7 MS. MONTGOMERY: Franceska.

8 MR. COOK: I mean, the prohibition against
9 appropriation. If you plop down 100,000 square foot
10 facility on a piece of lunar soil, are you not
11 appropriating 100,000 square feet of lunar property?

12 MS. SCHROEDER: It depends on who my client
13 is. I say that partly jokingly and partly seriously.
14 If I need to use the land on the moon for a limited
15 period of time, be it 99 years or 1,000 years or nine
16 minutes, one could argue that was an appropriation of
17 the land on the moon for that period of time. It just
18 depends on how it's perceived as to whether or not it
19 would be considered illegal appropriation under the
20 Outer Space Treaty or whether it would be considered a
21 legitimate appropriation under the Outer Space Treaty.

22 You have to go back to the Apollo example.

23 Did we illegally appropriate the moon for that mission?

24 I would argue absolutely not. Somebody who disagrees
25 with the U.S. activity on the moon during that time

1 would argue absolutely it was. So it really depends on
2 your view, the outcome you want to achieve, and how many
3 people you can get to agree with you.

4 MR. COOK: But in the absence of property
5 rights, your appropriation could vary with the direction
6 of the wind.

7 MS. MONTGOMERY: Well, I'm not sure that
8 all readings of Article II of the Outer Space Treaty
9 prohibit the private company from using that land
10 indefinitely because it says "shall not appropriate by
11 claim of sovereignty" which is something a nation state
12 would do rather than a private company. Although, there
13 are scholars out there who claim that the treaties would
14 apply to private individuals as well.

15 MR. FERRELL: Tom Ferrell, FAA Consulting.
16 I may be taking this off into left field and if I am --

17 MS. MONTGOMERY: Where do you think we
18 started?

19 MR. FERRELL: It's interesting to me that
20 no one has brought up in this whole conversation any
21 previous models that we could point to aside from the
22 space act. In particular, I want to draw the attention
23 to international treaties related to the peaceful use of
24 Antarctica.

25 It's the only piece of the world where

1 multiple countries take on scientific exploration.
2 There's certainly tourism down there. Although, I don't
3 think there are any permanent residents. Are there any
4 models to look at in terms of how that works that we may
5 be able to hang our hat on to how maybe the moon might
6 work?

7 MS. SCHROEDER: Well, Antarctica is a very
8 good example. The other example that my mind goes to is
9 the development of maritime law, the concept of law of
10 the high seas. The concepts are strikingly similar. In
11 large part, international space law has its roots in
12 international maritime law. So there are analogies.

13 The big separating factor is geography.
14 Antarctica is on this planet. The high seas are on this
15 planet. The situation changes drastically when the
16 example leaves this planet. So to the extent that those
17 analogies are useful we should use them. We have used
18 them. Like I said, international space law can in fact
19 find its roots in international maritime law. But you
20 can only take terrestrial analogies so far when dealing
21 with a celestial matter.

22 MR. BENDER: I'm not familiar with the
23 particulars of how they coordinate operations of various
24 countries' communications facilities when they do
25 exploration in Antarctica. But I would suspect that

1 there is a very considerable coordination among the
2 nations who are either setting up earth stations or
3 otherwise communicating from the facilities there.
4 Either under the auspices of ITU or otherwise, they will
5 coordinate those facilities so that they don't cause
6 interference to one another.

7 So that's an example I think of governments
8 cooperating with each other and parties cooperating with
9 each other to make sure that they can both co-exist in a
10 given environment. The same would happen on the moon.
11 Again, you would need to make sure you can both co-
12 exist.

13 MS. MONTGOMERY: Ms. Smith.

14 MS. SMITH: I wanted to ask a question. In
15 spectrum, there is an issue that was debated for a
16 number of years at the ITU. It's a concept called
17 squatters' rights. Has there been any such thing
18 conceived of when it comes to the moon?

19 MR. BENDER: Well, I don't think so. At
20 least in the current framework of the ITU when you say
21 "squatters' rights," for example in the satellite arena,
22 I mentioned that there was a first come first serve
23 principle. Fundamentally, if you apply for an orbit
24 location and to use certain frequencies, the ITU will
25 recognize that and based on the date of filing that you

1 make you will have a date priority. That is not so much
2 a squatters' rights issue, but it's the first guy to
3 apply will get it.

4 So in that sense, you really have a leg up.

5 There is a counter-veiling ITU principle which says
6 notwithstanding your priority of being the first to be
7 there that you need to cooperate with and share and
8 basically enter into agreements to the extent possible
9 to accommodate other parties who are behind you in the
10 line. So there is this over time at the ITU where the
11 first come first serve principle is all important.

12 The second principle is that you need to
13 try to accommodate other users. That has come up
14 particularly as we have had a congested orbital arc for
15 satellites and a lot more satellites that were
16 envisioned early on. I will say that under current ITU
17 law and regulation the fact that you would, for example,
18 deploy a satellite without going through their process,
19 the fact that you were there and operating a satellite
20 gives you no rights whatsoever. If you put up a
21 satellite and say I'm a squatter and I was here first
22 and had not gone through the process, you don't have any
23 rights under the existing ITU rules.

24 MS. BRECHER: I don't know how many of
25 those present are in the age bracket to have

1 participated in the Apollo mission. I had the privilege
2 to participate in analyzing samples. In every case when
3 the U.S. astronauts landed on the moon, in a sense, they
4 laid a stake to a territorial claim. We did leave a
5 flag there. Later we left laser lunar red reflectors.
6 We left all kinds of pieces of lunar rovers, hardware.

7 In a sense, anyone else from the U.S. who
8 would build a hotel, and of course it would have to be
9 subterranean or else any tourist would lose their brain
10 mass within a couple of weeks, of course you would have
11 to have underground mining rights. You need at least
12 two meters of lunar -- to be protected from cosmic rays.

13 But let's not discuss about subterranean rights.

14 Land rights. The U.S. could very well say
15 that any place that an Apollo space craft landed or an
16 Apollo astronaut walked is U.S. territory. The Russians
17 also went of course and brought back samples with
18 robotic missions. But what is there to prevent us from
19 laying stakes or laying claim to part of the lunar
20 territory that was already explored by Americans?

21 MR. BENDER: Well, one thing I could say is
22 that the space treaty at least envisions and anticipates
23 that you can explore and you can "use." So to the
24 extent that there's tension between the notion of using
25 the moon and appropriating the moon, the relevant

1 treaties today contemplate and expect that governments
2 and indeed private parties can use the moon. I was just
3 looking at the space treaty.

4 As for setting up a hotel, there's another
5 article which is interesting here. It says that "All
6 stations, installations, equipment, and space vehicles
7 on the moon and other celestial bodies shall be open to
8 representatives of other states party to the treaty on
9 the basis of reciprocity. Such representative shall
10 give reasonable advanced notice of a projected visit in
11 order that appropriate consultations may be held and the
12 maximum precautions be taken to ensure safety and avoid
13 interference with normal operations in the facility to
14 be visited."

15 So again, the space treaty as it currently
16 exists contemplates that you would be using the moon.
17 It doesn't contemplate, as Franceska said, that you
18 would appropriate the land or the territory. It even
19 contemplates that if you have a facility that other
20 nations can come and visit it with due notice so you
21 don't interfere with the operations. So I guess from
22 all these notions and principles you would have to get
23 out some working arrangement between companies and
24 between countries that are on the moon.

25 MS. MEREDITH: Right. I guess you have to

1 distinguish between three types of appropriation. One
2 is the one where you appropriate territory. That's the
3 sovereign appropriation. That's the type that's
4 forbidden. The other type is when you are a private
5 enterprise and you lay claim to a piece of land. That's
6 a real estate. That's not prohibited, at least not in
7 the way the western scholars interpret the space
8 treaties.

9 The third type is when you exploit national
10 resources. That's also questionable. Again, western
11 scholars will say that is not prohibited under the Outer
12 Space Treaty. Of course, you have the Moon Treaty of
13 1979 that sets up a whole regime for these types of
14 exploitations and also has a much stricter regime for
15 the moon itself.

16 But again, I think I agree with Ray there.

17 Obviously the treaty allows for and encourages that
18 kind of use. Freedom of exploration and use of outer
19 space is one of the strongest principles of the treaty,
20 counter-balance by the non-appropriation principle. But
21 obviously, it's the freedom of use that has allowed us
22 to do what we're doing today and to make it all
23 possible.

24 MS. SCHROEDER: And just to make one last
25 point on this. I agree with everything that Ray and

1 Pamela have said. Your question was what would stop the
2 United States from claiming that territory as its own.
3 As we have all discussed, it's the Outer Space Treaty
4 that would prevent us from appropriating that land by
5 claim of sovereignty.

6 That does not however prevent us, as Pamela
7 said, from using the land. I also think that this is a
8 good lesson to consider. The treaties are in fact quite
9 flexible. They were broadly drafted. They are open for
10 a variety of interpretation. I can only speak as a U.S.
11 lawyer. The United States has been able to do what it
12 wants to do within the confines of the treaties.

13 So I think it's quite positive in fact that
14 the treaties are so broadly drafted. They allow for the
15 signatories to implement the treaty obligations through
16 domestic law. I think to keep them broad is a good
17 thing.

18 MR. SCANDURA: Just a couple of points.
19 The discussion of treaties using the moon or other
20 bodies, the Apollo missions and those types of things
21 have typically been scientific or research based. We're
22 not talking about that. We're talking about profit and
23 capitalism. Someone is going to make a dollar off of
24 this operation. Someone else is going to want a piece
25 of it. All treaties aside, we're now talking about

1 making money. That changes everything.

2 My other comment. We talk about the
3 premise with getting there to build a hotel. We talk
4 about having licenses and all these things. Let's
5 assume you got there and you built the hotel and you
6 have the facility in operation. Now it's a totally
7 different story of who is going to enforce or support
8 the treaties, the responsibilities, and those types of
9 things.

10 As one gentleman pointed out here, history
11 repeating itself. Once a group of people or colonists
12 gets across an ocean and gets on their own after a while
13 the mother country gives up, loses control over them.
14 If you get a facility on the moon, at some point whoever
15 had any control over it won't have any control over it
16 anymore. Either they will choose not to because they
17 can't afford it or it's just not feasible anymore.

18 So once you get that hotel there, keeping
19 it going is more of an issue than getting it going in
20 the first place. You have all these treaties. But who
21 is going to complain? Who is going to enforce those
22 types of things?

23 MS. MONTGOMERY: That's why there will have
24 to be some lawyers on the moon.

25 (Laughter.)

1 MS. MONTGOMERY: I think Michon wants me to
2 wrap this up. Thank you all very much for your
3 attention and your interest.

4 (Applause.)

5 MS. WASHINGTON: We will take a short 15
6 minute break. Come back for our last panel of the
7 afternoon. Off the record.

8 (Whereupon, the foregoing matter went off
9 the record at 3:17 p.m. and went back on
10 the record at 3:30 p.m.)

11 MS. WASHINGTON: On the record. I have an
12 announcement to make. I will also make it a second time
13 when people are back in the room. Someone has lost a
14 cell phone. The phone number on the cell phone is 720-
15 308-1403. If that is your cell phone number, you can
16 pick your phone up at the registration desk.

17 Good afternoon. Once again, there has been
18 a cell phone found. The number on the cell phone is
19 720-308-1403. If that cell phone number belongs to you,
20 you can pick your phone up at the registration desk. I
21 will make this announcement again at the end of the day
22 just in case the person is not here.

23 We will go ahead and get started with our
24 last panel of the day. This panel is led by Mr.
25 Christopher Draper. He is a mechanical engineering

1 graduate of UC Berkeley and is currently an Aerospace
2 Engineer Safety Inspector in the Licensing and Safety
3 Division of AST. I will hand it over to Mr. Draper.

4 MR. DRAPER: Good afternoon. These
5 panelists are a little more veteran than I, so I
6 apologize if there are any nervous mistakes. On the
7 panel in alphabetical order from last name, we have Eric
8 Anderson of Space Adventures, Jacob Lopata of Space
9 Launch, Roscoe Moore of PeerSat, and Paula Trimble of
10 Department of Commerce. My name is Chris Draper of the
11 Licensing and Safety Division.

12 The focus of this panel is to discuss
13 issues inhibiting the growth of the commercial space
14 transportation industry. By eliminating common problems
15 of this form, I hope we can arrive at innovative
16 solutions. While we have the panel up here with a wide
17 perspective on the industry, I'm actually drafting you,
18 the audience, into what we hope to be an open discussion
19 on the industry's issues.

20 As the audience, speak up. There are no
21 wrong comments, no wrong statements, no wrong questions.

22 Give both your opinions and ideas, but don't give them
23 until you have a microphone please. Please keep in mind
24 that this is not the appropriate forum for discussing
25 the specifics of an active rulemaking. Please refrain

1 from considering comments directed in any way at an
2 active rulemaking.

3 My understanding is we have a pretty laid
4 back panel up here that doesn't like to talk, so if you
5 could help me out as much as possible, I'd appreciate
6 it. With that being said, the question we're asking
7 today is what do you see as the inhibitors of
8 profitability in space and more importantly what do you
9 see as the solutions to those inhibitors. Turning it
10 over to the panel, we'll start with Roscoe Moore. Mr.
11 Moore, given your investment background, what in your
12 opinion is the state of venture investing for space
13 ventures?

14 MR. MOORE: First of all, I would like to
15 say that even though I might appear to be kind of young
16 I've actually been focused on the space and satellite
17 industry and investments for the last 20 years of my
18 life starting here in the Washington, D.C. area at St.
19 Albans High School and then later at the Air Force
20 Academy. I see some of the blue suiters in the crowd.
21 I studied aeronautical engineering.

22 Later I went on to the International Space
23 University and Georgetown law with a focus on nothing
24 but space and satellite investments. During the time I
25 was in law school, I went on to Space Vest, a venture

1 capital firm which focuses on at the time nothing but
2 space and satellite investments. I was there for four
3 years. Then I founded my own company, PeerSat.

4 A lot of times this industry has a belief,
5 especially over the last three years, that industry has
6 been doing poorly and that the situation for space and
7 satellite investment is a poor one. When you look at
8 some marketing studies that have been put out, primarily
9 one by Fultron, and I saw Joe Fuller and Phil McAlister
10 in the audience and Troy Thrash, you actually see that
11 the commercial space industry has continued to grow even
12 during this economic downturn. So if people are saying
13 that the commercial space industry is doing poorly, they
14 are very incorrect.

15 The next statement people make is space
16 investments have gone down and there has been almost no
17 investment activity in the space and satellite industry.

18 That also is not true. If you look at just the last
19 few months, XM Satellite Radio did a near \$500 million
20 financing. Inmarsat potentially might be near about a
21 billion dollar financing. It's going to be more of a
22 private equity event. Wild Blue received about \$200
23 million in financing. Astrolink right here in this area
24 received about \$46 million in financing.

25 Also, a note on XM Satellite Radio, my

1 family, primarily my uncle because I'm the poor one in
2 my family, invested about \$30 to \$50 million in XM
3 Satellite Radio. So there are investors who
4 consistently invest in this industry. They are
5 investing in this industry right now. They believe that
6 this industry can produce them a lot of money and a lot
7 of profits. A lot of those people are in this area.

8 So let's ask the question of where the
9 perception is that this industry is doing poorly. I
10 think a lot of that perception comes from the present
11 audience or a lot of people in the present crowd. A lot
12 of people that show up at these industry events are
13 typically dominated by people who come from the vendor
14 community or people who come from communities where they
15 depend on others to finance a large portion of their
16 success.

17 If you are looking specifically at space
18 launch or satellite manufacturing, it's probably not the
19 best time to make investments into those sectors. If
20 you look at the sectors that have been doing nothing but
21 growing over the last seven or eight years, i.e.
22 satellite TV, GPS chipset production, there are a lot of
23 people who have become billionaires literally since
24 1995. You have the Rupert Murdochs of the world, the
25 John Malones, the Charlie Ergens, the Gary Berrells, the

1 Ming Kows, the Garman.

2 You have Jack Dangerman of the ESRI who
3 does nothing but create software for GIS and some remote
4 sensing files. He's probably a billionaire if his
5 company was actually publicly traded. So there's a lot
6 of upside in the industry. It's just that the people
7 who dominate these types of events are sometimes on the
8 downside of the industry because if you are an attorney
9 or an insurance broker or you are someone who is a
10 vendor or a financier who has consistently invested in
11 the wrong parts of the industry you'll have the idea
12 that the industry is not doing too well.

13 I guess to answer your question, there are
14 no inhibitors to investment in this industry. People
15 are investing now. People are making money now. They
16 continue to do that if you have something that could
17 make someone money and they are experienced investors
18 who have invested and will invest repeatedly in this
19 industry and make money.

20 MR. DRAPER: Before we go to Jake because
21 I'm sure you probably have a counter-example, I want to
22 go to Paula first. What is your take on the market
23 right now and the industry?

24 MS. TRIMBLE: One of the things I'll start
25 off by telling you is that the way that we feel at the

1 Department of Commerce we can be most effective in
2 helping the industry is by producing accurate data about
3 the industry as it exists today. We've been working
4 within our office to produce trend reports that look at
5 all of the markets that were just mentioned to you;
6 satellite navigation, remote sensing, and space
7 transportation.

8 We are now looking also at the
9 entrepreneurial space businesses. One of the efforts
10 that we undertook in the past year was to work with
11 George Washington University to identify ways to better
12 capture what makes up the space industry and to look at
13 ways to improve how that data is disseminated. We're
14 working within Commerce with the Bureau of Economic
15 Analysis and working with International Trade
16 Administration which has an indicator's report as well
17 to start up an effort to improve the way we deliver data
18 to industry and investors that will help drive better
19 decisions and also to the government.

20 That's one of the ways that we're looking
21 at keeping the market informed. I think that will drive
22 investment and research in the industry. I can tell you
23 that we are releasing, and it should be this afternoon,
24 our Space Economic Data Report which looks at the ways
25 we can all work together within industry and government

1 to improve that data. That will be available on our
2 website hopefully this afternoon. I can provide you
3 more information about that if you are interested.

4 One of the other things that I've noticed
5 is the Department of Commerce Secretary Evans is
6 highlighting entrepreneurship as a key area that he
7 wants to focus on. That's something that we've been
8 working on all along. We're happy to see that he's
9 taken it under his wing. But at the end of the day, it
10 is up to the industry to make the deals.

11 We can do our best in government to create
12 the environment that will help to provide the data, to
13 look at markets that will be served by space, and to
14 highlight those in the public community. At the end of
15 the day, the investors have to make a decision based on
16 business case. We are here to at least help identify
17 those markets for them.

18 MR. DRAPER: I guess speaking of business
19 case and our previous comments, Jacob, I'm sure you have
20 a thought on Roscoe's statements.

21 MR. LOPATA: Actually, it may not make for
22 a good debate. I'm not going to argue with Roscoe's
23 statements. Actually, I think his statements are quite
24 valid. What I will say, though, is that I agree with
25 him that there are investors out there, but even in

1 economic times like these investors are more risk-
2 averse. For any business, it's finding the right
3 investor at the right time to fit your business model.

4 There's no one-size approach that fits all
5 when you are trying to capitalize a business. So you
6 have to basically develop a strategy that's unique to
7 your situation which is what at Space Launch Corporation
8 we are trying to do as well. We tend to stay away from
9 the extremes such as we will only use government funding
10 or we will only use private funding or we will only use
11 one type of funding. Obviously that type of approach
12 doesn't work. It has been historically shown not to
13 work in the past.

14 You need a pragmatic approach. You need to
15 identify the right kinds of money at different stages of
16 the development of the company. I think the key is to
17 understand your own business, identify what the risks
18 are at different stages, and then find the appropriate
19 money for those stages and try to implement that plan as
20 best as you can. You have to be flexible and pragmatic
21 all at the same time.

22 Again, it's a bit more difficult in the
23 industry that we're in but not impossible. I think that
24 by keeping an open mind about the investment community
25 and working hard to identify partners that identify with

1 your vision as well as are open to the different levels
2 of risk at the appropriate time it is possible to
3 finance ventures such as a satellite venture or a launch
4 vehicle venture. That's just my opinion.

5 MR. DRAPER: I wasn't intending to go
6 straight down the line, but I guess Eric is next.
7 Roscoe made another statement that there are no
8 inhibitors. Given your multinational ventures and such,
9 do you share the same view?

10 MR. ANDERSON: I would just like to point
11 out one thing regarding the "space industry" because
12 it's clear that the industry that we refer to as space
13 has many different components which are actually quite
14 different from each other. Satellite companies,
15 arguably, are communications companies that just use
16 satellites to do their business.

17 Launch vehicles are an entirely different
18 business from satellite companies or from things like XM
19 Radio. Then there's the defense industry and remote
20 sensing. It's actually very different all across the
21 board. Some of those businesses are historically much
22 easier to finance because there are revenue models that
23 are understood, there are markets that have been proven,
24 there are expansion capability for things like satellite
25 telephones in other countries and other parts of the

1 world.

2 Some of those subsectors have been
3 notoriously difficult to finance. Those include
4 building new rockets or better types of launch vehicles.

5 I think it's important to draw the distinction between
6 those different things. Certainly, space tourism,
7 that's the area so to speak that Space Adventures swims
8 in. But I'm not sure space tourism is really a space
9 company. Or is it a tourism company? Is it an
10 experiences company that really lives in that market and
11 is simply dependant on technology from the space
12 industry?

13 Again, that also is a difficult area to
14 attract financing to. I think it's important when we
15 are talking about how easy is it to finance space
16 adventures to look at which sectors of the space
17 industry we are talking about because they are
18 drastically different. Some have a much higher risk
19 profile in a potential investor's mind simply because
20 investors invest in what they know.

21 If a particular type of business or a
22 particular type of industry has had a string of
23 successes, then they have much more confidence investing
24 in a better, faster, more economical way to do that.
25 However, if there is a business out there that is

1 completely new or they don't quite know which basket to
2 put it in, then it becomes much more difficult to
3 finance simply because they can't readily evaluate the
4 risks at the level they can in other businesses.

5 MR. DRAPER: So how exactly would you get
6 the word out is my question. I've done an unscientific
7 study walking down the street in D.C. I found that ten
8 out of ten people have no idea how satellites get to
9 outer space. Most people think they are built there
10 which I thought was an interesting answer too.

11 If we have an unfamiliar market here and
12 we're basically saying satellite communications is
13 pretty much communications in space and we're going
14 against something that is financially viable like fiber
15 optics and those things of that nature, how exactly do
16 we get the word out? How do we get investors to feel
17 more comfortable? What is your plan to get the word out
18 to get these different investments?

19 What do you think of the newest scheme on
20 eBay? I'm not as familiar with this as many of you out
21 here might be. If anyone has an opinion on it, please
22 step up and say so. Have any of you heard of that? I
23 forget which company is doing it. Is it Astro Aerospace
24 or AstroSpace? My apologies on the name. I guess there
25 are no comments on that one. Eric, how do you plan on

1 getting the word out?

2 MR. ANDERSON: I can only speak from the
3 confines of the Space Adventures yard. When the group
4 of people came together to found a space tourism company
5 nearly five years ago, Space Adventures, they came from
6 the aerospace industry, the adventure travel industry,
7 the kinds of people who took private explorers and
8 adventurers to Antarctica or Mount Everest or places
9 like that, and they came from the regular travel
10 industry.

11 It was clear that people had talked about
12 space tourism for a long time. Companies like Pan Am
13 sold tickets to the moon. There was a lot of dreaming
14 and wishing and hoping. When you do market surveys,
15 four out of ten say that they would fly in space. We've
16 seen all the data. It's real data.

17 But it was also very clear that it didn't
18 make it past the giggle factor. People still thought of
19 it as a long way away. So the only strategy that's
20 worked for us in terms of attracting investors which we
21 have and finding big customers which we've been lucky
22 enough to do as we grow is to be very careful in what we
23 say, to not promise things that we can't deliver on, to
24 make sure that we put the credibility of the new
25 industry as the first priority in our dealings with

1 investors.

2 If we don't know the answer, we endeavor
3 not to make it look as though we do. If we don't
4 understand how much certain things are going to cost, we
5 don't say we do. If we don't know when something is
6 going to happen, then we don't say that we do. I think
7 many in this industry have done the same thing. It's
8 been to the benefit of the industry to just be very
9 careful about what we do.

10 If investors don't have an example of a
11 successful space tourism company or a successful
12 reusable launch vehicle company that can take people in
13 space, then the only thing they have to judge you by is
14 the steps that you have made to get to where you are
15 going. The only thing they have to judge the industry
16 by is the small steps that companies are making towards
17 those goals. So you have to be very careful because the
18 magnifying glass is on you.

19 MR. LOPATA: I'll add one thing as well to
20 answer your question. I'm sure Roscoe can add to this
21 as well. I don't think the problem is finding the
22 investors. I think they are out there. I think if you
23 have a good idea, and this is something that Roscoe
24 mentioned to me outside in the hall before we started,
25 the investors will find you.

1 I think that the focus should be on
2 developing your idea, developing you plan, making it
3 attractive and putting it out there and going and
4 talking to people. It may take 100 discussions with
5 different investors of different types before you find
6 the one that fits your model and is willing to put the
7 money in, again, considering if you are at the right
8 stage for his risk level. It just takes time and effort
9 to get to that point.

10 Basically, investors want to know four
11 things. They want to know the management team. They
12 want to know how much money is required or the funding
13 timeline. They want to know when it is break even and
14 what is their return on the investment. If you can
15 answer all those questions successfully and to their
16 level of satisfaction, then you can go to the next step
17 with them. But just getting in front of an investor is
18 not hard at all.

19 MR. MOORE: One thing that I might add is I
20 primarily always focus myself on trying to make money on
21 equity investments because when I saw people who had
22 ridiculous growth and wealth, i.e. people who became
23 billionaires, et cetera, I found that just about all of
24 them got that wealth from actually founding a business
25 and they actually had value in the equity. In a perfect

1 market or in a perfect financial system, you shouldn't
2 have people who become billionaires because in a perfect
3 system everyone can see the same opportunity and at most
4 someone would become a millionaire before someone else
5 jumped in, started competing, and destroyed the value.

6 When we look at equity investments, you
7 actually want to be in a situation where the rest of the
8 market doesn't believe in your success. By the time the
9 market does believe in your success, it's too late and
10 you have already built up a billion dollars worth of
11 value. If you look at most of the billionaires in this
12 industry, they were working on their project, on their
13 idea for a period of a decade, maybe longer. People
14 probably didn't understand exactly what they were doing
15 because they wanted to play with space toys or whatever
16 they wanted to do.

17 Then when the market started to value them,
18 by that point, they owned 50 percent or 25 percent of
19 the equity of a company that was worth billions of
20 dollars. If you look at the space and satellite
21 industry, I'm sure there are probably engineers even in
22 this room who can say I wrote a business plan for
23 satellite TV back in the 1960s. But a lot of people
24 executed on that business plan in the `80s with C-band
25 and then in the `90s with Ku-band. There were probably

1 about four or five people who became billionaires off of
2 that.

3 Maybe I'm contrary in saying this, again,
4 it is one reason why I founded PeerSat and I'm going
5 about things the way that I'm going about them. The
6 real issue is why would you really care, if you are
7 looking for true investment capital, if other people
8 really know who you are as long. As you have the people
9 on your team that can help you to get through that phase
10 of your life, in the long run, you might make even more
11 profit because less people believe in that industry
12 segment.

13 That's how you actually are able to make
14 the exorbitant amounts of money that you see some of
15 these entrepreneurs making. Look at Charlie Ergon.
16 People say how can you raise that much debt and how can
17 you sell dishes for that low a price. Then all of a
18 sudden a year or two after people thought he was going
19 to go out of business he is worth about \$30 or \$40
20 billion on the stock market at the peak of the dot-com
21 era. Now he's only worth about \$5 billion but I'm sure
22 he's not crying.

23 The issue is there's a lot of money to be
24 made. When you come to a conference like this, you can
25 talk to a lot of people at this conference and find out

1 there are a lot of ideas that will make people a
2 tremendous amount of money over time. It's just that
3 this industry doesn't generate the kinds of people that
4 really want to follow through over an extended period of
5 time with that idea during the time period that people
6 don't believe in it. For some of the entrepreneurs at
7 this table, that's exactly what they are doing. Over
8 time, maybe they will have their tremendous upside.

9 MR. DRAPER: Paula.

10 MS. TRIMBLE: Yes. The one thing I was
11 going to add, and I think this goes back to your
12 original question about raising public awareness about
13 the space industry, is that one of the nice things about
14 the office in which I work is that we are a promotional
15 organization. Our job is to promote the market for
16 space and all of the different aspects and applications
17 of it.

18 I think what we try to do is promote
19 realism by looking at near-term markets, looking at
20 things that can be filled in the next five to ten years.

21 One of the things that we've done is try to reach out
22 to industries that are not traditionally associated with
23 space such as tourism itself or package delivery or
24 pharmaceuticals, things that you don't necessarily think
25 of when you think about space but who are taking an

1 interest and who we can reach out to and try to bring
2 them into the dialogue when we talk about space markets
3 for the future.

4 One other example that I was going to
5 provide is that based on some of the work that we've
6 done we've looked at the market for suborbital, reusable
7 launch vehicles. We are trying to work with the
8 industry to promote that as an incremental step towards
9 orbital reusable launch vehicles and look at the markets
10 that will be developed out of that. I think that we can
11 try to help raise public awareness by not only producing
12 the data I talked about but also by promoting some of
13 the realistic opportunities that lie ahead in the next
14 few years.

15 MR. DRAPER: I guess I will get back to the
16 big question. What are realistic opportunities? I pose
17 this to everyone. What I'm hearing is we have
18 communications and travel. Are there any others? What
19 are the big things out there? You mentioned
20 pharmaceuticals. I assume in pharmaceuticals we are
21 talking about pure crystal growth and things of that
22 nature.

23 What else? What is there? I guess that
24 was pretty much the question we're trying to get at on
25 this panel. I'll open it to everyone. Is there anyone

1 out there with the next great idea besides travel and
2 communications?

3 MR. MOORE: If no one is going to say
4 anything, I will.

5 MS. TRIMBLE: I was going to say I can add
6 to that a little bit more. Some of the markets that we
7 looked at specific to suborbital vehicles were dual-use
8 applications, looking not only at the military
9 applications of suborbital vehicles for imagery missile
10 defense testing but also looking at the commercial
11 niches they can fill such as the ones we just mentioned.

12 So I think that part of the near-term aspect is what
13 will be of benefit to both the national security as well
14 as the commercial environment.

15 MR. LOPATA: I think a distinction needs to
16 be made too between different kinds of markets.
17 Transportation or a launch vehicle market is an enabling
18 market that would enable other markets and other
19 businesses to blossom and maybe requires a prerequisite
20 before you can even talk about other products on orbit.

21 We can talk all afternoon about different potential
22 ideas for creating businesses in space, but the current
23 foundation or infrastructure doesn't exist to take
24 advantage of some of those opportunities.

25 MR. DRAPER: As far as building that

1 infrastructure, I'm assuming your company has a good
2 understanding of the SBIR process. What do you think of
3 the SBIR process as being something to deliver that
4 infrastructure? How do you see that?

5 MR. LOPATA: That's a tough one. The SBIR
6 programs are quite extensive and very useful. They are
7 also difficult for a company to take advantage of in
8 terms of a stepping stone for real serious growths
9 because the level of funding initially is very low, the
10 process is very long and drawn out, and isn't very
11 attuned to the schedules of a commercial company. They
12 play a very useful role in getting new technologies off
13 the ground and funding innovative ideas. Obviously,
14 innovative research is part of the title.

15 But I don't think they fit well at least
16 for our company in terms of our business model. That's
17 why we have not aggressively gone after small business
18 innovative research grants. There are plenty of other
19 opportunities in government where government can play a
20 role and be a partner in the development of new
21 technologies and be a stepping stone to companies like
22 ours to bootstrap ourselves up to a point where we are
23 attractive to investors. That's our approach.

24 I think it's quite legitimate. The trick
25 for a company like ours as well is how do you identify

1 opportunities on the government side that don't distract
2 you too much from your own vision and goals. So you
3 have to be selective. You can't cast a wide net and go
4 after every SBIR you can think of because that
5 ultimately won't allow you to reach your goals.

6 Again, you have to have a pragmatic
7 strategy. You have to be very careful in what you
8 identify. There is some risk involved in there as well.

9 The risk is if you only go after a few certain select
10 programs that fit more along the technology development
11 path what happens if you don't get those. You still
12 have to pay the bills. You still have to write the
13 payroll checks. So there is some inherent risk in that
14 approach, but ultimately if you are serious about
15 sticking to your vision and reaching your goals that's
16 the path you have to take.

17 MR. DRAPER: You mentioned not getting the
18 grant or not getting the proposal. Do you see fluidity
19 as a problem within the market? There's a lot of
20 turnover obviously when a new program comes up or a new
21 program is finished. Now we have a lot more employees
22 on the market. That's a major problem I would assume in
23 the industry. How do you see that or does anyone else
24 have a comment on that?

25 MR. MOORE: Actually, could I comment on

1 that?

2 MR. DRAPER: Go ahead.

3 MR. MOORE: One thing with investment and
4 when you want to look at some of the new opportunitites,
5 one thing I always figured when I was at SpaceVest was
6 you always want to follow the money wherever the money
7 is. One thing that I did through PeerSat and
8 trademarked was just the name Replace Map because that's
9 exactly what I'm doing. You look at something like
10 Replace Map, and you look at what happens in space news.

11

12 You look at a lot of the press releases
13 that supposedly Space Imaging and Digital Globe are
14 going to receive a lot of money. You find out that NEMA
15 is going to use their imagery to replace a lot of their
16 mapping function. You hear that NEMA is hiring a lot of
17 analysts to actually take over a different function
18 because they are going to start producing a lot more
19 digital maps for different applications.

20 The details I don't necessarily know about,
21 but I do know to follow the money. When you follow the
22 money into a market, sometimes there are stones that
23 have been unturned. When you say that a lot of people
24 are losing their jobs, it was interesting to me. Of
25 course I'm just getting this from "Space News," that

1 soon after Space Imaging got some of its contracts or
2 maybe their contracts are coming downline, their CEO
3 resigned and also it was announced that they had a lay
4 off.

5 The people that they primarily laid off
6 supposedly were a lot of people that were developing the
7 software to create useable products for the commerical
8 market. Now, you can look at that as being depressing
9 or if you are an entrepreneur that means that your labor
10 cost has gone to almost zero because there are a lot of
11 people who have millions of dollars worth of research
12 and development behind them who can literally walk out
13 of that company, getting around the certain intellectual
14 property issues, and could assist a business and provide
15 from day one \$10 million worth of value. When you look
16 at it from that perspective, it's actually a tremendous
17 benefit to someone who is trying to make money in this
18 industry.

19 MR. DRAPER: When you say "intellectual
20 property issues," what do you mean?

21 MR. MOORE: If someone was developing a lot
22 of software while they were at Space Imaging and then
23 Space Imaging gave them their walking papers, a lot of
24 times they will sign non-competes or something else
25 which will say that the intellectual property actually

1 belongs to Space Imaging. Even though Space Imaging
2 might not see any value in that product because they
3 actually laid off the people that produced the product,
4 you still might have an issue in using that engineer or
5 using that product for your own company.

6 But a lot of times if one company doesn't
7 see value in an employee or in a technology, another
8 company might see value in that employee or that
9 technology. That's how a lot of people go on the path
10 to becoming billionaires.

11 MR. DRAPER: Back to the SBIR thing. My
12 apologies. I saw Jeff out there -- at the SBIR process
13 when Roscoe was saying it was a bit of a slow and
14 tedious process. The question becomes how do we fix the
15 process. How do we make the SBIR process fair yet still
16 be helpful? Does anyone have any ideas?

17 AUDIENCE MEMBER: (Inaudible.)

18 MR. DRAPER: I guess we have all day. I'm
19 just kidding. As far as the international individuals,
20 Eric, you do a lot of international partnerships. Have
21 you found problems with regulation of international
22 people going across borders and those sorts of things?
23 What have been your experiences there?

24 MR. ANDERSON: Let me answer that question.
25 I had another thought while we were sitting here.

1 We're talking about all these new markets. We're here
2 at the Commercial Space Transportation Conference.
3 Let's focus on space transportation systems for a
4 second.

5 There are a number of markets that we know
6 about right now for commercial transportation systems
7 whether it's tourism or point-to-point package delivery
8 or launching satellites into orbit or whatever. There
9 are several markets for those. There are many more down
10 the road if we can develop systems that are orders of
11 magnitude, more economical whether it's space-based
12 energy or manufacturing or whatever it is.

13 An interesting thought, and I don't know
14 who would take the lead on this, but while there may not
15 be very many companies or venture capital organizations
16 or investors out there who focus specifically on space,
17 and SpaceVest is the only one I can think of actually in
18 terms of venture capital, there are a lot of venture
19 capital or other alternative financing sources and
20 different organizations that focus on those other areas.

21 These are things like transportation systems or energy
22 systems or tourism even.

23 Many people don't realize that tourism is a
24 \$6 or \$7 trillion per year industry worldwide. It's the
25 largest industry in the world if you count all the

1 airline tickets and everything that goes into travel and
2 tourism. Anyway, there are a lot of organizations out
3 there that invest in those types of companies that don't
4 necessarily know or have not been educated about the
5 prospects of space transportation systems and their
6 effect or their usefulness for those businesses later.

7 I was thinking maybe what would be useful
8 is to have some kind of event or conference or
9 something, and I don't know whether it's the Commerce
10 Department or NASA or the FAA or us all together, where
11 we draw in and attract the people who invest in those
12 industries and educate them about the potential future
13 applications for their industry of commercial space
14 transportation. Maybe that's one of the ways to draw
15 more people into this. Anyway, you were asking about
16 international issues.

17 MR. DRAPER: International issues. As
18 Roscoe says, we have a huge turnover yet we have
19 nondisclosures and all these other things. Have you had
20 any problems specifically with international issues or
21 with nondisclosures as you are creating these
22 multinational partnerships?

23 MR. ANDERSON: Well, we have obviously a
24 number of clients that are international clients for not
25 only the orbital space flight but the suborbital

1 programs that we're developing. A number of the
2 companies that we are working with to develop those
3 vehicles are not United States companies. There are
4 issues. Obviously, there's technology transfer issues.

5 There are issues of confidentiality. The Russian Space
6 Agency has those same issues.

7 We come across it many times. When Mark
8 Shuttleworth, who was the second space tourist, wanted
9 us to help him get his Soyuz capsule after his flight,
10 we had to go through the long process of having it
11 gutted if you will of all the technology that the
12 Russians didn't want to be taken outside of the Russian
13 Federation. And also with the suborbital companies it's
14 the same situation.

15 I think it's reasonable. I don't think
16 there is anything we can do about it. Especially in
17 today's environment, space launch systems are weapons
18 systems. They can be used for all kinds of different
19 things other than tourism and more peace time markets.
20 They have to be regulated. I think we have to find a
21 way to work within those confines.

22 MR. DRAPER: Well, I know that we have a
23 meeting that one of the panelists has to get to, so I'll
24 try and get some concluding remarks here. We will start
25 down the line again. Roscoe, if you have any concluding

1 remarks. Again, the questions we had today were what
2 you see as the inhibitors of turning a profit in space
3 and what do you see as the possible solutions.

4 MR. MOORE: Just to reiterate some of my
5 earlier points, I really don't see any inhibitors to
6 turning a profit in space. I think there are inhibitors
7 to easily turning a profit in space, but of course if it
8 were easy everyone would do it and it would be difficult
9 for you to have that exorbitant return on investment.
10 Specifically when you look at something like a Space
11 Adventures, I think the company was actually founded
12 about five years ago.

13 If there are suborbital vehicles available
14 in the next two years and they actually start generating
15 revenue, as an investor, it might be too late to invest
16 in that company for a reasonable price because that
17 company might be worth tremendously more than it is
18 today. So there probably are inhibitors towards people
19 easily receiving capital for their ideas but none of
20 this stuff is supposed to be easy. If it was easy,
21 there would be no reason for someone to go through all
22 the stress of entrepreneurship to actually carry through
23 with it.

24 MR. ANDERSON: So invest now while you
25 still can.

1 MR. DRAPER: Paula.

2 MS. TRIMBLE: I think as I've said earlier
3 the inhibitors that we see are in raising public
4 awareness and raising awareness in the investment
5 community about the opportunities that do exist in space
6 business. Also, I think one of the other inhibitors for
7 entrepreneurs is navigating the government and
8 understanding the regulations that do exist and who to
9 get in contact with and how to navigate the maze
10 especially if you want to be involved in international
11 business.

12 Like I said, our office, working with DOT
13 and working with NASA and working with other agencies,
14 are trying to make a start at helping people through
15 that. We want to be an advocate for the industry by
16 providing information to the public at large and also by
17 just listening to the problems and looking at solutions
18 whether they be putting out information on the web or
19 directing you to the appropriate government agency.

20 But ultimately I think there is something
21 to be said for entrepreneurs taking on the business
22 risk. There isn't a whole lot that we can do there that
23 is an inhibitor, but it's something that you have to
24 take if you want to move forward.

25 MR. DRAPER: Jake.

1 MR. LOPATA: I would just say that if we
2 start with the assumption that to complete an air space
3 related business, we will require at least some portion
4 of private capital at some point. The question we
5 should be asking is not what are the inhibitors at this
6 point but how do we make aerospace businesses attractive
7 to those types of investors. I think there's a number
8 of different strategies that can be employed to make
9 these types of companies more attractive.

10 Obviously, I mentioned earlier I don't
11 think there's a one-size fits all approach. I think it
12 depends on the market segment, the level of perceived or
13 actual risk, and it's going to require a pragmatic
14 approach that involves both the government, the vendors,
15 vendor financing, customer financing, and private
16 capital as well. We could have all kinds of discussions
17 at the end of time on different strategies and
18 approaches to doing that. Since that's not really the
19 basis for this kind of a panel, we'll leave it at that.

20 I think that we need to be optimistic and we need to
21 just keep moving forward as best we can.

22 MR. ANDERSON: I guess I would say that
23 specifically with regard to space transportation systems
24 the thing that the industry most needs to attract
25 private investment is one shining example of a new

1 company or a new system that drastically reduces the
2 cost of space access and does it successfully and
3 repeatedly. It's just like any other industry.

4 It's like software before MicroSoft or
5 Consumer Software. It's like anything else. As soon as
6 they have an example, the money will flow. So we just
7 have to keep trying, bootstrap it, beg, borrow, steal,
8 do what we say we'll do, and put something together.
9 After that, I think the world will open up.

10 MR. LOPATA: I just want to add one more
11 thing on what Eric said and I think we need to stress
12 this point. I probably can't stress it enough. We do
13 need a success in the private sector as it relates to
14 commercial aerospace. That kind of a success, given the
15 track record of the last 10 or 15 years, would just do
16 immeasurable good and would open up many more avenues
17 for other companies to move forward and do similar
18 things. We need that success first. We need some sort
19 of a demonstration of a success before the investors are
20 really going to open up their wallets and take more risk
21 in this sector.

22 MR. DRAPER: Roscoe, did you have one more?

23 MR. MOORE: I just wanted to maybe conclude
24 with an anecdote. When you look at some of these space
25 launch companies or companies in space tourism, a lot of

1 them are looking some time in the future raise millions
2 or tens of millions of dollars. So obviously it's not
3 below people's radar screens. When you get to that
4 level of money, there's an entire huge industry of
5 people that are looking for these kinds of transactions.

6 Just as an anecdote, my uncle has obviously
7 known me for my entire life. He's known my focus for my
8 entire life. He knew I was working at SpaceVest. He
9 was on Wall Street for a long time and made a lot of
10 money. He called me up one day from New York and asked
11 me what I think about this XM Satellite Radio thing. I
12 just talked through some things. He said he was looking
13 to put a little bit of his own money in it.

14 I knew he had put money in and then he sold
15 it. About two months later, I was reading the
16 "Washington Post" and saw he bought six percent of the
17 company. So it's one of those things where he's not a
18 space person, he wasn't even talking to me beforehand,
19 but within his own circle of non-space people and people
20 that have money they will always find the opportunities.

21 Then they will make the calls to whoever they want to
22 make the call to. Then they are going to move that
23 money in the market.

24 I think one issue with this industry or a
25 lot of these industry-type conferences is you don't have

1 those kinds of people coming to these conferences but
2 believe me if you have a true investment opportunity
3 those people know who you are and they will float down
4 out of nowhere sometimes and throw some money in if they
5 think they can make money on it.

6 MR. DRAPER: Patti.

7 MS. SMITH: I just had a thought in terms
8 of the traditional financial community where the
9 investments are going. I was wondering to what extent
10 businesses that are underway, that have moved out, that
11 are still trying to close the final part of their
12 business case have reached out to the financial advisor
13 community, the brokers who talk to people who are
14 willing to take different kinds of risks. We may be
15 interested in what they consider in that arena as more
16 of a fringe market, something they can look at that may
17 not reap huge gains in the beginning but over time. Is
18 any of that going on?

19 MR. ANDERSON: I think there is. Again,
20 the usefulness of that type of approach depends on the
21 stage of development of the company. My experience, and
22 I would assume all of our experiences with early stage
23 companies, is we have done that. We've used brokers and
24 we have hired guns that will go out and try to get your
25 business plan in front of investors and try to sell your

1 idea. Obviously, that is only opening the door. Once
2 the door is open, you have to go and do all the work.

3 Again, I think getting it in front of
4 investors is not that hard. It just really depends on
5 the stage of development. If you are saying for later
6 stage companies that have already demonstrated
7 something, that may even have a product and they are
8 just trying to bridge that last gap between the end of
9 product development and having something that is
10 actually sellable, it's much easier for them to go to
11 venture capitalists at that point and raise the
12 additional money they need.

13 It's much easier than for an early stage
14 company that still has to go through the risks,
15 especially in our industry. It's very capital intensive
16 and requires a great deal of money up front.
17 Traditionally times to break even are very long, not the
18 year or year and a half or two years that a lot of
19 investors are still requiring.

20 Again, we need to think about strategy.
21 What is our approach? How do we make ourselves more
22 attractive to investors? What do we have to do at the
23 early stages to get ourselves to a point where we are
24 attractive? Then we can use these kinds of resources to
25 finish the race so to speak.

1 MS. WASHINGTON: I had a question for
2 Roscoe. I'm not really familiar with PeerSat. Can you
3 tell us a little bit about the company?

4 MR. MOORE: PeerSat. I say that my mission
5 statement is to monetize the inevitable expansion and
6 conversion of digital, Internet, and satellite content
7 delivery. That's actually a mouthful. But the mouthful
8 basically means I'll do whatever it takes to make money
9 within the skill set area and the network that I've
10 built because if you are not leveraging your past skill
11 set, your past network then you really are out on your
12 own.

13 Replace Map is what I am focused on.
14 Replace Map is literally just replacing maps with
15 digital files on thin clients, primarily mobile devices.

16 A thin client just means something that doesn't have a
17 huge amount of processing power. If you look at where
18 the true money was made in the space industries, it's
19 been made mostly through the advance of digital
20 technology and also the advances in semiconductors. I
21 can go on a long tangent with this.

22 When you look at what happened with C-band
23 in the satellite industry, a lot of people knew at that
24 time that you eventually would be able to sell a dish in
25 the Ku-band that was a lot smaller, that was \$100. You

1 just had to know the advancement of the chipset
2 technologies. A lot of people always look at the
3 satellites in the sky instead of seeing what's on the
4 ground and what really costs a lot of money.

5 To answer, Patti's question from earlier
6 about brokers. One thing a lot of people don't
7 understand is there is a humongous difference between
8 investment bankers who are brokers and investors. An
9 investment banker or a broker typically will take a cut
10 of a transaction whether or not that transaction ever
11 makes money.

12 I think a few years ago Kistler Aerospace
13 actually raised somewhere in the order of \$500 million.

14 The investment bankers who raised that money for them,
15 and typically it's a seven percent cut, might have taken
16 \$35 million for themselves. Your typical investment
17 banker might be in investment banking for about three or
18 four years before he retires at age 32 and goes on and
19 does something else.

20 That brings up the issue that there are
21 always people looking to handle you transactions because
22 they will make a lot of money off of being a broker on
23 that transaction. You always have to watch the
24 difference between an investor and an investment banker.

25 An investment banker will always come in and pretend

1 like he or she is an investor. They definitely don't
2 have the same stake that you have in your own business.

3 MR. DRAPER: We'll open up questions from
4 the floor.

5 MR. FERRELL: Tom Ferrell, FAA Consulting.
6 We've heard quite a few times today about the need for
7 education and letting people know just what the space
8 business is all about. It's not just rockets. It's
9 pharmaceuticals. It's mining. It's package delivery.
10 We have also heard this issue of we need a success.

11 I guess the question is why haven't we
12 capitalized on Shuttleworth and Tito and the Mir-
13 Corp/Pace trip. What do you all think has been the big
14 problem in getting people excited? It may take \$20
15 million now, but we have so many other industries where
16 it starts out really expensive and the price comes down.

17 Why don't people see that? What is keeping us from
18 getting that message out?

19 MR. DRAPER: I guess we'll start with
20 Roscoe.

21 MR. MOORE: I don't want to speak for Eric,
22 but his company has generated I believe in the millions
23 in revenue. He is profitable. I think the issue with
24 entrepreneurship is this. Different people will have
25 different views on what success is. A lot of times,

1 especially in this industry and luckily we have people
2 like Jacob and Paula, et cetera on this table, they will
3 see a young face. They will see someone who is an
4 outsider. And they will only see a few million in
5 revenue.

6 Compared to your hundred million dollar or
7 billion dollar program, that's a joke. They will say
8 that's not success. Also because people aren't used to
9 slogging through the difficulties you have to slog
10 through to become an entrepreneurial success. People
11 are not entrepreneurial successes in one years or two
12 years. Typically, it's a period of decades if you
13 include the building up that they had to do to even
14 begin their entrepreneurial adventure.

15 So I guess maybe in answer to your
16 question, there already is success in space tourism.
17 Maybe that success is matching the size of the market at
18 this time. If the market increases dramatically
19 overnight, and let's say a suborbital vehicle is
20 actually available, then the same people who are
21 successful today at the millions of dollars level, where
22 some people don't think that's enough success, when they
23 do become successful at the hundreds of millions of
24 dollars level because they literally dominate that
25 market, all of a sudden you are saying I knew that kid

1 from three or four years ago at this presentation.

2 We all had a perception that there was no
3 success in space tourism. We weren't watching. We
4 weren't reading what was happening in "Space News" or
5 the "Wall Street Journal" last week on space tourism.
6 We weren't reading and understanding that success is
7 already there, all be it at a smaller level. When that
8 success increases to a much larger level, we might not
9 be there to play in the upside.

10 I guess my answer is the success is there.

11 I think this panel was about success because you're
12 looking at people on this panel right now who are
13 already successful in doing what they do. It's just
14 that the way this industry and maybe some of the people
15 that attend these conferences look at success, they
16 maybe don't look at this as success yet because they are
17 comparing it to their program or their budget or
18 whatever.

19 MR. DRAPER: Did you have something to add,
20 Jake?

21 MR. LOPATA: Yes, I think I'll add
22 something as well. I think that we need to
23 differentiate between a broad success for the aerospace
24 industry and how that success translates to additional
25 success for individual companies. I think it was

1 mentioned earlier that anything that is good that
2 happens in the aerospace world or the space community is
3 good for the entire space community. If something bad
4 happens and Russia has an accident, the Ariane explodes
5 during ascent, that's bad for the entire industry.

6 So I believe while the Shuttleworth and
7 Tito flights were good, they brought a lot of publicity
8 and increased people's awareness of the ability for non-
9 professionals to fly into space and that creates a good
10 feeling for the entire aerospace community, it may make
11 the difference between an investor wanting to talk to
12 you or not wanting to talk to you. At the end of the
13 day, he's still going to make his decision based on your
14 business plan.

15 The fact that they flew into space,
16 especially for a company like ours which is not involved
17 in space tourism or even manned space flight, we're
18 focused on expendable vehicles for very small payloads,
19 it doesn't really help us very much. At the end of the
20 day, what it comes down to is talking with different
21 investors. Again, in terms of helping the industry in
22 general, those kinds of things are good when you have a
23 success.

24 You have good publicity. It creates
25 fertile ground, but it doesn't make the difference. I

1 think a good analogy would be why didn't we capitalize
2 on our success of Apollo at the end of those missions.
3 It's for the same reason. Again, there was no good
4 long-term plan for developing based on that success.
5 There was, but obviously it didn't turn out the way the
6 people had planned or at least dreamed of back in late
7 '60s and early '70s.

8 I think the space market that exists today
9 is really not sustainable in the long term. We need to
10 take that success and find ways to really jumpstart to
11 the next level. Flying one person a year at \$10 or \$15
12 million, again, there may be a market, even a small
13 market. That's not sustainable in the long-term to a
14 really healthy space tourism industry.

15 MR. DRAPER: There is another point on the
16 educational outreach and development. We do have a
17 panel on that tomorrow to answer some of your questions.

18 He did another question and maybe I'll turn to Paula.
19 How do we get people excited about space? I don't know
20 if I'm really that excited to read government reports on
21 the web. How else do we do it?

22 MS. TRIMBLE: Well, I think it's a really
23 good question. It's one that we all talk about in our
24 side discussions all of the time. I don't know if there
25 is a good one mechanism for getting people excited about

1 space. The specific examples that you cite, my
2 interpretation of the problem is those are the long
3 view. The general public doesn't see it as realistic
4 for them to take that same flight. They may not have
5 the money. They don't have the time, the guts,
6 whatever.

7 I think that we need to have some sort of
8 repeatable success on a level that people can identify
9 with. We talked about suborbital vehicles. I think
10 that Eric could tell you that he has a waiting list of
11 people that want to fly on a suborbital vehicle the
12 second it's ready. We talked about that at the
13 beginning of the panel.

14 So I think there is excitement that exists.

15 I think we do need to work a little bit better with the
16 media to get the message out there these are near-term
17 possibilities. There is an opportunity there for you to
18 become part of this. So maybe it's that we don't
19 communicate it very well outside of our own circle. But
20 I am also interested in the education aspect.

21 I know within the government we all do a
22 lot of work with students. We try to reach out to them
23 and explain to them why we got involved in this in the
24 first place. As someone who is younger than a lot of
25 the people in this industry, I have an easy time of it.

1 I get up there and people say if she can do it then
2 maybe I can too.

3 That's one of the problems that was
4 highlighted in the Aerospace Commission's work. We need
5 to attract young people to this work force. I'll do
6 what I can to help with that. That's all I can say. I
7 think there is a lot of excitement there. We just to
8 bring it to the forefront.

9 AUDIENCE MEMBER: A question about the
10 costs that your companies incur in compliance to federal
11 regulations. How much are those costs? Are they
12 overburdening? What can the FAA, specifically the AST,
13 do to help minimize those costs for you?

14 MR. DRAPER: I guess we'll go to Space
15 Launch since that would be them. Do you have an opinion
16 on this one?

17 MR. LOPATA: I'm sorry. I didn't catch the
18 end of the question. I was writing myself a note. I
19 apologize.

20 MR. DRAPER: What was your question again?

21 AUDIENCE MEMBER: My question was about the
22 costs that your company is incurring in order to comply
23 with federal regulations. What can the FAA,
24 specifically AST, do to reduce those costs for you?

25 MR. LOPATA: To be perfectly honest, we

1 haven't really reached the point where we're incurred
2 any significant costs at least vis a vis the FAA. I can
3 say that in terms of federal regulations in general we
4 have incurred some costs as a result of ITAR
5 regulations. Again, this is a whole other line of
6 discussion that could go on for quite some time. I
7 don't know if we want to open that Pandora's Box but the
8 ITAR regulations can be a significant burden on small
9 companies.

10 It doesn't help that they are sometimes
11 conflicting and confusing. I think some attention needs
12 to be focused on that. I think it only gets worse
13 especially considering the events of 9/11. The emphasis
14 has not been on decreasing that burden. It actually has
15 increased that burden. In some cases rightfully so, but
16 we need to be smart about how we deal with these kinds
17 of national security issues.

18 I think there's definitely a case to be
19 made that we need these kinds of rules and regulations
20 for national security. I just think that the broad
21 nature of the current regulations really moves the focus
22 off the technologies that we really should be protecting
23 versus those which really aren't going to make any
24 difference whatsoever and really just cause us great
25 headaches in carrying out our business on a day to day

1 basis.

2 So I think there should be a whole other
3 conference just on ITAR. We should bring people from
4 industry, especially from small businesses, to find out
5 what we can do to streamline things and clean up a bit
6 so we don't have significant problems in the future.

7 MR. MOORE: One thing that I might add
8 about the cost of regulation with the FAA or any agency.

9 I know when I was first starting law school and I was
10 telling people I wanted to be an entrepreneur in the
11 space and satellite business they said why would you
12 become an attorney, that makes no sense. I was trying
13 to explain to them that the D.C. area is the number one
14 area in the world for communication start ups and for
15 space and satellite start ups. And a lot of the people,
16 if not the majority, who start those companies are
17 attorneys.

18 A lot of times the cost of regulation
19 becomes the greatest asset on the balance sheet of these
20 companies. That's definitely been proven in the
21 communications industry. If you look at Governor Mark
22 Warner of Virginia and Columbia Capital, you know what
23 he's done with Nextel, XM Satellite Radio, digital
24 television services, et cetera. The cost of regulation
25 is actually something that puts you ahead of everyone

1 else.

2 When you specifically look to FAA/AST, I
3 don't want to speak specifically to this because I don't
4 know the details. I see Mike Kelly in the audience as
5 well. But I know that back in the late '90s when Wall
6 Street was going crazy over these rocket launch
7 companies because the investment bankers saw an
8 opportunity to take their seven percent cut of raising
9 hundreds of millions of dollars for rocket companies,
10 one thing that an investment banker might do right away
11 to try to find out who is credible and who is not
12 credible is who are the three or four or five people who
13 are actually in the queue to get their licensing done.

14 So it is sometimes a difficulty. But it's
15 a difficulty that's unique to D.C. It's a difficulty
16 that actually provides an advantage to an entrepreneur
17 who knows what he or she is doing.

18 So I understand your question. Regulation
19 a lot of times does need to be streamlined, but there
20 are all kinds of people who have made hundreds of
21 millions of dollars because it's not streamlined and
22 because they built their entire career around figuring
23 out how to get through all the hoops and develop their
24 assets through this process.

25 MR. DRAPER: I've never heard that argument

1 before. That's actually very good. Any other
2 questions? Thank you very much.

3 (Applause.)

4 MS. WASHINGTON: Well, this panel will
5 conclude our conference for today. I would like to
6 thank everyone for coming. I hope you found the
7 information interesting and informative. There will be
8 a reception starting at 5:00 in the Colonnade Room.
9 It's the same place that the luncheon was held.

10 And I will make this announcement one more
11 time. There was a cell phone found. The number is 720-
12 308-1403. If that is your cell phone, you can retrieve
13 it at the registration desk. Again, thank you for
14 coming. Have a good evening. We look forward to seeing
15 you tomorrow. Off the record.

16 (Whereupon, the above-entitled matter
17 concluded at 4:34 p.m.)

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