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FEDERAL AVIATION ADMINISTRATION

COMMERCIAL SPACE TRANSPORTATION ADVISORY COMMITTEE

Thursday, June 14, 2018

9:30 a.m.

U.S. Department of Transportation Headquarters

West Atrium

1200 New Jersey Avenue SE

Washington, D.C. 20590

Reported by: Michael Farkas

1 A P P E A R A N C E S

2 Di Reimold, Acting Deputy Administrator

3 Sharon Pinkerton, Airlines for America

4 David Karnes, Kutak Rock Law Firm

5 Chris Hassler, Syndetics

6 Debra Facktor, Ball Aerospace

7 Charity Weeden, Lquinnox Consulting

8 Jim Armor, Northrop Grumman

9 Livingston Holder, Holder Aerospace

10 Robbie Sabathier, United Launch Alliance

11 Greg Autry, University of Southern California

12 Kelvin Coleman, Acting Associate Administrator

13 Mike Gold, Maxar Technologies

14 Michael Lopez-Alegria, NLA Space

15 Chris Kunstadter, XL Catlin

16 Eric Stallmer, Commercial Space Flight Federation

17 Richard Dalbellow, Virginia Orbit, Virgin Galactic

18 Jennifer Warren, Lockheed Martin

19 Brigham McCown, Alliance for Innovation and

20 Infrastructure

21 Oscar Garcia, Interflight Global Corporation

22 Paul Damphousse, MCS Government Solutions

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A P P E A R A N C E S (continued)

Steve Lindsey, Sierra Nevada Corporation

Tim Hughes, SpaceX

Dale Nash, Virginia Space Authority

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1 P R O C E E D I N G

2 MS. RAMPROSON: Good morning, everyone.

3 Welcome to Department of Transportation. My name is
4 Erin Ramproson. I'm actually the events coordinator
5 here.

6 Just a couple of housekeeping things I wanted
7 to go over. The restrooms are located directly behind
8 you guys in the conference center. If you have any
9 cell phones, if you could go ahead and put those on
10 vibrate for us, that would be great. There's also
11 trashcan receptacles behind you. If you have any
12 drinks or trash, please make sure you utilize those.

13 In case of an emergency, if you guys could
14 just remain calm, stay seated, we'll have a floor
15 warden come out. We'll direct you guys out the back
16 door to the plaza, and we'll stay there until we get
17 further notification.

18 Any questions, I'll be walking around, so
19 please enjoy your meeting.

20 MS. REIMOLD: Good morning, and on behalf of
21 Dan Elwell, the Acting Administrator of the FAA,
22 welcome to this 65th Meeting of the Commercial Space

1 Transportation Advisory Committee.

2 We're really thrilled to be here this morning,
3 and to have such an esteemed group of members that form
4 this newly reconstituted COMSTAC, whose charter was
5 signed approximately a year ago. It's taken us just a
6 little while to get the membership in place, but now
7 that we are in place and established as an advisory
8 committee, we are ready to undertake some pretty
9 important work.

10 But to get us started in this inaugural
11 meeting of this group, we have a very, very exciting
12 lineup of speakers this morning, and I will just note
13 that our first speaker, Scott Pace, will probably like
14 me to hurry this along a little bit, but Scott, with
15 your indulgence, I thought it would be very helpful for
16 us just to very quickly introduce ourselves, and I'll
17 start with me. I'm Di Reimold, the Acting Deputy
18 Associate Administrator for Commercial Space
19 Transportation at the FAA. And I thought it would be
20 important to do that, because not only do we have some
21 new members of the COMSTAC, we have a lot of new faces,
22 both from industry and from government here, and from

1 other industries, as well.

2 So I think it would be great for us to know
3 who's in the room. So Sharon, I'm going to put you on
4 the spot to begin around the table, and just name and
5 organization and over to you.

6 MS. PINKERTON: Good morning. Sharon
7 Pinkerton, Airlines for America, and I'm happy to join
8 you.

9 MS. REIMOLD: Thank you.

10 MR. KARNES: Former Senator David Karnes,
11 Kutak Rock Law Firm.

12 MR. HASSLER: Chris Hassler, Syndetics, new
13 member to the COMSTAC.

14 MS. FAKTOR: Hi. I'm Debra Facktor with Ball
15 Aerospace.

16 MS. WEEDEN: I'm Charity Weeden, President of
17 Lquinox Consulting.

18 MR. ARMOR: Hi. I'm Jim Armor with Northrop
19 Grumman.

20 MR. HOLDER: Livingston Holder, Holder
21 Aerospace.

22 MS. SABATHIER: Robbie Sabathier, United

1 Launch Alliance.

2 MR. AUTRY: Greg Autry, University of Southern
3 California.

4 MR. COLEMAN: Kelvin Coleman, Acting Associate
5 Administrator for Commercial Space Transportation, FAA.

6 MR. GOLD: Mike Gold, Maxar Technologies.

7 MR. LOPEZ-ALEGRIA: Michael Lopez-Alegria, NLA
8 Space.

9 MR. KUNSTADTER: Chris Kunstadter, XL Catlin.

10 MR. STALLMER: Eric Stallmer, Commercial Space
11 Flight Federation.

12 MR. DALBELLO: Richard Dalbello with Virgin
13 Orbit and Virgin Galactic.

14 MS. WARREN: Jennifer Warren, Lockheed Martin.

15 MR. McCOWN: Brigham McCown, Alliance for
16 Innovation and Infrastructure.

17 MR. GARCIA: Oscar Garcia, Interflight Global
18 Corporation.

19 MR. DAMPHOUSSE: Good morning, Paul
20 Damphousse, MCS Government Solutions.

21 MR. LINDSEY: Good morning, Steve Lindsey,
22 Sierra Nevada Corporation.

1 MR. HUGHES: Tim Hughes with SpaceX.

2 MR. NASH: Dale Nash, the Virginia Space
3 Authority.

4 MS. REIMOLD: Great. Let's go very quickly
5 through our audience. Robbie.

6 (People talking off mike, could not be
7 recorded, audience members only).

8 MS. REIMOLD: Will you all speak up? The
9 acoustics are really hard in this room.

10 MR. GRANGER: Matt Granger, Lockheed Martin.

11 MS. ROBERTS: Rachel Roberts, British Embassy
12 Washington.

13 MR. SKINNER: Mark Skinner, the Aerospace
14 Corporation.

15 MS. HOWARD: Diane Howard, Embry-Riddle and
16 the International Institute of Space Law.

17 MR. STADD: Courtney Stadd with Vector Launch.

18 MR. SAKOWITZ: Randy Sakowitz with Vector
19 Launch.

20 MS. MARSO: Adalelace Marso, Department of
21 Transportation.

22 MR. GUMP: David Gump, Circumspace.

1 MR. KELLY: Michael, Chief Engineer, FAA AST.

2 MS. GILLEN: Suzanne Gillen, Maxar.

3 MR. PENNINGTON: Dale Pennington, ALPA.

4 MR. KANAGAY: Randy Kanagay with the Airline
5 Pilots Association.

6 MR. DePETE: Captain Joe DePete, the Airline
7 Pilots Association, First VP.

8 MR. THOMAS: Dan Thomas with NASA.

9 MS. JOHNSON: Sara Johnson, NASA.

10 MS. McBARREN: Kelsey McBarren, FISH.

11 MR. FULMER: Dean Fulmer, the MITRE
12 Corporation.

13 MR. McLAUGHLIN: Kevin McLaughlin, NATKA
14 (phonetic).

15 MR. CHRISTIANSON: Gary Christianson, FAA.

16 MR. VERGA: Mike Verga, ATO Safety.

17 MR. DUANE FREER, ATO.

18 MS. FRONTAGE: Good morning, Sally Frontage,
19 FAA, Air Traffic Organization, Commercial Space
20 Integration.

21 MR. OSWALD: Christ Oswald, Airports Council
22 International, North America.

1 MR. MCGRAW: Paul McGraw, Airlines for
2 America.

3 MR. BERLIN: Ben Berlin, FAA AST.

4 MS. ROSNER: Glen Rosner, Commercial Space
5 Transportation.

6 MS. DeWARD: Lauren DeWard, NTSB.

7 MS. HALLOWELL: Heather Hallowell, GAO.

8 MR. MUNCY: Jim Muncy, CSF.

9 MR. JACKSON: Stewart Jackson, FAA.

10 MR. KNUAFF: Good morning, Ken Knauff, FAA
11 Technical Center.

12 MS. RICHIE: Good morning, Judith Richie, SAE
13 International.

14 MR. DAVENPORT: Chris Davenport, the
15 Washington Post.

16 MR. RAND: David Rand, the U.S. Department of
17 Transportation, Office of the Secretary Policy.

18 MS. JACKSON: Jackie Jackson, Air Traffic
19 Organization, FAA.

20 MS. PIERCE: Good morning, Jullianne Pierce,
21 Space Florida.

22 MR. PRINGLER: Good morning, Glen Pringler,

1 White House OSTP.

2 MR. MURRAY: Dan Murray, FAA Commercial Space.

3 MS. GLADFELTER: Kelsey Gladfelter, FAA.

4 MR. NIELD: George Nield, Commercial Space
5 Technologies, LLC.

6 MR. BOWER: Patrick Bower, Aerospace
7 Corporation.

8 MR. AROL: Steph Arol, FAA AST.

9 MR. HUMPHREY: Cameron Humphrey, Aviation
10 Subcommittee, House of Representatives.

11 MR. SINGLETON: Steven Singleton, NTSB, Embry-
12 Riddle Student.

13 MS. REIMOLD: Thank you all for your
14 indulgence as we went through that introduction. I
15 think it was important for you all to have the
16 perspective of what a wide range of representation we
17 have from government, from industry, and we are
18 delighted that everyone has made the time for a pretty
19 exciting program today.

20 So without any further ado, I'd like to
21 introduce Mike Gold, who is serving as Chair of this
22 term of COMSTAC. Mike.

1 MR. GOLD: Thank you so much. Welcome,
2 everyone. Just in the interest of time, I'm going to
3 cut right to the introduction, so we can hear from Dr.
4 Pace. Scott Pace is the Executive Secretary of the
5 National Space Council, previously served as Director
6 of the Space Policy Institute, George Washington
7 University; was the Deputy Director and the Acting
8 Director of the Office of Space Commerce; also did a
9 stint at NASA as Associate Administrator for Programs
10 Analysis and Evaluation.

11 Scott is no stranger to FACCUS, having served
12 as the Vice Chair for NOAH'S Advisory Committee on
13 Commercial Remote Sensing. You know, this industry can
14 be a diverse, both a diverse and divisive place. It
15 won't come to a shock that we can disagree on many
16 things. I'm sure we'll see some of that today.

17 But one thing we can all agree on is the
18 breadth and depth of Scott Pace's knowledge, that when
19 he was announced as Space Council, I think there was
20 uniform support. Everyone was very excited about the
21 match-up between his incredible knowledge base and
22 leadership of the Space Council.

1 Scott has served as a mentor, a role model for
2 many of us in the industry, including myself. I've
3 been lucky to avail myself of his incredible knowledge
4 and not pay tuition for it, because I'm cheap like
5 that.

6 So let's have a warm round of applause to Dr.
7 Scott Pace.

8 DR. PACE: Thank you, Mike. Okay, terrific to
9 be here and particularly a great facility here, and one
10 almost wouldn't think it's a government building. This
11 is actually really pretty nice.

12 And so I think that, you know, going forward
13 the government is going to be playing, of course, a
14 very large role and continue playing a very large role
15 in commercial space operations and transportation, the
16 regulatory function that FAA AS&T does, is going to
17 continue to be critical, but the goal is going to be to
18 transform that process, such that the government
19 function gets done, but done in such a way that it's
20 going to be seamless with the commercial community, and
21 you wouldn't even know that you're necessarily dealing
22 with a government office. You're hopefully going to be

1 dealing with a very, very seamless and more timely
2 operation.

3 One of the top priorities, of course, of this
4 Administration has been to promote a deregulatory
5 agenda, a streamlining agenda, but deregulatory process
6 doesn't simply mean getting rid of things. It also
7 means enabling legislation and enabling regulation to
8 deal with new priorities and new situations that have
9 come up.

10 And so one of the biggest challenges that
11 we've placed on the Department of Transportation, on
12 AS&T is to update and streamline and create new
13 enabling regulations, to keep up with the pace of the
14 industry that you all are speaking for.

15 So DOT FAA is really on the cutting edge of
16 this regulatory reform, in part because of the rapid
17 changes that your communities and space communities
18 have been forcing and pushing in this environment, so
19 we've paid attention to that.

20 The AS&T, of course, and COMSTAC itself have
21 been around for a long time. 1984 for those of you
22 around for the Commercial Space Launch Act back then.

1 At that time one of the regulatory streamlining agendas
2 was to not have to deal anymore with Bureau of Alcohol,
3 Tobacco and Firearms, in the process of getting launch
4 licenses.

5 You know, again, we hope to continue that
6 spirit as you go forward.

7 I particularly want to extend a welcome to the
8 airline industry representatives here to this, because
9 one of the things that we're also cognizant of is that
10 rockets going up and re-entry vehicles coming down go
11 through the National Airspace System, and so DOT's
12 fundamental role as a safety organization and
13 responsibility for Title 49, responsibilities in the
14 national airspace is really crucial.

15 And so there's been a lot of the commercial
16 industry going out and space industry talking to itself
17 and talking to government. But I think it's particular
18 important that we have a cross-industry dialogue, and
19 so the fact that we have airline industry communities
20 and pilots and representatives to really come up and
21 look at what's happening in this industry and how we're
22 going to be working together to transit the national

1 airspace in a more efficient and effective manner, I
2 think is also really important. So again, I welcome
3 those new representatives.

4 So in looking -- I'd like to quickly review
5 some of the Administration's accomplishments in space.
6 It's just been a little over a year. The Executive
7 Order creating the National Space Council was just
8 signed in June. So it seems appropriate to look back
9 at what's happened since then.

10 The President has signed a NASA Transition
11 Authorization Act in 2017, allocated \$19.5 billion in
12 funding for NASA and directed the agency to put a man
13 on Mars by 2033. The authorization also set long-term
14 goals for the nation's efforts in space.

15 The President signed an appropriations bill,
16 which gave NASA a total of \$20.736 billion, 1.6 billion
17 above what the original request was.

18 In addition to the National Space Council
19 being re-established, we've had two meetings of the
20 Council, one at the Udvar-Hazy Center out in Dulles,
21 many of you saw, and the second on February 21 down at
22 Kennedy Space Center, and the next one coming up on

1 June 18th is going to be here at the White House, and
2 the next day will be the first meeting of a user
3 advisory group, RFAC (phonetic) for the National Space
4 Council, the next day at NASA Headquarters.

5 The President issued Space Policy Directive 1,
6 which sets forth the series of principles for guiding
7 the National Space Program in exploration activities,
8 returning to the moon, going on to Mars. As former
9 Acting Administrator Robert Lightfoot put it, with
10 regard to the moon and Mars, we say embrace the healing
11 power of "and," both of these objectives.

12 And in part we also said to do this with
13 international and commercial partners, because the
14 environment today is very different than that of the
15 space race of the 1960's. here the intent is not
16 simply to demonstrate what we can do that no one else
17 can do. Our intent is to do this with international
18 and commercial partners, that is, to have the largest
19 club we can for going out and pushing and exploration,
20 and so that means partnerships with industry, which
21 includes your communities.

22 In looking at this situation, we of course

1 realize that, again, unlike the 1960's, we're not going
2 to be putting one percent of the GDP into the NASA
3 budget. I'm sorry. You know, as what's happened in
4 fiscal year '64, that Professor and me can't help but
5 noting that. So that's not going to happen again.

6 So what do we need to do if we're going to
7 have ambitious objectives in space? We need to grow
8 the economy. One of the things that the Administrator
9 can do in working with the Congress to grow the
10 economy, of course, is the deregulatory and
11 streamlining agendas.

12 So to make sure that our regulations are up to
13 date and are relevant to the speed of commerce that you
14 all are engaging in.

15 With that in mind, the President signed Space
16 Policy Directive 2, which laid out a deregulatory
17 agenda in a couple of detailed areas, export control
18 reforms and streamlining, remote sensing. Of course,
19 pointing out that space launch and activities that need
20 to be streamlines, and we're looking forward to a
21 follow-on effort, we hope in the near future. Space
22 Policy Directive 3, which will deal with space traffic

1 management, which again looks to the number of
2 thousands of satellites, hundreds of launches occurring
3 and, again, what do we have to do to prepare for that
4 environment?

5 Space traffic management and regulations are
6 probably two of the largest domestic priorities in
7 terms of challenges that the commercial community
8 faces. I would say the next priority is going to be
9 the international community.

10 So commercial space may not be a surprise to
11 many of you, and as Mike and I experienced at the U.N.
12 in Vienna, commercial is still an odd concept to many
13 other countries. So the idea of a larger private
14 sector role in space is something that the
15 international community is still I think wrapping its
16 head around, and this actually has historical roots and
17 can go back into the early 1960's, when the old Soviet
18 Union contended that private activity in space was akin
19 to piracy, because only member states could be
20 legitimate actors in space.

21 And, of course, the U.S. rejected that
22 position and we adopted Article 6 of the U.S. Outer

1 Space Treaty, which said that state parties will be
2 responsible for entities under their jurisdiction or
3 control, we will license commercial activities, but in
4 fact we will have commercial activities in space.

5 And so other countries are taking that up and
6 have adopted some of the similar ideas and licensing,
7 and so the dialogue we've been having internationally
8 is to promote industry best practices and principles
9 from a bottom up perspective, not a top down
10 perspective, as these ideas, such as were reflected in
11 the orbital debris mitigation guidelines, then get more
12 widely understood within the community. They're
13 adopted as these non-binding guidelines, which can then
14 be pointed to and used by member states to adopt in
15 their own national law and regulation.

16 So in this way, consistent with the
17 Administrator's foreign policy objectives, of focusing
18 on national sovereignty, that is, we have friends and
19 partners in space, but we are not subsuming the United
20 States as some new transnational authority.

21 So but the dialogue with the international
22 community is critical. And your role in that is

1 critical in terms of these best practices, but we in
2 turn look at adopting binding regulations and law at a
3 national level that has been coordinated
4 internationally. So this is the balance we want to
5 have between being flexible and yet being responsible
6 for activities in space and promoting the public safety
7 and national security.

8 As I mentioned, longer term goals, of course,
9 are returning to the moon, expanding the sphere of
10 economic activity from the United States and farther
11 out into space, and making sure that our nation is, if
12 you will, the indispensable nation that's part of
13 really any space activity. That doesn't mean that
14 we're going to dominate in every area, except
15 militarily, but it does mean that we're going to be
16 there, whatever happens, because we want to see
17 American values and American priorities fully reflected
18 on the space frontier, even as other countries and
19 other entities join with us and are part of that
20 frontier. We, of course, don't want to leave that to
21 them alone. We want to make sure that we are fully
22 present and are shaping the norms of behavior, the

1 rules and values of that frontier.

2 So and finally, so what does this mean really,
3 not just for the space community, but what does it mean
4 here at home? Fundamentally it means contributing to
5 our national security, contributing to our economy,
6 contributing to jobs, not just, you know, those of us
7 wearing suits here in Washington, but jobs of
8 technicians, blue collar members, middle class
9 engineers, people across the country, that what space
10 does represents some of the highest, most-advanced
11 technology and manufacturing and skill jobs that there
12 are in this country.

13 And so promoting that and growing that,
14 particularly in the private sector, is vital to the
15 future of the United States and it's vital to our
16 security and it's vital to our standing in the world,
17 and so anything that you all can do to help us remove
18 those barriers and grow this industry, so that the U.S.
19 is fully the international leader it should be, we are
20 most grateful and the nation is most appreciative.

21 With that, let me pause and simply really see
22 if I can take any questions, up until the time Mike

1 tell me to cut it off.

2 MR. GOLD: I would never tell you, I would
3 only consult. So -- let's go to the COMSTAC membership
4 first. Questions for Dr. Pace?

5 The good professor, I've sucked all the air
6 out of the room, okay, there's nothing left. Let me
7 kick off with a question, if that's okay. There we go.

8 So relative to ISS and LEO commercialization,
9 you know, I think the Administration caused a very
10 product debate and discussion relative to where we're
11 headed. You know, I worry every day that something is
12 going to happen to the ISS and America will lose its
13 foothold in LEO, and I know throughout my career and
14 for many of us, we've been waiting for this moment.

15 So I was just wondering if you could say a few
16 words about where you think the Administration wants to
17 head and continuing to have a presence in LEO, but one
18 that's very different relative to where we've been with
19 International Space Station, moving to more of a
20 commercial model?

21 DR. PACE: Right. So first I would think it's
22 important to point out that the International Space

1 Station partner agreements, it is not a U.S. owned
2 facility. It is an international partnership. And
3 probably the most important thing that has come out of
4 the Space Station, in addition to being an engineering
5 marvel and in addition to doing fascinating scientific
6 research and in addition to being a vital platform for
7 technology development, the most vital thing that's
8 come out has been the relationships among the thousands
9 of people internationally who have been working on the
10 station.

11 And so that if we're going to be going
12 anywhere deeper in space, it's going to be those
13 relationships that we're going to have to build on. So
14 what we want to be able to do is that we'll maintain
15 that foothold that we've built at great cost and effort
16 in low Earth orbit, as a vital facility, we want to
17 maintain that foothold but at the same time turn
18 government attention toward exploration and toward
19 moving out deeper into space.

20 And so in order to do that, the international
21 partnership agreements, which are now slated to end in
22 2024, we need to think about what the world looks like

1 after that.

2 We went through a lot of effort in the last
3 Administration to get those relationships extended
4 through 2024, and one of the most crucial questions was
5 -- were asked is great, station is wonderful and we
6 like working on it, we like supporting. We do
7 wonderful research in it, but we want to know what
8 comes next.

9 And so we were in -- office and I, we were in
10 Tokyo in March of this year for the International Space
11 Exploration Forum, and that meeting was held in the
12 U.S. in 2014, and it said a lot of nice things about
13 cooperation internationally, but there wasn't really a
14 lot of particular direction in that.

15 The difference in the March meeting was
16 profound, in that because of Space Policy Directive 1
17 and having a direction, people said oh, that's where
18 you're going next, how can we work with you, not
19 whether, but how can we work with you.

20 And, of course, the Space Station partners
21 were then most interested in, and say okay, how does
22 that affect the Space Station relationship, what do we

1 do? And we said that's the conversation we want to
2 have with you, because, you know, we know it's ending
3 in 2024, we've now said here's the direction we're
4 going to go in. How do you want to pivot from where
5 you are now to where you want to go?

6 You also want to maintain the capability in
7 low Earth orbit, so that can mean the station itself
8 under private sector management. It can mean a portion
9 of the stations. It can mean new and different
10 stations.

11 What the Administrator has been very I think
12 clear about is we've said ending direct investment,
13 direct payment, in there, that doesn't mean there won't
14 be a demand or a market for doing continual research,
15 having astronauts in orbit, both private sector and
16 public. What it does mean is we need to think about
17 how we do this differently, and we have several years
18 now, which of course is not long in space terms, to
19 then figure out where we're going to go next.

20 So there's a number of things on the agenda.
21 The ISS docking port, what do we do about that.
22 Commercial hat facilities and platforms, what can we do

1 about that? Do they all need to be at 51.60 re-
2 inclination? No. Maybe they need to be elsewhere.

3 So having a greater diversity of options,
4 maintaining that foothold in low Earth orbit, is
5 crucial. And so as we look to this the kind of bumper
6 sticker phrase we use is "The United States Government
7 wants to be a tenant, a major tenant, in the building.
8 We don't want to own the whole building."

9 Now, of course, the reality is we do own the
10 building in partnerships, kind of like a New York
11 condo, you know, we own in partnership with other
12 members. And so again it's a partnership we need to
13 discuss, how we want that to go forward. But we want
14 to see more people operating facilities in space,
15 supported by your members and transportation to those
16 facilities. Of course, the degree to which you can
17 bring costs down means that the viability of those
18 private platforms becomes better.

19 So there's a crucial synergy here in what
20 you're doing and that transition away from a fully, you
21 know, government-owned and operated facility, and one
22 where government can focus on exploration. So long

1 answer, but these things are all embedded with each
2 other.

3 MR. GOLD: Jennifer.

4 MS. WARREN: Thank you. And thank you for
5 kind of setting a great context for the start off --
6 kickoff of this meeting of the COMSTAC.

7 I wanted to ask you, in Space Policy Directive
8 2 there's a focus on spectrum, which many of us really
9 welcome because it's often an underrepresented, under-
10 discussed topic for space. Could you maybe elaborate
11 on what you hope to see from the report? Thank you.

12 DR. PACE: Sure. So one of the things that we
13 did, we had -- so a lot of these mega constellations
14 that people are looking toward with great hope and, of
15 course, in terms of launch businesses, those don't
16 happen without spectrum. And those don't happen not
17 only without spectrum from the FCC and licensing
18 decisions, those don't happen without stable
19 international globally protected allocations within the
20 International Telecommunications Union. And so you and
21 I have been in those fights.

22 And so spectrum is absolutely vital; and,

1 therefore, the regulation of it is central to the
2 future of the space industry.

3 There has been a great attention to, of
4 course, the revolutionary contributions of mobile
5 broadband. The Administration is very dedicated to the
6 future of 5G. The United States is to be a leader, if
7 not dominant, in the future 5G transition. So this is
8 a big, big focus.

9 But 5G does not mean everything is on the
10 ground and everything is terrestrial. There are rural
11 areas that are not going to be served by ground
12 systems. There are developing countries that are not
13 going to be served by ground systems.

14 And so in this environment satellite spectrum
15 and satellite services are absolutely crucial to our
16 success in 5G in terms of having a mixed strategy going
17 forward. They are crucial to our outreach into the
18 developing world to underserved communities, both at
19 home and overseas, which in turn is where the votes are
20 within the ITU.

21 The United States has done actually very well
22 over the years in space and the International

1 Telecommunications Union more broadly, because space
2 interest of the United States and the needs of
3 developing countries have actually aligned in many
4 cases, so protection of GPS, satellite communications,
5 weather systems environment, all are very vital not
6 only to our national interest, but also to the interest
7 of many developing countries.

8 So I think what the Administrator has
9 recognized, again, the healing power of "and." It's
10 not ground or satellites. It's and, and that in that
11 combination the regulatory advocacy in the United
12 States is going to be crucial to that, so we have that
13 balance and that mixture.

14 And I would say that I think that the language
15 that you've seen from NTI Administrator Redl in his
16 testimony, in what happened, comments from the FCC, at
17 the NTI symposium the other day, again, talking about
18 satellites as part of the system.

19 Now, this doesn't mean everybody can relax.
20 Okay, because the natural tendency is to focus on the
21 immediate markets, such as in dense urban environments,
22 which are dominated by land-based systems. I think we

1 need to keep and maintain a global perspective and
2 broader than just our immediate cell phone coverage,
3 and look broader than that, and so if we want to
4 promote the success of commercial space commerce more
5 generally, making sure there's adequate and protected
6 spectrum for satellite systems internationally is going
7 to be crucial, and again this community is important to
8 contributing to that.

9 MR. GOLD: Further questions from COMSTAC?

10 MR. HOLDER: Within the framework of our
11 responsibility, as COMSTAC, to the FAA AS&T as an
12 advisor, what role do you see or what interaction do
13 you see formally or informally with COMSTAC, its
14 members and the NSC?

15 DR. PACE: And the what?

16 MR. HOLDER: The National Space Council.

17 DR. PACE: Okay. So I think one of the first
18 thing I would say is COMSTAC is very valuable in terms
19 of blending together a consensus recommendation. We
20 see lots of individual companies, okay, and one of the
21 things that I learned when I was a career service
22 person at the Commerce Department, Bush 41, which seems

1 ancient now, is that individual companies coming in all
2 have fairly complex agendas, and I'm not smart enough
3 to know what all those agendas are.

4 And so it's really important that there be
5 trade associations or groupings or advisory groups like
6 this where the commonalities that are beneficial to the
7 country as a whole come together.

8 So while I'm very interested in sort of the
9 details and particular problems that companies may
10 face, as a policy matter I really can't care. I need
11 to care about what does the industry as a whole need.
12 And so as a consolidation and as a prioritization
13 function, advisory groups are crucial.

14 If you look at, for example, the scientific
15 community, we have decadal surveys that prioritize what
16 the astrophysics community wants to do or prioritize
17 what the planetary science community wants to do. They
18 can't do everything, so they need to set priorities.
19 They need to come to a consensus. Those decadal
20 surveys are incredibly valuable for NASA and for the
21 Congress because the relevant, smart community has
22 gotten together and self-organized and set those

1 priorities. And that means that we don't have to.

2 So in looking at you all coming together and
3 saying what are the priorities, give me a consensus,
4 give me that short list, pound out the individual
5 competitive agendas among yourselves, so that I don't
6 have to try to second guess that, that is very, very
7 valuable input and so the stronger and more cohesive
8 that is, I think the more impact it as, as we've seen,
9 for example, in the science community.

10 Some science communities are stronger and more
11 cohesive than others. It took a long time for the
12 first Earth science decadal to come together, because
13 it was really hard to get those very, very different
14 communities to agree on prioritization amongst each
15 other.

16 They did that and the recent decadal, I'll
17 commend to you, has been quite good, but the same thing
18 here with this community, and this is why I mentioned
19 the important involvement of the airline community in
20 this, because you're transiting the same national
21 airspace. So prioritizing that. The mention of
22 spectrum. Okay, it's not just launches but getting

1 past special temporary authorizations for every time
2 you go up. Okay, is an important key piece. That
3 means going to the FCC. That means having a priority
4 in that stack.

5 So to the extent that you can kind of distill
6 that for the limited bandwidth attentions that
7 sometimes we have, that's a very valuable contribution
8 to us.

9 MR. GOLD: Unfortunately I'm getting the
10 heave-ho. Let's have a round of applause for Scott
11 Pace.

12 MS. REIMOLD: Scot, thank you very, very much
13 for making time for us this morning.

14 DR. PACE: Thank you very much, appreciate it.

15 MS. REIMOLD: So Scott's remarks were
16 absolutely a perfect leadup to our next speaker. Scott
17 highlighted the focus on the regulatory reform and the
18 inclusion of other industries, as we work forward to
19 the future of commercial space transportation, and
20 also, of course, the importance of international
21 collaboration.

22 And these attributes, I think, are a perfect

1 segue to introducing our next speaker, Mr. Carl
2 Burleson, who is the Acting FAA Deputy Administrator,
3 since January of this year. In his role, as you all
4 are well aware, he is responsible for the world's
5 largest and most advanced aviation system, and he does
6 a darn good job of it.

7 Prior to this assignment Carl was the FAA's
8 Deputy Assistant Administrator for Policy,
9 International Affairs and Environment and he's held
10 that role since 2011. So in this work he led the
11 Agency's efforts to increase the safety and capacity of
12 the global aerospace system in an environmentally sound
13 manner, and that was pretty simple, wasn't it, Carl?
14 Yeah, uh-huh. We all remember the ETS days.

15 Anyway, he's also very heavily involved in the
16 FAA's strategic planning efforts and forecasting and on
17 that note, I would also note that the commercial space
18 transportation industry figures into a chapter of that
19 annual forecast, so that's pretty exciting stuff for
20 us.

21 I'm in a nutshell telling you that Carl's done
22 a lot of exciting things in the Agency, and we're very,

1 very thrilled to have him as the Acting Deputy
2 Assistant Administrator. More importantly, Carl's
3 demonstrated through his commitment of time to our
4 organization, just how the premium that he puts on the
5 commercial space transportation work that we do on
6 behalf of the industry, so without any further ado,
7 Carl Burleson.

8 MR. BURLESON: Thanks very much, Di. It's
9 really good to be here. I seem to have a pattern here,
10 as Jennifer knows, I was at the NTI symposium speaking
11 for the FAA, and I always get to speak right after the
12 White House person. So I could make the simple speech,
13 which is what he said, so clearly Scott did a very nice
14 job.

15 I also have to confess that Di was talking a
16 little bit about my background. I am a recovering
17 economist by training, and so I really appreciate your
18 willingness to listen to sort of how I'm forecasting
19 the future, because as one of my professors said, you
20 know, the reason they invested economic forecasters was
21 to make astrologers look good.

22 So -- but with that said, on a clear day in

1 February, earlier this year, the world's most powerful
2 rocket launched from the Kennedy Space Center in Cape
3 Canaveral. It hurdled toward orbit, powered by 27
4 engines, carrying a cherry red Tesla, playing David
5 Bowie's Life on Mars.

6 The rockets were usable boosters, returned to
7 Earth minutes later, and I will say some observers
8 called this one of the most beautiful things they had
9 ever seen.

10 I will tell you I was halfway across the world
11 at the Singapore Air Show, and it was striking to me
12 that morning how many people were talking about that,
13 how many people actually had been up in the middle of
14 the night watching that launch. And I think that says
15 something about where the world is today in terms of
16 commercial space transportation.

17 Feats like this that seemed impossible a few
18 years ago are now becoming more commonplace. And
19 they're certainly inspiring, I think a new generation's
20 fascination with space. And the good news is they're
21 being achieved by American businesses on American soil.

22 Our nation has a very long history of

1 leadership in aerospace. As everyone knows, we were
2 home to the first flight. As Sharon will know, we were
3 home to the first commercial aviation flight, and we
4 certainly were the first to send a man to the moon.

5 And now the commercial industry in space is
6 growing at an unprecedented pace. There are countless
7 possible uses for space technology, from near real time
8 Earth imaging to hypersonic shuttles, and as companies
9 from around the world start to consider this potential,
10 it's essential that the U.S. show leadership.

11 Being first in space isn't just a matter of
12 national pride from our standpoint. I think it's also
13 good for the economy. A recent study estimated 2017
14 commercial space market was about \$9 billion, and in
15 seven years that's expected to triple.

16 I will say Scott Pace made I thought a really
17 nice intervention, which is not just the numbers in the
18 economy, it's the kind of jobs and opportunity that it
19 offers. And I think as Vice President Pence reconvened
20 the National Space Council last year, it sent the world
21 what I believe is a clear signal, if you want to issue
22 a license for commercial space operation, America is

1 open for business.

2 This Council is coordinating their efforts
3 across government and certainly the FAA is playing very
4 fully, as is the Department, in trying to advance the
5 efforts. And I think the work is already paying off.
6 After lagging behind China and Russia for the last few
7 years, the U.S. licensed the most commercial space
8 launches in 2017. And as my folks in AS&T have told
9 me, we're well on our way to breaking that record.

10 So now we need to build on that momentum, and
11 certainly the Department of Transportation is committed
12 to doing that. In accordance with President Trump's
13 recent space policy directive, the Department will
14 release a new system for managing launch and re-entry
15 licenses next year. It will replace the requirements
16 of a prescriptive system with a performance-based
17 system that will streamline many of our existing
18 processes.

19 Our goal is to make it easier for commercial
20 space operators to receive the approvals they need in a
21 timely fashion.

22 And additionally, we're studying new

1 technologies to help meet this increased industry
2 demand. For example, the FAA is testing the Space Data
3 Integrator, a platform that automates the current
4 manual, time consuming and resource-intensive process
5 to support commercial launches and re-entries, we'll be
6 able to safely reduce the amount of airspace we need to
7 block off for commercial space operations and it has
8 the potential to make launches less disruptive to the
9 existing National Airspace System users.

10 We've also chartered several aviation
11 rulemaking committees where stakeholders are providing
12 us the advice we need of how to reshape the system.
13 With participants from both aviation and the aerospace
14 communities, they will provide us recommendations of
15 how to improve our spaceport categorization system, as
16 well as to prioritize and more effectively integrate
17 different users into the National Airspace System.

18 We are committed to improving our regulatory
19 environment, so that the U.S. will remain a world-wide
20 leader in commercial space transportation, and it's
21 this kind of collaboration that's actually going to be
22 essential if we're going to make progress. And that's

1 why we've brought you together. We're re-establishing
2 the Commercial Space Transportation Advisory Committee.

3 The group was first created in 1984, so that
4 the industry and stakeholder groups could provide
5 recommendations to us on the most pressing commercial
6 issues of the day. That group's advice was invaluable
7 and it's going to be even more important, and I think
8 it's really important as we've reconstituted that it
9 has both aerospace and aviation interest on this to
10 advise us, because I don't see innovation slowing down.
11 And, in fact, I see it speeding up. And if we're going
12 to need your expertise, we're going to need your input,
13 we're going to need your guidance, if FAA is going to
14 keep pace with the changes in technology and operations
15 and users, while maintaining the level of safety that
16 the American people expect.

17 So I want to thank you very deeply for taking
18 the time and effort to be committed to this committee
19 and to give us advice. You're going to play a critical
20 role in shaping policy and prioritizing what we're
21 doing going forward.

22 We've already tasked you with a long list of

1 important priorities to assess and I look forward to
2 working with this group to see what it comes up with.

3 You know, someone once said that the best way
4 to predict the future is to create it, and I think the
5 Trump Administration is committed to making sure it's
6 created right here in the United States. By removing
7 regulatory burdens, by being able to use technology
8 more creatively, and by partnering with you, the
9 industry and users. In this way we will ensure our
10 national continues to build on the great legacy we've
11 had as a world-wide aerospace leader.

12 So I thank you for your attentiveness. I wish
13 you a productive meeting, and I'd be glad to take a few
14 questions. Thank you.

15 MR. GOLD: Questions from the COMSTAC?
16 Please.

17 MS. PINKERTON: Good morning, and I just
18 wanted to first of all say thank you again to the
19 Administration for including the airline community in
20 COMSTAC. I really appreciate the opportunity to
21 collaborate with you all.

22 I think, as you know, for us a commercial

1 space is an exciting new industry in terms of its
2 impact on commercial aviation, and so I'm excited to
3 learn more. My first learning experience was really
4 the front range project out in Colorado, and as Carl
5 knows, he's been the object of some anxiety, quite
6 frankly, on behalf of the airline community.

7 And so, Carl, I guess my question to you is
8 how best can airlines and the commercial space
9 community collaborate to make sure that we're talking
10 to each other and understand each other's concerns, our
11 concerns, of course, being the fact that we believe
12 that NASA -- it's a limited resource. We need to share
13 it, but we do care about the safety and efficiency
14 impacts on commercial aviation. So whatever counsel
15 you have, but my main message is thank you for
16 including me in the conversation.

17 MR. BURLESON: So thanks, Sharon. I do think
18 this is one important step, because I do think it will
19 be very helpful to the FAA, because as the gentleman
20 imposed the question about the kind of input we need,
21 we really do need advice from COMSTAC, and we need it -
22 - certainly consensus is the best and having this blend

1 of issues, both from the aerospace side and the
2 aviation side, coming together will help the FAA a lot.

3 I do think the frontier example is actually
4 very helpful, because I think what we saw in there was
5 when we recently brought people in to talk about how we
6 are going about it, it was clear that there was a lot
7 of education that needs to go on between the two
8 communities, because I think the aerospace community
9 has operated in a certain set of rules. The aviation
10 traditional users have operated in different ones, and
11 I think there are oftentimes a lot of concerns, worries
12 and fears because no one quite understands the
13 different licensing operating processes. And
14 certainly, that process of education, I think, has
15 addressed some of those fears, and I think also trying
16 to be more open and transparent. We've certainly tried
17 to encourage all the different stakeholders in this
18 process of trying to set up a spaceport, of how do I
19 provide the information to different folks, so that
20 there is less concern and less fear, and there are ways
21 of actually managing all the different users?

22 Because again, I will just say, we are -- as

1 the Secretary said the other day, we're kind of in the
2 third age of innovation in aviation, so the commercial
3 space users are one, but we also have this whole new
4 set of users called drones. So it really is going to
5 be a quite interesting process as we try to integrate
6 into this limited national airspace resource all the
7 different demands, but we are committed to finding ways
8 of doing it.

9 MR. GOLD: Questions from the Committee?

10 MR. GARCIA: Thank you, Carl. Oscar Garcia,
11 Interflight Global. I'd like to make a comment
12 regarding the hydrosonic cruisers you mentioned and I'm
13 glad you mentioned that. Those vehicles start blurring
14 the boundary between air and spacecraft, and probably
15 from a transportation viewpoint, commercial
16 transportation could be the precursors to higher and
17 faster. So I applaud the collaboration of the FAA air
18 operation system with the space, as that boundary is
19 getting blurred more and more, and becoming also more
20 real with realistic super hydrosonic craft on the
21 making. Thank you, Carl.

22 MR. BURLESON: Well, no. Well, it's actually

1 our own self-interest, because we keep on -- it's
2 interesting to see, even in the commercial space
3 industry today, we're seeing different hybrid concepts
4 of what might reach space and certainly we've had a
5 number of technology innovations, which is causing us
6 to relook at do we have the possibility of re-
7 introducing supersonic flight. And so again, it's not
8 that far of a step, going from supersonic then to
9 hypersonic, so again it's a really interesting time to
10 be at the Agency, because we're having to adapt a way
11 of doing business to take -- dealing with all these new
12 technologies.

13 MR. GOLD: Questions from the group? Charity.

14 MS. WEEDEN: I'd be interested in knowing how
15 you collaborate with ICAO in this question of the
16 evolving airspace.

17 MR. BURLESON: Good question. So I think
18 right now what we've been trying to do is starting to
19 educate people, because again, as I said earlier, I
20 think even domestically there's a need to try to build
21 a knowledge across the different disciplines, and
22 certainly at ICAO we have started to educate folks

1 about what are the potential issues, how might we treat
2 commercial space? I don't think anyone has quite
3 figured out what would be the right international
4 realm.

5 I mean, I do think one advantage that ICAO
6 offers, at least it's a platform that we have used for
7 decades to try to meet the evolving needs of aviation,
8 because again when we started in ICAO there wasn't a
9 security. Back in 1944 when the Chicago Convention was
10 generated, there were no security articles. There were
11 no environmental articles, but the document and the
12 organization was able to evolve over time to take into
13 account how aviation needs have changed.

14 I will say, the other things that's -- why
15 we're trying to educate ICAO in this area is because,
16 again, it is not an operational agency. It's a
17 standard-setting organization, and so what we have seen
18 over time, if you have the ability set standards in
19 terms of vehicles or how things are operated or
20 expectations on airspace, then you at least have a
21 minimum set of expectations everywhere in the world
22 that everyone agrees to operate to. And so, again, it

1 allows a good deal of flexibility for any nation to
2 operate the way it wants, but again within an
3 international framework, so again it's helpful to
4 educate ICAO in this area of growing interest for the
5 U.S.

6 MR. GOLD: Any other questions from the
7 Committee? Do we have any questions from the audience?
8 Jeff.

9 MR. FOUST: Jeff Foust with Space News. You
10 talked about getting the new licensing regulations in
11 place by next year. The rulemaking process
12 traditionally has been a multi-year process. What are
13 you going to be doing in order to get that done in less
14 than a year?

15 MR. BURLESON: Great question. Come on, you
16 know, I'm waiting for the headline about FAA rulemaking
17 saying hip, cool and doing it right. So I think what
18 we've tried to do -- I mentioned the Aviation
19 Rulemaking Committee, structure that we have this
20 ability to do. We put one together on the licensing
21 process. In fact, it has met several times and has
22 delivered to us a set of recommendations, so that's

1 really helpful in terms of trying to streamline what
2 we're doing.

3 The second thing is we're taking an approach
4 where, you know, before I think I'm trying to remember
5 Kelvin and Di -- I think we had something close to 300
6 pages of regulation in this area, so part of the
7 solution is how do we move down to a performance-based
8 approach, which again we -- and we have experience
9 recently doing this in a different part of aviation,
10 because in our what's called Part 23, where we have
11 traditionally certified general aviation aircraft, we
12 had the same process or problem, where we had stacks of
13 accreted prescriptive rules that have grown up over
14 basically 50 years, that we changed to a performance-
15 based, and so we were able to rapidly shrink what we
16 were doing and how we're doing it, but it can still
17 achieve the safety.

18 So our view is if we can do that, again, it
19 will help, and then the third thing is we have, because
20 of the commitment of this Administration, we've been
21 able to get the commitment of different parts of the
22 rulemaking process, and not just what the FAA is doing

1 in terms of committee and resources to get this done,
2 but also with DOT, OMB, the whole Administration to
3 make sure that we have different gate posts that we can
4 meet, so we can get out the -- by February of next
5 year, the Notice of Proposed Rulemaking.

6 MR. GOLD: Any other questions from the
7 audience? Seeing, none, a round of applause.

8 MR. BURLESON: Thank you very much.

9 MS. REIMOLD: Carl, thank you very much for
10 those insightful remarks and really to underscore the
11 importance that the Agency is placing on not only
12 creating a more positive regulatory environment, but
13 certainly all the work that we're doing to bring the
14 communities together, so appreciate your remarks, and
15 more importantly, your ongoing support.

16 So with that, it's yet another perfect segue
17 into our next speaker. We have the great privilege of
18 hearing from my colleague, Kelvin Coleman, but before I
19 ask Kelvin to come on up to the podium, I thought it
20 would be kind of fun to share a few things, so when
21 George and I started talking, I guess George, about two
22 years ago, about my returning to the Agency to work

1 with George and the team, one of the first people I met
2 was Kelvin. And George had been telling me hey, I've
3 got this great guy, Kelvin Coleman, he's going to be,
4 you know, really, really important for you to get to
5 know and to work with, and everything.

6 The thing about Kelvin is what I'd notice --
7 I'd always see him in passing. He was always flying
8 down the hall or flying off to work another emergency,
9 and so I finally met Kelvin and, you know, what George
10 promised was true. He's been a terrific colleague and
11 a terrific person to get to learn the organization.
12 But I think more importantly is in our current
13 arrangement we're working together to advance several
14 key priorities, and Kelvin is going to walk you through
15 some of those priorities this morning and you'll see
16 how important they are to the work ahead for the
17 COMSTAC. So with that, Kelvin.

18 MR. COLEMAN: Thanks, Di. And good morning.
19 It's great to be here.

20 I'm really excited about commercial space
21 transportation and what lies ahead for this sector.
22 Since our inception, the Office of Commercial Space

1 Transportation, which as many of you know, began some
2 34 years ago as a staff office in the Office of the
3 Secretary of Transportation, has been an instrumental
4 player and a partner in enabling not only an industry
5 that to this day has a perfect public safety record,
6 but also enabling and fostering a strong and
7 internationally competitive U.S. commercial space
8 transportation sector.

9 Well, some things change and well, some things
10 don't. And what hasn't changed is AS&T's commitment to
11 partnering with industry and our government partners to
12 ensure that the U.S. commercial space transportation
13 sector is not only the safest in the world but also the
14 most successful. That's what hasn't changed.

15 Now, I did say, as well, that some things
16 change, and I'll speak to that in a few minutes, but
17 before I do I want to take a pause to thank our
18 colleagues and friends here at the Department of
19 Transportation for housing our meeting today, as well
20 as our Executive Secretary for the National Space
21 Council, Scott Pace, and acting FAA Deputy
22 Administrator Burleson for their remarks this morning

1 and for continuing to exhibit the kind of leadership
2 that has been so instrumental in moving U.S. commercial
3 space transportation forward.

4 I'd also like to welcome back, after a little
5 bit of down time, our COMSTAC members, both old and
6 new, for this, the 65th meeting of the COMSTAC. I want
7 to especially thank the guy that I go back a few years
8 with, to say the least, and that's our Chairman, Mike
9 Gold. Mike's been instrumental in his leadership of
10 the COMSTAC for several years and has been a great
11 friend and colleague to work with in support of AS&T
12 and our mission objectives.

13 The COMSTAC has been an instrumental advocate
14 for the U.S. commercial space transportation and so
15 critical to our success with providing strong
16 leadership and high quality advice and recommendations,
17 that the Department and the FAA have leveraged over the
18 years to improve and enhance so many aspects of what we
19 do towards enabling a safe and successful industry.

20 We are delighted to have the band back
21 together, so to speak, and very much look forward to
22 your continued contributions.

1 Well, I said earlier some things change, so
2 let me touch on that now. It's been a while since the
3 COMSTAC has met and in that time a few things,
4 important things, some might say, have happened. I'll
5 just touch on maybe one or two of those things, maybe
6 three.

7 There's been a significant shift, as Carl
8 mentioned earlier, in the public's enthusiasm and
9 recognition of commercial space. I haven't done a fact
10 check on this, and maybe Tim can help me, but I've
11 heard that SpaceX's Falcon Heavy launch this past
12 February was one of the most launched events on
13 YouTube, maybe in the top one or two. Number two? Tim
14 says number two.

15 I did do a fact check on this. I looked today
16 and the number of views was well over 22 million.
17 That's a lot of eyeballs. We're really excited about
18 that.

19 And as Carl mentioned earlier, last fiscal
20 year we had a record-breaking number of licensed
21 launches. And to peak ahead a bit, we're on track to
22 top that this year. We're really excited about that,

1 as well. Also, as some of you may have noticed, we've
2 had a change in the Administration. And with it, a
3 renewed enthusiasm and focus on American space policy.
4 We heard Scott talk about that earlier today.

5 It was nearly a year ago that Vice President
6 Pence chaired the first meeting of the newly revived
7 National Space Council. We've seen the Council and the
8 White House move swiftly to issue a number of space
9 policy directives that would return American astronauts
10 to the moon, for long-term exploration and utilization,
11 as well as mission to Mars and other destinations.
12 And, as many of you know, of course, drive us towards
13 an entirely new streamlined and consolidated regulatory
14 construct that ultimately will ensure that the U.S.
15 remains the leading global provider of space services
16 and technology.

17 We're really excited about that too, and
18 embrace the challenge of making it happen. And since
19 the last COMSTAC meeting, we've had a change or two in
20 AST, as well. After 45 years of civil service, the
21 last several years of which having served as the
22 Associate Administrator for Commercial Space

1 Transportation, Dr. George Nield retired in May.

2 Now, I don't want to say that we're real
3 excited about that, but I will say that what we are
4 truly excited about is the fact that George left us a
5 strong hand to play to enable and partner with our
6 industry stakeholders to foster a safe and successful
7 industry.

8 And so this may be a good point to say a
9 little bit about where we head from here, and what our
10 priorities are at AST. We're looking at a very bright
11 future. And with United Launch Alliance, Blue Origin,
12 Boeing, Northrop Grumman, Virgin Galactic and Virgin
13 Orbit, Rocket Lab, SpaceX, Sierra Nevada, and Vector,
14 to name a few, pushing hard to bring new and
15 transformative launch services to the market, that
16 enhance our everyday lives as citizens, serve our
17 national security needs and advance our science and
18 exploration missions, we have our work cut out for us
19 at AST as we strive to enable a safe and innovative
20 launch service industry.

21 So what we've done at AST is focus our efforts
22 on three priority areas that I'd like to share with

1 you. First, as Carl mentioned, is reforming our
2 regulations and processes to create a 21st Century
3 licensing regime with performance-based requirements
4 for launch and re-entry being the centerpiece. Our
5 goal is to ensure public safety, provide regulatory
6 certainty for our industry, and minimize to the maximum
7 extent possible, the burdens of the license application
8 process.

9 We've obviously got a little bit of help from
10 the National Space Council here, but I do want to say
11 that setting this as a priority was not an arm twist
12 for us. We recognize for many years that our
13 regulations, which were written in the early and late
14 90's, as well as early 2000's, needed an overhaul. And
15 we're happy to have the opportunity to create a
16 regulatory construct that will enable industry
17 flexibility, will be scalable to meet the oversight
18 needs of a diverse industry, and adaptable to meet
19 future innovations in launch and re-entry that still
20 have yet to be made manifest. With the help of many of
21 you here today, we're making great progress in that
22 area.

1 Our second priority, which is very closely
2 related to the first, is keeping pace with industry.
3 Even while we were developing the new streamline role,
4 we need to keep pace with industry by delivering our
5 products and services on time. So this is really about
6 delivering our products and services at a pace and in a
7 way that meets the needs of business, without
8 jeopardizing public safety.

9 We're reviewing our internal processes to find
10 efficiencies and new ways of doing business that will
11 make licensing and permit determinations faster and
12 more efficient. We're starting off so to be innovative
13 to keep up with increasing launch tempo and the
14 complexity of operations.

15 Another important piece of this is the
16 partnerships we hold with the Air Force and NASA at our
17 federal ranges. This is significant because of the
18 fact that the vast majority of commercial space
19 launches take place from federally-owned launch sites,
20 including NASA's Kennedy Space Center and Wallops
21 Flight Facility and the Air Force's Cape Canaveral Air
22 Force Station in Vandenberg Air Force Base.

1 I recently met with senior leaders in the Air
2 Force and NASA to collaborate on ways to improve and
3 streamline oversight of commercial space launch
4 activities at the federal ranges. And I'm happy to
5 report that while it's still yet early, we're making
6 good progress.

7 And our third priority, as Carl also
8 mentioned, is to fully integrate commercial space
9 launch operations into the National Airspace System.
10 We're making significant efforts to move from
11 accommodation through flight restrictions and special
12 use aerospace to integration. We're working hard
13 across FAA to make this happen.

14 AST, along with our air traffic organization,
15 and our Air Force office, as well as our Next-Gen
16 organization, are jointly developing a concept of
17 operations for integration of commercial space into the
18 National Airspace System. And this will be the basis
19 of an agency-wide strategic planning and roadmap
20 development. The FAA intends to provide the document
21 to the industry for review and comment later this year.

22 We're also working closely with the air

1 traffic organization and Next-Gen, as Carl mentioned
2 earlier, on a space data integration program that will
3 significant improve the FAA's ability to respond to a
4 contingency during a launch or re-entry and facilitate
5 more dynamic management of the airspace during normal
6 operations.

7 And we are facilitating a dialogue between the
8 aviation and space industries and facilitating cross
9 industry education on issues of common interest.
10 Accomplishing these goals we've set in each of these
11 priority areas is extremely important to us. With your
12 partnership and cooperation, we're confident that we
13 will.

14 And again, I'd like to thank you all for being
15 here and I look forward to hearing from our
16 distinguished speakers throughout the day's conference
17 and from -- getting the advice and recommendations from
18 our COMSTAC going forward. So with that, thank you for
19 your time and attention.

20 MR. GOLD: Thank you for those kind words,
21 Kelvin. Congressman Culberson is here, so we're going
22 to have to move on, so you haven't completed escaped

1 Q&A. We'll just get back to you later on.

2 So if Congressman Culberson could make his way
3 to the stage, I'll give him his introduction. As Chair
4 of the House Commerce, Justice, Science and Related
5 Agencies Appropriations Sub-Committee, which funds
6 NASA, Congressman Culberson is focused on ensuring that
7 NASA receives the funding and guidance necessary to
8 maintain U.S. leadership in space. He believes that
9 American investment, basic scientific research, spurs
10 innovation in technology and generates long-term
11 economic growth and investment in NASA, leads to life-
12 saving technologies, like MRI machines, improved
13 pacemakers, advanced semiconductors, to more accurate
14 weather predictions. He is currently working to ensure
15 that establishing access to low Earth orbit through the
16 commercial crew program, returns our astronauts to
17 orbit on American-built vehicles as soon as possible.

18 He's also working towards the space launch
19 system, heavy lift rocket, an Orion multi-purpose crew
20 vehicle, to explore further into our solar system.
21 These programs will be critical components of our
22 capability to return to the moon or to lunar orbit, or

1 to reach Mars and to go beyond.

2 In planetary science, Congressman Culberson
3 has been an advocate for the next large planetary
4 mission, which will explore Europa, a moon of Jupiter.

5 There are few questions that we deal with
6 really as humans that are more intriguing and engaging
7 than if life exists outside the Earth, which is why I
8 have been so personally grateful to Congress Culberson
9 for his unflagging support of the Europa mission and
10 unlocking the secrets and mysteries of that planet that
11 will inspire us and spur us to go forward and further
12 in space.

13 Ladies and gentlemen, Congressman John
14 Culberson.

15 CONGRESSMAN CULBERSON: Thank you very much
16 for having me. It's a privilege to be with you today.
17 I'm convinced that the commercial sector is going to
18 unlock the horizons in the space program that we can't
19 even really imagine today. It's an extraordinary time
20 to be involved in the space program, a great time to be
21 an American, when these new horizons are just now
22 becoming visible to us.

1 As an appropriator, it's my responsibility to
2 make sure that our constituents' very scarce and hard-
3 earned tax dollars are wisely and carefully spent to
4 ensure that the space program or the United States
5 Space Program is the best on Earth. I want to ensure
6 that NASA returns, is lifted above and beyond the glory
7 days of Apollo. In fact, it's the only reason I agreed
8 to serve on the Appropriations Committee, so I could be
9 here to make sure that we go above and beyond what we
10 were doing during Apollo.

11 I am native Houstonian. Those astronauts are
12 my heroes as a boy growing up. Always loved the
13 program. I'm an amateur astronomer. I got my first
14 telescope when I was about 12 years old, and I'm a
15 dyed-in-the wool fiscal conservative. I didn't want to
16 go to the Appropriations Committee. Tom DeLay in my
17 neighbor to the south. I didn't know Tom that well
18 when I first got elected to Congress. He asked me in
19 late -- in November of 2002 if I would take his seat on
20 Appropriations, when he became majority leader. I was
21 all lined up to go to the Energy and Commerce
22 Committee, because West Houston is to the oil and gas

1 sector what Silicon Valley is to the computer industry,
2 and I said no thank you, I don't like spending money, I
3 hate debt, the starting answer is no on anything unless
4 it's NASA or science. He said you're perfect, you're
5 hired. And that's how I got the job. '

6 And I agreed to do this only if I could serve
7 on this sub-committee, so I've had a very singular
8 focus over the years in addition to making sure that
9 I'm taking care of the day-to-day needs of my
10 constituents and the people of Texas, when it comes to
11 infrastructure, when it comes to recovering from that
12 terrible hurricane we just suffered through last
13 summer. Rebuilding from Harvey and then expanding our
14 floor control network is a vital part of what I'm
15 doing, and focused on helping my neighbors and
16 constituents.

17 But for the long term, as my favorite founding
18 Father, Thomas Jefferson, liked to say, I like the
19 dreams of the future far better than memories of the
20 past, so the work that I do on NASA is really designed
21 to help unlock the dreams of the future.

22 I thank you for mentioning the Europa mission.

1 One of the reasons I'm so focused on it is it has been
2 the top recommendation of decadal survey of planetary
3 scientists for the last 20 years, but headquarters
4 would not fly the mission. And I am convinced that we
5 are going to need a civilization level discovery to re-
6 ignite the public's passion for NASA.

7 Everyone in this country loves NASA. We love
8 space exploration. In fact, I saw an in-depth
9 marketing survey of all the different functions of the
10 federal government, and the only part, the only part of
11 the federal government that is more popular than NASA
12 is the United States Marine Corps. It is something in
13 our DNA as human beings to want to know what's over the
14 next horizon, to unlock secrets of life and the
15 universe and to learn more about where we come from and
16 where we're going.

17 And NASA is the only agency that can do that,
18 the only part of the federal government that can do
19 that, that really inspires young people to want to go
20 on to become scientists and engineers and
21 mathematicians, so I'm convinced that there needs to be
22 a civilization level discovery for the public to be --

1 to re-energize the public support for NASA and to
2 inject the amount of money that's going to be necessary
3 to really lift NASA above and beyond the glory days of
4 Apollo, and I'm convinced that civilization level
5 discovery will be the discover of primitive life forms
6 on another world.

7 And the science community is convinced that's
8 going to happen in the oceans of Europa. There's two
9 times more water on Europa than there is on Earth.
10 It's a hundred kilometer deep saltwater ocean, with a
11 free-floating ice shell, no continents. It's a total
12 ocean world, so when I became chairman of the Committee
13 I created the ocean world's program to direct NASA to
14 send discovery, new frontier and flagship class
15 missions to the ocean worlds of Europa, Titan,
16 Enceladus, Triton, a moon of Neptune, look for life in
17 another world, and I've also enacted and funded in the
18 Congress, Justice, Science Bill, a 51-year plan for
19 NASA that begins with a search for life on another
20 world, on the ocean worlds, and then I've directed NASA
21 and funded -- given them the resources they need to
22 begin to identify the nearest Earth-like planet with

1 signs of life around -- using a telescope and something
2 called a star shade, which is a wonderful piece of
3 technology designed by a mathematician largely that's
4 designed to occult the light from the -- to occult the
5 light from the central star, so you can see a planet
6 right up next to it and spectroscopically fingerprint
7 the atmosphere so you can identify carbon dioxide,
8 oxygen, water vapor, methane, and I'm told they can
9 even see industrial pollution.

10 So begin to search for that nearest Earth-like
11 planet with signs of life, and then develop
12 interstellar rocket propulsion to go no less than ten
13 percent of the speed of light, and then on the 100th
14 anniversary of Neil Armstrong setting foot on the moon,
15 I've directed NASA to launch Humanity's First
16 Interstellar Mission to that nearest Earth-like planet.

17 Now, all of you on the commercial sector are
18 going to be a vital part of that effort. Developing
19 that new type of propulsion. That innovative
20 technology, those technology accounts, all of those --
21 all those research accounts in the NASA budget are
22 robustly funded.

1 I've personally with Senator Shelby's help,
2 and he's been a great partner in this, as the new
3 Chairman, full Chairman of the Senate Appropriations
4 Committee, Senator Shelby has been a terrific partner
5 in this effort. We've been able to get NASA funding to
6 recover levels.

7 You're going to see -- if you see the 2019
8 bill, you're going to see it again in the 2020
9 appropriations bill, record levels of funding for NASA,
10 for rocket development, for technology development, to
11 make sure that we get Americans back into space as
12 quickly as possible, using again the commercial sector
13 will the first ones to get an American back into space
14 on an American-built rocket, to the Space Station.

15 You're going to see a continued commitment on
16 the part of the Congress to make sure that the Agency
17 has the funds it needs and the commercial sector has
18 the funds it needs to really revolutionize the space
19 program and keep it to the cutting edge.

20 I just think it's extraordinary that the
21 private sector is now doing what is something we've
22 always dreamed about, and that's multiple use rockets.

1 It is extraordinary that we'll be able to use not just
2 the rocket engine but the entire rocket body perhaps as
3 many as ten times.

4 It changes completely the calculation on the
5 cost of getting into space. It changes completely the
6 whole idea of the future of space exploration and I
7 also think that we need to continue to encourage the
8 private sector to look at space as a way to find
9 different ways to make money in space.

10 The Space Station is going to continue to fly.
11 There is strong support in Congress to continue the
12 Space Station as long as the engineers tell us it's
13 safe to do so, but I do think we need to expand the
14 opportunities for the private sector to use modules on
15 the Space Station for commercial purposes to make a
16 profit. We've got to lease space on the station to the
17 private sector, just as if this were a regular, you
18 know, private office building. You just lease space to
19 different private companies and same way the Space
20 Station. That's the same way the Space Station ought
21 to operate. And also find ways to mine space. You
22 know, the asteroid that NASA is going to go visit that

1 appears to be the exposed core of an unformed planet
2 that's apparently loaded with rare earth elements and
3 precious metals, there's great opportunities I think
4 for manufacturing in space.

5 Jeff Bezos told me recently that he believes
6 we will in years to come manufacture -- do all heavy
7 manufacturing in space and then de-orbit finished
8 products to Earth in the far future. That's something
9 that all of us in this room I know are committed to,
10 something you can count on me to continue to do. I
11 will also -- to make sure that you've got the funding
12 that you need, that NASA has the money they need to
13 make all those dreams of the future come true, but I
14 also want to commit to you, and then I'll stop and take
15 questions and I'll do everything I can to keep politics
16 out of NASA, to keep politics out of science.
17 Politics, neither left nor right, should influence
18 science. There should be absolutely no pressure
19 politically one way or the other. You need to just
20 follow the facts, as Joe Friday says on Dragnet.

21 My job as a policy maker is -- I can't make
22 good decisions if I don't have honest, objective

1 verifiable data, and we just need the facts. Do I'll
2 do my best to make sure you've got all the fuel you
3 need in your tanks, all the money you need to succeed
4 and also keep the politicians out of your business, so
5 nobody is pressuring you from the left or the right
6 politically, so you can just do what you do best and
7 make those dreams of the future come true.

8 I'm happy to answer any questions that you've
9 got.

10 MR. GOLD: Wonderful. Thank you, Congressman.

11 CONGRESSMAN CULBERSON: One thing I really do
12 hope while you're thinking of questions that needs to
13 be done is the private sector needs to be sure that
14 we've doing planetary protection. I've not heard
15 enough about protecting the pristine nature of worlds
16 like Europa from Earth organisms. It's very, very
17 important as the private sector expands and begins to
18 launch missions to other worlds that we have the same
19 high levels of planetary protection and sterilization
20 for commercially private-built spacecraft that we do
21 for NASA spacecraft, by the way. Excuse me. Yes, sir.

22 MR. AUTRY: Greg Autry.

1 CONGRESSMAN CULBERSON: Greg, good to see you
2 again.

3 MR. AUTRY: I know you're a big fan of JPL and
4 in Southern California we appreciate (indiscernible)
5 your dedication. I'd like to ask with the JPL FFRDC
6 model, whether you think that's something that should
7 be applied more broadly at NASA and in the government
8 in general?

9 CONGRESSMAN CULBERSON: I'm a huge fan of the
10 FFRDC model. It's very successful in so many different
11 areas with the Department of Energy. I think all of
12 their laboratories are run as an FFRDC. Big supporter
13 of the FFRDC model across the board. I would love to
14 see it expanded, Greg, to as many NASA centers as
15 possible. It's more challenging when it comes to the
16 Human Space Flight Program.

17 It's challenging. I'd love for somebody to
18 suggest or find a good way to do a decadal survey for
19 the Human Space Flight Program. That's a real
20 challenge.

21 In fact, I've directed NASA in my bill over
22 the year to follow the decadal survey recommendations

1 in each of the major categories, astrophysics, Earth
2 sciences, planetary sciences, heliophysics,
3 astrophysics, et cetera, because the decadal survey
4 process is one that I think works, where you have the
5 scientific community get together, hash it out,
6 prioritize missions over the next decade that need to
7 be funded and flown, and that's another reason I like
8 the FFRDC model is you've really got to a large extent
9 the private sector and private companies that are
10 looking at how to make the best use of our
11 constituents' very scarce, very precious and hard-
12 earned tax dollars the best.

13 So I love the FFRDC model but it's tough to
14 expand it beyond the unmanned program.

15 Yes, sir.

16 MR. KUNSTADTER: Congressman, we appreciate
17 your enthusiasm for the exploration mission, and in the
18 same way that private industry has been encouraged to
19 take on the transportation mission, do you see any way
20 to transfer some of the exploration tasks to private
21 industry, somehow incentivize the private industry to
22 take on some of that burden from the taxpayer?

1 CONGRESSMAN CULBERSON: Yeah, I encourage them
2 to go and do it make a lot of money at it. It would be
3 terrific.

4 MR. KUNSTADTER: Fair enough.

5 CONGRESSMAN CULBERSON: If you take the risk,
6 you ought to enjoy the rewards. It's a big part of
7 what made America great. God bless America. It's a
8 good thing. Profit is a good thing. I want to
9 encourage it as much as possible, while ensuring,
10 again, planetary protection, orbital safety. W also
11 need to make sure -- I've done this in my bill. The
12 Department of Defense has done this for years. I've
13 already made it a statutory requirement that every new
14 spacecraft designed and launched by NASA has to be
15 refuellable, maneuverable, and serviceable. That's
16 essential.

17 And we need to keep the Chinese out of our
18 business. We need to be very careful about -- I saw
19 the Lenovo computers coming in. Nobody should be using
20 Lenovo computers. They're all infected. They've all
21 got Trojan horses hardwired into them and, in fact,
22 that was prohibited years ago. I mean, Frankl Wolf, my

1 predecessor, was exactly right about the threat posed
2 by cyber threat and the Chinese just -- the Chinese
3 government happens to be the worst on the planet.
4 There's a lot of bad ones out there, but all of us need
5 to be very, very careful about keeping the Chinese
6 government out of the space program, when it comes to
7 the United States. They're not in it for our benefit.

8 MR. KUNSTADTER: Congressman, I would actually
9 combine the two uses, the Chinese have deployed
10 servicing systems, robotic servicing systems, so we
11 appreciate your support on both of those. And
12 (indiscernible) mentioned the psyche asteroid that you
13 talked about --

14 CONGRESSMAN CULBERSON: Psyche, that's it.

15 MR. KUNSTADTER: Actually a naked planetary
16 core that would allow us to see, you know, what's it's
17 like inside a planet, not to mention the resource
18 extractions you mentioned.

19 And forgive me for asking because I'm so
20 inspired by you on this, but I'm just curious what you
21 think society's reaction will be when we do, and I'm
22 going to say when, we find life outside of this planet?

1 CONGRESSMAN CULBERSON: It's a civilization
2 level discovery that changes our perception of who we
3 are and where we came from in the universe forever.
4 It's always extraordinary to me that as far as you can
5 see, no matter which direction you look, you see the
6 periodic table of elements. It is evident, I think,
7 that God seeded life all over the universe. It's just
8 almost impossible to believe it's not out there.
9 Anywhere you look, I mean, a star without planets is
10 the exception. Everywhere we look -- look at what
11 Kepler has discovered.

12 The curve of new discoveries, of planets, went
13 like this, as soon as Kepler began to look, and it was
14 simply looking for transiting planets. It was only
15 looking at one spot. I mean, it's extraordinary what
16 we think we'll discover when the -- when we make that
17 first discovery, I think it's going to be a moment that
18 we will never forget. It's one of those we all
19 remember. I remember being a little kid watching Neil
20 Armstrong setting foot on the moon on a black and white
21 Heath kit television at my uncle's house in
22 Albuquerque.

1 We all know exactly where we were when Neil
2 Armstrong set foot on the moon. We will all remember
3 where we were when the discovery of primitive life is
4 made for the first time in another world. And it's a
5 great privilege for me -- it's such a privilege to
6 represent the people of Texas and an extraordinary
7 privilege to be a member of Congress, but I still pinch
8 myself to realize that had I not been elected, this
9 wouldn't have happened. I mean, the Europa mission was
10 dead. Europa had no advocate. The mission was dead.

11 The bean counters, the bureaucrats had killed
12 it successfully, cannibalized the money for other
13 things because NASA didn't have enough money to do
14 everything on their plate, so I've now made sure that
15 NASA has enough money on their plate for the Human
16 Space Flight Program to be robust, for robust
17 commercial sector, for there to be enough money to fly
18 a good cadence and balance of new frontier discovery
19 and flagship missions, and to ensure that -- I also
20 wrote it into law, by the way, that the Europa orbiter
21 and lander are the only missions it is illegal for NASA
22 not to fly.

1 So I do take great joy in this. It's a lot of
2 fun to realize that one random, obscure Congressman
3 from Texas has been responsible for these extraordinary
4 missions, and when life is discovered it will -- I'm
5 thrilled that that will have -- that I will have had a
6 decisive hand in that, and whenever we launch that
7 first interstellar mission to the nearest Earth-like
8 planet with signs of life, I hope I'm still in a -- I
9 don't know, by 2069 I won't be here, but I will have
10 helped make that happen.

11 MR. KUNSTADTER: I hope they launch on the
12 U.S.S. Culberson.

13 CONGRESSMAN CULBERSON: No, no, no.

14 MR. GOLD: Other questions.

15 CONGRESSMAN CULBERSON: The U.S.S. Texas.

16 MR. GOLD: There you go. There you go. Any
17 questions?

18 MR. STADD: (Indiscernible).

19 MR. GOLD: I'll repeat it if you can't hear
20 it.

21 CONGRESSMAN CULBERSON: Thank you, sir. It's
22 my joy, truly. And it's not parochial.

1 MR. STADD: We know that.

2 CONGRESSMAN CULBERSON: It's for the good of
3 the nation and future generations.

4 Mr. STADD: It's literally cosmic. We know
5 that. Courtney Stadd with Vector Launch -- well, one
6 of the companies that's in your vision in terms of
7 private capital, developing commercial rockets to
8 launch commercial payloads, I wonder if I could hear
9 your view because we really are a product, we, the
10 industry, many of the members of the COMSTAC to
11 represent launch companies, commercially promoted by
12 your committee or colleagues.

13 In terms -- occasionally we get members who
14 are interested in putting money into developing other
15 launch vehicles, and I wondered if you could publicly
16 talk about your view in terms of encouraging launch
17 services but not having the government compete with
18 those of us who are putting private capital at risk.

19 CONGRESSMAN CULBERSON: That's an interesting
20 question and I want to make sure that the private
21 sector has got as many advantages as possible.

22 Sure.

1 CONGRESSMAN CULBERSON: There are -- once the
2 cost of launches comes down, if you're able to -- if
3 Blue Origin and SpaceX and others are able to actually
4 launch rocket bodies, as well as engines, ten times,
5 changes everything. It drops -- if you're actually --
6 Bezos is correct and Elon Musk are correct, that they
7 can reduce the cost down by factor of ten to launch to
8 get into space, it changes the whole formula. It
9 changes everything.

10 So it's -- I think that the space program,
11 NASA, should be viewed when it comes to the future as
12 the interstate -- interplanetary highway system for
13 deep space. NASA should provide the long-term deep
14 space lift carrying capacity, and going to low Earth
15 orbit should be like stepping out of the front of this
16 building and catching a cab. I should be able to get
17 an Uber, a Lift, taxi, to get wherever I want to go.
18 If I'm going to low Earth orbit, just choose your
19 provider and you're free to choose. It's your money.
20 You invested it, and spent it, and the private provider
21 should be able to make as much money as humanly
22 possible in outer space, while preserving planetary

1 protection, while ensuring that we're not clouding the
2 entire -- I mean, lower Earth orbit is already a pretty
3 busy and crowded place. I do worry about the Cube-
4 Sats, which are a wonderful technology, but you just
5 create more debris in orbit for us to fly into as a
6 worry.

7 So there's got to be some regulatory
8 framework, which the Congress has already passed, when
9 it comes to the Department of Commerce. I think that's
10 a great idea to have a one-stop when it comes to the
11 commercial sector, to go to the Department of Commerce,
12 and then FAA -- understand, the FAA's role is simply to
13 basically once you're out of the atmosphere, you're out
14 of the FAA's responsibility. So you just provide a
15 permit from the ground to the edge of the atmosphere,
16 and then the Department of Commerce picks it up from
17 there.

18 We're literally in an age of Columbus. We're
19 in the age of Magellan. And it's an extraordinary time
20 to be alive and to be an American, and what a privilege
21 for me to be here to help make sure you have all the
22 resources, support and encouragement you need to make

1 all the dreams of the future come true.

2 Thank you very much.

3 MR. GOLD: Thank you. So now I'd like to kick
4 things over to our Vice Chair and resident former
5 astronaut, Michael Lopez-Alegria, everyone. Let's have
6 a round of applause for Mike.

7 MR. LOPEZ-ALEGRIA: So Mike is letting me
8 introduce the next speaker from here, because it will
9 take me longer to get there and back than it would to
10 make the presentation. Our next speaker can't be with
11 us today because he's orbiting the Earth at 17,500
12 miles an hour at altitude of 250 miles, aboard a place
13 near and dear to my heart, the International Space
14 Station.

15 But Commander Drew Feustel is going to give us
16 a short message here. He's a leading a truly
17 international crew of three Americans, two Russians and
18 a German. We had hoped to connect with him live, but
19 he is a little busy right now. He's halfway into a
20 six-and-a-half-hour spacewalk, to install some high
21 definition cameras that are going to allow commercial
22 crew vehicles to dock to the ISS. So I think we're

1 ready for the video.

2 (Video played, could not be recorded.)

3 MR. GOLD: That's it, it's official, folks.
4 We're the first FACA in space. So now it's my pleasure
5 to introduce our next speaker, Jim Bridenstine, who
6 represented Oklahoma's first congressional district,
7 where he served on the Armed Services Committee, the
8 Science, Space and Technology Committee, and authored
9 the American Space Renaissance Act.

10 You know, far too often in industry we all try
11 and put everything into silos, whether it's military
12 space, commercial space, science space. One of the
13 great things that I think Jim did early on was try to
14 break down those walls. I mean, that's what the
15 American Space Renaissance Act was all about, and just
16 look at it as a holistic industry.

17 Prior to his career in Congress, he served in
18 the U.S. Navy, flying the E-2C Hawkeyes off of U.S.S.
19 Abraham Lincoln aircraft carrier. It was there that he
20 flew combat missions in Iraq and Afghanistan and
21 accrued most of his 1900 flight hours and 333 carrier-
22 arrested landings.

1 He later moved to the F-18 Hornet and flew
2 with the Naval Strike Air and Warfare Center, the
3 parent command. It's Top Gun.

4 So that's the resume. And as I said before,
5 now I want to say a quick word or two about the man
6 himself.

7 I first met Congressman Bridenstine several
8 years ago, and when I was meeting with the member, I
9 was parking my car by the House, put in enough for
10 about a half hour, figured ten minutes tops, meeting
11 with the member.

12 And hour later I had pretty hefty parking
13 ticket, so you owe me about \$30 on that one, but I'll
14 tell you, it was worth every penny, that Jim
15 Bridenstine's enthusiasm for this field is palpable.
16 His knowledge is deep and broad. It was embarrassing
17 to me when I transitioned from Bigelow Aerospace to a
18 satellite company, that he knew more about commercial
19 satellites than I did walking into this job.

20 You know, we had Congressman Culberson talk
21 about the importance of removing parochialism and
22 partisanship from space, and even during his short

1 tenure I think Jim Bridenstine has already moved us
2 forward in a very positive direction there.

3 After his most recent testimony at the CJS
4 Appropriations Subcommittee, I received several calls
5 from Democratic Senators and Republic Senators
6 complimenting his amazing performance.

7 So, you know, we don't go forward to the final
8 frontier as Democrats or Republicans. We go forward as
9 Americans and humans and I think there is no one better
10 to unite us as a country, as an industry, than this
11 gentleman, who I'm about to say -- and let me tell you,
12 I've been waiting a long time to say these words,
13 ladies and gentlemen, it's my pleasure to introduce the
14 13th Administrator of NASA, Jim Bridenstine.

15 CONGRESSMAN BRIDENSTINE: Wow, that was quite
16 an intro. I appreciate those very kind words. He
17 might have over-spoken a little bit, but thank you
18 nonetheless.

19 I want to say also thank you to Chairman
20 Culberson. Chairman Culberson has been a great friend
21 of mine. I would say that he's a mentor of mine. He's
22 somebody who is very passionate on these issues, but I

1 will tell you also, he's a great friend to NASA.

2 Maybe some of you have seen that the NASA
3 budgets have been increasing lately, and that's very
4 bi-partisan and, of course, the President's budget
5 request has done the same, and he matches it or exceeds
6 it. So thank you so much to Chairman Culberson, as
7 well. He's a great friend to the Agency, a great
8 friend to the United States, and as he said, he doesn't
9 do these things for any parochial reason whatsoever.
10 He doesn't do it for any other reason that he is just
11 very passionate about space and exploration and
12 discovery and science and all of those things that NASA
13 does.

14 So I'm just thrilled to be here to follow
15 Chairman Culberson.

16 Now, since we are at the COMSTAC, I'm going to
17 talk specifically about some of the issues that you
18 guys are up against, and gals are up against.

19 There's a number of bills right now that are
20 floating around for how to do authorization and
21 continuing supervision for non-traditional space
22 activities. This has been an issue I've been involved

1 in for a number of years. People in this room are very
2 familiar that the Outer Space Treaty clearly says that
3 we need to provide authorization and continuing
4 supervision for these -- for everything that we as a
5 nation put into space, whether it's commercial or
6 government.

7 What's interesting is sometimes there's debate
8 over whether or not we even have an agency that's
9 capable of doing authorization. Do we have an agency
10 that's capable of doing continuing supervision? And
11 when I first started learning about this issue, it was
12 my opinion that if you get a launch license from the
13 FAA Office of Commercial Space Transportation, then
14 there's your authorization, and if you have the JSpOC
15 doing your situational awareness and conjunction
16 warnings, well, there's your continuing supervision.

17 Unfortunately, my view on that was not
18 reflected broadly throughout the U.S. Government. And
19 so a lot of people who wanted to bring capital to the
20 United States, a lot of people who wanted to capitalize
21 private companies in the United States, started
22 thinking about the fact that there is a political risk

1 in any venture we invest in, for which we might not be
2 able to ultimately launch.

3 And so it became clear to me that we need to
4 have buy-in from across the interagency, and we need to
5 have buy-in from Congress. And now we actually have
6 bills on this. We -- in fact, we have a bill in the
7 House of Representatives. It's very public. There's a
8 bill in the Senate that may eventually become more
9 public. I know a lot of different people are
10 negotiating what ultimately it will look like.

11 But here's the thing. Some people argue that
12 it ought to be at Commerce, the Commerce Department
13 ought to do the authorization and continuing
14 supervision for non-traditional space activities.
15 Again, I want to re-emphasize why this is so important.

16 When you think about these non-traditional
17 space activities, we're talking about commercial
18 habitats, commercial space stations, and we know that
19 the Space Station, as enthusiastic as all of us are
20 about it, we know that there's going to come a day when
21 it will not be feasible for us to keep it in space, or
22 at least not in its current form.

1 That being the case, what we don't want to see
2 is we don't want to have a gap in human activity in low
3 Earth orbit. We want to do everything possible to
4 avoid that gap.

5 At the same time NASA, the agency I'm now
6 charged with running, we want to go further. We want
7 to go to the moon. In fact, that's the President's
8 direction to me, Space Policy Directive 1. We are
9 returning to the moon in a sustainable way, which
10 requires commercial much like many companies that are
11 represented here are engaged in, and not just for
12 launch but also landers and other kinds of
13 capabilities.

14 But the bottom line is whether it's a
15 commercial lunar lander that's going to be doing
16 science on the surface of the moon, or whether it's a
17 commercial space station, a commercial habitat, that
18 could be doing manufacturing or it could do science,
19 could be involved in pharmaceuticals, any different
20 number of areas, whether it's robotic servicing of
21 satellites in low Earth orbit, which in some countries
22 would be perceived as provocative.

1 Any time you're doing rendezvous in proximity
2 operations and you have that capability to grapple
3 another satellite, well, that triggers in some
4 countries' minds, I guess it triggers -- they're
5 willing to stand up and say no, that is not an activity
6 that we like.

7 Well, who does the authorization and
8 continuing supervision for robotic servicing of
9 satellites, for rendezvous in proximity operations, for
10 commercial habitation, for trips to the moon or even to
11 an asteroid, if we wanted to extract resources or mine
12 as asteroid.

13 And some would say well, we don't have the
14 ability as a government to do that authorization and
15 continuing supervision, so we have to come to a day
16 where we have agreement on this.

17 And I'm going to tell you what my concern is,
18 as somebody who has been in Congress, and I just heard
19 John Culberson and I just heard Mike Gold talk about
20 this cannot be parochial. And it can't be where
21 there's a jurisdiction issue, you know, depending on
22 what committee you serve on, you want this agency to

1 have it instead of that agency.

2 This is too important. We have to get this
3 done. So some say well, this kind of activity needs to
4 be at the Department of Commerce, and others says well,
5 this kind of activity needs to be at the FAA Office of
6 Commercial Space Transportation.

7 And both sides have wonderful arguments. And
8 believe me, I can tell you what they are because I've
9 heard about them over and over again from different
10 sides of this issue. But I will say this. We cannot
11 let the -- let the good be the enemy of the perfect in
12 this particular case.

13 We have to get it done, and this is going to
14 require compromise. It's going to require people on
15 either side of this to say you know what, I can see it
16 your way, and for the good of the country I'm willing
17 to take that next step and maybe go that direction.

18 So that's a big thing. Now, this is going to
19 require legislation. Of course, we have Space Policy
20 Directive 2, which is very clear. It puts Commerce in
21 the lead, but it doesn't preclude the fact that
22 Commerce as the lead could ultimately rely on FAA AST

1 or NASA or any other federal agency. State Department
2 has an interest here.

3 So while Commerce could be the lead, they
4 could also rely on the expertise of the other agencies
5 within the Government. So I think that's important to
6 note, as well.

7 But again, I want to re-emphasize the
8 important thing is to get it done and not prevent it
9 from getting done because people are worried about what
10 agency it might be at at the end of the day.

11 So that being said, you know, as the NASA
12 Administrator, again going back to Space Policy
13 Directive 1, we're going back to the moon, and the
14 President said it has to be -- it has to be
15 sustainable. And what does that mean, sustainable?

16 That means this can't be the Vision for Space
17 Exploration again. And it can't be the Space
18 Exploration Initiative again. It can't be one of these
19 things where we design the architecture, we invest
20 billions of dollars and then we get distracted because
21 of maybe it's budgets or maybe it's something else, but
22 the rug gets pulled out from under us.

1 The President wants to go and he wants it to
2 be sustainable.

3 Here's the great thing that we have today that
4 we didn't even have ten years ago. We have commercial
5 providers, many of which are in this room, that can
6 help us get it done. We have the miniaturization of
7 electronics. We have reusable rockets, which I heard
8 Chairman Culberson talking about. We have the
9 opportunity today to go back to the moon in a way that
10 is sustainable.

11 We've never had this opportunity before. And
12 so, you know, the first thing we're going to do is the
13 Commercial Lunar Payload Services, which is -- right
14 now we have a draft RFP out, and we're looking to get
15 feedback on that, but ultimately, we're going to buy
16 services. NASA will buy services to get small payloads
17 to the surface of the moon in a commercial way.

18 And that's going to be, I think, you know,
19 it's going to change the dynamic of how we do business
20 on the moon.

21 We're going to take those technologies and
22 those capabilities and we're going to feed forward to

1 larger landers on the surface of the moon, ultimately
2 to return humans to the surface of the moon, and it
3 will be really clear why we're going back to the moon.

4 There's a number of reasons, but chief among
5 them is that we want to go further. You know, what we
6 do at the moon, all of that technology, all of that
7 capability, all of what we learn, whether it's the
8 types of spacecraft or how we do in situ resource
9 utilization, how we understand the physiology of
10 astronauts on the surface of the moon, which is still
11 unknown.

12 You think about going to Mars, you're going to
13 spend six months in a micro-gravity environment as an
14 astronaut. You're going to get to the surface of Mars,
15 you're going to be put under a gravity environment
16 again, and you're going to have to work harder than
17 you've ever worked before in your life just to stay
18 alive.

19 Well, knowing what we know about astronauts
20 coming back to earth, that's sometimes very difficult
21 to make that adjustment early when you come back --
22 come back from the International Space Station. So

1 what we can do with the moon, we can prove it out. We
2 can send astronauts to the International Space Station
3 for a period of five months or any other commercial
4 habitat for that matter, since some of those are
5 represented here, and then ultimately go to the moon
6 and see if being in a 16g environment, the physiology
7 of the astronaut, maybe your cardiovascular system, you
8 know, repairs itself quicker. You know, there's
9 deconditioning that happens in a micro-gravity
10 environment. Maybe that reconditioning happens faster
11 when you go to a gravity well that's one-sixth that of
12 the Earth.

13 Maybe it doesn't happen as fast. We don't
14 know. Of course, there's other challenges with the
15 vestibular system. Maybe your vestibular system will
16 recover much faster in a lower gravity environment.
17 Maybe it will take longer to recovery. Again, we don't
18 know.

19 But what we do know is that if we can prove it
20 on the moon, then we go to Mars, we know what we're
21 going to know, and the value of the moon is that it's
22 only three days away. If something goes wrong on the

1 way to Mars, if we haven't proven out all of our
2 technologies and capabilities and the physiology on the
3 way to Mars, it's going to be difficult to get back in
4 any timeframe that's going to be good for the
5 astronauts.

6 So with that, there's a lot happening with
7 NASA commercially. I'm very proud of it. COMSTAC is
8 an organization, a FACA, that is important to inform us
9 in many ways of how we're going to go forward. Because
10 the decision that you make ultimately reduce the costs
11 on us, we buy a lot of access to space commercially, so
12 thank you guys for your leadership on that.

13 And with that, I'll just turn it over to a few
14 questions, if that's okay, Mike.

15 Sure. Thank you, sir. So again, you heard
16 how excited we are to have an Administrator just open
17 up with a question.

18 MR. GOLD: I'm curious if there's an update or
19 any thoughts you'd like to share in terms of the Deputy
20 Administrator, what direction you think we're headed
21 there.

22 CONGRESSMAN BRIDENSTINE: Yes, this came up

1 the other day. This is an important time in American.
2 I'll say the same thing today I said two days ago. So
3 we've got two commercial solutions to give us crew to
4 the International Space Station, ULA and Boing and
5 SpaceX. Those are going to be launching very soon,
6 with humans on board.

7 For the first time since 2011, which was the
8 last space shuttle that we flew, so I'm talking about
9 launching American astronauts on American rockets from
10 American soil. We haven't done that since 2011. Now
11 we're going to do it with two commercial rockets.
12 Again, which has never been done before either, doing
13 it commercially.

14 On top of that we have the SLS, which is going
15 to take us deeper into space than we've ever gone
16 before in human history. And that's going to be flying
17 in the short term, as well.

18 While all that's going on developmentally, and
19 I want to be very clear, the scope of that is larger
20 than what was under development during the Apollo
21 program. That's the -- no pun intended, but that's the
22 gravity of the situation that is before your NASA

1 Administrator right now. These are big changes that
2 are critically important with human lives at stake.
3 There can't be any mistakes here.

4 And on top of that, every day, of course, we
5 have astronauts even right now on the International
6 Space Station as you just saw, doing extravehicular
7 activities, preparing the International Space Station
8 for a new capability to get to the ISS, which is
9 commercial crew.

10 So this is all happening right now. So given
11 what we are up against right now, given how important
12 what we're doing right now, in my view we need a space
13 professional. We need a scientist. We need somebody
14 who has been involved at NASA for a very long time. It
15 would be beneficial to me if that person was an
16 astronaut. And, of course, the person I've been
17 advocating for is Janet Kavandi, who is here today with
18 us.

19 She is the Center Director at the Glenn
20 Research Center in Ohio, so she's led large
21 organizations, including at one time being the head of
22 the Astronaut Office, and she's a Ph.D. in chemistry,

1 so if you're looking for the package that would be a
2 great deputy, she has everything that would be
3 appropriate at this juncture. So I'm advocating for
4 her to be my next deputy.

5 Thank you for the question.

6 MR. GOLD: Other questions from the COMSTAC
7 membership? Debra?

8 MS. FAKTOR: Okay, maybe a fun question. So
9 you're in -- you're finally in the role, and it's super
10 exciting. I know you've wanted it for a long time and
11 we're happy to support you.

12 So is there anything that surprised you so
13 far, either that you expected that isn't so or that you
14 didn't expect that is so?

15 CONGRESSMAN BRIDENSTINE: Couple of things.
16 Number one, and this is absolutely true. And I
17 expected this. Everybody at NASA is exceptionally
18 bright, without question, a lot of really bright
19 people.

20 What I didn't expect is how quickly everybody
21 would want to give me their opinion. And they are not
22 shy about sharing their opinions, and they're not --

1 very divergent opinions. Again, that's good, as well.
2 It's been a lot to take in though but it's important
3 that we understand that there's a lot of different
4 directions that NASA could go ultimately on a whole
5 host of different things, and a lot of different
6 opinions on that. So again, that's good. But it's not
7 easy.

8 And, of course, as NASA Administrator, I'm
9 trying to set direction and policy, so that's been
10 good. So I think I'll just leave it with that one.
11 All good.

12 MR. GOLD: Oscar.

13 MR. GARCIA: Thank you. Thank you,
14 Administrator Bridenstine. Oscar Garcia, Interflight
15 Global.

16 I'm the Chair of the Safety Working Group on
17 the new COMSTAC and I'd like to bring the conversation
18 of safety and praise that we're leading the world's
19 safest air transportation business, which is where I
20 come from. And projecting that safety standard to the
21 future is important.

22 The relationship between industry and AST on

1 the safety aspect has been exemplary and I couldn't
2 speak any higher about it.

3 Now, with the National Space Council, the
4 Space Administrator, the mission oversight changes.
5 I'd like to see that that robust dialogue, the culture
6 of safety that industry is showing, is continuing and
7 it doesn't get repeated or diluted in too many factors
8 or too many different groups.

9 CONGRESSMAN BRIDENSTINE: Yeah. Yeah, that's
10 a good point. And this is an important point, just
11 philosophically for our country, for the Agency that I
12 serve, and of course for your Committee.

13 Here's what we know. What we do in space is
14 critical. Space has changed our lives, the way we
15 navigate, the way we communicate, the way we produce
16 food and energy, the way we do disaster relief and
17 provide national security, the way we do even things
18 like banking. Banking requires a GPS signal.

19 Weather prediction, and understanding Earth's
20 climate. All of these things, you know, require us to
21 utilize space. It is critical that we maintain safety
22 in space. You know, part of, you know, you talk about

1 Space Policy Directive 2 and the non-traditional space
2 activities. A lot of you heard the Vice President talk
3 maybe at the Space Symposium about space situation
4 awareness, space traffic management.

5 Another issue that I'm sure this Committee is
6 very in tune with and dealing with, all of these are
7 safety issues. But going back to what I think you
8 might have been talking about specifically is the
9 safety of humans. Again, a big challenge, because what
10 we do in space ultimately is important for national
11 security. It's important for discovery, science, and
12 we're doing big things, generational kind of changing,
13 civilization changing kind of discoveries, and we need
14 safety to be first.

15 And here's why. We know that if a bad day
16 happens at NASA, the entire world shuts down. The
17 President of the United States will stop what he's
18 doing, just like that, and he'll get briefed on it.
19 And he'll be expected very quickly to give a speech to
20 the entire world on the issue. The Presidents and the
21 Prime Ministers and the leaders of countries all over
22 the world will stop what they're doing and they will

1 also the same thing in their countries.

2 We've seen this happen before. That's how
3 significant it is to be safe as we do space flight.

4 It's also important to note that as important
5 as it is to stay safe, we also have to always be
6 pushing the edge to go further, and that's what our
7 astronaut core has done, and eventually we're going to
8 have commercial astronauts doing the same thing.

9 And the reason we push -- you think back to
10 the Apollo era, and why we were taking such great risks
11 in the Apollo era, and a lot of times it doesn't get
12 talked about, but there came a day 11 years after we
13 got done with the last Apollo mission, 11 years after
14 that we had a President announce the Strategic Defense
15 Initiative, SDI. A lot of people said it can't be
16 done, it's too expensive technologically and feasible,
17 we can't accomplish that objective, right?

18 But here's what's true. The former Soviet
19 Union believed that we could do it, and they believed
20 that we could do it because of the success of Apollo.
21 They saw a political and economic and technological
22 advantage of the United States of America, that nobody

1 had ever seen before, and because of that they believed
2 it could be done, and our President was saying we are
3 going to do it.

4 They spent an immense amount of money and time
5 and effort trying to undermine the Strategic Defense
6 Initiative. At the end of the day we spent very little
7 money as a country, but it was a piece of the overall
8 puzzle that resulted in the collapse of the former
9 Soviet Union.

10 So we have to understand that there is risk
11 here, without question, and we have to do everything we
12 can to avoid that risk. We also have to understand
13 that what we are doing is a demonstration of our
14 economic, political and technological prowess, and we
15 have to be willing to do big things as a country in
16 order to continue to be great.

17 Thank you for that question.

18 MR. GOLD: Soft power, ladies and gentlemen.

19 Any other questions from the COMSTAC membership?

20 Hearing none, we'll go to the audience. And before you
21 go, let me just acknowledge, Thomas Evans, Director of
22 West Virginia Robotic Technology Center -- if not for

1 his efforts driving, I would not be here today, so
2 thank you, Tom.

3 Mr. EVANS: Thank you, Mike. Administrator
4 Bridenstine, (indiscernible) Director of the West
5 Virginia Robotic Technology Center. You mentioned
6 robotic satellite servicing. My team has worked
7 extensively on that to support the Restore L mission.
8 As that comes to realization, we're also looking to the
9 future. We're looking to things like in-space assembly,
10 planetary body exploration and doing precursory
11 activities before astronauts get to Mars.

12 CONGRESSMAN BRIDENSTINE: That's awesome.

13 MR. EVANS: Can you talk about the importance
14 of that or the thoughts from your position?

15 CONGRESSMAN BRIDENSTINE: Sure. I'll talk
16 about it kind of policy-wise, legislatively. But
17 certainly, the technology and the capabilities that we
18 drive from that is, again, revolutionary and game
19 changing.

20 So I get the question about robotics. I had
21 it before, just not too long ago, when I was testifying
22 before the Senate Appropriations Committee. In fact, I

1 think it was your Senator that brought it up. That
2 might not have been on accident, now that I think about
3 it.

4 But here's the reality. You mentioned the
5 National Space Council and the importance of the
6 National Space Council. And you're talking about
7 robotics, right? What we need to think about when we
8 talk about robotics, National Space Council, we need a
9 whole of government approach. This isn't about
10 national security necessarily, although that's a piece
11 of it. It's not about civil space and it's not about
12 commercial space.

13 It's about the American Space Enterprise. And
14 robotic servicing of satellites could revolutionize the
15 American Space Enterprise and put us in the lead for
16 generations. That's how important it is.

17 So when you think about just communication
18 architectures, you know, everybody is familiar with the
19 large constellations and geostationary orbit that
20 provide over the horizon communications. I was a Navy
21 pilot, Air Force pilot after I was a Navy pilot. I've
22 taken advantage of those capabilities.

1 But what we're seeing now is we're seeing
2 those constellations go from geostationary orbit down
3 to low Earth orbit, and instead of, you know, one
4 satellite covering a big chunk of the planet, we're
5 going to have thousands of satellites in low Earth
6 orbit with antenna that can be phased, phased ray
7 antenna, or I should say electronically steerable
8 antennas that can track the satellites and so you can
9 have captured, you know, a half a dozen satellites all
10 at the same time.

11 Here's my point in this. This global portable
12 bandwidth will revolutionize access to the entire world
13 for everybody in the world. All of the folks in Africa
14 that don't have access to the internet, people on
15 islands that don't have access to the internet, all of
16 a sudden everybody is going to be very connected
17 because of the global portable bandwidth.

18 So when you think about the inter-agency, what
19 is NASA's role in that? When you think about the
20 National Space Council, and how we go forward, what --
21 the various agencies of federal government, how do they
22 play in that?

1 Right? So if you're the Department of Defense
2 you're saying okay, well, I need global portable
3 bandwidth and I need it to be protected. I want
4 frequency hopping for anti-jam capability, and I want
5 encryption so that it can't be spoofed.

6 By definition, those kind of constellations
7 are far more resilient than today's constellations,
8 because there's thousands of them. Kinetically they
9 become, yeah, you can kill a few of them but can you
10 kill thousands of satellites in low Earth orbit,
11 especially when you consider the fact that there will
12 be maybe a dozen different constellations of thousand
13 of satellites between 1200 kilometers and below?

14 Like it becomes very resilient kinetically.
15 Then we've got to make it resilient from electronic
16 attack and dazzling and spoofing and jamming, and all
17 the things that our competitors are advancing, so
18 that's how you think about it from a DOD perspective.

19 That means what the National Space Council
20 could say is we need to get in front of this, we need
21 to make investments today, because commercial satellite
22 operators that are providing, you know, internet

1 broadband from space, internet from space, they're not
2 necessarily going to make those investments on their
3 own, because it's not part of their business model.
4 But if the DOD wanted to take advantage of those
5 capabilities, well, here's your opportunity to do it,
6 we just need to make investments early.

7 The other thing we could think about is hosted
8 payloads on each one of those thousands of satellites.
9 Opportunities galore, right there. For weather and a
10 whole host of other capabilities.

11 So there's another interagency piece. Maybe
12 NOAH would be interested in this, NASA would be
13 interested.

14 So then the piece becomes, and this is what
15 you were asking about, what is NASA's role here? Well,
16 we're involved in robotics. And, of course, your work
17 there at the West Virginia Robotic Technology Center is
18 a big piece of that.

19 Now, if we're going to be involved in
20 robotics, we can do -- you mentioned Restore L, which
21 is a fantastic mission, and I support it. But at the
22 end of Restore L we're going to be able to, you know,

1 restore a Landsat 7 satellite. And as you know, and I
2 know, we need to go way bigger than that. We need to
3 generate the technologies that feed forward to an
4 architecture of maybe a dozen commercial companies,
5 each of which take advantage of these robotic
6 technologies, all of which will be servicing these
7 satellites in low Earth orbit.

8 And, of course, I bring up the communication
9 satellites, because there's so many of them, thousands
10 of -- there's huge opportunity right there. And so we
11 need to think differently.

12 Again, Restore L? Great mission. We need to
13 go beyond that, and I know I'm preaching to choir on
14 this. We need to go beyond that. We need to have an
15 architecture that says the technology is going to be
16 licensed to commercial operators, who can then each
17 launch dozens of satellites of their own, to do the
18 robotic serving low Earth orbit, and it goes back to,
19 as COMSTAC is aware, safety. It goes back to how do we
20 provide situational awareness, space traffic
21 management? How do we reduce collisions?

22 Well, one way to do it is to make sure that

1 satellites are serviceable and they're not just, you
2 know, dead bodies floating around in orbit. So I think
3 it's another reason to do this kind of activity.

4 But each piece of the whole of government
5 approach needs to be involved in these kind of
6 capabilities. Robotic servicing crosses all of them.

7 So thank you for the question.

8 MR. GOLD: Thank you. Other questions from
9 the audience?

10 MR. DON FELDER (Phonetic): Mr. Bridenstine,
11 thank you very much for attending our FAA Commercial
12 Space Transportation University Consortium Meeting a
13 few years ago. You are a guest breakfast speaker.
14 Thank you. Chris Don Felder with the Center of
15 Excellence for Commercial Space Transportation, as well
16 as Florida Institute of Technology.

17 I wanted to get your thoughts on your vision
18 for education at NASA, both through the Space Grant
19 Program, the Office of Education and broadly the Center
20 of Excellence for Commercial Space. We have ten
21 universities representing dozens of states, as well as
22 affiliate members, and I just would like to hear your

1 thoughts on education and how higher ed in the United
2 States can support your mission.

3 CONGRESSMAN BRIDENSTINE: Absolutely. So
4 higher ed is very involved already and they will
5 continue to be involved.

6 So I'll share this -- for a lot of folks,
7 maybe some don't know, I used to be the Executive
8 Director of the Tulsa Air and Space Museum. And before
9 that I was -- long before that I was a child myself,
10 who went to museums, right. So one of the summer camps
11 I went to one year was a summer camp where I got to
12 interact with a wind tunnel. And I got to use an
13 airfoil. Then I got to change the airfoil and see how
14 it changed lift and drag and do all of those things.

15 And I knew at that point in my life that I was
16 going to be a pilot. There was -- the deal was over.
17 I'm going to be a pilot. That's what I'm going to do.

18 And then when I became the Executive Director
19 of the Tulsa Air and Space Museum, I saw other children
20 have that same experience.

21 What's unique about NASA is that it is the
22 only agency in the federal government that has this

1 unique capability of getting children and just people
2 in general to see a much different perspective of
3 themselves in the universe. And it's inspirational.
4 It's life-changing.

5 NASA has that unique ability. And so I'm a
6 big advocate of what NASA does in the stem fields. We
7 do have an Office of Education, and of course we've got
8 the grants that you mentioned. All of that has
9 resulted in life-changing experiences for children and,
10 of course, even at the universities and even beyond
11 that. Researchers at universities are taking the data
12 that we're getting from our satellites and they're
13 using that data to give great information to us as an
14 agency. So all that is important.

15 It's also important to note that the Office of
16 Education is one piece in the total education
17 capability of NASA, so every program also is involved
18 in inspiration. And each of the ten centers of NASA,
19 they're involved in inspiration and education. So NASA
20 has this great ability, and we're going to do more.
21 And I fully support that engagement.

22 We're looking at maybe changing the name.

1 Instead of Office of Education, making it the Office of
2 Stem Engagement, because one thing I get worried about
3 is some people might think that we're duplicating what
4 other people do, and we really don't.

5 We're about inspiration. We're about
6 motivation, and that's what the Office of Stem
7 Engagement is about, rather than education per se. So
8 --

9 MR. GOLD: The Administrator has been very
10 generous with his time. If we have one more question?

11 Mr. FOUST: Jeff Foust, Space News. To return
12 back to the issue of authorization and continuing
13 supervision. Regardless of what agency takes the lead
14 on that, what role do you see NASA playing in
15 supporting that, particularly in areas like planetary
16 protection, which Chairman Culberson earlier this
17 morning emphasized the importance of for commercial, as
18 well as government missions?

19 CONGRESSMAN BRIDENSTINE: That's great. So
20 NASA plays a role in providing technical advice for
21 planetary protection, specifically. And that's
22 something that we will continue to do. It's -- let's

1 see, beyond that -- say the question one more time.

2 MR. FOUST: What role NASA plays --

3 CONGRESSMAN BRIDENSTINE: So, yeah. Technical
4 advice is the key thing, but also when you think about
5 a lot of the technological advancement, we do science,
6 we do research, we do technological advancement.

7 You know, when you look at maybe the bill in
8 the House and it focuses exclusively on these non-
9 traditional space activities, and then you look at
10 other bills that might be out there that we might soon
11 see that will deal with space situational awareness and
12 space traffic management, there's a whole other area
13 there where NASA could be involved in developing
14 technology, doing the research, doing, in fact, pilot
15 programs, which I think is also important.

16 The way I see it, Jeff, is similar to the way
17 NASA is involved in UTM, Unmanned Aero Systems Traffic
18 Management, where this is a function of the FAA, and
19 NASA doesn't want to be involved in air traffic
20 management, but what we do want to be involved in is
21 helping figure out what are the technological gaps and
22 how do we fill those gaps, and then take those

1 technologies and license them to a broader spectrum of
2 people and share them with other agencies, and
3 ultimately be a part of solving the problem, even
4 though we're not going to manage the traffic within the
5 National Airspace System.

6 That doesn't mean, however -- we could have a
7 similar role for situational awareness, space traffic
8 management, and certainly we could have a similar role
9 for a whole host of technology demonstrations, to
10 include or technical advice, as you mentioned, with
11 planetary protection.

12 MR. GOLD: A round of applause. Before we
13 lose him, I just want to acknowledge someone. Barry
14 Plans (phonetic) from the Department of Transportation.
15 He didn't make the COMSTAC, but he made it better.
16 Everything from the table setup to the idea of that ISS
17 video. Thank you, Barry.

18 So with that being said, let's break for an
19 hour for lunch, and we'll resume the schedule. If
20 everyone could be back by 12:30, we're appreciate it.
21 Thank you for your time. We'll see you soon.

22 (Lunch break.)

1 MS. REIMOLD: I want to welcome everyone back
2 to the Afternoon Session of the COMSTAC meeting. All
3 right, thank you very much.

4 We were having a discussion up here; the sun
5 is making its way to the center of the atrium glass.
6 It's going to get a lot warmer before it cools off, but
7 the comment was just made to us that we may be nothing
8 else, but we're the coolest because everyone is sitting
9 around wearing sunglasses, so good job, Debra. I think
10 you set the tone for us today.

11 So this afternoon we are going to have a
12 couple of more very exciting speakers, but predicated
13 upon their schedules today, we thought we'd go ahead
14 and initiate this afternoon's session with an initial
15 discussion of the COMSTAC work program for this term.

16 So for the folks who are not COMSTAC members,
17 I thought I'd take a minute or two to describe the
18 process that we've been through. I mentioned in my
19 remarks this morning that the COMSTAC charter was
20 signed last June, and that charter is in effect for two
21 years. So we are already -- this is a spoiler alert --
22 we're already working on the updated charter to get it

1 submitted, because we don't want, A, to have it expire
2 again. But, B, more importantly, we're I think a
3 little bit more -- our thinking is a little changed in
4 the events of the last 18 months, about what
5 potentially we could add into the charter to make it a
6 more robust tool.

7 So after we got the charter signed, we turned
8 our attention toward the membership, and the membership
9 has been a process and, you know, we're delighted with
10 the outcome certainly of our slate of COMSTAC members.

11 But equally important, we also undertook --
12 and the "we" in this case, by the way, I would say was
13 somewhat organic with the FAA, the Office of Commercial
14 Space Transportation. We put together another
15 document, and we called it Terms of reference for lack
16 of a better word.

17 And what we were trying to when we established
18 the terms of reference was just to give everyone -- and
19 particularly the new members a basic set of guidelines
20 on how this Committee would operate, you know, how the
21 meetings would be conducted, expectations of the
22 working groups, et cetera, et cetera. It's fairly high

1 level, but it provided at least some initial guidance
2 toward our ability to fulfill the objectives of the
3 COMSTAC itself.

4 And then the third piece of that puzzle
5 actually came once the slate of members were developed.
6 We -- the "we" in this case and expanded to include the
7 Mikes, as Tom and I refer to them, Mike Gold and Mike
8 L-A, as Chair and Vice Chair respectively, and myself
9 and Tom as the AST folks that are involved with COMSTAC
10 most directly. And we put together a proposed list of
11 priorities and sent those to the COMSTAC members.

12 And what we were suggesting with that would
13 become the beginnings of our COMSTAC roadmap, and then
14 allow us more quickly to go into some defined work
15 areas and get some workgroups set up with subject
16 matter experts to look at those priorities.

17 So that in a very quick fashion, a high-level
18 way, gives you some idea of how we as a steering group,
19 and again that refers to the Mikes and to Tom and I,
20 about how we would like to conduct the business of this
21 Committee and hopefully from the members we'll get
22 input to continue to make that process better.

1 So what we're going to spend a little bit of
2 time on now is providing an overview of some of the key
3 areas that we see figuring into the COMSTAC work
4 program for the foreseeable future. And we've got some
5 folks that are going to talk to you a little bit in
6 detail about what each of these five areas is intended
7 to be about, and more specifically the kind of input
8 that we're looking to enlist from COMSTAC.

9 And to get things started, we have under the
10 Item Number 1, we called -- it's somewhat
11 governmentese, necessary facilities covered by a side
12 operator's license, so I'd like to invite my colleague,
13 Stewart Jackson, to come on up and walk us through this
14 topic.

15 MR. JACKSON: Good afternoon, everybody. I
16 hope everyone had a decent lunch.

17 I don't know if they're going to put up the
18 question or not. Would somewhat put the -- all right.
19 So what I want to do is just touch on a few things.

20 The question that we have here for necessary
21 facilities, it's really three parts to that question.
22 And I want to go through each one of those parts very

1 quickly.

2 The first part is what are the necessary
3 facilities that should be covered by a site operator's
4 license? And what we mean by that is that -- to give
5 you some examples, there are certain facilities that
6 are connected to the preparation for launch, close to
7 launch. And they could be some facility such as --
8 I'll give you an example of what that would be would be
9 maybe like a facility for fueling a vehicle on the
10 runway. There may be some off to the side. It could
11 be an area where you have taxiing, whether you're
12 taxiing a vehicle.

13 Another area could be -- in this particular
14 case, if it's a necessary facility, how about safety in
15 the vehicle? I mean, we know the shuttle comes back
16 and it was certain preparations that had to be done
17 before even the crew got off the -- came off the
18 shuttle.

19 So the point is is that we're trying to look
20 at -- behind these, what are those necessary facilities
21 that we might want to consider? And I think that's
22 what we're asking COMSTAC to look at, what are those

1 things?

2 I'm not trying to at this point say that what
3 I gave as a suggestion are those facilities. You may
4 look at that and say, no, it's not, and that's fine,
5 but understanding what those facilities are and those
6 are the facilities that are involved with the actual
7 launch operations, close to the operations.

8 Now, when I go into those areas, the second
9 part of the question is will be that what regularly
10 authority should AST have regarding facilities and
11 operations within the boundaries of a launch or re-
12 entry site, that are unrelated to the preparation of
13 the launch vehicle.

14 And what that could be, and thinking again
15 ahead of what those types of facilities would be, may
16 be something in the sense of a static fire for an
17 engine that's not connected to that launch preparation.
18 That may be a facility that is uninvolved in the
19 preparation of that facility. Or it could be even
20 where we're having airports and spaceport co-exist. It
21 may be items of facilities on that airport that is not
22 related to launch, in that particular case.

1 And the last part of that question is that if
2 none -- come back and say there aren't any, how should
3 these unrelated facilities and operations be managed or
4 be handled or be treated? There may be a point where
5 you may have with that particular facilities, we should
6 not at all have any authorization on it, but we should
7 not be concerned, we being ASC, be concerned, on how
8 that facility is being taken care of or managed, simply
9 because of the fact that it's unrelated to the
10 operations.

11 But then again, there may be some that might
12 have some type of connection that you may want to
13 handle a different way. It could be state, could be
14 local, or could be even business alone. So in short,
15 and I've taken up a lot of time up here, but the point
16 is is that we are very concerned about the, you know,
17 addressing the necessary facilities, because the one
18 thing that things are happening, changing in the
19 industry as a whole. Airports, spaceports, there are
20 other facilities now that the boundaries that we're
21 using for a lot of the flights are changing and
22 spreading out and wanted to add in other operations in,

1 it could even be, you know, fuel storage and so forth.
2 So we're seeing those boundaries that once were
3 basically almost around the runway, for example, for
4 horizontal launches, they are around the entire
5 facility, including other areas in the boundary. So we
6 really would like from you to really come back with
7 some of the ideas of what you would consider that a
8 necessary facility would be, and what we should be --
9 maybe what AST should be authorized to regulate in
10 those areas.

11 MR. KUNSTADTER: Thanks for the presentation.
12 I just want to make sure that I'm clear on what the
13 problem is that you're attempting to address here.

14 MR. JACKSON: Mm-hmm.

15 MR. KUNSTADTER: Is it purely the property
16 damage and liability issues, or are there other issues
17 besides the property damage and liability issues?

18 MR. JACKSON: Well, one -- whether there's --
19 we do have property damage and liability, but one of
20 the main drives that we have had is that we did not
21 necessarily define in the existing Regulation 410 what
22 necessary facilities are. In that existing regulation

1 there is a footnote that talks about necessary
2 facilities.

3 And what we wanted to do is make sure that we
4 -- want to get an idea what the industry feels
5 necessary facilities are in that regards. And, of
6 course, you're going to look at -- because if it's
7 under the launch, you are going to be looking at or be
8 concerned with any type of loss and so forth as you
9 indicated.

10 But it's the idea of defining that. We have
11 not defined it and we wanted to get some help in what
12 that definition should be. In order to do that, we
13 need to understand what the industry feels necessary
14 facilities are.

15 MR. KARNES: Okay. Is there an analogy on the
16 airport side for necessary facilities? I don't know.
17 I'm asking the question. Maybe it's something we on
18 the COMSTAC should look into.

19 MR. JACKSON: And I would say yes, to look
20 into it, because if you look at an airport, an airport
21 has facilities to operate aircraft.

22 MR. KUNSTADTER: Yeah.

1 MR. JACKSON: And if you look at a launch
2 facility, that is part -- it's going to probably have
3 facilities that needed to prepare for launch. So when
4 you look at those two, of course, you can almost say
5 yes, the airport will handle their facilities, and AST
6 will handle those, but are there anything else that's
7 unrelated that we have to deal with? So it's more than
8 just a quick --

9 MR. KUNSTADTER: Sure.

10 MR. JACKSON: -- answer to it. I think it
11 does need to be a little research and looking into that
12 and that's part of this, as well.

13 MR. KUNSTADTER: Maybe it would -- the airport
14 analogy, you know, you may include maintenance
15 facilities that aren't really tied to actual operations
16 --

17 MR. JACKSON: Exactly. Or it could be
18 maintenance facilities are mixed, combination. When
19 you look at the dynamics and the diversity involved, it
20 could be a number of things that could happen, because
21 we are looking at not so much the present but the
22 future, all right.

1 MR. KUNSTADTER: Mm-hmm.

2 MR. JACKSON: And as we brought up earlier,
3 how this industry is changing. And so that's the goal.

4 MR. KUNSTADTER: Thank you.

5 MR. HOLDER: The fundamental challenge here is
6 that as the industry grows --

7 MR. GOLD: Microphone.

8 MR. HOLDER: The fundamental challenge here is
9 that as the industry grows, the mixture in variability
10 from one operation to another seems to be expanding, so
11 while some operators may find themselves perfectly fine
12 with a runway at an airport, because the airport has
13 everything else it needs, other operators may want more
14 than what that airport has to offer, including
15 facilities from scratch they build themselves.

16 So you could go from one operator, where the
17 only thing that is not covered by somebody's existing
18 regulation, is the vehicle itself and perhaps something
19 unique to that vehicle that maybe the type of
20 propellant they're using to others, where everything
21 that they build is from scratch, to support their needs
22 in a green field.

1 And the challenge then becomes when you look
2 at the regulatory approach, one size clearly will not
3 fit all, and so you may end up with a series of boxes
4 checked and one box says runway covered by the airport,
5 no need for AST to provide any regulatory input here.
6 Fuel loading for the aircraft, checked, already covered
7 by the airport, no need for AST to provide input here.

8 But there may be other facilities where those
9 things do not exist and AST will need to provide
10 support, so in the end are you trying to make sure that
11 you've got at least all the bases covered for what we
12 can imagine today and tomorrow?

13 MR. JACKSON: Yes, and I would say definitely
14 yes to that, because we want to be able to look at what
15 those bases are, as you indicated.

16 Now, you also would have and I'm going to
17 bring this up, because why you were talking, thinking
18 about this -- when I say facilities, it may not
19 necessarily be some structure box, something like that.
20 It may be location. It may be I need certain distance
21 that you may need from the public.

22 For example, you have a situation that we

1 already have where you have an aircraft -- an aircraft
2 that's taking off from an airport. Now you have some
3 concerns with public. Now, that public will be, well,
4 if I look at what -- I believe what a lot of air shows
5 use, they use something like 500, 600 feet from the
6 runway.

7 Now, that can fit -- that can be satisfactory
8 for the -- it's the area that the public is going to be
9 sitting, to stand and so forth, the facility that
10 you're going to have off to the side for spectators to
11 be. You can say all right, we're going to put them 600
12 feet away from the airport.

13 That may be sufficient for what we -- what AST
14 may need for the protection of the public. And yet
15 could also satisfy the airport in a sense for their
16 type operations and air show. So it's that type of
17 diversity that I'm talking about. I'm throwing this
18 out for that point, that I don't think anyone -- I
19 don't want anyone to get locked into a certain way, but
20 be more open-minded on what those necessary facilities
21 would be needed, and as you stated, how those -- how
22 it's being used. Can it be used jointly or not?

1 Things of that sort.

2 MS. WARREN: So just to clarify, I think your
3 last comment may have done that. We're -- necessary
4 facilities does not have to be defined by who has the
5 site operator's license. It can be something that's
6 owned by a third party. It can be something that is
7 jointly used by multiple entities. So who owns it and
8 controls it is not necessarily a criteria for
9 necessary. Is that what I'm --

10 MR. JACKSON: You say not necessarily a
11 criteria --

12 MS. WARREN: I'm sorry. A criteria for the
13 definition of necessary.

14 MR. JACKSON: If I understand you correctly,
15 you're saying that it does not necessarily be something
16 that is necessary for the site operator to satisfy --
17 sorry.

18 MS. WARREN: The site operator doesn't have to
19 have either control or ownership of a facility to have
20 it be necessary, for the definition of necessary.

21 MR. JACKSON: Okay.

22 MS. WARREN: Question mark, not an assertion,

1 a question mark.

2 MR. JACKSON: All right. I see. It's not
3 necessary to launch operator that has that
4 responsibility. It could be the user that has the
5 responsibilities, but to say for that necessary
6 facility, for their operations. That is correct. I
7 believe you can look at it that way, as well. Or I'm
8 not going to lock it in on any area.

9 I think this approach should be really open.
10 I mean, we could filter out anything that's different,
11 but I really want people to be open, so that we can try
12 to figure out what the definition of necessary
13 facilities would be or should be.

14 All right. Well, thank you very much. I
15 appreciate it and I'll be happy to talk to anyone later
16 on. That will be fine. Thank you.

17 MS. REIMOLD: Next slide, please. Next slide.
18 Okay. So the second item -- the thing I realize I
19 didn't mention, so there's actually many more work
20 areas that we've outlined. We just took some
21 representative samples of kind of the tranche of work
22 areas that we suggested for this initial roadmap. And

1 we've already grouped these topics, obviously, into our
2 proposed working groups, so you might guess that the
3 conversation that was just summarized will be -- will
4 be a focus for our infrastructure working group in the
5 weeks and months ahead, and certainly by our fall
6 meeting we'll be able to begin reporting out.

7 So this next area will fall cleverly enough
8 under our safety working group, and I'm going to ask
9 Mike L.A. if he can provide a summary of this area,
10 please?

11 MR. LOPEZ-ALEGRIA: Sure. So this -- I'll be
12 happy to pass this on to Oscar at some point, but this
13 sort of fell out of the work that was started under the
14 Standards heading. And as the working group morphed
15 from being focused only on standards to something more
16 broad, of which standards is only a part, which is
17 safety, and another aspect of this is is there a system
18 that we can copy or model after existing today in the
19 FAA, and there's certainly both at NASA and within FAA
20 reporting systems that are used to I'll say discuss
21 anomalies that occur either in operations or in testing
22 that might be -- provide lessons learned that would

1 benefit other operators.

2 Some of the challenges that we face are that
3 in a commercial space flight world so far, there are so
4 few operators which operate -- they tend to operate
5 very different vehicles, that it's hard for somebody to
6 make a report about something without revealing a lot
7 about who the operator was.

8 So that's an obstacle, because that's going to
9 keep companies or make companies reluctant to
10 participate at such a system, perhaps if they feel that
11 there are data that they'd like to protect.

12 So this is really a question that I think we
13 need to talk about within the working group, is what
14 model can we try to follow or do we have to re-invent
15 one or is this just too hard, because the industry is
16 too small.

17 Would you like to add anything, Oscar?

18 MR. GARCIA: Yeah. Thanks, Mike. Yeah, the
19 main challenge as you point -- this is an ultra-
20 competitive nascent industry, so we are looking at
21 examples outside of the space flight or the flight
22 realms, such as motor racing, ultra-competitive

1 disciplines that when it comes to safety, they come
2 together to cooperate.

3 So we are looking in that direction, but the
4 important thing about reporting elements of safety in
5 addition to the competitiveness, is that they point out
6 risk areas that later we want to manage and
7 standardize.

8 So as we left the standard processing place,
9 now it's time for us to share clues or happenings that
10 can point to risk elements that then can be
11 standardized, so that's a very important part of the
12 safety work.

13 MR. LOPEZ-ALEGRIA: I'll keep talking while Di
14 is occupied, so this is -- the challenge that we have
15 again is to try to get companies to participate in
16 this, because we do feel like history has had examples,
17 where if a practice or if characteristics of an anomaly
18 had been reported to the wider community then a mishap
19 might have been avoided down the road.

20 So that's sort of the goal that we've after.
21 And I may just chime in too that, of course, our work
22 is not occurring in a vacuum, and there's a number of

1 different government efforts going on right now in this
2 area, one of which is DARPA'S CONFERS. Another is
3 within NASA HEO, the International Space Standards
4 that's working on Lot G, and even with the power
5 propulsion element, there's going to be, as you heard
6 the Administrator talk about, they're going to try and
7 create the safety standards. Industry is going to take
8 a cut at that, so I almost wonder whether it would be
9 good if we could even begin to synthesize and at least
10 understand and list out all of the different government
11 safety and standard efforts that are going on.

12 My fear is that they start contradicting each
13 other or going across purposes.

14 MS. REIMOLD: I guess I also wanted to make
15 the point, and we've had this discussion certainly
16 within AST. I mean, this is truly an area that I think
17 the commercial space industry can leverage some of the
18 best practices of the aviation industry, so Joe, I'm
19 looking at you guys, because again aviation went down
20 this road many, many years ago, and you know, it was
21 the same set of concerns or worries that the aviation
22 industry expressed that I'm hearing as I talk to

1 stakeholders about the, you know, what a potential
2 sharing of safety information might look like. And I
3 think we've gotten pretty good at de-identifying data
4 that shouldn't be out there, but I think, you know,
5 it's certainly something that we can figure a way out,
6 you know, with COMSTAC's concurrence, that we spend
7 some time listening to the aviation community about how
8 they move forward and address some of the concerns, and
9 see if we can, you know, borrow some of those best
10 practices. So I think some good opportunities are --

11 MR. AUTRY: One of the things that's unique
12 about this industry is the fact that the designers,
13 manufacturers, are also the operators, which is a
14 little bit different than the mature aviation industry.
15 I suspect as this industry matures we may not see that
16 model, but that makes it much more difficult. It's
17 easier for an airline operator to report a failure on a
18 piece of equipment they didn't design and manufacture,
19 than it is for the company who's responsible for
20 building it.

21 MS. REIMOLD: Fair point. Fair point, but I -
22 - just in the interest of trying to figure out what has

1 worked and what hasn't worked, and there's a lot of
2 other -- a lot of other differences. I mean, I
3 recognize all of that but it's simply a thought.

4 MR. AUTRY: Yeah, I'm curious if there's other
5 industries that fall into that designer-builder-
6 operator model too, as well, that faces simile problem.

7 MS. FAKTOR: So maybe one other consideration
8 is anything around export or ITAR issues, because a lot
9 of times the anomalies then get into the how and why
10 and that gets into export control areas, which is
11 really difficult. I mean, that already exists in the
12 insurance side of, you know, who can see what, so that
13 might fit in. What is report and then what actually
14 comes out of it as a result.

15 MR. GOLD: Debra knows I can't resist the
16 export control bait; right?

17 MR. FRALEY: I teed that up for you.

18 MR. GOLD: Thank you. So not only I think is
19 that a very valid concern that Debra raises, but I
20 would take it a step further to say that even when you
21 articulate standards or safety measures, that those
22 very protocols or standards themselves could be export

1 controlled. So I think we have to be very cautious how
2 we do that, and particularly as we look at some of the
3 experiences that DARPA CONFERS is having. You know,
4 that's intended to be an open process with
5 international feedback, which adds another layer of
6 complexity, another layer of difficulty when it comes
7 to export control, so I think it's a critical point
8 that Debra makes, that we need to pay attention to
9 that, so that we don't get into trouble and we make
10 sure we know where that line is and don't cross it.

11 I think we're good there then. Any other
12 questions, comments? Okay, I think we're ready to move
13 on then -- do we want to go to taskers?

14 MS. REIMOLD: We're going to just go to the
15 next area. I just want to finish our descriptions.
16 Next slide, please.

17 So this one, when you read it, it's pretty
18 straightforward, best practices and processes and, you
19 know, interaction and things, and it may strike some
20 folks as a little odd that we put this in here as one
21 of the focal areas for COMSTAC, but I'll explain why
22 since I was the one that I think wore you guys down

1 that I thought this should be in here.

2 So we talked -- many speakers have talked
3 today about the regulatory reform effort that we're
4 going through and the schedule that we're on to have
5 notice of proposed rulemaking for launch and re-entry
6 licensing published by February 1st, 2019. But it's
7 very clear to us in AST and elsewhere in FAA that the
8 regulatory improvements are only one part of the
9 solution, toward assisting the industry and improving
10 safety and efficiencies and all that.

11 And so we have actually put aside some of our
12 resources to start focusing on just some pretty mundane
13 things, like automating processed within AST, and
14 building some interfaces, potentially more
15 aggressively, into the operational work of the National
16 Airspace System.

17 But what we're thinking is is that in many
18 ways we acknowledge, and I've certainly talked to some
19 of the industries that you all have systems in place
20 and that we need to know a lot more about that in order
21 for us to do our requirements, development and all of
22 that. So that's really why this is hear.

1 You all were asking the COMSTAC to help us
2 help you, and we'll talk about this a little bit more
3 when we get the working groups together, but we think
4 this is a pretty high-ticket item, particularly if
5 we're talking about ultimately automating the licensing
6 process and to what extent we can have, you know, the
7 transparency, not only of where an application might be
8 at any part of the process, but we see, you know, what
9 are the allowable interfaces into company systems that,
10 you know, again we can see what's happening. You all
11 can see what's happening with us, so it's -- I think
12 it's a pretty exciting project and we hope to get some
13 pretty near-term -- at least immediate recommendations
14 from COMSTAC, so we can get some of the work underway.

15 Any questions?

16 MR. GOLD: I did have a comment. And first of
17 all, Di, let me compliment you and the AST for even
18 asking this question. You know, I have often said that
19 -- let me go back. We talk about that promote
20 authority that AST has in the regulatory, and there's
21 some who see a conflict there. I actually see a
22 complement, that it's the fact that you want to get to

1 yes is why we get questions like this, and that you
2 come from a place where you want industry to succeed.

3 Far too many regulators, you're guilty until
4 proven innocent, and the AST has always been the flip
5 of that, so I just want to complement you for, again,
6 posing and pushing for that question.

7 I do want to add though that as we talk about
8 regulatory streamlining, and you've already heard quite
9 a bit about it today, the Article 6 issue, and I have
10 been talking about this, as you all know, for years.
11 You're probably tired of hearing me raise it, but when
12 we talk about streamlining, I get concerned that for
13 many of the key commercial activities that you've heard
14 described today, whether it's satellite servicing
15 private sector space stations, whose time is coming,
16 asteroid mining, commercial lunar rovers, which we
17 haven't talked about, those are being caught in a
18 regulatory purgatory.

19 And we can try and streamline all we want, but
20 without Article 6 resolve, we're building on a faulty
21 foundation, and AST has done what they could to try and
22 act as a band-aid on this scenario, but I truly hope

1 that we can resolve that because, again, without that
2 strong foundation, you know, we are just going to be
3 looking at ad hoc solutions, lack of transparency, a
4 lack of predictability.

5 And if I can just echo what the Administrator
6 said, let's not let the perfect be the enemy of the
7 good. Let's get something done and if not perfect, we
8 can move forward, but we need solutions, because if we
9 don't do that, it's all going to move overseas.

10 MS. MITCHELL: Can I just make a comment?
11 This is Megan Mitchell.

12 MR. GOLD: Yeah.

13 MS. MITCHELL: I appreciate the recommendation
14 here to look at internal AST processes, but I'd also
15 like to raise a question about the fact that COMSTAC is
16 now looking at the aviation community and the fact that
17 the FAA has orders in place and certification plans
18 that they use when you talk about basically certifying
19 aircraft. That's a process that they developed with
20 the industry and it has worked and shown successful.

21 I'm curious whether or not with COMSTAC asking
22 AST to look at developing their own orders that would

1 guide how the office goes through a licensing process,
2 as well as certification plans that do provide that
3 transparency, as you go through regular form,
4 considering having orders and internal guidance to AST
5 that doesn't have to be written in the regulations
6 specifically, but could be used as a way to communicate
7 with the industry partner throughout the process of a
8 license and setting things up from the beginning, so
9 everybody knows what's due in a license processes.

10 MS. REIMOLD: Megan, that's a great comment.
11 I mean, certainly an area of a lot of discussion, and I
12 would say -- I mean, I've only been in AST for a year
13 and a half, but my sense is that these kind of
14 conversations have been going on for a long, long time
15 and I would say as AST continues to evolve its
16 relationships, you know, not only outside but within
17 FAA itself, I mean, it kind of goes back to the comment
18 I was making about, you know, how do we intelligently
19 share safety data?

20 There's a lot we can learn and pick up from
21 what's happened in aviation already, and so I think as
22 we -- and we have a perfect opportunity now, right? So

1 the conversation of what is guidance, what is orders,
2 what is standards, what is this, what is that, what
3 bucket does it go to? I mean, it's a daily occurrence,
4 so you -- I can absolutely promise you you're going to
5 be hearing more from us on that. We just don't have it
6 all figured out right now.

7 Thank you. Any other comments, questions?
8 No, no, you've used up your share, Mike.

9 MR. GOLD: Probably wish you had kept it that
10 way too, as I get into this. So you know, Megan, as
11 you well know, I think another issue that we have to
12 talk about and consider that's going to be challenging
13 for everyone is the national airspace. And we need to
14 make sure that there is an objective and balanced
15 discussion when it comes to that.

16 You know, as we look at this building in the
17 aviation field, we're a minority in space. And I get
18 very concerned in terms of the equities of that
19 discussion. And again, I'm not saying we need to go
20 too far one way or the other, but there needs to be an
21 objective and balanced discussion that takes into
22 account the innovation and what space can bring, while

1 at the same time maintaining safety.

2 I think we still have some of our ALPA members
3 here, who I had been having a conversation with
4 previously. So I see it as the duty, particularly of
5 this Committee, to make sure that that conversation is
6 had in a fair, equitable and objective manner, that
7 looks at, again, what's best for the country from a
8 more wholistic perspective.

9 MS. REIMOLD: Mike, I think that that's
10 absolutely right, and certainly -- I mean, these
11 conversations, as you're well aware, are going on
12 through other ARC's now, aerospace access, and to a
13 limited extent some of our space work categorization.

14 But I'm going to put Duane Freer on the spot,
15 just because I'm looking at him. So Duane is out at
16 the FAA Command Center, and he's got the responsibility
17 for organizing all the moving parts when we are
18 planning for a launch. But maybe, Duane, just a couple
19 of minutes about, you know, some of the things that you
20 are looking at and where you see things evolving in the
21 future, just kind of general information.

22 MR. FREER: Yeah, thank you, Di, and I

1 appreciate the opportunity.

2 We're looking at all different kinds of
3 things. The commercial space operations has been a
4 paradigm shift for us over the last couple of years, so
5 in the near term we're looking at processes and
6 procedures and how we can make the airspace more
7 efficient.

8 And we're working on the ARC and that's been a
9 great opportunity. We actually had the Arc at our
10 facility a couple months ago, and I'd like to extend
11 the invitation to anybody in here that would like to
12 come out.

13 I think it was a great learning opportunity
14 for everybody to see what we do and how we do it. So
15 we had that opportunity. We're working on the
16 commercial space integration team on longer range
17 activities, and the NextGen Office on SDI and other
18 opportunities and technologies that we can exploit, to
19 make that more efficient and to integrate better in the
20 future.

21 So a lot of activity going on and a lot of
22 opportunities out there, so -- thank you, Di. I

1 appreciate it.

2 MS. REIMOLD: Thanks, Duane. So what Duane
3 was just mentioning is, you know, and I think Carl
4 mentioned it too, the airspace access ARC and the
5 spaceport categorization ARC, the benefit of having
6 both the space and the aviation communities, and it's
7 been, you know, an intense education effort for both
8 communities to understand each other's language,
9 understand each other's operating environments, and you
10 know, Mike, I want to circle this back to your comment,
11 because I think it's absolutely valid.

12 I think any kind of a thoughtful and forward-
13 moving conversation about equities or otherwise has to
14 be built with a mutual understanding of what the issues
15 are. So I think we're working toward that. I'm
16 encouraged. I mean, we're having dialogues that, you
17 know, as recently as five years ago, I don't think ever
18 would have taken place, and that's true both within and
19 without -- or external to FAA.

20 Jennifer, I think you wanted to make a
21 comment?

22 MS. WARREN: Jennifer Warren -- the airspace

1 access ARC. Again, I really commend the FAA on that.
2 It's bringing together not only unmanned, manned and
3 space, but it's also bringing together parts of the
4 FAA. So it's kind of transcending all of the relevant
5 stakeholders.

6 What I'm curious about is how does the COMSTAC
7 help overlap, intersect, inform or vice versa what's
8 going on in the ARC? Because I know there's a lot of
9 overlap potential of policy and there's active dialogue
10 going on there, which is very valuable. One of my
11 teammates is on that. So if you could maybe share how
12 you see -- to avoid duplication but to maybe reinforce
13 the effort? Thank you.

14 MS. REIMOLD: Yeah, thanks, Jennifer, and
15 that's a good point. So, you know, this is pretty
16 extraordinary by anyone's estimation that the Office of
17 Commercial Space of the FAA is actively managing three
18 aviation rulemaking committees simultaneously,
19 regulatory reform, airspace access and spaceport
20 categorization, and standing up an advisory committee.

21 I would like to say it was as well-thought-out
22 plan that just, you know, manifested itself, but it

1 wasn't. It was an era of timing in a lot of ways, but
2 I think it makes your question all the more relevant.

3 So ARC's are finite. They're established for
4 a specific purpose for a specific time. The ARC's have
5 slightly different durations. The current ARC's,
6 subject to change.

7 The reality is is that we're going to have to
8 -- I'm looking past Mike L.A., sorry Mike L.A. The
9 reality is is that we're going to have to be very
10 thoughtful and deconflict, and not to say that these
11 groups -- because actually many of you are just wearing
12 a different hat, depending on the meeting that you're
13 going to, but that we are messaging the information
14 that's coming out between the groups, and then building
15 on that.

16 And a lot of that -- and again, it's more in
17 the details of the proposed work program for the
18 COMSTAC, where you'll start seeing the attributes of
19 some of the questions or even some of the advances
20 we're making with the ARC.

21 So -- and I would say that, you know,
22 certainly our intention as we sit here today is that

1 the COMSTAC is a long-term thing, you know, and we'll
2 keep it going, and it will build on the work of the
3 ARC's.

4 And also, I can't rule out that there wouldn't
5 be additional ARC's. I mean, frankly the advantage of
6 being able to pull an ARC together is it's incredibly
7 flexible for a government pseudo advisory group, you
8 know, where COMSTAC, like any other advisory committee,
9 is subject to a lot of rules and restrictions.

10 So they both -- both mechanisms have their
11 advantages and both have their disadvantages, so, you
12 know -- I'll look certainly toward the COMSTAC members
13 to challenge us when they start hearing the same thing
14 in all different places, and it doesn't seem like we're
15 making any progress.

16 Any other question on this topic? We're going
17 to continue to move through our schedule this
18 afternoon. As I mentioned at the onset is we have a
19 couple of more -- couple of other very exciting
20 speakers. There's been a little bit of a delay, so
21 we're going to continue plowing through these proposed
22 work areas.

1 Next slide. This is a perfect lead-up to the
2 question that came up about -- Mike's question about
3 airspace access and Duane's discussion about some of
4 the advances we are currently implementing and planning
5 for in terms of improved technologies and procedures to
6 better integrate into the National Airspace System.

7 And my colleague Dan Murray, where did he go?
8 You're quick. Dan is going to walk us through this
9 next work area.

10 MR. MURRAY: Thank you, Di. My name is Dan
11 Murray. I'm the Manager of the Space Transportation
12 Development Division, AST100, and I'm here to talk
13 about acceptable level of risk.

14 So the space industry and the aviation
15 industry, of course, have developed at different times
16 under different circumstances, and so have the safety
17 standards that have been used in these two industries.
18 They've developed at different times under different
19 circumstances.

20 Frankly, the increasing frequency and
21 complexity of commercial launch and re-entry operations
22 have caused the FAA to review how it protects aircraft

1 and passengers relative to these differences, so we're
2 a safety agency, a safety organization. We are always
3 looking at safety, but we're taking a particularly
4 close look at the difference of these two standards
5 here just recently, and what that means.

6 So at the risk of going too deeply into the
7 numbers, it's hard to talk about this though without
8 going into the numbers. So the FAA's air traffic
9 organization provides a safety service during a launch
10 and re-entry operation. They provided notice to other
11 airspace users of potentially hazardous activity
12 through the publishing of notices to airmen, they alter
13 air traffic flows to prevent conflicts, and they
14 prevent aircraft from entering into airspace in the
15 vicinity of a launch or re-entry operation.

16 The ATO has established a target level of
17 safety, at which they provide their air traffic
18 services. And it's certainly based on the frequency
19 and volume with which they provide these services. And
20 it's set at a very high number of no more than -- high
21 in the sense of being low actually -- no more than one
22 catastrophic accident per one billion air traffic

1 control operations or flight hours, where a
2 catastrophic accident is defined as an accident that
3 results in a fatal injury to a person on board the
4 aircraft, or a whole loss.

5 And an air traffic control operation could be
6 many things, but it could be simply a single clearance
7 provided from a controller to a pilot.

8 Currently within NAST -- many of you know this
9 very well -- we have a target level of public safety
10 for individuals of no more than one casualty in one
11 million launch or re-entry operations, where we define
12 a casualty as a serious injury requiring
13 hospitalization or a fatality.

14 And in practice, the regulations restrict
15 access to the public from locations on the ground, on
16 the sea or in the air, where the one in a million
17 individual risk requirement cannot be met. And in the
18 air, we call these areas aircraft hazard areas.

19 We've also used the term "segregated airspace"
20 at different times, since air traffic controllers are
21 providing air traffic services that segregate
22 operations occurring within these aircraft hazard areas

1 from other airspace users.

2 So there's a difference in terminology and
3 underlying assumptions that goes into both of these
4 safety standards, and as hard as we could to try to
5 work to translate or map between the two of them, and
6 the FAA has spent a considerable amount of time over
7 the last almost two years trying to do this, they don't
8 match up. In fact, they don't directly compare.

9 But fortunately, they are not quite as
10 different as they may appear numerically, so you hear
11 one in a billion, you hear one in a million, you're
12 thinking that's several orders of magnitude difference.

13 But fortunately, the way that we -- in
14 particular in the commercial space world, compute one
15 in a million and apply one in a million, it's actually
16 a relatively conservative estimate of the risk and it's
17 actually closer to one in a billion than it may appear
18 but I'll get into that more in a minute.

19 So the fact is that they are different. And
20 that has been the focus of our work within Office of
21 Commercial Space and the air traffic organization, and
22 even more broadly we worked with aviation safety, we've

1 worked with NextGen. We've worked really across the
2 FAA to try to tackle this problem.

3 And there were a couple of different ways we
4 could go forward. Certainly, one way we could go
5 forward would be to impose one industry's standards on
6 the other. But this could have some pretty drastic
7 negative consequences, since in launch and re-entry for
8 public safety, we achieve that primarily using
9 segregated airspace.

10 And so to impose a more strict level of safety
11 on a commercial launch or re-entry operation, would
12 mean that we would be increasing the amount of
13 segregated airspace, and that would become extremely
14 detrimental to the airspace system's efficiency and
15 capacity.

16 An example we like to cite is a launch from
17 Cape Canaveral that is perhaps going on a Space Station
18 trajectory, and going over Europe. Well, if we were to
19 instead of computing the aircraft hazard area for that
20 mission at a one in a million probability of casualty,
21 and instead compute it at a one in a billion
22 probability of fatality, the hazard area associated

1 with that would start off the coast of Florida and it
2 would go uninterrupted all the way over Europe and even
3 into Asia.

4 So protecting that kind of an airspace,
5 basically a hemisphere's worth of airspace, would be a
6 very challenging problem.

7 At the same time continuing to ask air traffic
8 controllers to provide air traffic services to
9 different types of operators conducting different types
10 of operations at different levels of safety can be
11 pretty problematic, as well.

12 So we do have some slides and back-up slides
13 on these that we can step through, but I don't know if
14 we can get those up, but I'll just keep going with
15 this.

16 Instead of taking that approach, of putting
17 one industry standard on the other, we went with what
18 we have ended up calling the acceptable level of risk
19 approach, and we believe this is a reasonable
20 compromise between the two safety levels.

21 What it is is procedural changes that the air
22 traffic organization implements in the way that it

1 manages traffic around a launch or re-entry operation.

2 These changes incorporate three key elements.

3 The first is the application of an intermediate
4 adjustment in individual risk, so it's an intermediate
5 step between one in a billion and one in a million.

6 Secondly, it applies operational restrictions
7 that more carefully manage the exposure of individual
8 aircraft during a launch or re-entry operation, and
9 lastly an employee's -- a new collective risk limit,
10 and I say new, where those of us in the space industry
11 know that we use both individual risk and collective
12 risk to address public safety, and we've done that for
13 a very long time.

14 In the air traffic world that's a fairly new
15 concept, applying a collective risk limit, in addition
16 to an individual risk limit.

17 So the individual risk limit, as I mentioned,
18 it's an intermedia adjustment and it is set to one in
19 ten million probability of fatality. And we picked
20 that number, because as I mentioned before, the way we
21 currently compute aircraft hazard areas at a one in a
22 million likelihood of casualty, actually is about an

1 order of magnitude safer than that, based on some
2 modeling intricacies that we can get into at a
3 different times.

4 But what that does is by using one in ten
5 million probability of fatality, it allows the FAA, it
6 allows the industry, it allows all of our safety
7 partners to continue to compute aircraft hazard areas
8 the way they always have, and then to apply those.

9 So what we do then is we take some operating
10 restrictions, and we do apply those to those aircraft
11 hazard areas, and these are procedural steps again that
12 the traffic managers and controllers take to control
13 the exposure of the airplane. And the way that
14 typically works is you would have air traffic routes
15 that are in the vicinity of a particular trajectory and
16 the air traffic managers would identify which of those
17 routes cross the trajectory and do so at an angle that
18 is sufficient to allow the airplane to cross and not be
19 exposed to a higher level of risk.

20 At the same time if we have routes that are
21 parallel or near parallel to the launch trajectory, or
22 if we have airplanes performing operations like

1 circling or hovering, the traffic managers and the
2 traffic controllers have to prevent those from
3 occurring too close to the operation.

4 So while we continue to look at aircraft
5 transiting the area at a level of risk at a one in ten
6 million or one in -- below one in a billion level, if
7 there is a risk to an aircraft that is above one in a
8 billion -- again the air traffic target level of
9 safety, we count that as what we call an exposed
10 aircraft, and this is how we apply the collective risk
11 limit.

12 We tally the number of exposed aircraft from
13 each launch or re-entry operations, and we computed a
14 limit, an annual limit, on the number of exposed
15 aircraft, that would reduce the likelihood of an
16 accident occurring within any person's lifetime at a 95
17 percent confidence level.

18 And without going into all the math, what that
19 means is over a rolling 12-month period, we would look
20 to have no more than 6,412 exposed aircraft. And the
21 way we keep an eye on that is each launch and re-entry
22 we figure out what the level of risk exposure is to

1 aircraft transiting the area, and we tally those and
2 keep reference of that versus that count.

3 So we've applied this so far to commercial
4 launch and re-entry operations. In fact, more
5 specifically, commercial launch operations and even
6 more specifically fly-back missions, but we're
7 continuing to evaluate its application to the full
8 range of launch and re-entry operations. And we've
9 done this incrementally in the sense that we've
10 identified particular missions. We've looked to the
11 degree that they are defined and designed and data is
12 available for us to try to apply this ARL approach to
13 them, make sure that it works the way that we expect it
14 to, and then of course, we can apply it if we can going
15 forward.

16 So this does allow the FAA to achieve a higher
17 level of safety during a launch or re-entry operation
18 than it has in the past, and it does so without drastic
19 increases in the size of the segregated airspace and
20 the associated impacts on the airspace that that could
21 cause.

22 Further, it integrates aspects of both the

1 aviation and the space industry safety standards, so in
2 that regard, again, it represents an intermediate step
3 between the two target levels of safety. However,
4 doing so, it still requires the air traffic
5 organization to accept a higher level of risk during
6 launch and re-entry than it accepts during other
7 operations. And for that reason, the FAA intends to
8 apply this approach only temporarily.

9 We are anticipating that we will be able to
10 develop technologies that will allow us to more
11 dynamically manage the airspace in a way that we can
12 accomplish safety at the ATO target level of safety
13 without, again, having to increase the amount of
14 segregated airspace. And the way we intend to do that
15 is through technologies like the Space Data Integrator
16 and technologies like the hazard risk assessment
17 management capability.

18 And what these do is they provide the FAA with
19 an increased level of situational awareness during a
20 launch or re-entry operations, allows traffic managers
21 and the FAA to monitor a mission as it's occurring. In
22 the event, as the mission unfolds, we can compute the -

1 - in real time the airspace that's affected by the
2 mission, the extent off that airspace. When airspace
3 is no longer affected by a mission, it can be released
4 immediately.

5 In the event of a contingency, we can
6 determine on the spot what the extent of the airspace
7 is that's affected. We can compare that against the
8 airspace that was protected in advance of the
9 operation, and ensure that it's sufficient. If it's
10 not sufficient, we can look at the delta and we can
11 look to address more airspace beyond the -- what we had
12 identified in the beginning.

13 So it's a really dynamic approach to airspace.
14 It's very automation-based. It replaces a lot of
15 processes that we currently do manually now that take
16 us several minutes to undertake. We can do this sort
17 of thing in a second or so. And again, that allows us
18 to be much more dynamic, not only in how we apply this
19 approach, but also in how we manage the airspace
20 overall.

21 We have what we like to call our three R's,
22 reduce, respond, release. And we're looking at

1 technologies and building them into the NAS in a way
2 that will reduce the amount of airspace we have to
3 preemptively close in advance of a launch in order to
4 ensure safety. We want to respond to contingencies in
5 a timely manner in order to make sure we're maintaining
6 safety, and of course as soon as airspace is no longer
7 affected by an operation, we want to release that back
8 to the system for normal use.

9 So these technologies are being developed as
10 we speak. They're going through the FAA's acquisition
11 management system process, and we are anticipating
12 fielding them within the next five years, and by
13 fielding those out into the future, as we're looking
14 to, again we're hoping that the -- or intending for the
15 ARL approach to be temporary in the sense that with
16 these technologies available, we will still be able to
17 address airspace at the ten to the minus six level, in
18 advance of the launch, but we'll be able to address
19 airspace at the ten to the minus nine level in the
20 event of a contingency.

21 So with that, I think I have a few minutes and
22 we can take a few questions.

1 MR. LOPEZ-ALEGRIA: So, Dan, that's
2 fascinating. I mean, I had never heard of this
3 concept, and I just want to read back what I think I
4 understood.

5 So when there's a launch you look at the
6 vehicle, the trajectory, you clear airspace based on
7 these numbers, these probabilities, and so now that
8 you're using some number that's between one and ten to
9 the minus six and ten to the minus ninth, you are
10 deviating aircraft less than you were before; is that
11 right?

12 MR. MURRAY: We would be deviating them more
13 than we had been in the past when we were working
14 strictly ten to the minus six level, but less than we
15 would be if we were working at the ten to the minus
16 nine level.

17 MR. LOPEZ-ALEGRIA: But you had been working
18 at ten to minus nine up until now?

19 MR. MURRAY: No. During launch and re-
20 entries, we've been working at the ten to the minus six
21 casualty level.

22 MR. LOPEZ-ALEGRIA: So could you -- I mean, I

1 don't know what the figure of merit is, but I'm just
2 curious, what is the difference in terms of, you know,
3 I guess it would be deviated miles overall between the
4 ten to the minus six and ten to the minus nine numbers?

5 MR. MURRAY: it varies, depending on mission
6 type and trajectory. And even vehicle, because of
7 course probability of failure is a factor, a key factor
8 in computing these areas.

9 The example I mentioned before is the one that
10 we like to point to that really I think sums up the
11 challenges of this. If you switch from a ten to the
12 minus six to a ten to the minus nine, and you apply
13 that to a launch off of Cape Canaveral, you're talking
14 about a corridor or a band of airspace that extends
15 uninterrupted from Florida over most of Europe into
16 Asia. That's what -- where a ten to the minus six
17 would extend out maybe a hundred miles, a couple
18 hundred miles, depending on the type of mission we're
19 looking at, we're talking about going thousands of
20 miles into Europe and Asia, if we were to just strictly
21 swap out the ten to the minus six and the ten to the
22 minus nine.

1 MR. LOPEZ-ALEGRIA: Well, okay, in lieu of
2 asking a bunch more technical questions, what do you
3 want from the COMSTAC in relation to this concept?

4 MR. MURRAY: So we're looking for feedback on
5 this. We've established this approach and it's been
6 our goal to bridge this difference in standards, and we
7 feel that we have taken what we believe is a reasonable
8 step to find an intermediate point in the middle and to
9 bring in some best practices from the space world in
10 the form of a collective risk limit, in addition to an
11 individual risk limit, and some operating limitations
12 that again can kind of seek to find this compromise in
13 the middle. And then on top of that, again, we're
14 looking for this to be temporary, so we're looking at
15 these technologies to come along in the very near
16 future that can allow us to move back to where we were,
17 so we're looking for the COMSTAC to give us some
18 feedback on this approach and, of course, we can
19 provide some information that goes into more of the
20 technical details, because there's quite a bit behind
21 this that we can then look for some feedback on and
22 some ways forward.

1 MR. KUNSTADTER: It would be interesting to
2 take -- I mean, what I see here is the nexus of the
3 work you're doing in my world of insurance where we
4 have space insurance, particularly launch liability
5 insurance for the launch operator. And then let's just
6 take airlines as an example. There's airline
7 insurance, where the airline is insured against
8 casualty, effectively against liability to their
9 passengers, if there were to be an accident.

10 So -- and I dare say -- and I have a couple
11 colleagues here in the room who are in the insurance
12 business, and I might even look to them for some advice
13 on this, but I dare say I imagine an aviation
14 underwriter has never even looked at the casualty risk
15 from launch activity. So it would be an interesting
16 discussion to have with the aviation insurance world.

17 MR. MURRAY: It would, and I'm not familiar if
18 that's happened or not, but that would be very
19 interesting input to this process.

20 MR. HOLDER: The description you've provided
21 has been statistical in nature. Are there models that
22 you have run against specific types of launch vehicles,

1 of specific locations, against specific air traffic
2 environments? You know, in perhaps even Monte Carlo
3 that to see if those statistical values hold up in what
4 we know today of likely operators out of likely
5 locations?

6 MR. MURRAY: We have to an extent. We have a
7 working group I mentioned earlier that's made up of
8 representatives from commercial space air traffic. The
9 Office of Airports Aviation Safety, NextGen, obviously
10 all of the lines of business, and after we had
11 addressed this initially with respect to fly-backs, we
12 stepped back and asked ourselves well, how would this
13 apply to any launch or re-entry operation.

14 We came up with a list of the different types
15 of operations based off of what we thought were the
16 significant differences between those types. I want to
17 say the list had something like 14 or 15 different
18 types in it, and then we examined using some analysis
19 tools and available data we had on each of those
20 different types of operations, how this could apply,
21 and we also did look at different geographical
22 locations to see how it would work.

1 There were several types of operations where
2 we just didn't feel we knew enough about how those
3 operations would actually be executed in order to
4 figure out whether this would apply as it has applied
5 to a vertical launch or a fly-back mission, and so
6 those we're kind of keeping an eye on. No one is
7 actually flying any of those yet, and as the industry
8 gets closer to potentially taking on some of those
9 types of operations, we'll be revisiting that again.

10 There is another category of operations that
11 based on the dynamics of it, that they're far more
12 vertical in nature than something going to orbit or
13 coming back from orbit that has a large horizontal
14 velocity component to it, and that had a big factor in
15 the way that we can apply those operating restrictions,
16 and without getting into a lot of the numerics again,
17 we had to use a slightly different approach for a
18 launch that is largely vertical, straight up and
19 straight back down, than a launch that's going to orbit
20 or coming back from orbit, and has a large horizontal
21 velocity component.

22 MR. HOLDER: I think you've just preempted my

1 next question was how flexible is the ALR approach, and
2 it sounds like you've built flexibility into it based
3 upon the vehicle type that you're dealing with.

4 MR. MURRAY: We have, so one of our goals
5 here, of course, was to implement this in a way that
6 this is something that air traffic is applying. It not
7 something that is a new requirement on the industry.

8 Of course, the industry will recognize this
9 change and it's part of the reason why we're here to
10 talk about this today, but these are requirements that
11 air traffic is placing on itself, and then the question
12 is well, how consistently can we apply those
13 requirements across all of the different types of
14 operations, and we are learning as we go. We have to
15 admit that, because there's not as much familiarity
16 with the different mission types that we may be facing
17 in the future now as opposed to what we hope to have in
18 the future, but we are looking at it from that
19 perspective.

20 MR. GOLD: So let's go with Dale and then I'd
21 actually like to each from the launch provider in a
22 moment.

1 MR. NASH: One caution, you talk about real
2 time analysis every few seconds. I know on the space
3 shuttle when we would get in later in the count, if
4 something was good, it was good through the remainder
5 of the count. Same with other launches.

6 I think one of the worst things could be you
7 get in your terminal count, your last few minutes or
8 whatever, and all of a sudden you say we're red, we
9 can't go because of our analysis, so more tools can
10 give you more information and more information may
11 scrub launches either for real or perceived reasons, so
12 just be careful with unintended consequences here,
13 because those scrubs become very, very expensive.

14 MR. MURRAY: Absolutely and that is something
15 we are very conscious of. As we move in this
16 direction, not just with ARL, but some of these other
17 technologies, we're drawing the links between safety
18 and system efficiency and capacity much tighter, much
19 closer together. And where we implement capabilities
20 and technologies that are intended to address one or
21 both of those things, we have to think about the
22 consequences of what happens if we can't apply those

1 for whatever reason.

2 And what does that mean to our ability to
3 still be able to manage the airspace during the launch
4 or re-entry operation? At that time if that data is
5 not available, if there are other circumstances that
6 are preventing us from following the plan that we had
7 mapped out, what are our alternatives at that point
8 that do avoid getting into situations like that?
9 That's an excellent point and one that we're very
10 conscious of.

11 MR. GOLD: Megan, please.

12 MS. MITCHELL: Thanks for the explanation,
13 Dan. The question is I was wondering if you could
14 speak on how AST looks at reusable vehicles in changing
15 probability of failure and how that impacts aircraft
16 hazard areas and whether or not ATO has accepted
17 changes that have to do with reusability on a vehicle?

18 MR. MURRAY: Yes. So the way we compute the
19 individual risk, it is a function of probability of
20 failure and that is a unique value for each vehicle,
21 even a vehicle on a particular mission, and it's based,
22 of course, on a number of factors but largely on the

1 success or failure that that particular vehicle has
2 incurred in its operating history.

3 And so with the reusable launch vehicle, of
4 course, we see opportunity for an individual vehicle to
5 be flying over and over again, and as its successes
6 mount, the probability of failure reduces. There's a
7 certain amount of reduction in probability of failure
8 that starts to make a significant difference in the
9 size of the aircraft hazard area, and that is a
10 function of a number of variables.

11 Where we could go and figure it out for every
12 individual mission and we do that sometimes because
13 there is a difference from mission to mission, that
14 hazard area could be reducing in size based off of
15 success, and in doing so it opens up an area that might
16 have been closed otherwise, and those are the
17 directions, of course, we want to be moving in as we
18 look at these.

19 At the same time, if the difference in the
20 hazard area is not as significant, it doesn't make a
21 difference really so much in terms of how the
22 individual operation will be executed within the

1 system, we might not look to make that change on a
2 mission-by-mission basis.

3 But for both an expendable launch vehicle and
4 a reusable launch vehicle, we are taking into account
5 the probability of failure and that is a function of
6 the flight history, and we are looking to account for
7 that in all of our aircraft hazard area work.

8 MR. GOLD: Thank you so much. We've got a
9 Congressman here so we'll cut off there for a moment.
10 So a round of applause for Dan, everyone. Obviously a
11 simple and easy issue he has there.

12 So to introduce Congressman Posey, former
13 employee of Kennedy Space Center and Chairman of Space
14 Florida's predecessor organization, Congressman Bill
15 Posey. He aims to maintain America at the forefront of
16 space research and exploration.

17 Congressman Posey wants to help develop space
18 technology, to ensure national security, by addressing
19 the vulnerability of military space assets and aiming
20 to use American public and private resource to send
21 American astronauts back to the International Space
22 Station on American spacecraft.

1 He introduced the Race for Space Act, which
2 was signed into law. The Act helps American space
3 companies compete in the global market, by allowing
4 private sector investment, Department of Defense
5 infrastructure, to meet commercial space launch needs.

6 Congressman Posey has been a tireless advocate
7 for space exploration generally and commercial space
8 transportation specifically. Please joint me in
9 welcoming Congressman Bill Posey.

10 CONGRESSMAN POSEY: Thank you, Michael. This
11 is my first visit to this wonderful building. What a
12 pleasant surrounding to meet in, isn't it? If you're
13 in the shade anyway, it is.

14 I want to thank you very much for the
15 invitation to be here. I want to pat on the back FAA
16 and COMSTAC for putting this event together, and I want
17 to thank my pal, Barry Plans, for inviting me or
18 working so hard here. I didn't notice his picture
19 painted on the wall yet. I hope they're working on
20 that, Barry, and you're certainly deserving.

21 We're living in pretty good times right now if
22 you like space, aren't we? Yeah, it really is. It

1 really is. And you know, from last year we had what,
2 90 orbital launches and this year we're on schedule for
3 180. I mean, that's like double in one year. That
4 seems lightyears from the 2000, when we had basically
5 given away all our launch business to foreign
6 companies.

7 And I remember in the 80's, where we had
8 virtually every bit of the commercial launch market,
9 but we kind of choked our golden goose a little bit.
10 We over-regulated. We indirectly taxed it, and it
11 really helped the French, for example, with their
12 Ariane, which is basically a copy of our Delta, and
13 even if they blew up every third launch, blew up every
14 third payload, it was still cheaper because their
15 government supported and subsidized the rocket
16 business, and we choked the heck out of ours. And so
17 what happened? They got so much of the business.

18 It says a lot that we've come this far on
19 building the relationships in most recent years between
20 FAA and NASA and the Air Force and the commercial
21 companies that we have now. I don't do Codels. I
22 don't do government trips. Went on one always wanted

1 to go to Israel, paid my own way to that, first person
2 ever did that. I just don't do the trips for a number
3 of reasons. But I make an exception for space.

4 So when they said how would you like to
5 Kourou? I mean, everybody wants to take a junket to
6 French Guiana. I mean, that's such a beautiful place;
7 right? And I go yeah, actually I'd do that, and I
8 wanted to see what the competition was really up to,
9 and I expected -- anybody here been to Kourou? Been to
10 the French Guiana, the European launch agency down
11 there? Okay.

12 Well, I was really shocked. I expected Circa
13 1960 Cape Canaveral. But did I get my eyes opened?
14 The launch facilities they have there are equal or in
15 some cases better than any we have in this country. I
16 mean, I was really shocked. I looked at their
17 satellite processing facility. I thought we had the
18 coolest place that there ever was. Actually, theirs is
19 a little bit more of a showplace than ours is.

20 They gave me free access. They said you can
21 go anywhere you want to but you can't take pictures in
22 the Russian thing and you can't take -- but they were

1 really hospitable and I think what I was most struck by
2 -- when you talk about being customer friendly, like
3 we've had at Kennedy before, we've had foreign
4 nationals that were paying a million dollars for a
5 launch. And in 90 days the Air Force couldn't clear
6 them. They were a security risk, so they couldn't come
7 on the property to watch the launch that they paid for,
8 like it might be some kind of security risk, like they
9 might blow up their own satellite or something, you
10 know.

11 And if they did get a pass and they were
12 blessed enough to get to watch their launch go up, they
13 stood in a dusty, nasty, old block house and waited for
14 the count, waited for the launch and, you know, on a
15 good day somebody might bring them a glass of water, if
16 it was, you know, was too hot or whatever.

17 Let me tell you how they do that thing in
18 Kourou. They have an elegant art deco style launch
19 control center. And I mean, all glass, probably equal
20 to a story or two here, outline in bright red paint,
21 you know, just really nice stuff. And it's surrounded
22 by stadium seats, not the kind you see down here at the

1 Washington Nationals stadium. These are the big Lazy
2 Boy ones like you see in the new theaters with the
3 drink holders in the side and the foot rests that go
4 out. And they've got several hundred of those seats
5 that surround their main viewing area in their launch
6 control center.

7 That's how they treat customers. And because
8 the French Foreign Legion has their jungle warfare
9 training camp about 30 minutes away, you wouldn't think
10 there's any more secure place in the whole world than
11 all the guys you see around there with those exotic
12 rifles and weapons and all kinds of fancy gear on. So
13 they really put the dog on for anybody, if you want to
14 go see that place. You know it's the most secure place
15 on the face of the Earth, more secure than Fort Knox,
16 it would seem, and it's customer friendly. They're
17 glad you're there and they treat you that way, and they
18 let you know it.

19 And so it was -- the answer to a lot of
20 questions that I had of how did we lose, how did we
21 parlay almost an entire hundred percent of the rocket
22 market in about five percent, and I think I saw it in

1 about, you know, a day and a half down there. It's
2 just a lot of how you treat people, how the government
3 works with the commercial sector.

4 So anyway, we still have a lot more work to do
5 obviously. One thing we have to do is continue
6 streamlining the loss and regulations, so that we keep
7 -- we can keep pace with the needs of our commercial
8 sector. That's one reason we've had a lot of increase
9 in activity and that's why it seemed more friendly, and
10 that's why we're gaining so much of it back, and we
11 need to keep doing that.

12 Some really good milestones, you know, recent
13 milestones, that give me a lot of hope in the future,
14 you know, this is -- I'm going into my tenth year here.
15 For the last seven years, the preceding seven years, we
16 did not have NASA funding authorized.

17 Now, the budget hawks up here, of which I'm
18 normally one, with this exception, say we shouldn't be
19 funding anything, not a penny to anything that's not
20 authorized. And I spent the last seven years shaking
21 in my dog-gone boots saying, oh, not this year, not
22 this year, not until we can get NASA authorized.

1 Well, NASA is authorized again. The President
2 signed the bill. There's really no good argument now
3 for not funding it and not funding it adequately.

4 Space Directive Policy 1, the President pushes
5 NASA and our commercial partners to extend their vision
6 and reach the outer limits of the Solar System. Been a
7 long time since we've heard any concrete directives or
8 concrete direction like that.

9 Vice President Pence reestablished an actual
10 Space Council. That's a big deal for -- that you
11 understand it. The general public doesn't understand
12 it, but that is a big deal. And earlier this year he
13 had just about the entire Cabinet down at Kennedy Space
14 Center for the first meeting.

15 Well, do you think everybody just needed to
16 take a hike? No, I think he felt that it was important
17 that besides just reading about space or thinking about
18 space or hearing rumors about space, that they get
19 onsite and look at this stuff firsthand and feel it,
20 touch it, understand what's going on. There's great
21 benefits to that. You know that. That's how you sell
22 space. You know, you don't sell steak, you sell the

1 sizzle and what we always tend to do is try and sell
2 steak, you know, and it's the sizzle that really sells
3 it and I appreciate the President taking the position
4 that we're going to do that, sell a little bit of
5 sizzle and get some people on site, let them get
6 enamored with it, let them get excited about space,
7 like the rest of us are, and it's going to help us go
8 where we need to go.

9 So, you know, working together, this is really
10 a wonderful time of opportunity, and if we continue to
11 work together, we will reach the frontiers in space
12 that we all want to go to.

13 Be glad to take a question or two, if I have
14 any time left, otherwise, thank you for your attention.
15 God bless you and God bless America.

16 MR. GOLD: We have some time for questions.

17 CONGRESSMAN POSEY: Michael, we got times for
18 a question? We've got a hand down here.

19 MR. GOLD: Yeah. Who do we have here? Go
20 ahead, Oscar.

21 MR. GARCIA: Congressman, Oscar Garcia from
22 Miami, Florida, just down the street from you. I've

1 been a strong supporter of spaceport vehicles for many,
2 many years, and even helped draft the (indiscernible)
3 back in 2013. Is this the year we're going to have
4 spaceport vehicle legislation to get flying on
5 spaceports?

6 CONGRESSMAN POSEY: Yeah, I think it's going
7 to be good. We keep a casual -- there's a lot of
8 turnover. We keep what we call a HAT list, House
9 Action Team list, and it's -- actually it's Texans
10 started it, but it's a roster of every member, and
11 beside them on the different votes, we get a green if
12 they've been with us, a red if they've been against us,
13 a yellow if they're new and they don't have a record
14 yet.

15 We're losing a lot of greens right now, so I
16 hope this next election cycle -- I mean, there's so
17 many people quitting and some are going to get
18 defeated, so it's going to be a major change for better
19 or for worse in November, so I hope that we're going to
20 get a lot of pro space people.

21 You know, in Florida, even in the legislature,
22 the State Legislature, people thought I was pro space

1 because it was parochial, because the Space Center was
2 in my district.

3 This is the honest to goodness truth. One
4 time we had a real quick meeting, a get-together about
5 budget, about Space Florida, funding Space Florida, and
6 another -- this is when I was a state representative.
7 And the former Mayor of Melbourne, who was also a state
8 representative, was off campus when we had the meeting,
9 so we couldn't get him (indiscernible).

10 And so the other side wanted to make an issue
11 of it, said well, here they're having this meeting and
12 they excluded this representative. Shame on them. So
13 they went to him to try and get a quote. Now, this is
14 a guy in Melbourne. This is a guy 20 miles from me.

15 And he said oh, I don't mind, that's a North
16 Brevard County issue. Now, that's in my own county,
17 it's a North Brevard County issue. And the way we
18 changed that is we did handouts that showed the
19 benefits of space, the employments to space, to every
20 county, not virtually every county but absolutely
21 positively ever county in our entire state, and we've
22 attempted to do that up here, how it affects everybody

1 in the legislature.

2 I mean, there's -- they spread this work
3 around so much to get these budgets passed that you
4 can't find a district without some space benefits to
5 it. And I could tell you some stories that would shock
6 you, some members' opinions of space or lack of
7 knowledge about space in high places, but I wouldn't
8 want to tell tales. Some day I'll write it in a book
9 or something, but I wouldn't want to embarrass anybody
10 now, but it's just really, really sad how poorly
11 informed the majority of my colleagues are on the
12 benefits of space.

13 They just -- you know, they don't realize the
14 importance to national security. They don't realize
15 the importance to our educational systems, stem, to our
16 technological innovation and our advancement, the
17 survival of our species. I used to mention that a lot
18 of times and my newspaper would always take cheap shots
19 at me, trying to scare people into liking space, you
20 know, when I talk about the survival of our species.

21 And it wasn't until about two years ago that
22 relatively tiny, undetectable asteroid hit a thousand

1 miles from the nearest home in the Soviet Union or in
2 Russia now, and injured 1200 people, over a thousand
3 miles away.

4 So they kind of got that a little bit, but
5 it's been forgotten. But it is important to the
6 survival of our species and just people don't like to
7 think about that. That's not a positive thing that
8 they'd like to dwell on, but it's a reality.

9 MR. GOLD: And I just want to acknowledge and
10 thank the Congressman. He's done a lot of efforts to
11 reach out to members who have not normally been in the
12 space process, and you've held those caucuses for staff
13 and members to educate them on the space issues.
14 They've been very helpful on Capitol Hill.

15 CONGRESSMAN POSEY: Yeah, thank you, Michael,
16 for mentioning that. Actually, you know, we've had
17 some really good fellows. In Congress you can have
18 fellowship programs and so we can get somebody from DOD
19 or CIA or -- and they work for me for a year, and
20 they're always bright guys. Matthew Stanley is with me
21 today. He's from CIA, and we get these talented people
22 for a year, because they want to see how our

1 dysfunctional Congress works, and we get to use them
2 for staff and they're usually pretty bright people and
3 pretty creative people, and so one gentleman we had
4 from DOD said, you know, so much of what happens up
5 here is staff driven. I said yeah, really too much of
6 it, you know.

7 I mean, if you ever look at when the members
8 go into the chamber to vote, they're all looking at
9 their blackberry saying what the hell's the office tell
10 me to do on this one here, you know.

11 So he said do you mind if springing for donuts
12 and coffee, we'll try to get a little staff group
13 together here? And to promote space. And so I said
14 shoot, go for it, so they came up with their own logo.
15 It's called Space Advocates. We have over a hundred
16 members of staff regularly attend. They have some
17 exciting programs that I'm only sorry that I'm not here
18 to attend a lot of them. They're just such great
19 programs, put on mostly by the commercial sector, smart
20 guys, and it's really worked out well. It's been
21 excellent.

22 MR. GOLD: We've actually got a former

1 Congressional fellow in, Paul Down (phonetic), who is
2 actually on the Committee now, so other questions from
3 the COMSTAC? Well, we've got one from the audience
4 looks like. Sir.

5 UNIDENTIFIED SPEAKER: Thank you very much.
6 I'm interested in the lessons learned from the Florida
7 experience to an international conversation. So we
8 heard about potential future space policy directives
9 speaking to the international dialogue and how the U.S.
10 would show leadership.

11 I'm wondering from your experience in Florida
12 how Florida showed leadership within the U.S., what did
13 you learn and how does that apply to showing
14 international leadership?

15 CONGRESSMAN POSEY: Well, you know, I don't
16 know that we've learned a whole lot really or we
17 wouldn't have taken so many steps backwards as we did
18 for the better part of a couple decades, but the
19 sparkplugs behind it are like the people in this room,
20 the people that are passionate about space, and it's
21 how you influence other people.

22 I mean, when I talk to groups, you know, and

1 by the way, internationally people outside this
2 country, just like they seem to appreciate freedom more
3 than the average American, they also seem to appreciate
4 space more than the average American. I mean, I've had
5 more foreign television people interview me since I've
6 been here about space, and I don't think I have any
7 regular American television people, because they want
8 to focus on differences and controversies, but foreign
9 people are excited about space, about the potential
10 about space, and impressed with what we've done as
11 we've stepped forward in space and moved forward.

12 And so, you know, it's great when we can have
13 international consortiums, and it's great especially if
14 we can ever get them to participate in paying for the
15 ride. You know, seems like most of the time we pay for
16 most of the ride, and we take along a lot of
17 hitchhikers. And I guess some of that is the cost of
18 doing business. A lot of that is the cost of goodwill.

19 You know, I know even in Cold War times, at
20 least our space people were talking to each other, and
21 that's not at all a bad thing. But I think right now
22 we're looking at the possibility of trying to put the

1 Space Station in private or international hands.
2 Interesting to see how that works out, very expensive
3 proposition. Not very many people in the world that
4 could afford to even dream about that, but you know,
5 I'm interested in seeing where it's going to go. It's
6 going to tell us a lot about the future.

7 I remember one time as we were struggling with
8 agencies at the space center, they said well, you know,
9 we can only have one launch every couple weeks because
10 we're having trouble tracking them. And I got
11 appropriations for a new tracking station. I got a new
12 control center, and what's the excuse now? Well, it's
13 always -- and so I thought, you know, I mentioned this
14 at one of the -- what do they call it, a space -- there
15 was a big fancy name for it about 12 years ago, they
16 started having Space Congress or something, they had a
17 couple of them down there --

18 UNIDENTIFIED SPEAKER: International
19 Astronautical?

20 CONGRESSMAN POSEY: Yeah. And I said well,
21 I'll tell you what, we wouldn't have the problem if we
22 privatized this place, you know, and we wouldn't. And

1 as we know, it's been the commercial companies that
2 have really paved a way, the innovation and the
3 technology, to allow that, and you know, our Cape right
4 now is looking at a hundred launches a year now, which
5 five years ago they said oh, that's impossible, we
6 could never stage and launch this many, but it's you
7 know moving forward as we really take an interest in
8 it, as we have the federal government look at space as
9 more than a profit center for the government.

10 Does that answer your question a little bit?

11 UNIDENTIFIED SPEAKER: Thank you.

12 CONGRESSMAN POSEY: Thank you.

13 MR. GOLD: Other questions?

14 CONGRESSMAN POSEY: All right. Thank you,
15 Michael, it's been fun. You all are great. Thank you.

16 MR. GOLD: A round of applause.

17 MS. REIMOLD: You're up next.

18 MR. GOLD: Up next? Okay. So now for the
19 actual work of the COMSTAC, where we're going -- this
20 is a different meeting. Normally we would have done
21 what are called observations, findings and
22 recommendations previously, and maybe just to set the

1 table a bit, particularly for new members of the
2 COMSTAC in terms of what the actual output normally is
3 of the committee. I just thought I'd go through that
4 for a little bit.

5 So our actual output, again, are what you call
6 OFR's, observation, finding and recommendation, and Di
7 or Tom or any one of the FAA, you want to correct me if
8 I get these wrong, but kind of three levels. One with
9 the observation. We're just stating an observation in
10 terms of what we think of something, and the AST and
11 Department of Transportation do not need to respond to
12 that. There's no response that comes from an
13 observation.

14 A finding is another level where we are
15 stating probably an opinion or a direction that we want
16 to go in, and the government then has the option to
17 respond to that. If we move to the highest level of a
18 recommendation, then it is mandatory for the government
19 to respond.

20 Now, the committee has gone back and forth a
21 little bit, where we were almost using observations and
22 findings to set up a recommendation. We then moved

1 away from that practice, where we were just going with
2 an observation, a finding or a recommendation, or a
3 combination, you know, of some, if we need it.

4 But again, you could just have a
5 recommendation alone. You could just have a finding
6 alone. Just trying to eliminate, I think, some of the
7 unnecessary backdrop and background information that we
8 had had previously.

9 These OFR's are relatively succinct. We're
10 usually talking about two sentences, three sentences.
11 Certainly, no more than a paragraph. The OFR's are
12 developed within the working groups prior to the
13 COMSTAC meeting. We then try and disseminate those
14 proposed OFR's that came through the working groups,
15 usually at least a couple weeks in advance of the
16 meeting, so that people have a chance to review. And
17 then the working groups will brief out to the COMSTAC
18 what they wanted to do with OFR's. We'll have a
19 debate. That's usually where people advocated for one
20 thing in the working group and then they completely
21 flip when it comes to the COMSTAC, so that's always an
22 interesting discussion.

1 And then the COMSTAC will eventually vote on
2 those OFR's. The OFR's that are adopted by the COMSTAC
3 are then put in a letter that I would then send to
4 Kelvin, and then Kelvin and the AST would respond to
5 those OFR's that they either choose to respond to or
6 were required to respond to via a recommendation.

7 Do people have any questions about that
8 process, particularly some of the new members? Okay.
9 Hearing none, this is a different meeting. Again,
10 we're starting over from a clean slate, so we didn't go
11 in and do that OFR process in advance. We were just
12 getting the working groups together, the working group
13 leadership.

14 What we wanted to do at this meeting was to
15 set the table, and I think address a challenge that we
16 had at the COMSTAC that I think even the members were
17 frustrated that, you know, a lot of times it would be a
18 bit of a one-way conversation, where the COMSTAC was
19 saying what we were concerned about, we develop OFR's
20 that would go over the transom to the FAA AST.

21 What we're excited about and again, not that
22 we didn't have at least some of this previously, but I

1 think we're going to get a lot more, is the FAA AST
2 telling us what their concerns are, again using the
3 FACA for the advice, and I think we can have a good
4 combination of both addressing what the FAA AST wants
5 from us, while also raising concerns or awareness over
6 issues that industry had that the FAA AST or DOT was
7 not looking at previously.

8 So we're looking forward to a good synthesis
9 of that, a little bit of both, and what we'd like to do
10 first today is look at what we're terming the taskers
11 from the AST, assign them to a working group. This is
12 an actual deliverable that would come from the COMSTAC,
13 have an understanding regarding timing and then we'll
14 have a conversation about what issues haven't been
15 covered via the taskers that membership would like to
16 see the COMSTAC address.

17 So any questions about that process? That
18 being said then, let's try and move to the first
19 tasker, if we could. Whoever is running the computer?
20 Is Tom there? So if this is indeed our first tasker?
21 No. Okay, here we go. No. Okay, well, good, this is
22 one I can handle. This is my favorite topic. Outer

1 Space Treaty Compliance. Yeah. Okay.

2 How can the United States best meet its
3 Article 6 Outer Space Treaty Obligations as it
4 regulates the commercial space transportation industry?
5 What does implementing continuing supervision mean to
6 the industry? How will Article 6 compliance work in
7 practice?

8 So again, we've actually had a little bit of
9 conversation about this topic already. I think it's a
10 very important one that again we can't fine tune a
11 machine that doesn't exist yet. And it's very
12 important we get this issue resolved and I think it's
13 very important that we get it resolved in a fashion
14 that creates transparency, predictability and
15 encourages investment, because if there's one thing
16 that investors, insurers, Chris, don't want, it's
17 uncertainty.

18 And I will say too as we talk about non-
19 traditional commercial space activities that fall into
20 this Article 6 gap, these are not science fiction or
21 theoretical activities. As you've heard today, we have
22 a number of satellite servicing programs that are

1 moving forward already, Jim's company, as well as my
2 own. We have lunar rovers that are in creation and
3 moving forward, and will likely be launched soon. We
4 have had hearings on private sector habitats and
5 private sector space stations. You've heard that from
6 a number of the speakers today.

7 Yet when we have investors or even insurers
8 and they ask what's the regulator scheme for these non-
9 traditional space activities? I have to say I don't
10 know. I don't know. That we've had AST adopted ad hoc
11 solution, where they've been able to serve as an
12 approval mechanism, via the payload review process, but
13 even in the case of Moon Express, I think it was
14 explicitly said that we gave this approval this time,
15 we don't even know that we can give the same approval
16 to you again, much less a different company or a
17 different activity.

18 As you heard Administrator Bridenstine talk
19 about, there are certainly some differing ideas about
20 how we go about doing this, what would be best what
21 would be most efficient for industry, and let me say,
22 regardless of which side of the issue people are on, I

1 think we can all echo Administrator Bridenstine's
2 sentiment that we need to do something.

3 So this is the issue. I think it fits nicely
4 into the International Competitiveness Committee, if
5 I'm getting the name wrong -- get close, because this
6 is an issue of international competition, that when we
7 look at, again, what is the situation in the U.S. and
8 we look overseas, you have countries like Luxemburg,
9 United Arab Emirates, others who are hungry to get into
10 the space world and move forward.

11 And when I asked the question what's your
12 regulatory scheme, they can provide me with one piece
13 of paper that explains it. Simple, predictable. In
14 the U.S., again, we're at unknown. So I would really
15 like that committee, working group, to take that on,
16 and our leaders of that working group, if we could
17 introduce ourselves maybe quickly there, we've got Jim
18 Armor serving as Chair of the working group, and
19 Richard Dalbello, and I think no two better people to
20 help resolve this challenging issue. And again, I
21 think they represent also between the two of them and
22 their companies, a good broad swaff of both large,

1 small, et cetera, so does anyone have any questions or
2 discussion about this, the working group that is being
3 assigned to, et cetera?

4 So let's talk about timeframes. Chris asked a
5 question about time. I mean, Di, I don't know if you
6 want to comment, but I mean, I think what I would like
7 to see is that we're looking at our COMSTAC meeting
8 most likely in October; correct? Yeah, October.

9 So, you know, that gives us June, July,
10 August, et cetera. You know, each working group is
11 different. You're going to have a different amount of
12 work, you know, different issues, so I'd leave it to
13 leadership to ultimately figure things out, but I think
14 it would be really good to see in at least this first
15 month that you would have an output, have a meeting,
16 that there would be discussion, and if not resolution,
17 that you'd be able to come back to us with where the
18 working group is at and what you see as the path
19 forward, and if possible draft OFR's at that time.

20 You know, we've had a lot of discussion, you
21 know, between us relative to the frequency of the
22 working group meetings, et cetera, and I think once a

1 month would at least, you know, be what we'd like to
2 see from the working groups moving forward. And I
3 think we would also put this in terms of these are
4 preparatory activities, again. You know, you wouldn't
5 be taking any votes on the OFR's, because that would
6 require, again, via the FACA, actual federal
7 notification, you know, there would have to be
8 participation with the public, et cetera.

9 So we would be looking to the working groups
10 to tee up the potential OFR's there, and I think we'd
11 like to do it in a month, unless the leadership of the
12 working group has any objections.

13 MR. ARMOR: No real objections. You'll get
14 the quality of work that you have allotted the time
15 for. And I would respectfully request that we be able
16 to work with the legal and regulatory working group, as
17 well.

18 MR. GOLD: Yeah, absolutely. I think there's
19 going to be a number of issues here where there's
20 crossover between the working groups. And I know
21 previously in the COMSTAC, I think many of us just
22 interacted with all the working groups because of that,

1 and it was so difficult to separate out.

2 So even though you're on one working group,
3 you know, I don't think there's anything preventing --
4 as a matter of fact, I would encourage COMSTAC members
5 to participate and continue to be aware of what's
6 occurring on the other working groups, particularly on
7 issues where there's crosscutting concerns.

8 MS. REIMOLD: Thank you, Mike. So a couple of
9 comments. And Tom, could you take us back to the slide
10 with the five kind of key work areas? So Mike, thank
11 you. I appreciate the overview and you're quite right,
12 you know, in terms of process.

13 I think it's also worth noting, so we've done
14 a very high-level overview of these topics and kind of
15 what it's about, and we've done a preliminary
16 assignment to a working group. We have a safety
17 working group, an infrastructure working group, legal
18 working group and an innovation working group. So
19 there's logic to this.

20 I think what Mike was just describing, you
21 know, in terms of laying out, you know, the details of
22 what's carried under each of these topics, and then the

1 outputs of that, I would suggest we're using the
2 advantage of this public meeting to socialize these
3 keys areas publicly, to make sure it's all very
4 transparent, to get the buy-in from the COMSTAC
5 membership that this, you know, certainly is the right
6 set of activities, and I would suggest that, you know,
7 in the timeframe of the month, Jim, that Mike was
8 outlining, notionally, what we've thought about as the
9 steering group is to have an administrative kind of a
10 call with the working group chairs and the steering
11 group periodically, how goes it?

12 And I think they can inform us a little bit
13 more on timelines, you know, once we have a little time
14 to absorb these items, because the other piece of it,
15 and we were a little bit sensitive about the amount of
16 time and again, owing to the schedules of some of our
17 speakers, how we could approach this hierarchy.

18 These five topics represent some of the kind
19 of most important areas to us right now in the FAA that
20 we need some thoughtful input on. We also laid out a
21 number of areas for the next trunch, and I'll read them
22 to you because we don't have slides, but to make sure

1 everyone is aware of what we as a COMSTAC are thinking,
2 you know, we think the next trunch of activities will
3 involve changes to MPL, conceptual vehicles for site
4 license applications, potentially an updated definition
5 of the encouraged facilitate and promote mandate, and
6 you know we've heard it alluded to, you know, what we
7 think about like a really effective industry engagement
8 in international outreach, and that was born out of the
9 fact that internally we spend a lot of time talking
10 with international organizations, space agencies, civil
11 aviation authorities and other entities, because
12 they're very anxious to learn how the FAA conducts its
13 licensing process, what the regulatory framework looks
14 like, how we do the kind of site management, if you
15 will on spaceports, so it's a big area of interest and
16 we're in a number of conversations to secure some long-
17 term bilateral agreements that will enable us to work
18 with these entities.

19 But it also strikes us that a lot of what
20 we're doing is being good global citizens, but more
21 importantly we're doing a lot of our outreach to
22 support the U.S. industry. And so what we think is we

1 need to get tied in closer, because we know that the
2 industry is very active internationally. We're active
3 internationally. Ideally, we should be aligned and
4 have a thoughtful idea about who is going to talk to
5 whom first, and so that's kind of the thinking on that,
6 again, in this next trunch of activities.

7 And then we took a look kind of at a third
8 level and certainly a lot of discussions internally
9 about changes to Part 420 and the operational launch
10 site and Stewart alluded a little bit to some of the
11 dynamics that we're talking about.

12 You know, research and development -- Robby,
13 where did you go? So, you know, I think R&D is an area
14 that we need some more COMSTAC engagement in in terms
15 of what's important to the industry, what's important
16 to the government, and get a better meeting of the
17 minds on that.

18 MR. DALBELLO: Di?

19 MS. REIMOLD: yes.

20 MR. DALBELLO: I've got a question on -- I
21 think it would be useful for the COMSTAC as a whole, if
22 not -- definitely the committee on innovation, but

1 hopefully the COMSTAC as a whole to get some insight
2 into the work that's already being funded on airspace
3 integration, the whole issue of how better to do the
4 activity, space launch activities in the airspace. I
5 know that you had some work a number of years ago
6 ongoing at the Tech Center.

7 MS. REIMOLD: Mm-hmm.

8 MR. DALBELLO: And it would be great to get a
9 briefing on the work that's ongoing and the objectives
10 of that work.

11 MS. REIMOLD: Yeah. I think, Rich, that's a
12 really great point and actually, you know, it's
13 unfortunate because I think Dan could have been up here
14 all day talking, not only about the acceptable level of
15 risk, because it is -- it's a pretty neat topic, but,
16 you know, Dan mentioned and Rich, this just comes back
17 to your point, that ARL is intended as an interim
18 measure, you know. The reality is is that we're moving
19 very aggressively to implement some new technologies
20 and procedures and we've alluded to that a couple of
21 times.

22 I think, Rich, you may have seen the initial

1 early demonstrations of the Space Data Integrator and
2 then what we're calling the ATRAM environment, this is
3 FAA acronyms at its best, so but absolutely. I think
4 we will take that as a very near-term action item, to
5 set up an opportunity to really spend some time on that
6 topic.

7 MR. DALBELLO: And if you think it would be
8 useful to try to have the subcommittee travel, maybe to
9 go up and actually see it on site?

10 MS. REIMOLD: Sure.

11 MR. DALBELLO: So I'd be willing to consider
12 doing that and see who's available to --

13 MS. REIMOLD: Yeah, and I think we're going to
14 as a COMSTAC maybe take Duane up on his offer. The
15 Command Center is also a phenomenal opportunity to kind
16 of watch it in very real time what is happening, so
17 yeah, sure, we can figure all that out.

18 MR. GOLD: After Congressman Posey, we need to
19 go to Kourou, as well, our next trip.

20 MS. REIMOLD: So anyway, so just to kind of
21 recap that, I've laid several things out and we have
22 additional information we're going to be providing to

1 the COMSTAC members, kind of we wanted to make sure
2 that during this public meeting there was no like what
3 are you thinking, why would you go down that path, and
4 I think we are on the right track, just judging by the
5 quality of the questions and some of the input, so
6 we'll get some additional information out on all of
7 these areas for the COMSTAC membership, but I think the
8 reality is -- is once we can get these topics grouped
9 and we've done that, but make sure everyone is onboard
10 and engaged, and then these working groups can do a
11 better definition of the outputs and then timely, if
12 you agree.

13 MR. GOLD: And again, I think there was some
14 good fine tuning of the working groups, as well.
15 Again, when we talk about these regulatory issues, it's
16 an international competitiveness question, and I think
17 it's great. Rich, you bring up a point, learning from
18 what our competitors did. You know, Congressman Posey
19 talked about Kourou, you know, I was on a lot of launch
20 campaigns in Russia, in Siberia, missing Siberia now,
21 but there, brand new facilities. We had an assembly,
22 integration and test building attached to the hotel

1 where we would literally roll out of bed and be able to
2 work on our spacecraft. And the regulatory authority
3 was also at the launch base, that they had the people
4 ready to approve there.

5 And I know AST already has a presence at
6 Kennedy, but I think transitioning some of that
7 approval authority, even so the launch base would be
8 close to the customer, that would be a very interesting
9 idea, so --

10 Do we have the next tasker that we can bring
11 up on the screen to discuss? Oh, that's all of them,
12 okay.

13 So our Space Treaty, let's go through and just
14 make sure we assign -- let's start at the top.
15 Necessary facilities covered by a site operator's
16 license. This would be Infrastructure Committee, and
17 just to introduce our leadership there, Janet
18 unfortunately is not here. Janet Curica (phonetic).
19 She's in Hungary. Hello, Janet. She's watching. But
20 we do have the Vice Chair, Dale Nash, and Dale, I
21 didn't know if you wanted to say a quick word about
22 that particular task or any questions you might have?

1 MR. NASH: It certainly makes sense to go in
2 the Infrastructure Committee and I look forward to
3 Janet's leadership here, either from abroad or at hand
4 here, so look forward to it. Thanks.

5 MR. GOLD: Thank you, Dale, and thank you for
6 accepting the position. I know the working group is a
7 thankless job, so we really appreciate everyone taking
8 the time. It's important for the input.

9 Going to the next, Reporting Safety Related
10 Anomalies, the talented Oscar Garcia, our continuing
11 returning champion for safety. Again, always a thorny
12 issue, and we really appreciate Oscar's expertise and
13 willing to take these topics on, so Oscar, if you
14 wanted to comment, if you're up for it, and any other
15 comments or input relative to Number 2?

16 MR. GARCIA: Thanks, Mike. Thank you for
17 doing it again another two years. Thanks.

18 Yeah, a lot of good things have happened in
19 the last 18 months. I think our community has shown a
20 safety culture and the ability to self regulate and to
21 self promote safety via consensus standards, a
22 voluntary industry consensus standards. In the last

1 year the commercial space like committee, M47, hosted
2 by ASTM, been very active introducing consensus
3 standards. So we intended the safety group to carry on
4 that task.

5 And in that activity, I'd like to applaud them
6 and thank AST for having been not only an observer but
7 an active participant in ensuring that the safety
8 culture we are showing is appreciated, supported and
9 participated. Thank you to AST.

10 A thorny issue remains and as Mike L.A. was
11 mentioning earlier, this is an ultra-competitive small
12 industry. The misuse of intellectual property, trade
13 secrets and secrets -- could interfere with the logical
14 need to share clues and events that are taking place,
15 as we test -- fly -- repeat the cycle.

16 So I think going forward, I'd like to support
17 this task and perhaps a first step could be for the
18 group and the community to kind of find a consensus on
19 to what are the cost and benefits and what are the
20 accepted practices to share clues, events, not only
21 accidents and incidents, but other clues that once
22 identified could give others tools, could give others

1 hints, to do things better. What's the cost benefit of
2 losing a little bit of IP versus having an accident?

3 Perhaps we can start a dialogue amongst
4 ourselves into what is a fair balance or a fair
5 tradeoff of safety versus commercial interests.

6 If we do so, as we have been treating
7 voluntary consensus standards, we might emerge with at
8 least some definitions of what constitutes an event,
9 and then we can move on to some guidance into what of
10 those events can be reported. I think based on
11 previous experience for the next six months, that could
12 be a good task to take and try to face that thorny
13 issue of competitiveness versus safety and emerge with
14 some consensus.

15 So that's my view, and I think I have an
16 excellent wingman on this task group, Steve Lindsey.
17 My ex-wingman, Livingston Holder, is not in the group,
18 but he will be in the group.

19 But those are my views so far and I think we
20 are carrying a lot of momentum on what we did with the
21 consensus standard, so I think we can apply that to the
22 reportable incidents, which I think is fundamental,

1 especially when we are starting to fly people, Blue
2 Origin, Virgin, Galactic, within the next 12, 18
3 months. I think a human spaceflight safety has not
4 lost the focus of the industry. Maybe it's not visible
5 at COMSTAC, because we haven't had COMSTAC, but we need
6 to pursue.

7 MR. GOLD: Really appreciate that, Oscar, and
8 again, to the extent the safety group can try and
9 interface with DARPA CONFERS, with NASA's international
10 standards effort, you know, I think it would be
11 wonderful to integrate that as we try and move forward.
12 And even with some of the trade associations, CSF, you
13 know, for example, have been very active there, as Eric
14 knows. And again, we're so happy and pleased and
15 appreciative of Steve Lindsey taking that duty on as
16 Vice Chair.

17 And we talk about the international forums and
18 International Space Station. When you go to the United
19 Nations in Vienna and you walk in, the very first thing
20 is you see a model of the long launch, the very first
21 thing you see. And China, as you may have read, is
22 already very proactive in reaching out and offering

1 U.N. members payloads on their space station, and I
2 really want to complement Sierra Nevada Corporation for
3 being proactive in the international environment,
4 helping put America back into the conversation by
5 offering payloads to U.N. members via S&C Dream
6 Chasers, so any comments? And thank you, Steve.

7 MR. LINDSEY: Well, Oscar did a really good
8 job summarizing this particular issue and what to do
9 about it. You know, having been a pilot myself and a
10 beneficiary of these anonymous safety systems, I know
11 how valuable they are and the lessons learned you can
12 get from preventing future accidents.

13 But I'm also part of that really, really small
14 competitive group that's trying to put a spacecraft in
15 orbit here within the next couple of years. And so I'm
16 really sensitive about that part, with my other side of
17 the job, so it's going to be -- I basically feel really
18 strongly both ways, I guess, is the best way to say it,
19 but I'm looking forward to the dialogue, trying to
20 figure out a way we could somehow preserve this small
21 competitive community and make sure that we can
22 continue to do what we need to do, but also, you know,

1 incorporate some of the safety that we learned --
2 particularly out of the aviation community back and
3 into the space community as we start flying more and
4 more people in the future. So thank you for the
5 opportunity.

6 MR. GOLD: No. Again, we're grateful. We
7 appreciate it and I think it's also important to
8 acknowledge that with Steve we've now doubled the
9 number of former astronauts on the COMSTAC, so thanks,
10 Steve. And Oscar, if you wouldn't mind, maybe just
11 saying a very quick word about ICAO and your engagement
12 there. I know you've been heavily involved in how you
13 see that factoring into the safety working group.

14 MR. GARCIA: Yeah. ICAO, International Civil
15 Aviation Organization, is the U.N. body that regulates
16 -- or not regulates but oversight safety of air
17 commerce, and because every time we launch or re-enter,
18 we go through the air commerce part of the airspace.
19 We are very interested in how that's going to affect
20 air commerce, air transportation operations.

21 This learning group is focused on some
22 (indiscernible) operations, which are predicted high

1 volume, for profit passenger or cargo delivery
2 operations in the future.

3 So the learning group brings in civil aviation
4 authorities from the rest of the world and I say that
5 with a point. AST is a unique agency globally. The
6 FAA is the only civil aviation authority in the world
7 that has a commercial space office. So when we
8 interact with the rest of the world at ICAO, we have
9 civil aviation authority which is not necessarily
10 understand or have the expertise of space
11 transportation, so the learning group is meaning to
12 inform and chair best practices standards and different
13 ways we do things in the U.S. to other civil aviation
14 authorities worldwide and the leadership of the -- for
15 the last couple of years, we've been able to project
16 and help proliferate some of the safety elements and
17 other practices we do here, and I have to say that the
18 response and the results have been very interesting as
19 we discuss with the rest of the world.

20 MR. GOLD: Great. I believe Senator Cruz is
21 here, so we'll be cutting off this portion and we can
22 revisit. Let me just say one last word relative to the

1 working groups and leadership. Again, we'd look for in
2 a month in terms of an update, where you're at, where
3 we're headed, questions, concerns, et cetera. And then
4 as you do your internal planning, you know, we want
5 those OFR's to be baked and ready to go a month before
6 the next meeting, so just if you can plan for the
7 meeting in October, we'll try and get you a date, so
8 that would mean that in September we'd like to have the
9 OFR's ready to go, so if we could all work towards that
10 schedule?

11 And do I see Senator Cruz here? All right.
12 We'll wait for him to come out and just continue as far
13 as we can until the Senator arrives. So let's move to
14 the next topic, the streamlining of internal AST
15 processes.

16 This is something that -- like legal and
17 regulatory, to be the group as a handle. Again, we
18 have the returning champion with Chris Kunstadter, who
19 is a rock in the insurance world, serving as Chair, so
20 Chris give us your thoughts there.

21 MR. KUNSTADTER: Thanks, Mike. And it's a
22 pleasure to be able to help FAA with this issue of

1 automating licensing and inspection. This fits very
2 well with the whole streamlining process that has been
3 a key part of these policy directives, Space Policy
4 Directives.

5 So we'll certainly solicit input from the
6 aviation committee, because they have certainly much
7 larger unit counts of vehicles that they have to
8 license and inspect, so that will be a natural starting
9 point for us.

10 MR. GOLD: And maybe just a quick word from
11 your Vice Chair. We've got some new blood here with
12 Brigham. Brigham, if you'd like to say hello to the
13 group? Oh, now he's here. All right. Brigham, hold
14 that thought and we'll come right back to you after
15 this.

16 So it's my pleasure to introduce a fellow
17 attorney serving as the United States Senator from
18 Texas since 2013. He grew up devouring science fiction
19 novels from Robert Heinlein and Isaac Asimov. Both of
20 his parents were mathematicians and his mother worked
21 for the Smithsonian, helping compute orbits for
22 Sputnik.

1 As Chairman of the Space Science and
2 Competitiveness Subcommittee, he has authored recent
3 legislation on commercial space to provide funding and
4 a long-term vision for NASA.

5 Senator Cruz has chaired the Science and Space
6 Subcommittee, which passed two major pieces of
7 legislation, both of which were authored by Senator
8 Cruz, concerning space.

9 In 2015 he worked closely with his Democratic
10 colleagues, including Senator Nelson, and House Members
11 to build consensus on the Commercial Space Launch
12 Competitiveness Act, and in 2017 he worked closely with
13 the Senators again to pass the NASA Reauthorization
14 Bill, unanimously, which occurs not often enough, and
15 we appreciate again the bipartisanship and leadership
16 that Senator Cruz has shown.

17 It's been my personal pleasure to testify
18 twice before Senator Cruz' committee, and I was always
19 impressed by not just what he had to say but how much
20 he listened to what industry was saying, to what his
21 experts were telling him, and that he integrated and re
22 acted to that.

1 I know Senator Cruz is known for his
2 eloquence, but it's his listening skills that I have
3 always been most impressed by. I've also been very
4 impressed as a Star Trek fan, that he's a big fan of
5 original series Star Trek, as am I, and Senator Cruz, I
6 want you to know that the commercial space industry is
7 a fan of yours, so let's have a wonderful welcome for
8 Senator Ted Cruz.

9 SENATOR CRUZ: Well, thank you, Mike, for that
10 very, very kind introduction. I appreciate the kind
11 sentiments. Although I will say, as I'm here having
12 the privilege of addressing a room of innovators, of
13 entrepreneurs, of pioneers, you truly know how to damn
14 someone with faint praise, when you introduced me as a
15 fellow attorney. You know, I'm reminded of it. It has
16 actually not been widely reported, but it's a new
17 phenomenon that in a number of test laboratories across
18 the country, they have begun using lawyers instead of
19 rats. And actually, there are two reasons behind that.

20 Number one, the scientists, they were growing
21 too attached to the rats. And number two, there are
22 some things even rats won't do.

1 I will say secondly, you outed me as a fan of
2 science fiction and Star Trek and Star Wars. I will
3 tell you something that may age a lot of us. I was in
4 the office a while back and was cutting back and I
5 walked over to the mouse on a computer and I picked it
6 up and I said, "Computer." And then I looked down and
7 said, "Oh, keyboard, how quaint." And not a single
8 staffer in my office had any idea what I was talking
9 about. They are all too young to remember Star Trek 4,
10 and I'm just looking at them going but go get an
11 education.

12 So it is wonderful to be here with you. It is
13 a privilege to have a chance just to encourage you, to
14 encourage you for everything you're doing concerning
15 commercial space, to encourage you for opening up new
16 frontiers.

17 You know, in 1890 the Superintendent of the
18 Census declared the end of the American Frontier by
19 stating, "Up to and including 1880 the country had a
20 frontier of settlement, but at present the unsettled
21 area has been so broke into by isolated bodies of
22 settlement that there can hardly be said to be a

1 frontier line. In the discussion of its extent, it's
2 westward movement, et cetera, it cannot, therefore, any
3 long have a place in the Census reports."

4 The American vision of westward expansion that
5 had been initiated 86 years earlier through the Lewis
6 and Clark Expedition, had been successful in leading
7 the expansion of American commerce and settlement in a
8 new territory that had not previously been charted by
9 American pioneers.

10 Last year in chairing the Senate Subcommittee
11 on Space Science and Competitiveness, we embarked on a
12 series of hearings looking at reopening the American
13 Frontier but this time not looking west, but looking
14 upwards to the heavens, which President Kennedy rightly
15 referred to as the New Frontier. And it's only fitting
16 that a nation born on the Last Frontier should continue
17 to lead the way on the New Frontier.

18 It is my firmly held belief that the United
19 States must continue to expand commerce and ultimately
20 settlement into space and we need to do it first. This
21 is an issue that not only impacts our global
22 competitiveness but our national security.

1 Just consider the growing interest in
2 investment that is taking place within the global space
3 economy. According to a January 2017 report issued by
4 the Niskanen Center, the global space economy amounted
5 to \$323 billion in 2015. That's a lot of money. It's
6 more than some people early in a whole year.

7 Commercial infrastructure and systems
8 accounted for 76 percent of that total. And global
9 space launch was responsible for \$6 billion.

10 The last report by the FAA in 2009 estimated
11 that commercial space transportation and enabled
12 industries generated 208.3 billion in economic
13 activity.

14 However, while the United States has the
15 potential to grow a vibrant and competitive commercial
16 space industry and to continue growing that industry,
17 there is always the real possibility that regulations
18 and outdated policies may stifle innovation, restrict
19 investment and drive the American launch sector and
20 non-traditional space activities to foreign countries
21 abroad.

22 For example, there needs to be a streamlined

1 regulatory process, from expendable rockets to reusable
2 rockets. Current Air Force licensing requirements for
3 expendables match those of the FAA's Office of
4 Commercial Space Transportation, almost word for word.

5 By contrast, Air Force and AST licensing
6 requirement for reusable rockets are completely
7 different from each other. This not only forces
8 companies to have to comply with separate certification
9 regimes that can be equally onerous, but it ultimately
10 penalizes innovative companies by creating excessive
11 barriers to launching in the United States.

12 We have also heard of the need for more
13 efficient and streamlined processes for how we manage
14 our national airspace. While traditional aircraft have
15 been the primary users of our national airspace for
16 decades, there is a growing need for a seamless
17 integration of commercial space assets into our
18 national airspace, so the United States can keep pace
19 as the launch cadence increases.

20 Another example of concern is NOAH's
21 management of commercial remote sensing. NOAH is
22 current required by law to review commercial

1 stipulation imagery applications and to make
2 determinations within 120 days of receipt of the
3 application. U.S. commercial satellite imagery
4 providers, however, have reported to Congress that some
5 companies have waited nearly three years for license
6 approval to sell data from their satellite.

7 Economist Milton Friedman once put it this
8 way. If you put the federal government in charge of
9 the Sahara Dessert, in five years you'd have a shortage
10 of sand.

11 If Congress and the Trump Administration do
12 not continue to work aggressively to reduce, to
13 eliminate, to streamline regulations, to fix processes
14 in our government that are clearly broken, then we
15 could one day wake up to see a shortage of commercial
16 space companies instead of the vibrant industry that
17 all of us are committed to.

18 Recognizing the dynamic and innovative
19 commercial space industry that has been growing in the
20 United States, I made it a priority as my first act as
21 Chairman of the Subcommittee, to work hand in hand with
22 Senator Bill Nelson in drafting the bi-partisan

1 Commercial Space Launch Competitiveness Act of 2015,
2 which was ultimately signed into law by President
3 Obama.

4 One of the key components of this legislation
5 was extending the regulatory learning period to 2023.
6 The regulatory learning period was initially enacted in
7 2004, and its extension prevents the FAA from
8 implementing new commercial space regulations that
9 could stifle innovation. This extension has been
10 crucial to allowing companies to innovate and
11 experiment with ways to operate more safely than if
12 they were forced to adhere to the strict requirements
13 of a uniform federal regulatory regime.

14 So where do we go from here? Well, we've made
15 great progress in growing a commercial space industry,
16 through our last commercial space bill. We know
17 there's still work to be done.

18 One of the biggest questions facing Congress
19 is who in the federal government should manage all non-
20 traditional space activity moving forward. There's a
21 great debate that is raging between the Department of
22 Transportation and the Department of Commerce, and who

1 should have the lead and principal role.

2 And at this point I would say I think there
3 are good and serious arguments that can be made on both
4 sides. As Chairman of the Subcommittee, I've been
5 listening to arguments. One of the very kind remarks
6 you made is the virtue of listening. Listen, each of
7 you do this for a living, are experts in space. And
8 I'd be a fool not to learn and continue to learn from
9 your continued expertise and judgment.

10 My office has been working on legislation with
11 Senators Nelson and Markey and Thune, and we're
12 exploring this question, and so I would say many of you
13 known Sean McLean, my staffer who covers these issues -
14 - Sean, wave for anyone who doesn't know you. We
15 welcome your input on the question of what is the right
16 place? We want to streamline the regulatory process.
17 Both Commerce and Transportation have important roles.
18 What is your collective assessment, if we're
19 streamlining and centralizing, where is the better
20 place to do it, to unleash commercial space?

21 Some of the players have picked an answer on
22 one side. Other players have picked an answer on the

1 other side. For my part I want to continue to receive
2 input and guidance from industry from the stakeholders
3 to make it a determination what would make the biggest
4 difference, removing barriers and encouraging the
5 maximum investment in commercial space and exploration?

6 I will note though, regardless of the
7 resolution of that question, one thing I think that is
8 absolutely clear is that the ISS remains a vital
9 component of our national space program.

10 In addition to working on new commercial space
11 legislation, I am also working and looking to introduce
12 a multi-year NASA re-authorization, ideally in this
13 Congress. In 2017, as you know, we passed the NASA
14 Authorization Act, the first authorization of NASA in
15 seven years.

16 Like the Commercial Space Launch
17 Competitiveness Act, that Act earned bi-partisan
18 support from Democrats, from Republicans. It earned
19 the support of all of the various states and parochial
20 interests in Congress. For whatever reason, and I had
21 trouble understanding it, there are states other than
22 Texas that think they have equities when it comes to

1 space. And we managed to navigate those divisions
2 between the various states, between the various
3 parties, even bigger between the Senate and the House,
4 and to get them together on a NASA authorization bill
5 that Donald Trump signed into law.

6 My hope now -- that was a one-year
7 authorization -- is to work and to be moved forward on
8 a multi-year authorization that can be bigger and
9 bolder, that the intent of that one is to maintain the
10 bi-partisan commitment of Congress to American
11 leadership in space, and in particular, among other
12 things, to have what is now a unanimous commitment from
13 both house of Congress, that we are going to Mars and
14 American will lead the way.

15 But for the next step, NASA authorization,
16 we're moving forward, and I will say I want to
17 underscore my commitment to the International Space
18 Station. As you know, there are a handful of voices
19 that have suggested zeroing out federal support for the
20 ISS in 2025. I think that proposal was ill-advised. I
21 think that proposal was contrary to federal law. The
22 very terms of the NASA authorization directed NASA to

1 study the technical feasibility of continuing the ISS
2 at least into 2028, if not later.

3 Now, I don't have the math chops of many of
4 the people in this room, but last I checked 2025 is a
5 lot sooner than 2028. And I recently held a series of
6 hearings examining the future of ISS, listening to the
7 stakeholders, listening to the technical experts, and
8 every witness that testified before our Committee made
9 clear that that station can last easily to 2025, easily
10 to 2028 and most of the experts think 2030 or beyond
11 are well within the scientific and technical
12 feasibility.

13 We've invested over \$100 billion in the ISS.
14 I think it would be the height of foolishness to
15 disregard that investment, particularly before there is
16 a reliable replacement in place.

17 China intends to have an operating space
18 station in low Earth orbit by 2022. We've seen from
19 constellations of the shuttle the disaster that happens
20 when America cancels one program without a reliable
21 replacement in the wings. We end up acting as
22 hitchhikers, needing a ride on Russian rockets because

1 we lack the capability to get to low Earth orbit.

2 That foolishness which we've seen from both
3 Democrats and Republicans -- it hasn't been a partisan
4 myopia -- that foolish should not be repeated with the
5 ISS. If we were to end up in a scenario where 2025 we
6 de-orbited Station and the lone low Earth orbit station
7 was a Chinese station, it is difficult to think of
8 something more damaging to America's leadership in
9 space than literally ceding it to the Chinese. And I
10 want to make clear to everyone here, as long as I am
11 Chairman of the Space Subcommittee and as long as
12 Article 1 of the Constitution provides that
13 appropriations will come from the Legislative Branch,
14 there will continue to be strong and resolute bi-
15 partisan support for the International Space Station.

16 Let me make one final point. This is a time
17 of partisan division. Our country is polarized right
18 now. Sharp and angry, it seems on most issues across
19 the board, there's not a lot of common ground. Both
20 parties digging in, firing bazookas at each other, for
21 many of us it's painful to watch.

22 I continue to believe as Americans there's

1 much more that unites us than divides us. Yes, we will
2 have differences on policy issues. Yes, we may have
3 differences on what the best top marginal tax rate
4 should be, and those issues and debates I believe
5 should be discussed in a civil and respectful manner,
6 focusing on substance and what actually gets the job
7 done.

8 The overwhelming majority of Americans share
9 the same ultimate objectives. We want to see
10 opportunity expand. We want to see prosperity expand.
11 We want to see those who are struggling have a better
12 opportunity to achieve the American dream. We may
13 disagree on the means to get there, but we share
14 objectives and if we can stop the partisan mud
15 slinging, the nastiness and personal attack and focus
16 on substance, we might even be able to find common
17 solutions.

18 Now, across the board it may be some time
19 before we get back to that, but the world of
20 encouragement I want to give you is there's one area
21 where that continues, and that is space. On space I've
22 been proud to work closely with the Democrats on my

1 Subcommittee to work in harmony, to reach compromises.
2 Now, none of us get everything we want. If you want to
3 work at a Legislative Branch, you're not going to get
4 everything you want. But we've been able to see
5 bipartisan cooperation and it is difficult to think of
6 another major policy area where you have major
7 legislation signed in 2015 by Barack Obama and in 2017
8 by Donald Trump.

9 That should encourage everyone that the bi-
10 partisan agreement that exists on space, that whether
11 Obama or Trump, we were able to move forward with
12 American leadership in space, and I intend to continue
13 to work to preserve that cooperation, preserve that
14 leadership and continue to create an environment where
15 commercial space flourishes and where American
16 continues to lead the way.

17 Thank you.

18 MR. GOLD: Senator Cruz, everyone. Thank you,
19 sir. All right. That's a tough act to follow now to
20 go back to today's discussion topics, but Brigham,
21 you're the man to top Senator Cruz. I'm sorry.

22 MR. McCOWN: Yeah, I don't know if I can do

1 that, but just kind of following the Seven Degrees of
2 Kevin Bacon, I am from Texas and I am also a lawyer.

3 Thankfully, that's not the end of the story.
4 I've been a regulator here at the Department of
5 Transportation, both as an Agency Chief Counsel and as
6 an Agency head, and earlier in life I flew as a Naval
7 aviator and have more recently been involved in
8 innovation policy, a think tank, which really is
9 looking for ways to find solutions to important public
10 policy challenges, and I think, you know, from that
11 viewpoint I've very cognizant of how regulations and
12 regulatory lag can negatively affect innovation.

13 And so, you know, some folks say time is
14 money, but more importantly I think squandering time
15 can lose economic and competitive advantages, and
16 that's something that we'll certainly keep in mind. So
17 I'm excited to join COMSTAC and I'm excited to be on
18 this subcommittee. Thank you.

19 MR. GOLD: Thank you, sir. So okay, we've all
20 been in the sun a little bit. Let's take a 15-minute
21 break, reconvene here just in 15 minutes, 3:20
22 everyone. Thank you.

1 (Break.)

2 MR. GOLD: Great. All right, thank you,
3 everyone. If everyone could return to their seats,
4 we're just going to try and finish up.

5 So we talked about streamlining the internal
6 AST processes, acceptable level of risk. Is there
7 anything more you think we need to say there, Di?

8 MS. REIMOLD: Well, I think on the ARL concept
9 I mentioned a few minutes ago, I think we could spend
10 all afternoon on that and how it, you know, applies to
11 our airspace access, equities and things like that.
12 No, I think this working group is really going to need
13 to spend some time in detailed understanding of the
14 concept and then some -- and how this will then migrate
15 toward the end state and the operational environment
16 that we're envisioning and timeframe. So I think this
17 is going to be among all the working groups, probably
18 one of the heaviest areas of education.

19 MR. GOLD: I'm sure. Thank you. Any other
20 comments on ARL that members want to make? Oscar?

21 MR. ARMOR: Yeah. What, on the equities and
22 the consensus of what costs what to who, to segregate

1 or not to segregate, what's the best -- when industry
2 brings input from operators, where do we take it from
3 here, to the ARC, we take it to Commerce? What do we
4 do with the input?

5 MS. REIMOLD: So you're talking specific to
6 this topic?

7 MR. GARCIA: Yeah.

8 MS. REIMOLD: Yeah, I think this -- that's a
9 fascinating question. I think this is going to be one
10 of the closest parallel efforts to the airspace access
11 ARC of any of these other work products, so I would
12 suggest that the input be shared with the ARC and vice
13 versa, because the ARC has had a couple of months
14 advantage on COMSTAC in beginning to understand some of
15 the issues and get a sharing of the information.

16 MR. GOLD: Any comments on ALR? Just another
17 procedural note. You know, we're going to try and keep
18 the working groups to the working group members to
19 maintain manageability on that. Again, the purpose of
20 the full COMSTAC meeting is when that synthesis will
21 take place. Chris, any other comments you want to make
22 in terms of the process there or is that --

1 MR. KUNSTADTER: No, I think you said it well.
2 You know, the idea is the working group itself hashes
3 out position. OFR's, what have you, and brings it to
4 the full COMSTAC, rather than having the working group
5 phone calls include members from other working groups,
6 so it starts to get unwieldy if you want to try and
7 manage positions and things like that. It's better to
8 keep the working group calls and meetings to the
9 working group itself.

10 MR. GOLD: Absolutely. And again, it's
11 preparatory in nature. There are no votes taken there,
12 so we can do that in preparation without OFL
13 notifications, et cetera, and then we do that public
14 outreach via the COMSTAC meetings.

15 Any other comments relative to these five
16 topics generally? Okay. Hearing none, as we mentioned
17 before, we do want this to be a two-way street. We've
18 now completed the conversation relative to what AST is
19 looking for.

20 Are there other ideas, issues that industry
21 feels like and COMSTAC members would like the COMSTAC
22 to deal with in any of the different working groups?

1 If you don't mind me putting you on the spot, Chris, I
2 know that there was at least one that legal regulatory
3 was going to take on.

4 MR. KUNSTADTER: Yeah. The issue was raised
5 about changes to the export control regulations and I
6 will plead innocence from the start and, Mike, I know
7 export control is your -- has been your baby for many
8 years, so maybe I'll look to you for some guidance
9 here.

10 But I think it's important for us to at least
11 come out with the position that export regulations, you
12 know, have the potential to hamper U.S. industry and
13 hamper the FAA's clients, so I think it's very
14 important that we look at what those suggested changes
15 are, see if it's a tightening, loosening of, shifting,
16 whatever it is, and again, Mike, I sort of pass it back
17 to you because you probably know more about the status
18 of that.

19 MR. GOLD: If export control is my baby, I've
20 been trying to put it up for adoption for quite a
21 while.

22 It makes me feel young again almost talking

1 about export control, quote, unquote, reform. And I
2 think that we have both an opportunity and a challenge
3 when it comes to recent export control policy. The
4 opportunity, as we're all aware, is via the National
5 Space Council, that under the stewardship of Scott Pace
6 and Jaret and Mike Bevin and others, they are looking
7 to try and enhance efficiency, to cut down on red tape.
8 And, you know, far too often we create the false
9 dichotomy with export control, where well, it's
10 commerce versus national security.

11 I honestly believe that we can and should
12 accomplish both, that bad export control, regulations
13 that aren't targeted or unclear, do hurt both, and that
14 when we can improve good expert control policy, is
15 complimentary to both national security and to
16 commerce.

17 So I think that the Space Council is looking
18 for some discrete actions that can be taken by the
19 Executive Branch, to try and improve the process, and I
20 can't commend the leadership of Council more. I think
21 export control is a crosscutting activity that is
22 perfect for the nature and capabilities of the Space

1 Council. So I think we really have an opportunity to
2 move forward there.

3 Certainly, one of the ideas that has been
4 discussed a number of times is the mandatory and
5 regular review of the United States munitions list.
6 The technologies are not static. They change, and if
7 we have a static export control system, it will
8 completely become counterproductive and obsolete over a
9 period of years.

10 We've made great progress in export control
11 reform, but we should not rest on our laurels because
12 if we do, we'll end up in the exact same position we
13 were ten years ago.

14 MR. HOLDER: Mike?

15 MR. GOLD: Yes, sir.

16 MR. HOLDER: It's Livingston.

17 MR. GOLD: Go ahead, Livingston.

18 MR. HOLDER: I can't agree with you more, but
19 I'm still concerned that we have a restrictive body of
20 rules that other nations do not have, and I listened to
21 our Congressional speakers today recount an issue and
22 talk about the glories of what they've seen in other

1 nations, who clearly don't have that issue, who clearly
2 didn't regulate their businesses out of the existence
3 or nearly out of existence or to a diminished state
4 like we have, and they've actually had, you know,
5 they're actually had governmental support that's been
6 quite robust.

7 I think we have an opportunity here with a new
8 Administration, with a new way of thinking, perhaps to
9 accelerate our work in this area, because so far, we've
10 been doing this slow creep toward -- toward improving
11 something or making it less bad.

12 Mike, I believe you probably more than anyone
13 else on this committee has given thought to this, of
14 what your preferred end state would be and how we might
15 articulate that end state, and I believe if we were
16 able to give the National Space Council the desired end
17 state as the vision, that might actually spur us to
18 jump over some of this incrementalism that we've been
19 suffering, as we all contemplate each inch worm move
20 that we make in this regulatory environment.

21 MR. GOLD: Yeah. It's a great point,
22 Livingston, and I think you actually described at least

1 part, if not all, of the end state that I would like to
2 pursue, and that is the elimination of export controls
3 for technologies that are widely available in the
4 international market, at least.

5 That, when we talk about the review of this
6 list, the review needs to be done in such a fashion
7 that if I can go down to Radio Shack and buy that
8 component, I shouldn't have to go through an export
9 control process. Be that, via the Department of the
10 State or the Department of Commerce.

11 MR. HOLDER: You've still got Radio Shack in
12 your neighborhood?

13 MR. GOLD: I'm from Montana. I've got a
14 fellow Montanan in the audience. We've still got a
15 Radio Shack going here or there.

16 And I think that's an end state that both
17 Congress and the National Space Council would like to
18 achieve. I think there's support for it, but I think
19 that there's a challenge relative to getting there.
20 And frankly, just in terms of people.

21 MR. HOLDER: Mm-hmm.

22 MR. GOLD: That this is not a bureaucratic

1 problem. We've got great allies frankly, Department of
2 State, Department of Commerce. Space Council is
3 leading the way. But we need to get full staffs in
4 order not only to do this, but just to maintain dates
5 and not fall behind on a variety of licenses. So I
6 think that's also a part of the recommendation, as
7 well, that we can't expect our export control officials
8 to react with alacrity if they're understaffed or to
9 conduct these kinds of reviews, but, you know, per your
10 point I think that the end state is that items that are
11 widely available are not on expert control lists, and
12 that's something that has to be done on an ongoing
13 basis. You know, you can't just wish it and it
14 happens. That requires constant vigilance and review.
15 So there needs to be procedures to actually get us to
16 that.

17 And second, frankly, is clarity, that you'll
18 have items on the USML and the CCL, same item, you
19 know, one will be a brake for a firetruck that will be
20 CCL. The other will be a brake for a tank, and that's
21 USML.

22 MR. HOLDER: That's the example I was thinking

1 of.

2 MR. GOLD: What do you do? So that's the kind
3 of thing we need to do. Our end goal is clarity. Our
4 end goal is not illegitimately restricting American
5 business, when it does no good for national security,
6 because if those technical advice are available,
7 there's no reason to restrict it.

8 MR. HOLDER: And the penalties are not well
9 understood unless you are the business producing the
10 brake, and putting the part number that is the ITAR
11 tank brake, in one control process in materials cage,
12 and the commercial ones in another, because now they're
13 two separate systems for items that are manufactured
14 identically and just have different end uses, so a
15 brake is a brake.

16 MR. GOLD: Now, and I think everyone will need
17 a break if we keep talking about export control too
18 long. Let me just add -- sorry, go ahead, Jennifer.

19 MS. WARREN: Sorry, I've been trying. So I'm
20 not going to touch on the substance, because obviously
21 many of us have been working on expert control reform
22 for quite a while.

1 I think we though have to focus on what is
2 actually the role of COMSTAC in advising the FAA to
3 advise the Department of Transportation that sits on
4 the National Space Council, what is the message, what
5 is our ask there that the Secretary represent into that
6 forum, because other than that and the report that's
7 due in 180 days, there is not -- this is not the
8 department with the responsibility for this.

9 So I think we need to be very clear, to pick
10 up a new point on clarity --

11 MR. GOLD: Mm-hmm.

12 MS. WARREN: -- on what the role is that we
13 would like to see the Secretary have on the Space
14 Council with respect to this, as opposed to just the
15 general. Thank you.

16 MR. GOLD: No, it's a great point, Jennifer,
17 and one that's been raised and that we've talked about
18 in the COMSTAC, you know, several times --

19 MS. WARREN: Mm-hmm.

20 MR. GOLD: -- before. I just go back to the
21 example of commodity jurisdiction requests, and I know
22 you've all been waiting for a good commodity

1 jurisdiction request discussion.

2 Previously the CJ requests were being put out
3 and no one would hear about them. You'd have to do a
4 FOIA to get any kind of information. The COMSTAC, you
5 know, via the AST and Department of Transportation had
6 George at the time go to Department of State and
7 recommend that our people, who were doing commercial
8 space transportation activities, really think it's
9 important for there to be transparency on what the
10 result of those CJ requests were.

11 Again, as a lawyer, I can tell you without
12 precedence, you know, you're in a lot of trouble. So
13 you'd have one company submitting and maybe get one
14 result, another company submitting and maybe getting a
15 different result. And the COMSTAC has actually been
16 quite effective via the promote authority that AST has
17 in terms of helping promote interests to other agencies
18 when we run into trouble, relative to those
19 regulations. And Jennifer, I think you put it
20 perfectly that the recommendations we would make on
21 export control would be for the Secretary of
22 Transportation in meetings of the National Space

1 Council or for her staff, to advocate that this is what
2 the FACA believes, you know, should be done on these
3 particular topics. Eric.

4 MR. STALLMER: Mike, just touching on the
5 transparency issue, and maybe this is something we can
6 talk about in the fall meeting, is that many of us
7 participated in the launch and re-entry ARC, launch and
8 re-entry reform ARC, and I know that there's going to
9 be a lot of work done on it in the next, is it year,
10 come February 1st, when they need to deliver the
11 findings, but if there could be some transparency on
12 what the architecture is looking like, you know, the
13 status of the reform and where we may stand on that, I
14 think that would be helpful to all the participants
15 that put a lot of time and effort in on that.

16 MR. GOLD: Yeah. No, thank you and you're
17 setting me up perfectly, Eric, for it. So I think
18 there are two actions that are happening in this area.
19 One is the National Space Council that's looking for
20 reforms that they can implement. The second is a
21 legislative activity, and I'm much more concerned with
22 the latter. And I believe that a lot of this stems

1 from concerns over Chinese investments in new and
2 emerging technologies in Silicon Valley. Frankly, I
3 think a lot of the focus is on AI and machine learning.
4 And believe me, I would be the last to say that we
5 shouldn't be concerned about those kinds of investments
6 and those kinds of activities.

7 What I'm worried about is repeating history,
8 and that when we've got a concern about a particular
9 country, which in this case for simplicity I'll just
10 say China, and that we start doing surgery with a
11 chainsaw instead of a scalpel, that if there is a
12 country or countries that are put on what's called the
13 126.1 List, that any actions that we take should be
14 targeted against those countries and not impact NATO or
15 major non-NATO allies, because when we do that over
16 breadth, we then knock out U.S. companies from being
17 able to participate in international business,
18 international coalitions, and guess who it is that
19 comes into that void? China.

20 So you actually are being counterproductive
21 relative to the original goal that you wanted to do
22 when those changes aren't narrowly focused enough. And

1 while we haven't quite gotten there yet legislatively,
2 I think there are some concerns. I've gotten some
3 reassurances from people on the Hill that this kind of
4 thing won't happen. But again, vigilance is the price
5 we pay for freedom, and I've seen a lot worse happen on
6 the basis of a lot less.

7 So I think just as you're describing, what the
8 COMSTAC should do in terms of transparency is that
9 there's two processes we tackle. One, you know, advice
10 that the Secretary of Transportation provides, via the
11 National Space Council, and then second how legislation
12 would impact commercial space transportation, via
13 export control, quote unquote, reform, particularly
14 when it comes to emerging technologies, which is itself
15 an ill-defined term. What is an emerging technology?

16 So again, I think clarity is needed in these
17 cases. Sorry.

18 MR. LOPEZ-ALEGRIA: So it's like pulling a dog
19 off of the export control thing, but I think Eric was
20 referring to a completely different topic, which is the
21 ARC on streamlining launch and re-entry licensing
22 requirements. So I'm not --

1 MR. STALLMER: I enjoyed what you had to say
2 though, Mike.

3 MR. LOPEZ-ALEGRIA: Are you done or do you
4 want to keep going?

5 MR. GOLD: Look, I'll answer the question I
6 want to hear.

7 MR. STALLMER: Mike, can you answer my
8 question, please?

9 MR. LOPEZ-ALEGRIA: Yeah, so what I think Eric
10 was referring to and something I wanted to bring up, as
11 well, is Di and I co-chaired this other ARC, the third
12 ARC that hasn't been mentioned until just now, and our
13 work is largely complete. We submitted a report to AST
14 but there is a lot of work that Eric alluded to that's
15 going on between now and February, when proposed
16 rulemaking will be announced, I assume.

17 And so I know that there is a lot -- there are
18 a lot of companies that participated in that activity
19 that a representative of the COMSTAC -- so I think at
20 the very least we should have a conversation about is
21 there anything else that we can do as a COMSTAC,
22 separate from the ARC process. You know, one is FACA,

1 one is not FACA, to see if there's an OFR or something
2 that we can tie up the activity that, you know, I think
3 many companies feel like there's more to do out there,
4 and -- yeah, I'll just leave it at that. So I think
5 that would fall also on your working group, Chris,
6 unfortunately, but it's a conversation that I think at
7 the very least we need to have regarding sort of
8 outstanding work that we might be able to do.

9 MR. GOLD: And maybe just to say a quick --

10 MR. STALLMER: Export control.

11 MR. GOLD: Yes, let's get back to the
12 important topic here. Just on the interaction of the
13 ARC's and the COMSTAC, right, that I would see the
14 COMSTAC is both reacting to, fine tuning, highlighting
15 aspects of the ARC, or where we disagree with the ARC
16 or where there were failures of the ARC in our view. I
17 think that this is a good second look at the ARC
18 process from this particular group's perspective, so at
19 least that's how I'd like to see, you know, us go, that
20 this is a good second bite at the apple to have from
21 the perspective of the COMSTAC versus the actual work
22 of the ARC, which necessarily and I think very

1 positively was done without, you know, the broad public
2 engagement. This is a reaction to the results of the
3 ARC.

4 MR. STALLMER: Yeah, I don't disagree. You
5 know, that was a very focused effort where people
6 literally spent hundreds of hours to put this stuff
7 together, and I don't think that COMSTAC has the
8 bandwidth to reproduce that, nor should we. But what I
9 think we can talk about is the interface between
10 industry and the government, which is at least by some
11 definition closed now, via that avenue. Perhaps we can
12 continue it via the COMSTAC.

13 MS. REIMOLD: Thank you, Mike. No, so I think
14 really good points and, Eric, I appreciate you raising
15 it again.

16 Maybe just from a perspective, and we've
17 alluded to it a couple of times because of the
18 uniqueness of the timing of having these ARC's, three
19 active ARC's and COMSTAC standing up, you know, it's
20 unusual. I tried to think of a previous situation
21 where we even had to entertain a discussion about, you
22 know, getting Aviation Rulemaking Committee

1 recommendations, potentially brought forward to an
2 Advisory Committee. But be that as it may, we are
3 where we are, and the reality is, you know, I've got to
4 go back and do some checking. I think it's a valid
5 point for the COMSTAC to at least be aware of, you
6 know, both the intent of the regulatory reform ARC and
7 the final report, for the simple reason that the
8 COMSTAC, just like the ARC, while there's a lot of
9 similarity in composition in terms of the members, it's
10 not inclusive on either side. So I think so to the
11 extent that some of the COMSTAC members -- well, I'll
12 leave it at that. So I think that that would be one
13 advantage.

14 But the reality is the ARC's and FACA's
15 operate in different sets of rules, so on an ARC the
16 FAA can accept the recommendations that the ARC
17 provides, or not. Obviously, with explanation. And
18 the FACA's operate somewhat differently. I mean, even
19 at the end of the day while the government is more
20 bound for the recommendations of Advisory Committees,
21 there has been precedent where for whatever reason an
22 agency has said -- understand the recommendation but it

1 is impossible to implement for the following reasons.

2 So again, I don't want to come across as
3 sounding like a bureaucrat. I will make a commitment
4 to the COMSTAC to figure out, you know, how and if we
5 can do this, just in view of where we are in this
6 particular day and time.

7 For those who have not been part of the
8 regulatory reform ARC process, industry was, and
9 remains, I think, quite interested in trying to help
10 the government formulate this revised rulemaking for
11 launch and re-entry licensing. That said, and we
12 understand it and certainly appreciate it and really,
13 really appreciate the high quality content of the ARC
14 recommendations, but you know, we are in such a
15 restricted and the ARC has heard this so many times, so
16 it -- you know, bear with me one more time. Because of
17 the compressed timeframe that we have on this
18 rulemaking activity, and it is extraordinary to be
19 given a direction in February from the Space Council
20 and have it immortalized in a directive, and have to
21 produce a Notice of Proposed Rulemaking in less than a
22 year, it's extraordinary. So timeframes alone don't

1 allow for negotiated rulemaking.

2 And the second item that our legal folks were
3 adamant about was that in order to allow the ARC to
4 continue to engage during the rulemaking process, it
5 could potentially disadvantage entities who were not
6 part of the ARC, and put the FAA in a position
7 potentially to be sued, because the process was not
8 inclusive, was not transparent.

9 So, you know, all of that to say I know that
10 there is -- because of all the work that was done in
11 such a short amount of time by industry to provide such
12 a comprehensive list of recommendations, and there was
13 a genuine desire to want to help, there's just factors
14 that preclude that from happening, and we continue to
15 try certainly within the FAA to figure out, you know,
16 there may well be a point where we ask the ARC to come
17 back together, because there's something else that has
18 occurred or we've come across an issue that's flat out
19 not resolvable, and we have to pull back together.

20 But anyway, I've kind of wondered wide and far
21 -- I'll just sum this up by saying I'll go back on this
22 item that Eric teed up and Mike, that you've indicated,

1 and we can talk a little bit about, you know, once I
2 can understand how we might make this happen, then
3 we'll come back and advise the COMSTAC membership.

4 MR. HOLDER: Di, doesn't the NPRM process
5 still hold though, and so doesn't that give a wider,
6 you know, view to the issue, which should -- I'm not
7 going to speak for any lawyers, but should at least
8 dissuade some of their concerns about pushback from
9 industry?

10 MS. REIMOLD: Yeah, I'm not going to weigh in
11 on the lawyers' behalf either, but yeah, I think there
12 is recognition of that certainly, you know, the public
13 comment period, any and all, but, you know, again I'm
14 not a lawyer. I can't -- yeah. But affair point.

15 MR. GOLD: I think legally you're right,
16 Livingston. It's just the bait nature of it is the
17 issue, going in, so -- other --

18 MR. HOLDER: Legally correct?

19 MR. GOLD: Legally correct but not
20 substantively sufficient. Any other questions,
21 comments in terms of what the COMSTAC should be
22 tackling from the perspective of industry? Oscar?

1 MR. GARCIA: Yeah, Mike. I know this is not
2 reconstituted COMSTAC, but back to a spaceport vehicles
3 issue that when we left it off a couple of years ago,
4 year and a half ago, it was on the table as a priority
5 for AST. In industry today, there are spaceports today
6 and there are operators of vehicles who are not capable
7 of extracting revenues from supporting space missions
8 whether flying payloads or people, and there are two
9 bills, one on the FAA side, (indiscernible) Bill, and
10 another one on the AST side, for systems and vehicles
11 on both sides, FAA and AST, would be allowed to fly
12 payloads and people for revenue, space (indiscernible)
13 activity. Communities would be happy with their
14 spaceport investment.

15 Would it be or when would it be a good time to
16 reinsert this conversation and ask AST to work together
17 with FAA to define what those support missions look
18 like, what's the criteria, because there's a tremendous
19 business lost every week, every month, from both
20 spaceport and operators not being able to capitalize on
21 spaceport vehicles?

22 MS. REIMOLD: I want to ask, Glen, is Glen

1 still here? So Oscar, I apologize, I don't have a
2 ready answer on that. I hoped our guy that focuses on
3 that was around but I'll take an IOU and get back to
4 COMSTAC.

5 MR. GARCIA: Just wanted to bring the
6 conversation back to the table. No urgency but --

7 MS. REIMOLD: And I --

8 MR. GARCIA: -- concern --

9 MS. REIMOLD: I'm aware of the issue. I'm a
10 little at disadvantage, because I'm not completely
11 aware to what extent it was in front of the COMSTAC
12 previously and what the direction was there, so I
13 apologize.

14 MR. GARCIA: Yes, thank you.

15 MR. GOLD: If memory serves, we had OFR's that
16 supported fixes in the past there, Oscar, and certainly
17 again, while AST has laid out what they would like us
18 to respond to, there's nothing preventing you from, you
19 know, developing your own OFR's on these topics, to
20 express COMSTAC's position or concerns over the issue,
21 for what it's worth.

22 Other comments, questions in terms of what we

1 would like to see COMSTAC deal with in terms of
2 industry? Dale? No, good. Okay. Going once, going
3 twice.

4 That being said, we've been doing a lot of
5 talking. Now our opportunity is to turn it back to
6 you, the people, for public comment. So if anyone --
7 do we still have someone with at the microphone? There
8 we go. If there is anyone with a public comments,
9 please raise your hand. We will bring the microphone
10 to you. Start here.

11 Mr. DEPETE: Thank you. Captain Joe Depete
12 again from the Airline Pilots Association. For those
13 of you who don't know -- Di, you mentioned it a couple
14 of times. Definitely interested in Number 2 and 4 up
15 there, up on the list, and I think we can help.

16 We represent 60,000 pilots at 34 airlines in
17 the United States and Canada, and we operate -- a lot
18 of people don't know, but one of the largest non-
19 governmental safety and security organizations in the
20 world, 450 pilots that are schooled in the areas of
21 just about everything to do with safety and security
22 and pilot assistance, as well as a full-time engineer

1 and air safety staff.

2 And I'm going to ask you -- you know, I think
3 from what I've heard throughout this is that I'm real
4 excited. I'm really excited about this. I remember
5 the days when I was a kid watching the space flights,
6 and I heard a lot of the speakers kind of reflect on
7 the same kind of feeling.

8 And so what I'm hearing is that it seems to me
9 it would be very beneficial to have a conversation,
10 right, with certainly aviation -- commercial aviation
11 and commercial space, kind of evolved together, I
12 think, in one point, or one was an offshoot of the
13 other for sure.

14 What can we do? What can the Airline Pilots
15 Association do? I think that having a dialogue or
16 hosting dialogues amongst the various stakeholders,
17 because it seems like in the ARC process itself, and
18 we're involved in all the ARC processes, you know,
19 there's a bit of pressure right there. But I think it
20 would be beneficial for us to hear one another, you
21 know, so that when we get in situations like that, that
22 we understand, you know, what the language is, so any

1 comment on that, how we might be able to help?

2 MS. REIMOLD: Joe, thank you, and we certainly
3 appreciate ALPA's support on the ARC. So I mentioned
4 earlier today when we were talking about the sharing of
5 safety data, I was looking directly at you, because
6 ALPA is part of several efforts that the FAA has
7 refined over the years to enable that the identified
8 sharing of critical safety information, and the reason
9 I'm coming back to this, and I know that there are the
10 differences between the space operators and et cetera,
11 et cetera, but I think there is so much there. I mean,
12 there's systems, there's processes, there's ways of
13 communicating suggestions and stuff, that I think Joe,
14 to answer your specific point, you know, having ALPA be
15 able to present on things like CASS and augment the
16 discussions on ASIAs and other things like that, I
17 think would be enormously helpful.

18 And you're giving it from a perspective of
19 people that, you know, they live and die by that kind
20 of data, literally and figuratively, so I think that
21 would be one area.

22 I think, you know, again there's been a

1 general kind of reference several times about the need
2 for education, you know, again because now this COMSTAC
3 does have entities on it that are not space, and then I
4 think, you know, I would certainly not hesitate to call
5 on you because you guys do a really great job of the
6 education.

7 And I think finally, when the COMSTAC starts
8 thinking more about in the future and certain when AST
9 starts thinking more in the future, you know, again,
10 right now we just worry about public safety, but it
11 doesn't -- it doesn't completely shut out the fact that
12 there may be a future where we're talking about a more
13 similar model, where we're worried about the humans
14 that are part of that transportation system, where
15 we're worried about the vehicles themselves, and o
16 again I think as we have those conversations, you know,
17 that's another area that strikes me that could be very
18 helpful.

19 And we brought, you know, we brought the
20 aviation folks in here to do a couple things.
21 Different perspectives, but it's certainly the pilots
22 that are there, that are having to respond to the

1 airspace closures that -- and talking to your operating
2 centers that Dan was talking about, you know, and so I
3 think, you know, it's going to be an education for you
4 guys, as well, but we'll look for your voice to help
5 eliminate some of those areas that are not maybe fully
6 understood.

7 And maybe while I'm on that point, there was a
8 request about Rich Dalbello asked about going up to the
9 Tech Center, and having a look at some of the
10 technologies that we're integrating into the National
11 Airspace System.

12 I think, you know, from a user perspective
13 it's one thing to manage airspace. It's a very
14 different perspective I've learned over the years to
15 hear it from a user's perspective.

16 MR. LOPEZ-ALEGRIA: Well, if I could add along
17 those lines, Captain, it would be interesting -- you
18 heard the discussion and if you understood it all
19 you're much smarter than I am, but this alternative
20 acceptable level of risk discussion about, you know,
21 how much the accepted probability of a casualty is
22 between one ten minus six, ten minus nine, so you know

1 Oscar mentioned it's a little hard to us to get our
2 arms around the equities, and I'm just curious if you
3 can off the top of your head say what your organization
4 might think about that trade, between, you know, lower
5 -- I would say less deviations and higher risk?

6 MR. DEPETE: Yeah, I think that would be an
7 integral part of the discussion, because that's the
8 discussion we had in the back of the room before, what
9 the impact of that would be, and I think that that's
10 why I think it's really important for us to have that
11 dialogue, and Oscar, I want to say to you, you know,
12 you spoke very eloquently about this, and I think the
13 point that you were making was is that, you know, we
14 talk about the concern about competitiveness and
15 preserving that with the use of the safety data
16 programs, because I think safety data programs can be
17 the bridge over there, because we've been so successful
18 with that. But you mentioned something, and I think it
19 hit me because it's something we say all the time, is
20 that we don't compete on safety. Right? That's not
21 what we do. We collaborate on it. We collaborate on
22 it, and everybody to different degrees from different

1 organizations contribute in their way, but in a sense
2 it, you know, it creates a whole versus, you know,
3 trying to look at it that way.

4 So I think the words that we choose are
5 important, and I've got two fantastic -- one, there's
6 an air traffic controller here who has had that -- and
7 we had that experience about what that actually, what
8 ten to the minus six versus ten to the minus nine
9 really means in terms of having your own carved out
10 piece of airspace versus us being together, and I think
11 that -- that's why I think it's important to have that
12 dialogue and talk about methodologies and mitigations
13 that we might be able to put into place.

14 If we understand one another, I think that's
15 really the key. I mean, there's a lot of people
16 competing for airspace these days, right?

17 MR. HOLDER: As a listener to this
18 conversation, I harken back to the days where we would
19 often have -- I'll call them guest speakers or experts
20 that were outside of our little world come in and help
21 us understand the rest of the world.

22 MR. DEPETE: Right.

1 MR. HOLDER: I would hope that at least
2 perhaps through the safety working group is my guess is
3 where the target is, Oscar, that we could hear your
4 voice in an educational fashion.

5 MR. DEPETE: Absolutely.

6 MR. HOLDER: Where you could help us
7 understand. Now, it's not a quick conversation. This
8 is a long process. You've been involved for years.
9 You've probably taken tacks and turns over the time,
10 but that experience would be extraordinary for us,
11 because we don't have it.

12 MR. DEPETE: We agree because, you know, I
13 heard so many things during the day. I mean, we could
14 be here long after happy hour. I heard so many good
15 things -- you know, we have a tremendous educational
16 effort. In fact, our strategic goal is for
17 organization.

18 Number one is our highest priority, safety
19 security, pilot assistance programs, okay. We hold
20 that in the highest regard. Ahead of pilot
21 representation, so in effect our pilots are saying
22 that's more important to them than their contracts.

1 That's huge to hear a pilot say that, right.

2 But also, the future of our profession, right?

3 And I could see parallels here to where we could work
4 together really, because in a sense -- and I go back to
5 the beginning of what I tell you when I was younger and
6 I saw the excitement surrounding the space program, is
7 that -- and a couple of people -- I think it was the
8 Congressman earlier, that mentioned that he thought it
9 was going to be some kind of catalyst that would, you
10 know, re-awaken the energy again.

11 (Microphone issues.)

12 MR. GOLD: That's how we control timing.

13 MR. DEPETE: But I'm just saying I think this
14 is tremendous opportunity for working together, for
15 common solutions, with a shared -- we call it in the
16 cockpit a shared mental model. I mean, I don't have
17 the expectation of walking in the cockpit and having a
18 first officer -- and I've been flying for 37 years.
19 That first officer is going to feel the same way I feel
20 about everything. We do that -- (indiscernible).

21 MR. DEPETE: So I think that's -- I think
22 60,000 pilots (microphone issues). So I'm excited

1 about it.

2 (Microphone issues, (indiscernible))

3 MR. DEPETE: I think we understand one
4 another, that's --

5 MR. GOLD: And while we're asking you to solve
6 the world's problems here, I would just add too, and
7 this goes back to a previous comment, dispute
8 resolution, you know, dispute resolution, that when
9 there are differences of opinion between the aviation
10 wing and the space wing in terms of how we're going to
11 cope with an issue, you know, again, I have grave
12 concerns relative to the size and influence of the
13 commercial space industry, relative to aviation, and I
14 think that's a David and Goliath setup. And again, one
15 of the things this committee needs to look at is how do
16 we again ensure an equitable and holistic view and to
17 the extent you've got ideas as to how we can do that
18 and make sure there's a meeting of the minds, and come
19 to the right decision for both parties, I think that
20 would be eminently helpful.

21 (Microphone issues.)

22 MR. DEPETE: A good step, work together --

1 MS. REIMOLD: Can you speak up?

2 MR. DEPETE: So I think that could be one of
3 the ways to possibly do that. Boy, I'm really going
4 through microphones pretty quick here today. But I
5 think that would be a way to have that dialogue, to
6 discuss how we would do that, you know, what's the best
7 way to do that, but the first thing to do is continue
8 to talk to one another, I think.

9 MR. GOLD: Well, the airspace will be easy now
10 that we've got the microphones fixed, so I think we
11 have one more public comment. Aaron.

12 AARON: Hello, everyone. It's a pleasure
13 seeing everyone again at COMSTAC. Great job leading
14 again, Mike, congratulations, as well to the other
15 Mike, congratulations to you, as well, and all the new
16 members.

17 I'm here today very briefly on behalf of the
18 Space Frontier Foundation. The reason I wanted to
19 speak is for those who don't know, we are doing a major
20 study with Deloitte to look at how big the industry can
21 grow. I think I speak for a lot of us at least when I
22 say, you know, we're happy to see rockets fly, you

1 know, when they fly right now, but we got in this
2 industry because we want to see launches happening
3 every day, thousands of people in space, thousands, you
4 know, trillions of dollars in business, all those kinds
5 of things.

6 So we've started a million dollar study with
7 Deloitte to start looking at how big can the industry
8 grow, and the specific area we're looking at is
9 disruption.

10 What happens if all the various proposals out
11 there that would, you know, lower launch costs, come to
12 fruition? What happens if there's a sudden demand
13 increase for space station development and deployment,
14 et cetera, et cetera, et cetera.

15 And so I'd love to encourage everybody to help
16 us out on this study. Our first workshop is going to
17 be at New Space at the end of June. We'd really love
18 to hear from -- I'm sure we've invited a bunch of you
19 already -- those of you who we have not invited, I'd
20 gladly have everyone of you at the workshop because we
21 want a robust study, so we can actually validate the
22 belief we have in this industry, because the more we

1 have that, the more that will help financing, the more
2 that will help grow the business, the more that will
3 help figure out how to handle everything from your
4 favorite topic, Mike, with ITAR to dispute resolutions,
5 to all those -- you know, and let us have those
6 millions of people in space. So I'd love to encourage
7 everybody to participate in that. I'm happy to talk
8 about this offline with other people.

9 We're going to be having many of you people --
10 as I say, we've invited a bunch of you already I'm sure
11 to the workshop. It's going to be at the New Space
12 Conference, and I hope everybody can help us out with
13 this.

14 MR. HOLDER: Let me second your invitation,
15 because it's in Seattle at the end of this month, and
16 so I'd love to have you folks join me on my side of the
17 country, but I think the thing that kind of caught me
18 about this study is it's not just, oh, what's the
19 industry doing, how's it growing, let's put some
20 numbers to it. But it looks at disruption and says
21 what happens at the edge of this event horizon, because
22 I think fundamentally we will change this eco system

1 and it will change space business, as our capabilities
2 grow, and I think it looks at the growth of the
3 industry from that disruptive standpoint because it's
4 like the iPhone. Before the iPhone a lot of things
5 that couldn't have been imagined now exist, you know,
6 so it's like well, I wouldn't have known that I needed
7 a heart monitor that was tied to my wrist that talks to
8 my doctor and helps me with a latent problem that I
9 have. You know, well, you didn't need it but you
10 actually needed it but you didn't know how to make it
11 happen.

12 So I think -- I hope that the conference is
13 well attended, and I hope we as a collective industry
14 can provide good input so that we get some new results
15 other than just the industry is growing this size year
16 over year. That's what I'm looking for out of it.

17 MR. GOLD: Certainly encourage members to
18 attend. Thank you for those comments, Aaron. We had
19 another comment from the audience. Ma'am. You got her
20 a microphone?

21 MS. HOWARD: Hi. This is Diane Howard from
22 Embry Riddle and the International Institute of Space

1 Law again. I just want to say thank you so much for
2 touching upon so many issues that we've included in the
3 conference that we've been putting on now since I think
4 2013 or 2014, and so many people here have participated
5 in that conference over the years, so this is just
6 music to my ears to see mass integration, a part of the
7 COMSTAC conversation is for me earth-shattering. I
8 love it.

9 And also, to talk about some of the
10 disparities and safety metrics, so I'm really, really
11 pleased to see this. I just want to let you all know
12 that we are going to do the conference this year, but
13 we're going to do it a little bit differently. And
14 because I think these issues are more relevant than
15 ever to this particular community and the stakeholders
16 that are present in this room, we will be co-hosting it
17 with UT Austin, Dr. Marie Bajaw (phonetic) some of you
18 know, and we're not going to do it in November or in
19 January. We're de-conflicting it. We're going to do
20 it after the FAA AST conference, and also after Science
21 and Technical Subcommittee, because there's going to be
22 some things that go on with the orbital coordination

1 part of it.

2 So again, the conference is going to include
3 user perspectives, NAS integration and also the orbital
4 coordination, and I just wanted to let you all know,
5 you'll be getting save the dates from us in the near
6 future, so I will barrage your email addresses. Thank
7 you very much.

8 MR. GOLD: Thank you, Diane. Over here.

9 UNIDENTIFIED SPEAKER: With the air traffic
10 organization. I just want to clarify one thing. I
11 heard that ALR represented a higher level of risk, and
12 I hate for anybody to walk away with that, because
13 that's not correct. That's not -- it is a different
14 parameter but we have continuous presence in collective
15 risk, have altered the math behind it, so we are still
16 at the same risk level, so there's no heightened risk,
17 and I really just wanted to make that point and make
18 sure that's clear.

19 MR. GOLD: Appreciate that. Other comments
20 from the public?

21 UNIDENTIFIED SPEAKER: I'm allowed to be part
22 of the public. Sally Frontage. I'm with the FAA.

1 With the comments on the ARC's and looking at the ARC's
2 and the recommendations and getting COMSTAC feedback,
3 which is now both space and aviation, I'd just like to
4 suggest maybe also incorporating looking at all the UAS
5 ARC's that are also ongoing, to make sure there aren't
6 competing interests from your perspective collectively
7 at COMSTAC, if that's appropriate. That's it.

8 MS. REIMOLD: Thanks, Sally.

9 MR. GOLD: And let me just add, in addition to
10 the ARC's, I believe the UAG will be meeting for the
11 first time, and I think that there should be
12 interaction between us and the UAG. We heard from
13 Scott Pace, and we'll certainly follow up with that, as
14 well, so I think the point is well taken.

15 Other comments from the audience? Okay.
16 Hearing none, before we break I do want to take a
17 moment to thank Kelvin Coleman, that it is his
18 leadership and vision is why we are all here. I view
19 it as our jobs to make sure that Kelvin and his office
20 are as successful as possible, and I'll tell you, I
21 think industry has a great relationship with AST, and I
22 can't say that for a lot of the other regulators that I

1 see. That doesn't happen by accident. You know,
2 that's a lot of work. That's a lot of backbone.
3 That's a lot of effort. So let's have a round of
4 applause for the new leader of the AST, Kelvin Coleman.

5 And before we run out of applause, I want one
6 more round of applause for somebody who is not at this
7 table, who helped make all this happen, Thomas Marrota,
8 our DFO. Tom.

9 And again, thank you to the COMSTAC
10 membership. You know, I know we're all very busy
11 people, and this takes up a lot of time, but for the
12 level of speakers that I think we got and that you saw
13 today, you know, the Committee is being taken seriously
14 and I think that our recommendations will be taken
15 seriously, so I believe that the time is well worth it.

16 Let me apologize in advance to the working
17 group chairs and vice chairs, that we will be hounding
18 you. That's really where the rubber hits the road
19 relative to the work and the production of OFR's of the
20 COMSTAC, and just how much I really look forward to
21 continuing to work with you folks. Again, I really do
22 consider this group and even all of you in the audience

1 family, and let me say thank you most of all for
2 getting me out on time for my son's Little League
3 championship game, so I really appreciate the support.

4 MS. REIMOLD: So if I could, maybe to -- Mike
5 and Mike, okay, to thank you both for your willingness
6 to continue this good work and what a pleasure it is to
7 see some familiar faces and meet all of you who have
8 just -- up until today many of you were just names on a
9 sheet of paper that I've been looking at for many
10 months, so I look forward to our working together and
11 to making great progress. Thank you all for being here
12 today.

13 (Off the record at 4:17 p.m.)

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I, Michael Farkas, the officer before whom the foregoing proceeding was taken, do hereby certify that the proceedings were recorded by me and thereafter reduced to typewriting under my direction; that said proceedings are a true and accurate record to the best of my knowledge, skills, and ability; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this was taken; and, further, that I am not a relative or employee of any counsel or attorney employed by the parties hereto, nor financially or otherwise interested in the outcome of this action.



Michael Farkas

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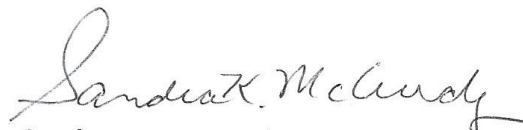
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I, Sandra K. McCurdy, do hereby certify that this transcript was prepared from audio to the best of my ability.

I am neither counsel for, related to, nor employed by any of the parties to this action, nor financially or otherwise interested in the outcome of this action.

June 26, 2018



DATE

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