



Briefing to:

Alabama Spaceport Authority

December 19, 2017

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Chief of Staff
Office of Commercial Space
Transportation
Federal Aviation Administration



FAA Office of Commercial Space Transportation (AST)

- **Mission:** To ensure protection of the public, property, and the national security and foreign policy interests of the United States during commercial launch or reentry activities, and;
- To encourage, facilitate, and promote U.S. commercial space transportation

Over **300** licensed and permitted commercial launches and reentries since 1989 without any public casualties or major property damage

ast.faa.gov



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Background



The U.S. space program today has 3 sectors:

- Civil (NASA)
- Military (DOD)
- Commercial (FAA-licensed)

The commercial sector had its official start in 1984 with Executive Order 12465

- DOT designated as lead Federal agency for enabling private-sector launch capability

Congress passed the Commercial Space Launch Act soon afterwards in 1984

- Regulatory oversight for the commercial sector was given to the Office of Commercial Space Transportation
- Originally within DOT and the Office of the Secretary



AST is one of five lines of business (LOB) within the FAA:

- Office of Aviation Safety (AVS)
- Office of Airports (ARP)
- Air Traffic Organization (ATO)
- Office of Commercial Space Transportation (AST)
- Office of Security and Hazardous Materials Safety (ASH)

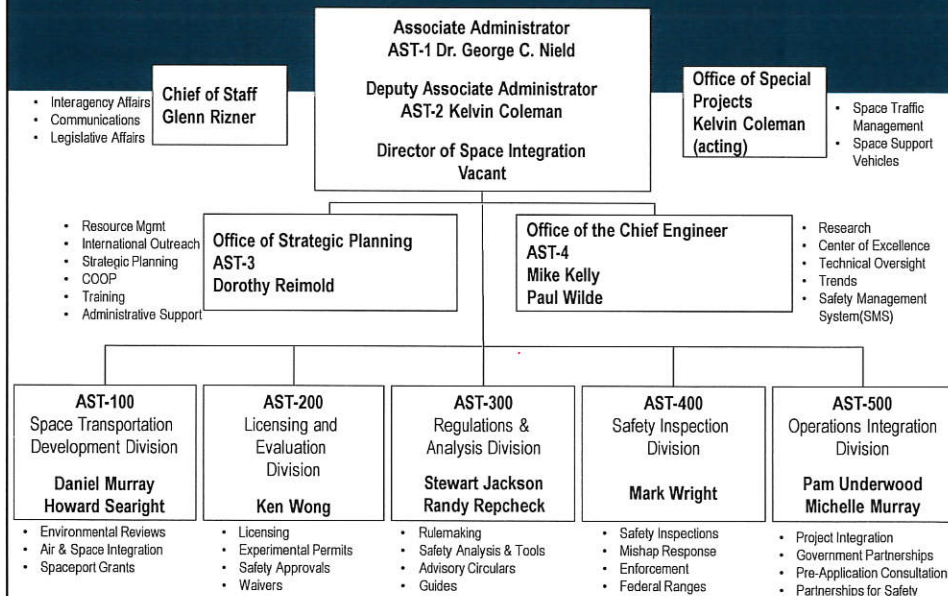


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AST Organizational Chart



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Commercial Space Laws

The U.S. Congress has only incrementally expanded DOT/FAA authority over commercial space transportation:

- 1984 included launch authority
- 1998 added reentry authority
- 2004 added firm authority over commercial human space flight (CSLAA)
- 2015 pro-growth environment for developing commercial space industry (CSLCA)



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What types of activities is FAA/AST involved in?

Commercial Launch/Reentry Licenses

Commercial Launch Site Licenses

Experimental Permits

Safety Approvals

Inspections of Launch Operations and Sites



Expendable Launch Vehicles (ELV)



Air Launch (ELV/RLV)



Launch Sites



Reusable Launch Vehicles (RLV)



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FAA Authority

Statutory Authority - United States Code (USC):

- Aviation regulations: U.S. Code: Title 49 – Transportation
- Space regulations: U.S. Code: Title 51 – National & Commercial Space Programs

Code of Federal Regulations (CFR):

CFR Title	Volume	Chapter	Part	Regulatory Entity
14: Aeronautics and Space	1	I	1-59	Federal Aviation Administration, Department of Transportation (Aviation Safety Regulations)
	2		60-139	
	3		140-199	
	4	II	200-399	Office of the Secretary, Department of Transportation (Aviation Proceedings)
		III	400-1199	Commercial Space Transportation, Federal Aviation Administration, Department of Transportation
	5	V	1200-1299	National Aeronautics and Space Administration
		VI	1300-1399	Air Transportation System Stabilization

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Spaceports: Launch Site Operator License (LSOL) – Part 420 Reentry Site Operator License – Part 433

For a launch site operator license, an applicant must comply with CFR part 420 to obtain this type of license

For a reentry site operator license, an applicant must comply with CFR part 433 to obtain this type of license

These types of licenses authorize the licensee to operate a launch or reentry site:

- A launch or reentry site operator may offer its site to multiple operators
- Remains in effect for five years from the date the license is issued
- License issuance does not confer exclusive use of airspace
- Any vehicle operator wishing to launch or reenter at a licensed site must also obtain a separate authorization

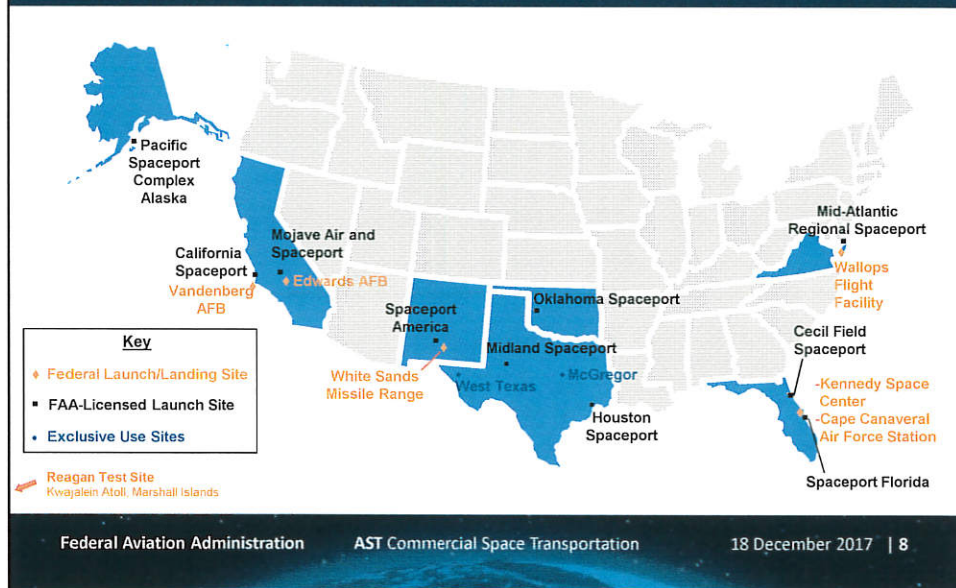


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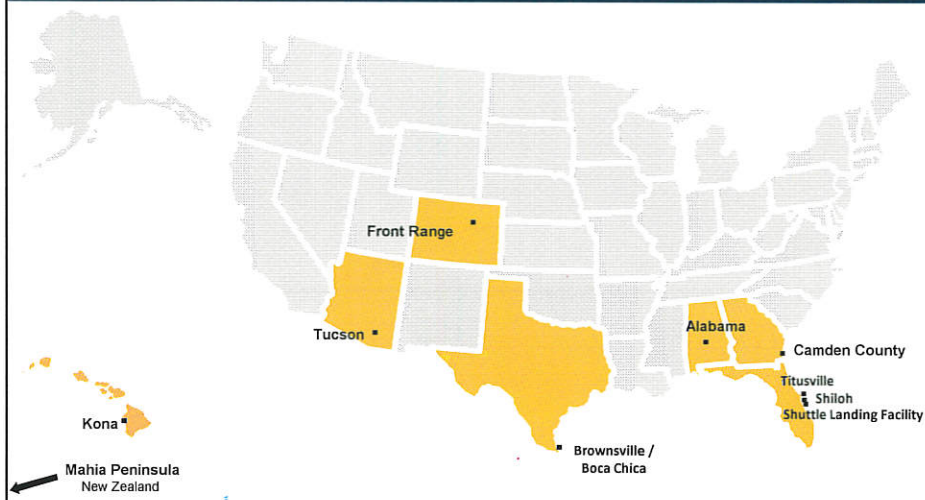
Current Trend: U.S. Launch Sites – “Spaceports”



Licensed Spaceports



Future Trend: Proposed Spaceports

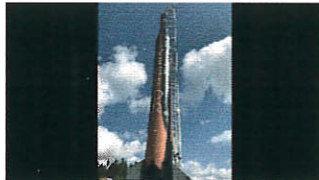


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Future Spaceports

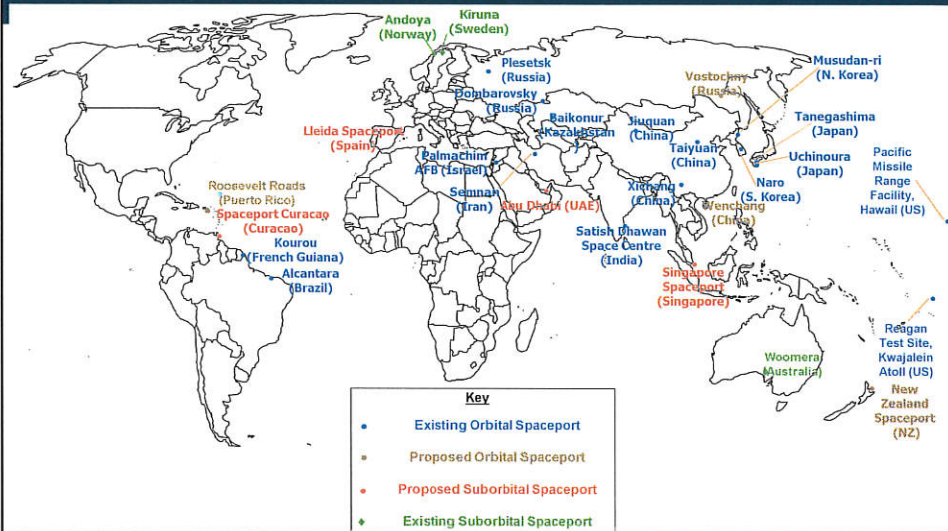


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Existing and Proposed Global Spaceports

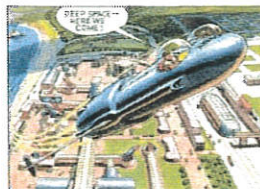


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Safe Integration... The Ultimate Goal



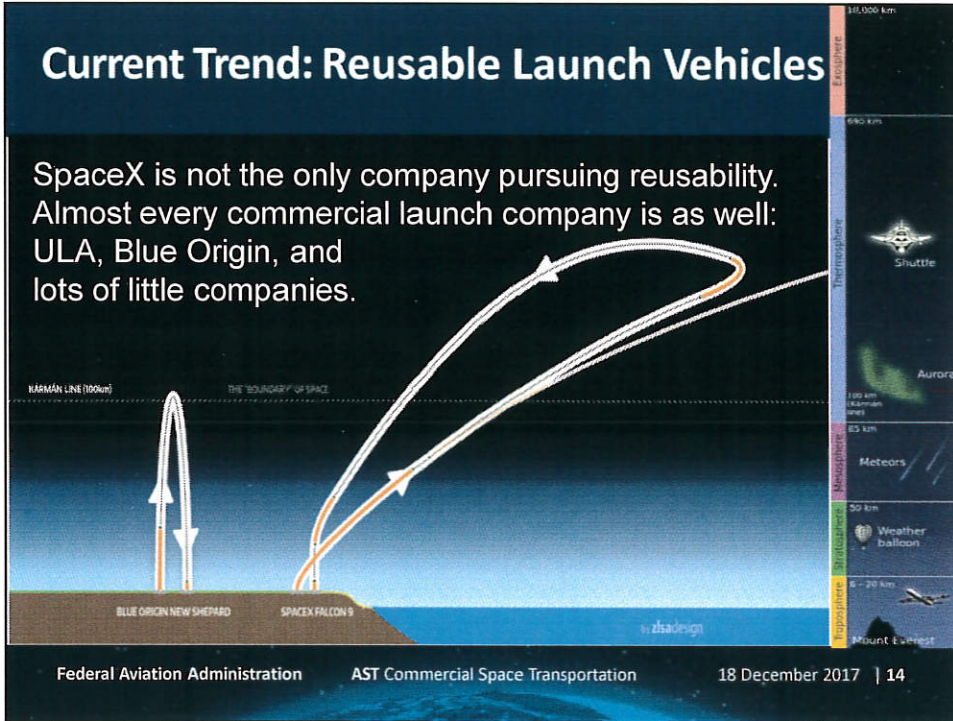
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Current Trend: Reusable Launch Vehicles

SpaceX is not the only company pursuing reusability. Almost every commercial launch company is as well: ULA, Blue Origin, and lots of little companies.



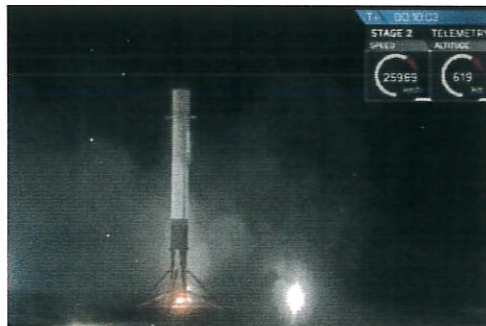
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Rocket Reusability

SpaceX and Blue Origin, although they have different goals, are both attempting to reuse the first stage of their suborbital (Blue Origin) and orbital (SpaceX) vehicles. For SpaceX - reusing the rocket first stage will hopefully dramatically decrease the cost of launches. The first stage of a Falcon 9 is about 70% of its \$54m price tag. In the future, SpaceX intends to return the second stage back to a landing site.



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Future Trend: Non-Traditional Reusability

- Balloon-based space tourism
- Balloon-based launch platform
- Space guns

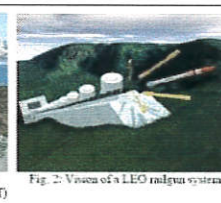
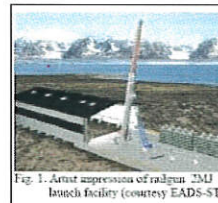
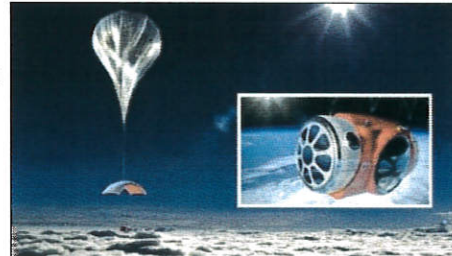
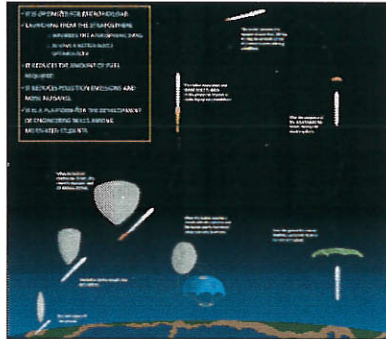


Fig. 1. Artist impression of railgun LEO launch facility (courtesy EADS-ST)

Fig. 2. View of a LEO railgun system

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New Heavy-Lift Systems - F9H & SLS



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Current Trend: Government as a Customer Commercial Procurement of Launch Services

To reduce costs, the Government is commercially procuring more launches:

- NASA Space Station Resupply and Crew
- DARPA XS-1 Spaceplane
- National Reconnaissance Office
- Other Government Satellites

DARPA XS-1—what is it?

Reusable 1st stage, expendable upper stage

- GOALS**
1. Fly 10X in 10 days, no upper stage/payload
 2. Design the objective system for >3,000-lb payload at <\$5M/flight
 3. Fly demo system one time with orbital payload >900 lbs



NASA Astronaut Transport

SpaceX Dragon 2



Boeing CST-100



Space Station Resupply

Orbital ATK Cygnus



Sierra Nevada Corp Dream Chaser



SpaceX Launches US Spy Satellite on Secret Mission, Nails Rocket Landing

By Irene Klotz, Space.com Contributor | May 1, 2017 07:50am ET

Current Trend: Government as a Customer

- DARPA has awarded Phases 2 and 3 of their Spaceplane program to The Boeing Company
- Phases 2 and 3 are focused on fabrication and flight
- Phase 3 objectives include 12 to 15 flight tests, currently scheduled for 2020.

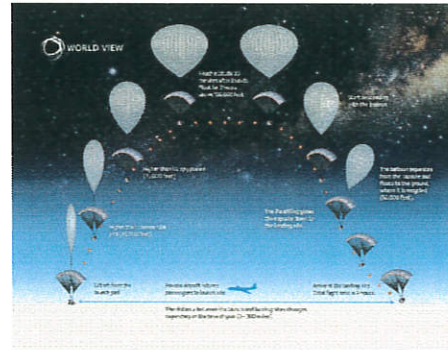
DARPA XS-1—what is it?

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Current Trend: Suborbital Human Spaceflight

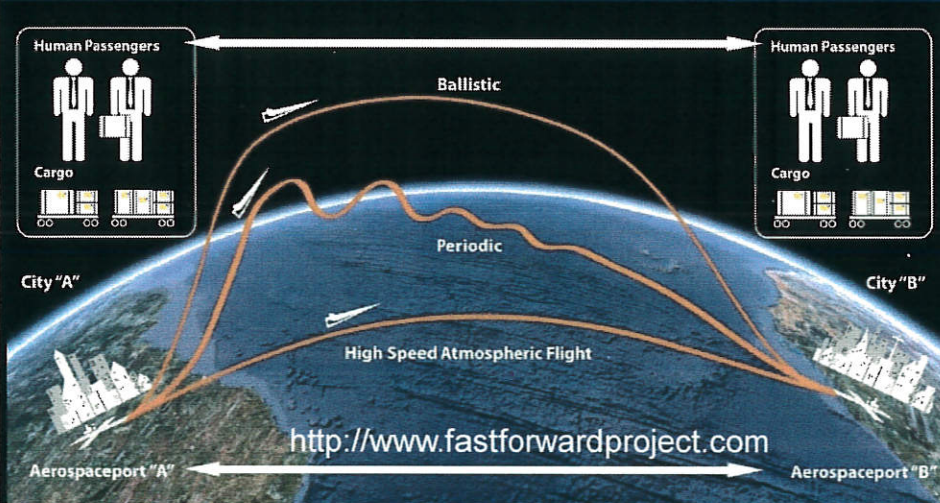


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Future Trend: Global Point-to-Point Travel



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Future Trend: In Space Commercial Operations

Satellite Servicing



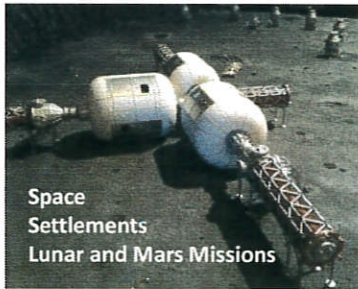
Commercial Space Stations



Lunar and Asteroid Mining



Space Settlements
Lunar and Mars Missions



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Pre-Application Consultation

Required per 14 CFR part 413.5

Our goal is to:

- Educate potential license, permit, or safety approval applicants about FAA regulations and processes
- Enable development of a high fidelity, complete application.
- Provide opportunity for applicants to gain a clear understanding the Part 400 regulations and associated review processes apply to proposed operations
- Provide FAA opportunity to gain an understanding of potential applicant's proposed operation(s) prior to application submittal
- Execute a process that enables FAA and applicant to work together efficiently to identify and proactively resolve technical, legal or policy challenges associated with the proposed activities.

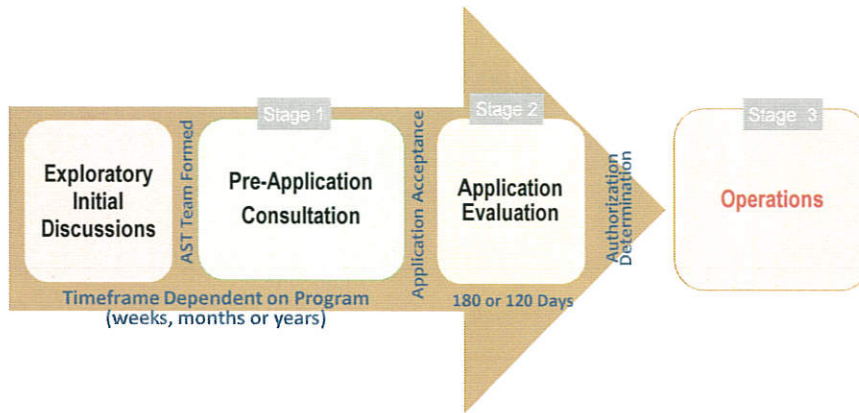


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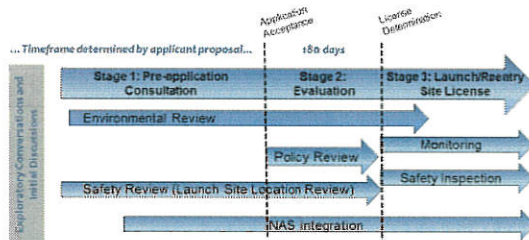
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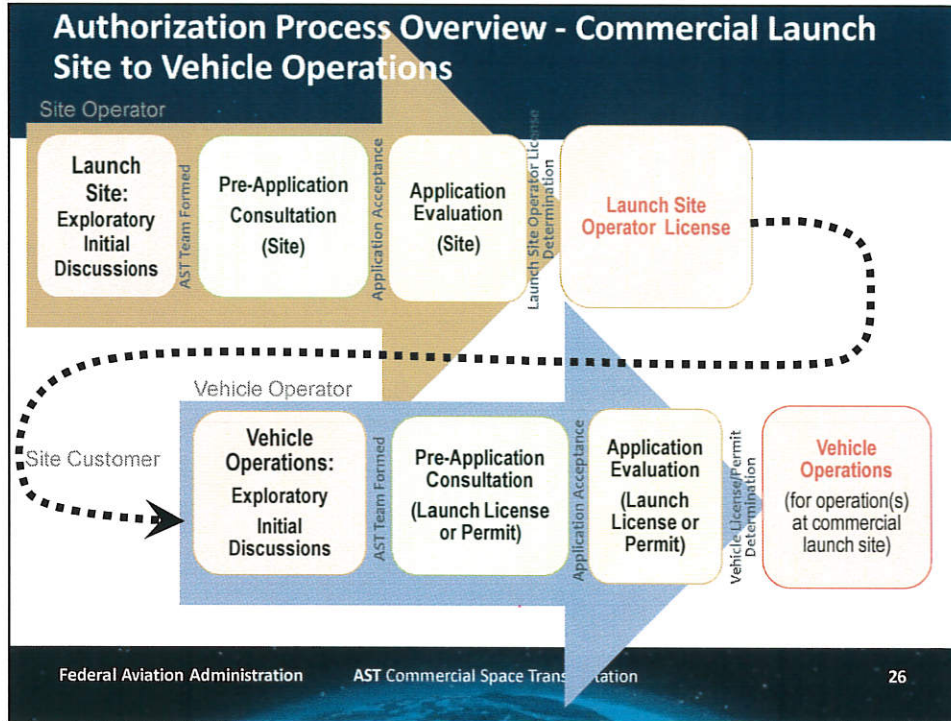
AST Authorization Process Overview



Pre-Application Consultation

AST Process Overview – Launch Site Operator License





National Space Council

October 5, 2017

First meeting of the National Space Council chaired by Vice President Pence




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New Space Policy Directive

New Space Policy Directive Calls for Human Expansion Across Solar System

President Donald Trump is sending astronauts back to the Moon.

The president Monday (12/11) signed at the White House **Space Policy Directive 1**, a change in national space policy that provides for a U.S.-led, integrated program with private sector partners for a human return to the Moon, followed by missions to Mars and beyond

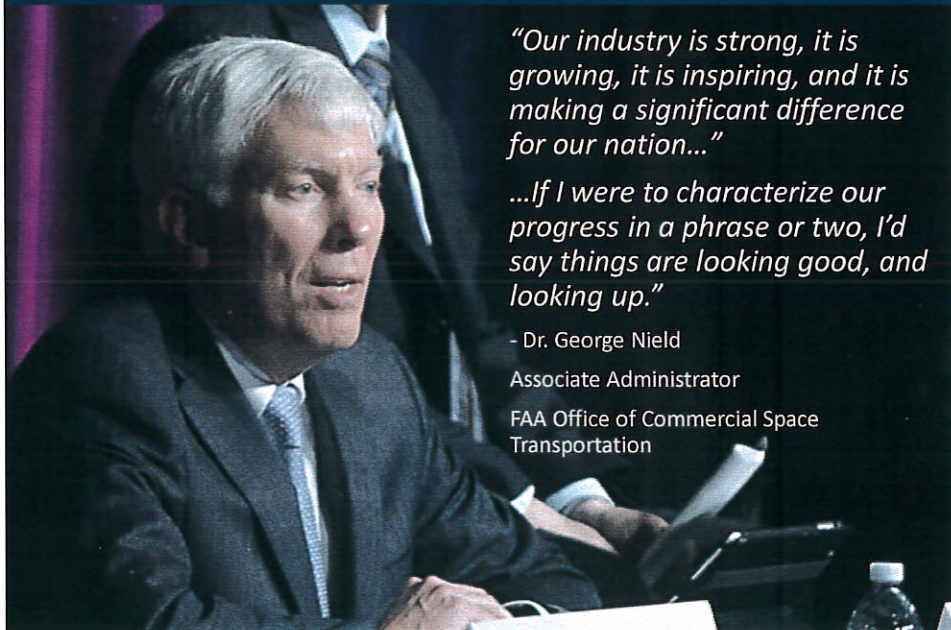


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Conclusion



"Our industry is strong, it is growing, it is inspiring, and it is making a significant difference for our nation..."

...If I were to characterize our progress in a phrase or two, I'd say things are looking good, and looking up."

- Dr. George Nield

Associate Administrator

FAA Office of Commercial Space Transportation