



# ***FAA Office of Commercial Space Transportation***

## ***Activities Overview***

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ACI-NA Annual Conference

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**Federal Aviation  
Administration**

# 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):

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

# Who Needs a License or Permit?



## **An entity must obtain a license:**

- To ***launch*** a launch vehicle from the United States;
- To ***operate*** a launch or reentry site within the United States;
- To ***reenter*** a reentry vehicle in the United States.

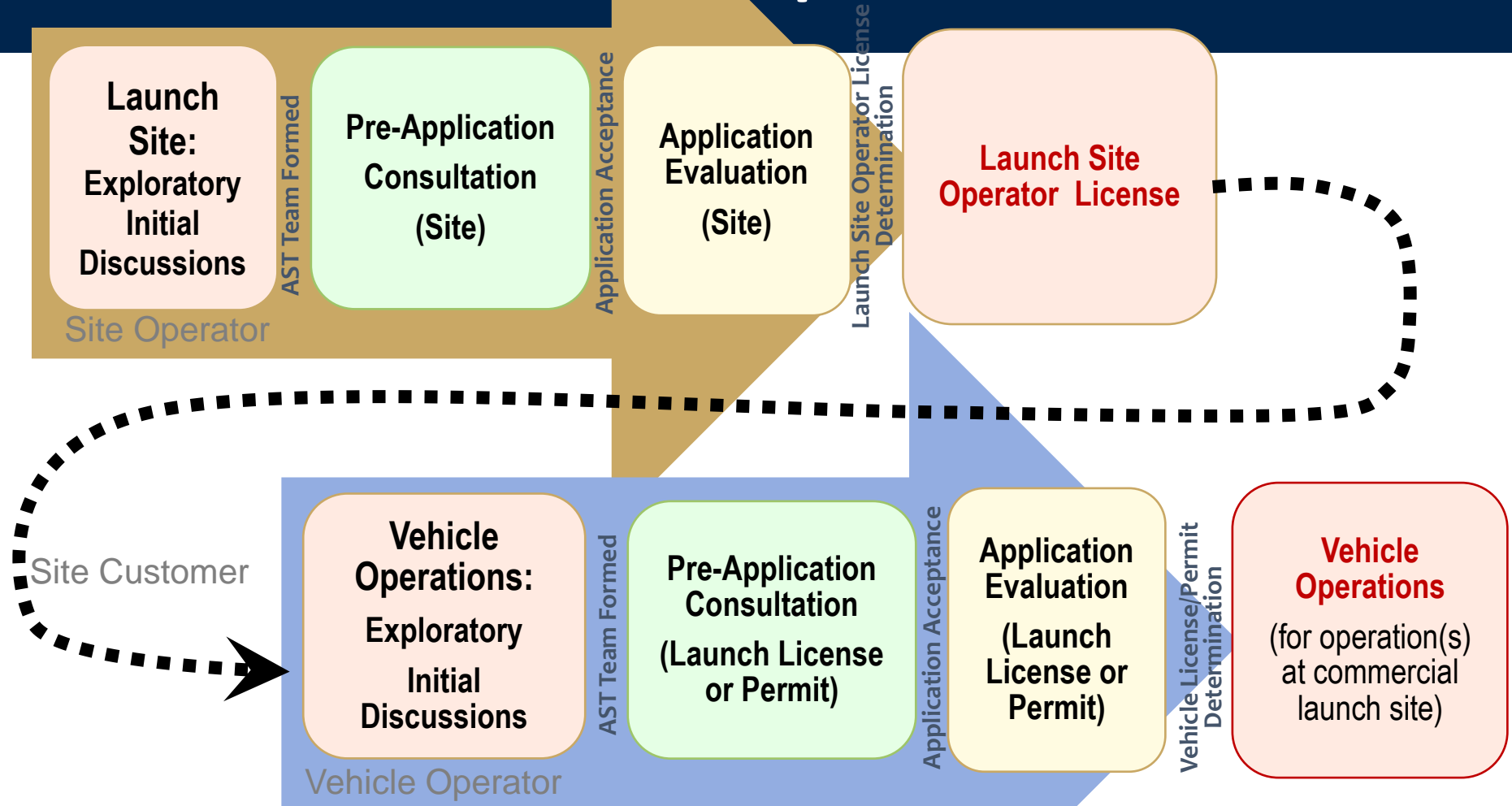
## **An entity may obtain an experimental permit:**

- To ***launch*** a reusable suborbital vehicle from the United States for research and development, or prior to obtaining a launch license, to show compliance with requirements for a license or crew training.

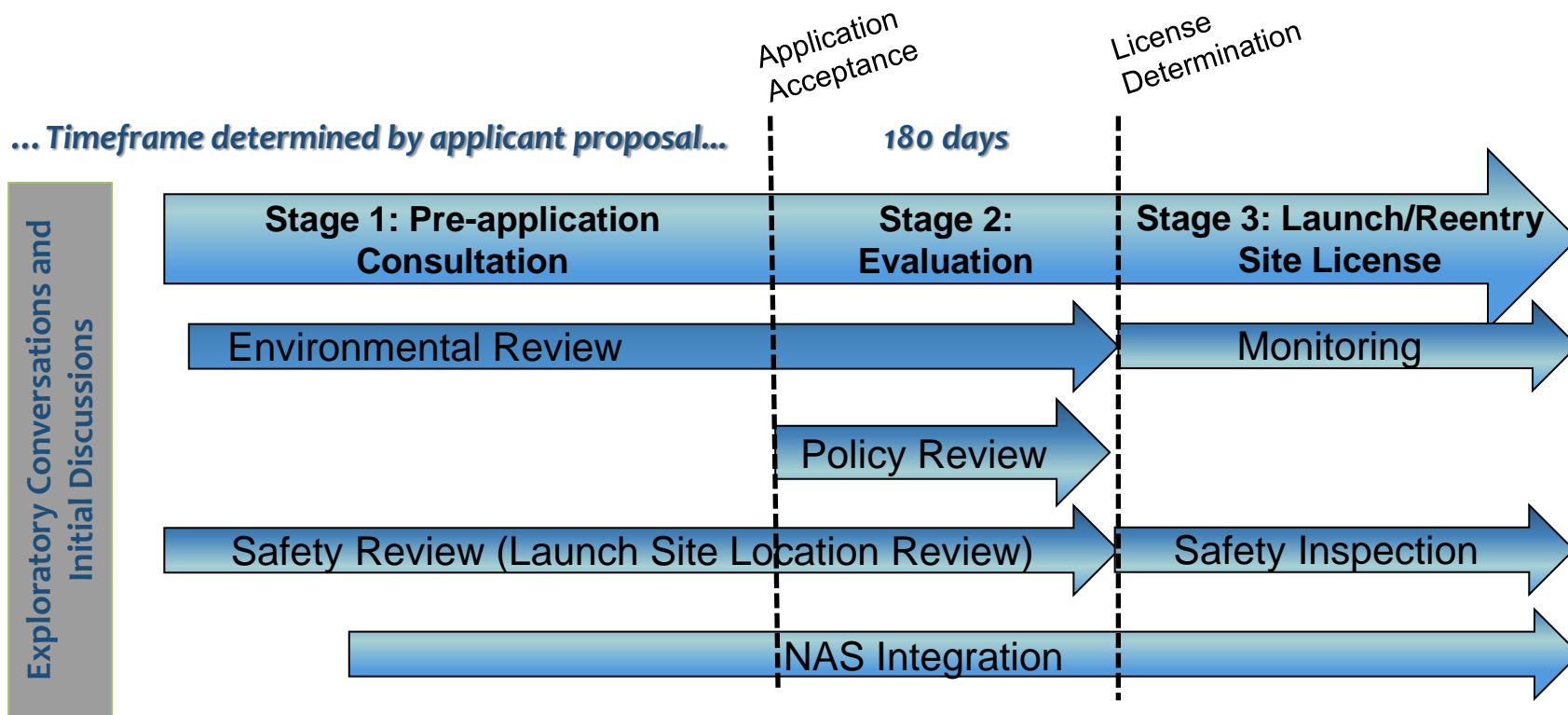
## **A U.S. citizen or an entity organized under the laws of the United States or any State must obtain a license:**

- To launch a launch vehicle *outside* the United States;
- To operate a launch or reentry site *outside* of the United States;
- To reenter a reentry vehicle *outside* of the United States; or

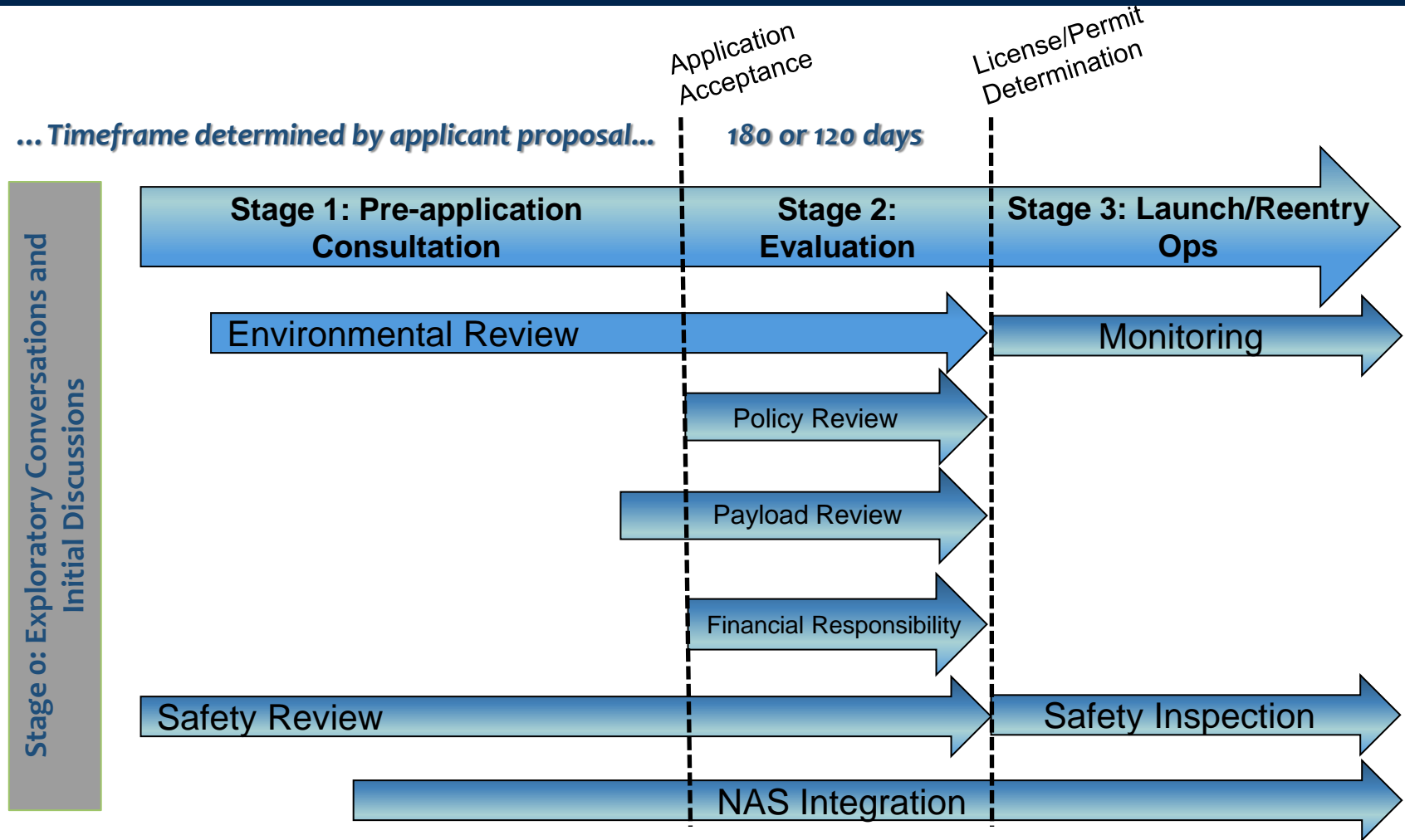
# Authorization Process Overview - Commercial Launch Site to Vehicle Operations



# Launch Site Operator License



# Launch Vehicle Operator License





# Stage 0: Exploratory Initial Discussions

- Series of meetings, the timing and frequency of which is largely proponent driven, to:
  - Identify points of contact
  - Conduct early discussion of initial plans
- Helpful for new companies that have never gone through the regulatory process before and/or companies proposing novel ideas
- Typically not necessary for experienced applicants/operators

# Stage 1: Pre-Application Consultation

- Required by regulation (14 CFR Part 413.5)
- Series of meetings, the timing and frequency of which is largely proponent driven, to:
  - Inform applicants about FAA regulations and processes
  - Inform FAA of potential applicant's plans, timelines, unique aspects of proposed operations
  - Enable development of a high fidelity, complete application
  - Develop and 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
- Pre-application can last months or even years, depending upon the readiness of the proponent and other factors





# Products of Pre-Application Consultation

- **Draft environmental document**
  - Description of proposed project provides overview of applicant's proposal, which provides insight into the concept of operations
  - Not proprietary, published for public comment
- **Draft Letter of Agreement (LOA) with ATO**
  - For sites, LOAs are developed at a high level, particularly for sites that do not have a committed operator
  - For vehicle LOAs, drafts should contain preliminary requirements and procedures; most do not show the hazard area(s)
  - Proprietary
- **Draft application material**
  - Focus on any aspects with high regulatory risk
  - Used to assemble preliminary policy review package
  - Proprietary

# Stage 2: Evaluation

Key aspects include:

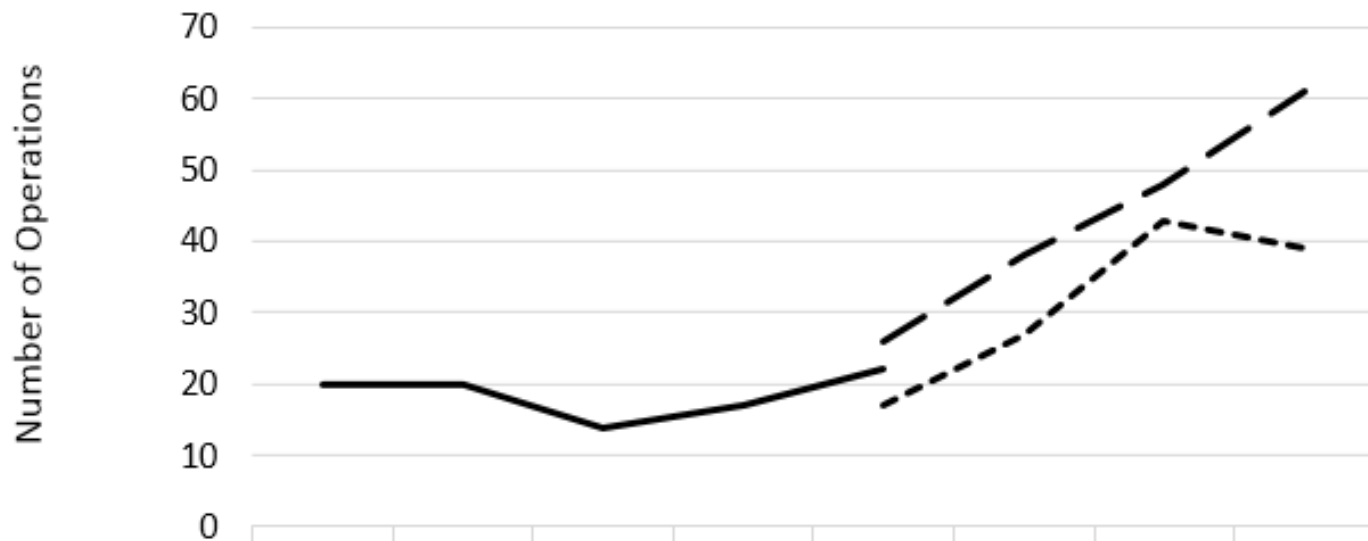
- ☐ Policy Review
- ☐ Environmental Review
- ☐ Flight Safety Analysis
- ☐ Maximum Probable Loss
- ☐ System Safety Analysis
- ☐ Mission Rules
- ☐ Airspace Integration
- ☐ Airport Coordination

# Stage 3: Operations

- ☐ Safety inspection
- ☐ Air Traffic support
- ☐ Launch/Reentry day activities

# U.S. Commercial Launch Forecast

Number of AST Licensed and Permitted Operations  
by Fiscal Year



	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020
Actual	20	20	14	17	22			
Forecast High					26	38	48	61
Forecast Low					17	27	43	39

# U.S. Launch and Reentry Sites



# U.S. Space Policy Implementation

## **SPD-1: Reinvigorating U.S. human space exploration**

Missions beyond low-Earth orbit    Return humans to the Moon for long-term exploration    Human missions to Mars

## **SPD-2: Streamlining commercial space regulations**

Goal: Reform regs governing commercial space activity to promote economic growth, minimize uncertainty, protect national security and public-safety, and encourage American leadership in space commerce

Directs DOT and DOC to revise and streamline regulations, reorganizes DOC, directs review of export licensing

## **SPD-3: Space traffic management policy**

Goal: Develop a new approach to space traffic management (STM) that addresses current and future operational risks

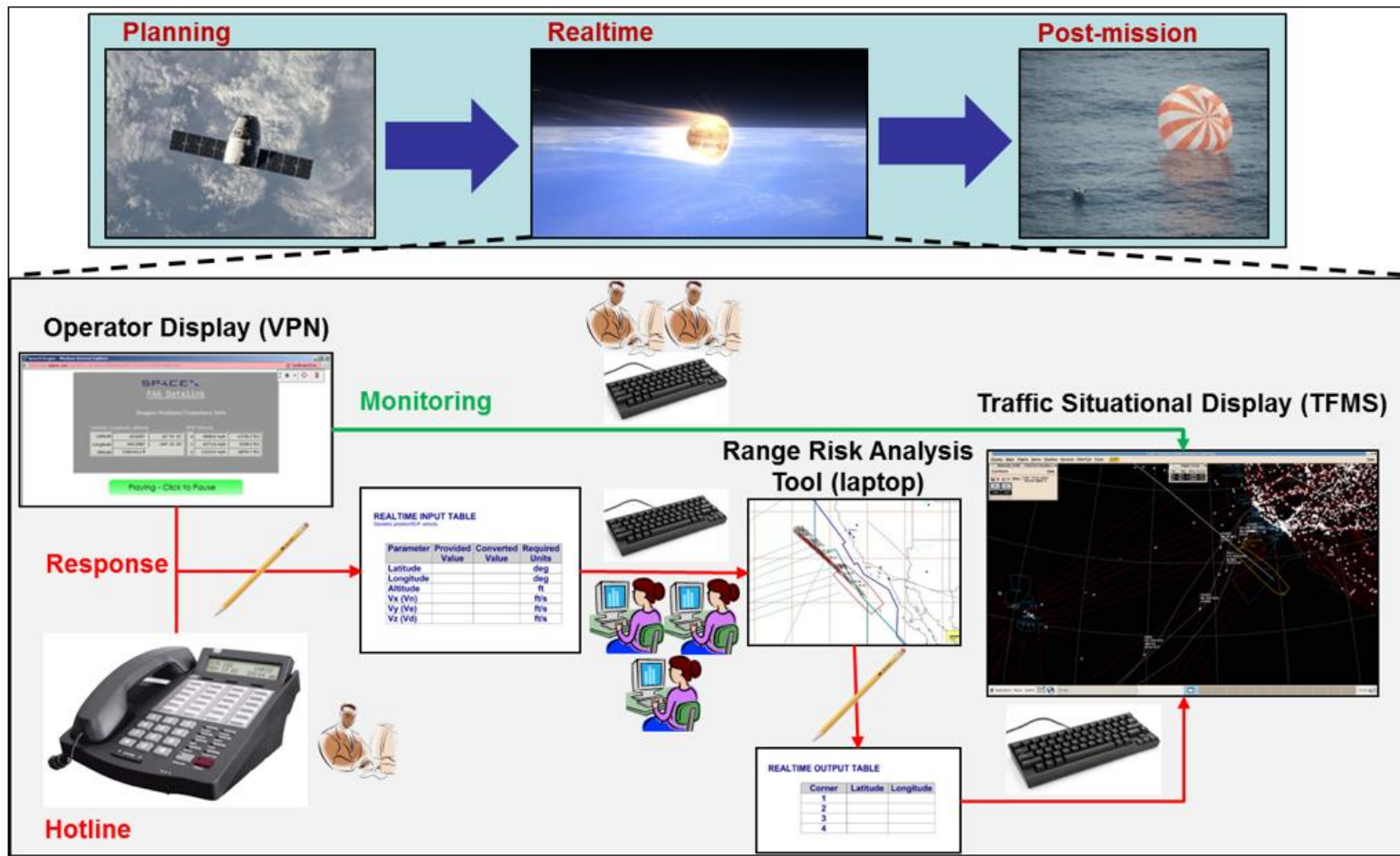
Primarily designates DOC as civil agency lead for SSA/STM

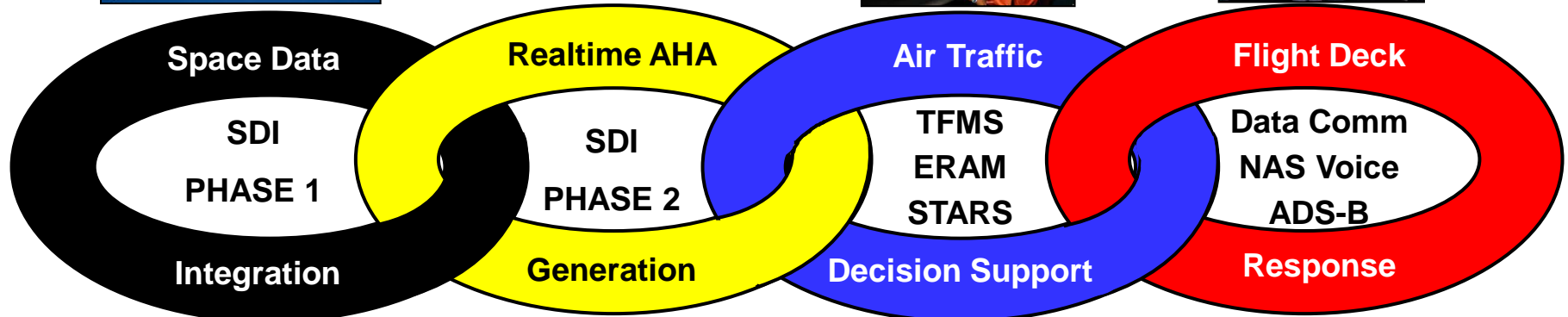


# Stakeholder Outreach

- Since 1984, the Commercial Space Transportation Advisory Committee (COMSTAC) has provided guidance, information and recommendations to the Department on matters facing the U.S. commercial space transportation industry. Composed of 26 members across the aerospace industry.
- Three Aviation Rulemaking Committees (ARCs) related to commercial space transportation:
  - ❑ Airspace Access ARC looking at how to more effectively integrate commercial space into the NAS
  - ❑ Spaceport ARC evaluating if FAA can more strategically advise potential launch site operators of key considerations that factor into siting and licensing
  - ❑ Regulatory Streamlining ARC submitted final report in April

# NAS Integration Today

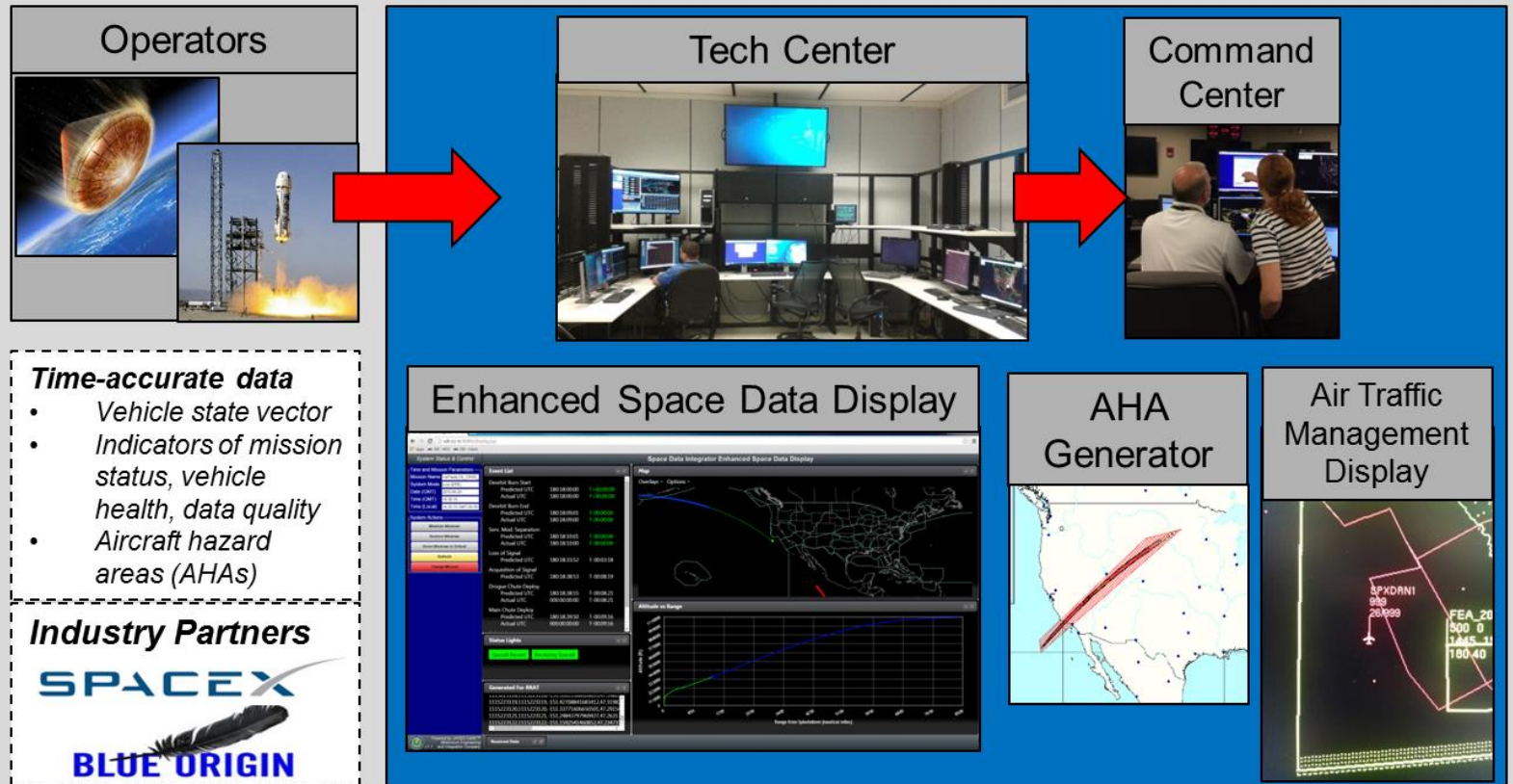




Realtime Situational Awareness	Rapid Identification of Affected Airspace	Risk Based Decision Making	Responsive Hazard Avoidance
Monitor for non-conformance to mission elements ( <b>respond</b> )	Verify if airspace closed in advance is sufficient ( <b>respond</b> )	Identify aircraft at risk ( <b>respond</b> )	Flight deck receipt ( <b>respond</b> )
Failure indication / confirmation ( <b>respond</b> )	Identify extent of additional airspace closures ( <b>respond</b> )	Prioritize mitigating actions ( <b>respond</b> )	Flight deck readback ( <b>respond</b> )
Indicate airspace no longer at risk ( <b>release</b> )	Dynamic refinement of areas to eliminate unaffected closure( <b>reduce</b> )	Deconflict and communicate actions across ATC boundaries ( <b>respond</b> )	

# Space Data Integrator

## SDI Proof of Concept



# BACKUP SLIDES

# Policy Review

**What is it?** AST prepares a package of material from the formal application submittal to send to the DoD, State Department, NASA, FCC and NOAA that describes the operation and requests their feedback within 30 days

## What does it contain?

- Vehicle/site description
  - Vehicle type, descriptions of major systems
- Mission description
  - Trajectories
  - Nominal impact area(s)
  - Payload(s)
- Proposed schedule

**When is it coordinated?** Package is distributed early in the evaluation process, after an application is formally accepted



# Environmental Review

**What is it?** The FAA must complete an environmental review under the National Environmental Policy Act (NEPA) by assessing the environmental impacts of the proposed licensing actions.

- Environmental Assessment (EA) – concise public document. Could result in preparation of a Finding of No Significant Impact (FONSI) or preparation of an Environmental Impact Statement
- Environmental Impact Statement (EIS) – detailed analysis of environmental impacts and plans to mitigate those impacts

## What does it contain?

- Purpose and Need
- Proposed Action Includes construction and vehicle operations
- Alternatives including the No Action Alternative
- Affected Environment – baseline description of project area
- Impacts Analysis
- Mitigation Requirements

# Environmental Review

## Timing?

- Scoping Meeting
- Public Meeting during Draft EA/EIS review
- Email updates
- Other stakeholder engagement

## When is it coordinated?

- Draft EA or EIS is released for public review
- Agency consultations are integrated into or referenced in environmental document
- Final EA or Final EIS is released for public review
- EA – end in Finding of No Significant Impact or preparation of an EIS
- EIS – Record of Decision

# Flight Safety Analysis (FSA)

**What is it?** FSA is a quantitative risk assessment that demonstrates that the risk of the operation to the public, expressed in terms of collective risk and individual risk, does not exceed regulatory limits

- Collective risk (expected casualties)  $\leq 100$  in one million per launch/reentry
- Individual risk  $\leq 1$  in one million per launch/reentry

Analysis includes data and supported assumptions on the following:

- Vehicle probability of failure
- Relative likelihoods of potential failure modes
- Lists of debris generated by nominal flight and failures
- Nominal and malfunction trajectories
- Vehicle guidance, navigation, and performance characteristics
- Meteorological conditions
- Population and exposure data
- Mission rules
- Flight safety system info

# Flight Safety Analysis (FSA)

## What does it contain?

- Calculations that demonstrate compliance with public safety limits (collective risk, individual risk)
- Flight safety limits and impact limit lines
  - Example: flight safety termination/destruct criteria
- Other flight rules that must be met in order for the assumptions used in the analyses to be valid
- Hazard areas on the ground, on the sea, and in the air
  - Areas that must be evacuated or monitored to ensure the public safety risk limits are met

**When is it coordinated?** Final results must be included in the application; results may not be available until between 30 and 10 days prior to operation

# Maximum Probable Loss (MPL)

## What is it?

- AST calculates MPL to determine minimum insurance requirements for government property, third parties, and third party property

## What does it contain?

- Data requirements for this calculation are very similar to the FSA data requirements

## When is it coordinated?

- AST provides insurance requirements no later than 90 days after it receives the necessary information

# System Safety Analysis

**What is it?** Applicants for a reusable launch vehicle license or an experimental permit must develop and implement a system safety program plan and demonstrate acceptable mission risk through system safety hazard analyses

## **What does it contain?**

- Description of the applicant's safety organization
- Analyses that demonstrate compliance with public safety limits  
Mission rules, procedures, contingency plans, and checklists
- Mission operational requirements and restrictions that must be met in order for the assumptions used in the analyses to be valid

**When is it coordinated?** Final results must be included in the application; supporting data may be provided later, but before the operation, according to terms & conditions



# Mission/Flight Rules

**What is it?** An applicant identifies operating requirements and restrictions necessary for public safety

**What does it contain?** Checklists, procedures, and other documents that address:

- Requirements necessary to ensure assumptions used in the FSA remain valid
- Requirements necessary to ensure assumptions used in the system safety analyses remain valid
- Other requirements necessary to ensure public safety that take the form of launch/reentry commit criteria and/or flight rules

**When is it coordinated?** Preliminary rules are submitted with the formal application; rules may be reviewed and updated throughout the preparation for the operation

# Airspace Integration

**What is it?** An applicant for a license or permit must complete a Letter of Agreement (LOA) with the FAA Air Traffic Control facility having jurisdiction over the airspace through which operations will take place

**What does it contain?** LOAs establish procedures for:

- Notification, including the issuance of a Notice to Airmen (NOTAM),
- Communication before, during, and after the operation,
- Contingencies/emergencies, and
- Any additional measures deemed necessary to protect public health and safety

**When is it coordinated?** Draft LOAs are required (by policy) for application acceptance; final signed LOAs are required for license/permit determination

# Airports Coordination

**What is it?** Airport standards, requirements, and/or contractual obligations remain in effect and must be addressed by an airport sponsor seeking to bring launch site and launch vehicle operations on airports that are:

- Identified in the National Plan of Integrated Airport Systems (NPIAS);
- Certificated under 14 CFR part 139, Certification of Airports; or
- Obligated through Federal financial assistance or property conveyance

\*An airport sponsor must comply with its obligations under Title 49 U.S.C. §47107 et seq.

# Safety Inspection

## **Verifies Operator Compliance with:**

- Applicable United States Code
- Applicable FAA Regulations
- Representations made in application
- Any special terms and conditions

## **Examples of typical inspection items:**

- Processes and procedures, particularly those concerning flight safety systems
- Rehearsals and readiness reviews
- Mishap response plan (signed)
- Launch commit criteria
- Mission and flight rules

## **Interaction:**

- Ask questions to verify compliance
- Respond to licensee queries
- Provide feedback as necessary – proactive approach

# Air Traffic Support

**Through the Joint Space Operations Group (JSpOG), AST supports the ATO at the Command Center by:**

- Providing space operations subject matter expertise to the interdisciplinary team
- Supporting the development of plans and procedures, monitoring NAS during launch/reentry missions, and responding to off-nominal scenarios
  - Evaluate/compute aircraft hazard areas (AHAs), contingency hazard areas (CHAs), and data required to support the implementation of the Acceptable Level of Risk (ALR) approach
  - Collect data to compare against pre-mission predictions
  - In the event of a contingency, compute AHAs as necessary
  - Exercise proof of concept tools for automating and improving processes

# Launch/Reentry Day Activities

- Onsite safety inspectors monitor the licensee's/permittee's compliance with the regulations, the license/permit, and representations made in the application
  - Duty officers distribute status information throughout AST and with the FAA Office of Accident Investigation and Prevention, NTSB, WOC, and DoD Joint Space Operations Center (JSpOC)
- Mishap response team prepares for potential response
- JSpOG convenes at the Command Center

# Insurance & Indemnification

## Insurance

Licensees and Permittees must obtain liability insurance or demonstrate financial responsibility to compensate for the maximum probable loss (MPL) from claims by:

- A third party for death, bodily injury, or property damage or loss; and
- The U.S. Government for damage or loss to government property.

Statutory ceilings:

- Third party - \$500M maximum
- Government property - \$100M maximum



## Indemnification

- The U.S. Government will indemnify, subject to Congressional appropriation, a licensee for any claims above the insured amount
- Space flight participants are not eligible for indemnification



# Key Differences Between a Launch License, Permit, and Amateur Rockets

	License	Experimental Permit	Amateur Rockets
<b>Regulations</b>	<b>14 CFR 415, 431 (AST)</b>	<b>14 CFR 437 (AST)</b>	<b>14 CFR 101 (Air Traffic)</b>
<b>Review Period</b>	FAA/AST has a <u>maximum</u> of 180 days	FAA/AST has a <u>maximum</u> of 120 days	Air Traffic requests at least 45 days prior (frequently takes longer)
<b>Performance</b>	Orbital or Suborbital (any impulse level)	Suborbital <i>and</i> Reusable Only (any impulse level)	Suborbital. Total Impulse must be under 200,000 lb-sec (889,600 Newton seconds) and does not reach altitude higher than 150 km (93.2 statute miles)
<b>Compensation for Hire</b>	Allowed	Prohibited	Allowed
<b>Indemnification</b>	Eligible for government indemnification	Not eligible for indemnification	Not eligible for indemnification
<b>Environmental Review</b>	Major Federal Action - Required	Major Federal Action - Required	Categorically Excluded

# Licenses

## Types of Licenses

- Launch-Specific License - Expendable Launch vehicle (ELV) or Reusable Launch Vehicle (RLV)
- Launch Operator License (ELVs or RLVs)
- Reentry-Specific License (Reentry vehicle other than an RLV)
- Reentry Operator License (Reentry vehicle other than an RLV)
- Launch Site Operator License (i.e. “Spaceport”)
- Reentry Site Operator License (i.e. “Spaceport”)

# Launch/Mission Specific License (ELV/RLV)

This type of license authorizes the licensee to conduct one or more launches or reentries:

- Same operational parameters
- Same type of launch or reentry vehicle,
- Operating at one launch or reentry site.

This type of license:

- Identifies, by name or mission, each activity authorized under the license.
- Terminates when all launches or reentries authorized by this type of license are complete or the expiration date stated in this type of license – whichever occurs first.
- Typically issued for operation(s) that are new and unproven.

For typical ELV launches, an application must comply with 14 CFR Parts 415 and 417.

For RLV missions, an application must comply with 14 CFR Parts 431.

# Launch Operator License (ELV/RLV)

This type of license authorizes the licensee to conduct operations, within a range of parameters:

- Operations are demonstrated to meet FAA safety requirements
- Remains in effect for five years from the date the license is issued

For typical ELV operations, an applicant must comply with 14 CFR Parts 415 and 417 to obtain this type of license

For RLV operations, an applicant must comply with 14 CFR Part 431 to obtain this type of license

# Experimental Permit

An experimental permit may be issued by the FAA for reusable suborbital rockets that will be launched or reentered solely for—

- Research and development to test new design concepts, new equipment, or new operating techniques;
- Showing compliance with requirements as part of the process for obtaining a license under this chapter; or
- Crew training prior to obtaining a license for a launch or reentry using the design of the rocket for which the permit would be issued

Carriage of people or cargo for compensation or hire is not allowed

Valid for a one year, renewable term from the date the experimental permit is issued

Allows for an unlimited number of launches and reentries for a specific suborbital rocket design within the year

For an experimental permit, an applicant must comply with CFR part 437 to obtain the permit.

# Launch or Reentry Site Operator License

This type of license authorizes the licensee to operate a launch or reentry site:

- A launch or reentry license is still required by an operator seeking to launch or reenter at a licensed 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

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