
AST
Commercial Space
Transportation
Towards a
Civil Space Traffic
Management System
Federal Aviation
Administration

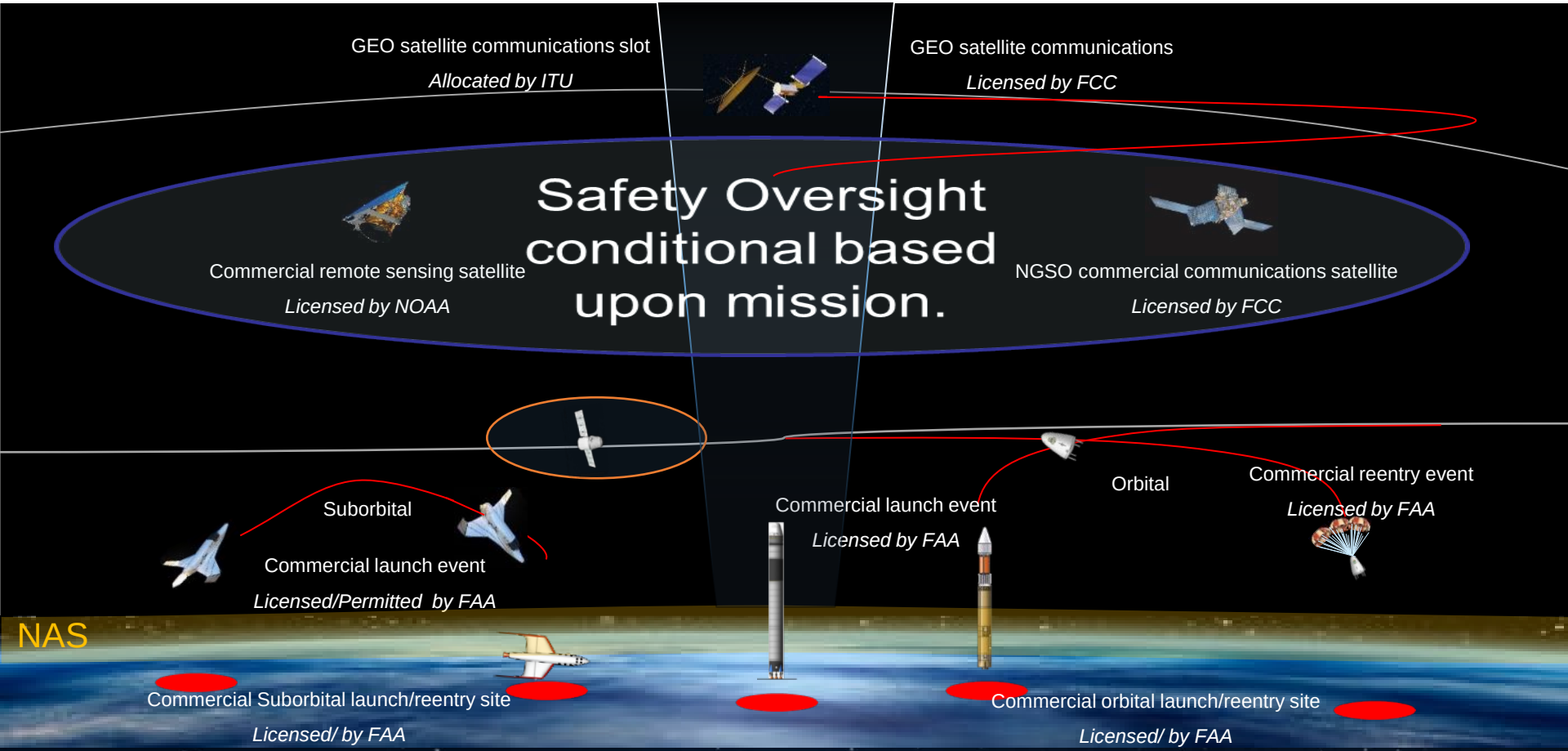
Purpose

Provide insight to Industry on the creation of a Civil Space Traffic Management System

- Product: An informed industry that can start to seriously consider how they can help

Today's Space Traffic Oversight Regime

- **DOD provides orbital safety information services**
- **Potential detrimental effects for emerging commercial space transportation activities**
- **Long-term sustainable solution needed to ensure safe environment for commercial activities**



Joint Activity – Orbital Safety Awareness

Activity is based on the National Space Transportation Policy and related work.

- FAA and DoD working together, under the guidance of OSTP
- Develop options to create a Civil Space Traffic Management system
  - Founded on non-security focused paradigms
  - Promote norms of behavior
  - Support National interests in space as well as commercial and civil needs
- Implementation timeframe – near term

OSTP Guidance

- FAA, DoD, and OSTP will work together
  - Options will assist in developing resource requirements, pace of the transition of commercial STM from DoD to the FAA, etc.

- Incorporating input from FAA and DoD Leadership:
  - Cost efficient
  - “Clean sheet of paper”
  - Take maximum advantage of emerging commercial SSA capabilities
  - Consider non-traditional business models

What is Space Traffic Management?

- Several definitions exist
- Civil System focus
    - Orbital safety and the preservation of the space environment
- Orbital safety awareness services – e.g., collision avoidance warnings – will *enhance, facilitate, and support* the continued development of the commercial space industry
- Orbital safety related services must be provided in a manner that ensures safe commercial orbital operations
    - Minimize false alarms
    - Development and sharing of norms of behavior and best practices

Why a Civil System?

- A civil system will focus on the commercial and civil needs for orbital safety awareness information.
- Provides a focus for preservation of the environment for long term commercial use.
- Position the US to extend a civil space traffic management paradigm to the international arena through the use of a civil agency that offers greater transparency in space situational awareness and orbital safety.

Civil STMS Goal

Safety of space operations and preservation of the space environment

Civil STM System Characteristics

What and How:

- Operate *cooperatively* with existing SSA architectures, while retaining the ability to function *independently*.
- Access to sensors from many sources across the globe
- Computation system with civil insight and responsive to civil system requirements
- Safety products produced by the civil operations team
- Transparent operation

Policy/Development Guidance:

- Organizational structure and policies that enable the attributes of a learning organization
- Maximize use of commercial capabilities
- No fees for use of service – supplied as a public good
- Information Sharing Agreements

No Reduction in DoD SSA Capabilities

- The DoD will continue to maintain capabilities, collect data, and maintain a database of space objects as well as conduct any operations necessary to maintain national security.

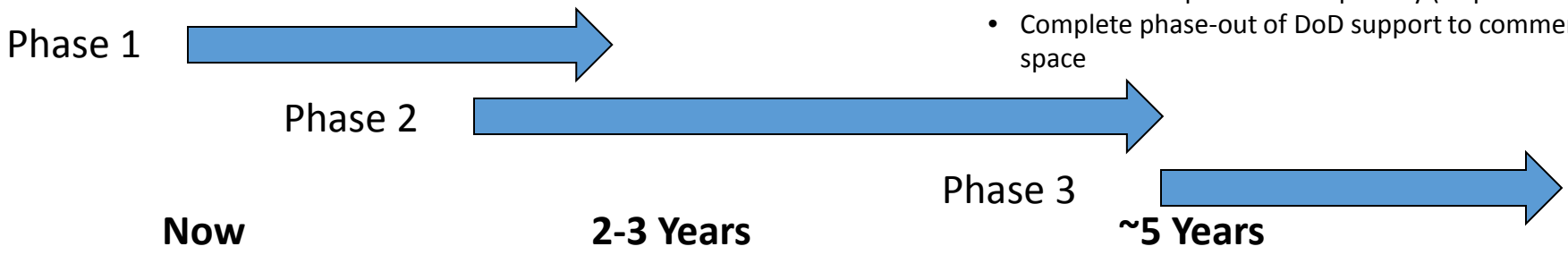
- Pursuant to the 2010 National Space Policy, all departments and agencies will share their capabilities, specifically SSA data and expertise as available, to assist each other in the accomplishment of the space safety mission.

Civil STM Products/Services

- Civil space catalog
- Conjunction Assessment and Collision Avoidance Messages
- Space Environment messages
  - Space Weather
  - Radio Frequency
  - Space Situational Awareness
- Norms of Behavior

Conceptual Civil STMS Program Plan

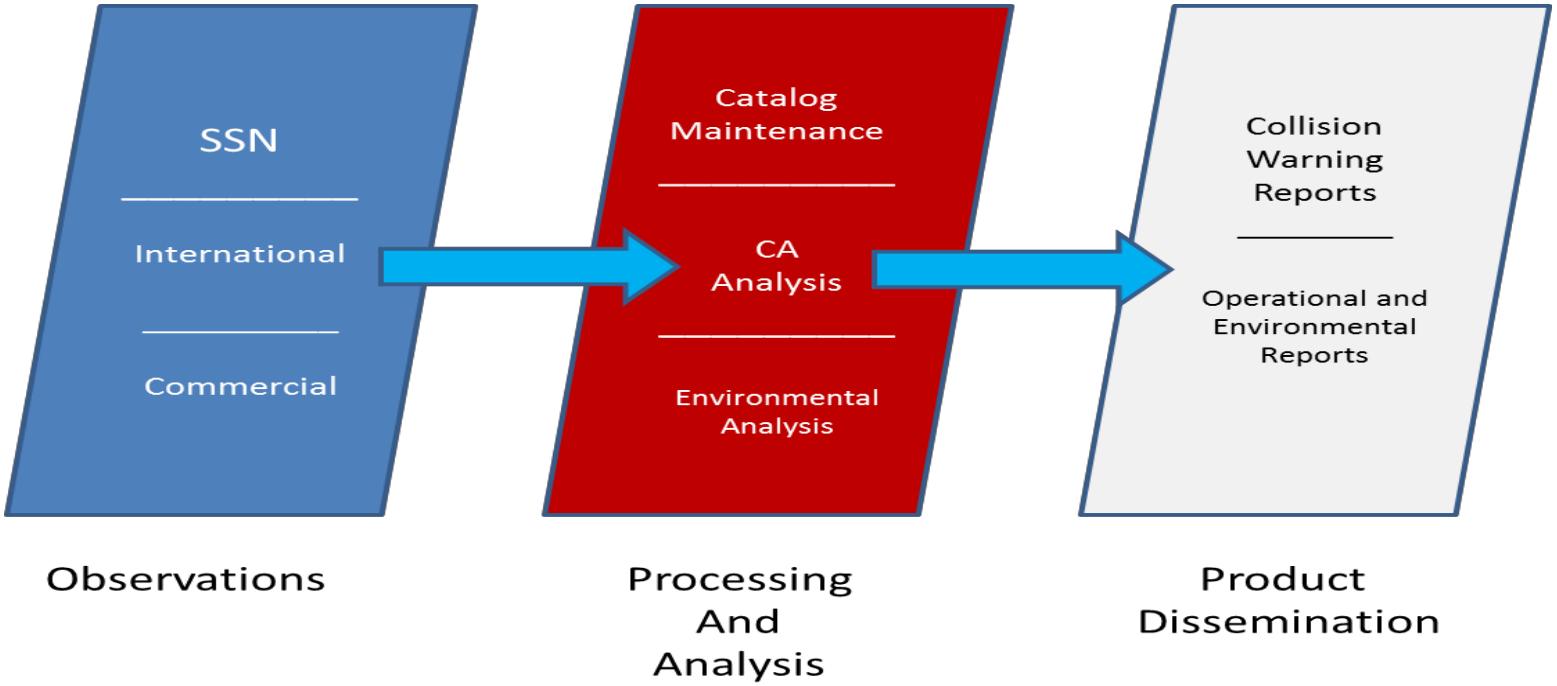
- **First Phase**
  - Bring FAA STMS Program onto a firm footing
    - Program requirements, budget, schedule, etc.
  - Perform confidence building measures
    - Pilot Program
  - Acquire the architecture, train the personnel
  - Focus on Transition and Transparency
  - Data Sharing agreements (commercial and international)
- **Second Phase**
  - Mature and Expand Operations (all customers, all orbital regimes)
  - Begin developing safety-related norms and standards
- **Third Phase**
  - Achieve Full Operational Capability (all products)
  - Complete phase-out of DoD support to commercial space



- **Future Phases**
  - Set Requirements / Implement regulations as needed
  - Direct actions if appropriate

A Conceptual Architecture

- All STM systems could be represented as comprising three basic functions:



STM Program Definition

What will the Civil Space Traffic Management System “look like”?

This is a clean sheet of paper

CSTM Program Definition -

Multiple approaches are possible – Here are a few that have been proposed:

- Let the DoD continue to do all the work and limit Civil role to distributing the results of the JSpOC safety related calculations

CSTM Program Definition (2)

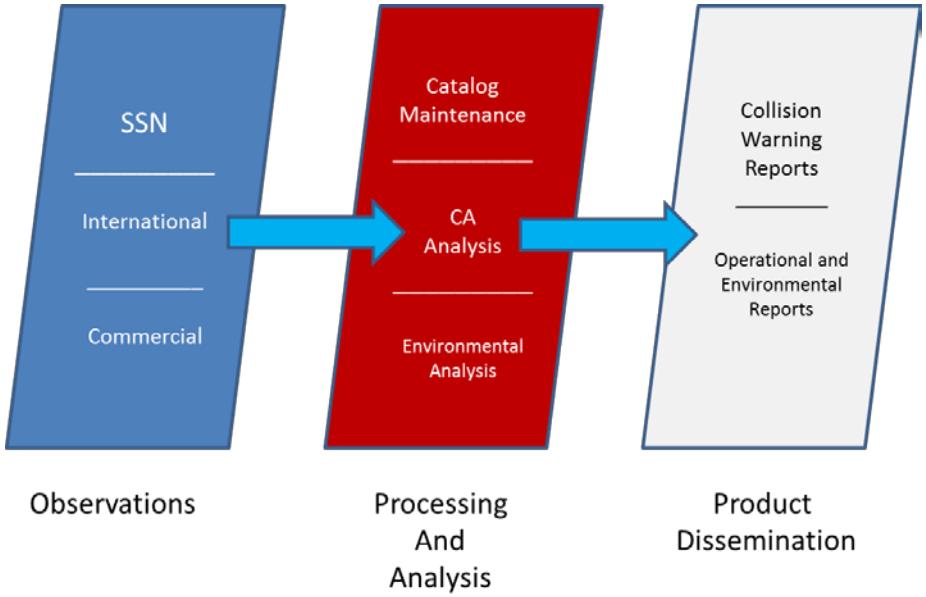
Replicate much of the DoD architecture: observation network, create a FAA operations center, and utilize copies of the existing DoD computation hardware and software

Or - Create a separate Civil Observation network and operations center, and develop/procure a unique computation capability based solely on Civil requirements

CSTM Program Definition (3)

Civil operation based on commercial capabilities

- computation center
- observation network
- product distribution



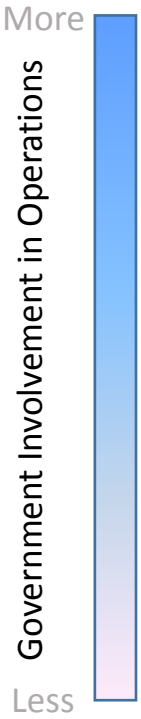
CSTM Program Definition (4)

- The final architecture will be driven by many independent variables such as:
  - Available budget and other resources
  - Implementation timeframe
  - Demonstrated commercial capability

- Other considerations:
  - Leverage commercial SSA capabilities
  - Cultivate increased technological innovation
  - Consider innovative acquisition approaches

Program Definition: Business Model

Architecture chosen will have an impact on the business model (and vice-versa)



- **Government owned/government operated**
- **Government owned/contractor operated**
- **Public/Private Partnership**
- **Licensed Supplier**

Conclusion

- Program Planning Considerations
  - Cost efficient
  - “Clean sheet of paper”
  - Take maximum advantage of emerging commercial SSA capabilities
  - Consider non-traditional business models

- The Goal:

Safety of space operations and preservation of the space environment