AIAA Contributions to Space Traffic Management and Long Term Sustainability

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Overview

- U.S. Space Policy Directive #3 (Summary of Highlights)
- AIAA STM Work
- Long Term Sustainability
  - Behavioral norms that enable…
  - Essential elements required to achieve…
- Examples of AIAA contributions to LTS
- Conclusions and Looking Ahead

Space Policy Directive #3 Highlights

- **Safety, stability, and operational sustainability are foundational to space activities, including commercial, civil, and national security activities.** *It is a shared interest and responsibility of all spacefaring nations to create the conditions for a safe, stable, and operationally sustainable space environment*. **SPD-3 § 3(a)**

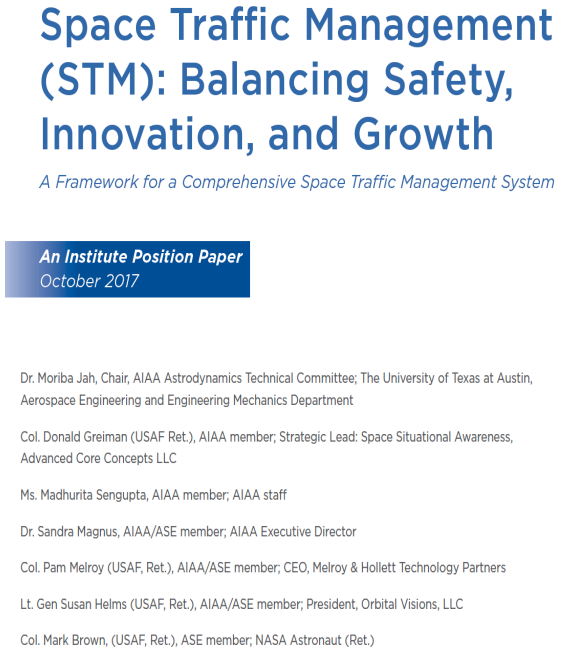
- **Timely and actionable SSA data and STM services are essential to space activities. SPD-3 § 3(b)**

- **Orbital debris presents a growing threat to space operations. SPD-3(c)**

- **A STM framework consisting of best practices, technical guidelines, safety standards, behavioral norms, pre-launch risk assessments, and on-orbit collision avoidance services is essential to preserve the space operational environment. SPD-3(d) N.B. SPD-3 § 4(f)**

AIAA Top-Level Initiatives

- Drafted white paper 7 months prior to issuance of SPD-3
- Convened STM working group with three task groups
  - STM problem definition and lexicon development
  - STM Experiment from data collection, curation, exchange, to exploitation and inference
  - STM best practices regarding orbital safety and sustainability (e.g. conjunction analysis and risk assessment)



Space Traffic Management (STM): Balancing Safety, Innovation, and Growth

A Framework for a Comprehensive Space Traffic Management System

An Institute Position Paper
October 2017

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Behavioral Norms That Enable Long Term Sustainability

- Transparency
  - Open and accessible Resident Space Object SSA data sharing
- Predictability
  - Preemptively communicate space operational activities that affect and impact orbital safety and operational sustainability
    - Orbital transfers
    - Station-keeping/relocation maneuvers
    - Launches
    - Re-entries
    - Deployments
    - High-accuracy/precision ephemerides

Essential Elements Required to Achieve Long Term Sustainability

- Space Object and Event Behavior Quantification, Monitoring, and Assessment
  - Minimize unwanted and uncontrolled growth of the population
- Sustainability Metrics
  - Space Traffic Footprint (STF)
  - Orbital Capacity
  - Space Sustainability Rating (SSR)
- Development and Implementation of Standards and Best Practices

Examples of AIAA Member Contributions to UN COPUOS LTS Guidelines

- AIAA members (government, industry, NGOs, academia) participate in public comment for rulemaking on space activities oversight and regulation.
  - LTS A-1 Adopt, revise and amend, as necessary, national regulatory frameworks for outer space activities
- AIAA supports U.S. Combined Space Operations Center and commercial SSA service providers to provide space debris monitoring information to the global space community to enable space sustainability.
  - LTS B-1 Provide updated contact information and share information on space objects and orbital events
- AIAA members work to ensure that new space objects are tracked as soon as possible for incorporation into on-orbit conjunction assessment processes.
  - LTS B-4 Perform conjunction assessment during all orbital phases of controlled flight

Examples of AIAA Member Contributions to UN COPUOS LTS Guidelines

- AIAA proactively establishes relationships with industry organizations and governments.
- AIAA members have devoted themselves to conducting research, information sharing, enabling space operations and promoting LTS best practices.
- AIAA members, spanning government, commercial industry and academia, conduct extensive research to characterize collision risk, identify suitable conjunction threat metrics, and establish requirements for SSA data quality, timeliness and comprehensiveness required to make such conjunction assessments decision-quality
  - LTS A-3 B-2 B-4 B-8 D-1

Examples of AIAA Member Contributions to UN COPUOS LTS Guidelines

- AIAA members develop space standards within the International Organization for Standardization (ISO)
  - AIAA administers the Secretariat for ISO/TC 20/SC 14 Space Systems & Operations
    - SC14/WG3: Space operations international standards.
    - SC14/WG7: Orbital debris mitigation international standards.
  - ISO/TC 20/SC 13 develops space data message international standards.
  - LTS C-1 C-3 C-4 D-1 D-2
- AIAA has convened a working group to address sustainability issues inherent to space traffic management and orbital coordination.
  - LTS C-2 Share experience related to the long-term sustainability of outer space activities and develop new procedures, as appropriate, for information exchange

Conclusions and Looking Ahead

- Support and contribute to making U.S. Space Policy Directive #3 become manifest
- Continue to develop the AIAA STM Working Group and its activities
- Continue to engage with UN COPUOS and the global community on LTS and its implementation

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