September 18, 2025

2025 AMOS Dialogue: Role of SSA in Enabling Novel Commercial Space Applications

SECURE WORLD FOUNDATION

maui economic DEVELOPMENT BOARD

About Secure World Foundation

The Secure World Foundation strives to be a trusted and objective source of leadership and information on space security, sustainability, and the use of space for the benefit of Earth. We use a global and pragmatic lens to study and evaluate proposed solutions to improve the governance of outer space. While recognizing the complexities of the international political environment, SWF works to encourage and build relationships with all willing stakeholders in space activities, including government, commercial, military, civil society, and academic actors. Central to this approach is increasing knowledge about the space environment and the need to maintain its stability, promoting international cooperation and dialogue, and helping all space actors realize the benefits that space technologies and capabilities can provide.

Cover Imagery

Image Credit: NASA

Doc. #PP24.02

Last Update: January 2024

SCAN TO RECEIVE ALERTS ABOUT
NEW SWF PUBLICATIONS

Follow us on social media

September 18, 2025

2025 AMOS Dialogue: Role of SSA in Enabling Novel Commercial Space Applications

Overview

Since 2013, Secure World Foundation (SWF) has partnered with the Maui Economic Development Board (MEDB) to hold an invite-only workshop that promotes collaboration and cooperation on space situational awareness (SSA). The 2025 Dialogue was held on September 28, 2025, as part of the 2025 Advanced Maui Optical and Space Surveillance Technologies (AMOS) Conference.

The goal of the AMOS Dialogue series is to facilitate discussion among key stakeholders in space situational awareness (SSA), thereby promoting greater collaboration and cooperation to enhance SSA for safe and responsible space activities. To accomplish this, the Dialogue brings together representatives from current and future SSA programs and initiatives around the world with a variety of end users and stakeholders so that they may exchange information and views in a not-for-attribution setting.

A number of areas of novel space activities are now seeing operational commercial missions increase in scope and pace. These include return and reentry activities; rendezvous and proximity operations, including satellite servicing and active debris removal; and cislunar and lunar surface missions. These activities offer both new needs for SSA information and new challenges for collecting SSA data. This year's Dialogue focused on identification of the role of SSA in enabling this novel commercial space applications, including discussion of gaps and opportunities for improvement in current capabilities. It also discussed how national space traffic coordination systems might relate to enabling these mission types and how SSA information might support improved licensing practices for novel space activities. The major themes that arose during the dialogue were questions about what "basic spaceflight services" mean and when might operators need more than that; the complications arising from the possible "bifurcation" of in terms of how sophisticated users of SSA information are; and the extent of the interplay between standards and regulation in oversight of novel commercial space activities.

Discussion Summary

The discussion started with brief remarks from a set of commercial actors involved in operating space missions that might be categorized as "novel commercial space activities;" these remarks addressed experience with In-Space Servicing, Assembly, and Manufacturing (ISAM) and cislunar missions. These operators emphasised that novel commercial space activities are not future activities, but are happening now. Several commercial ISAM missions have been conducted and in cislunar space, the Artemis II crew mission is scheduled for first quarter 2026 (admittedly, while this is not a commercial mission, it serves as a reminder that cislunar space is being actively being operated in at present). It was noted during this discussion SSA data is a foundational infrastructure element to enable ISAM.

Commercial operators present in the Dialogue noted several challenges or limitations with regard to current SSA services related to the needs of novel space activities. To begin, currently available public SSA services are "good enough" for most routine operations, but activities that have proximity operations phases, such as ISAM missions, more specific and detailed SSA services and information are required. This includes a need to to move services beyond cataloguing: the ISAM operators in the discussion noted that current SSA services are not dynamic, which makes it harder to conduct or plan maneuvers in close proximity operations.

In the cislunar lunar domain, it was noted that one coordination service already exists - the Multimission Automated Deepspace Conjunction Assessment Process (MADCAP) at NASA Jet Propulsion Laboratory (JPL) but that coordination through this platform is purely voluntary. It is based solely on operator to operator shared information, and doesn't include debris or non-cooperative operators or objects. Several participants also noted a need for an independent catalog for cislunar objects and beyond GEO objects, due to the specific and unique aspects of lunar orbits.

Several governmental national SSA or STC system providers also participated in the Dialogue. These SSA providers generally noted that their systems and services largely do not distinguish between novel and non-novel space activities. Instead, they focus on providing what they consider information needed for basic space safety; it was pointed out that there is no commonly agreed-upon definition as to what that means. These governmental service providers generally noted that if novel space activities need high frequency cataloging or other special info (e.g. for rendezvous and proximity activities), that is not a public service and instead is where commercial SSA providers should act while the government role should focus on fostering innovation. Some participants also noted that improving SSA services for novel space activities - in particular in the cislunar domain - would help to both track compliance with space safety and sustainability principles and to understand the consequences of activities that do not follow these practices. In this regard, it was specifically noted that "large constellations have this public eye on them, some novel activities do not."

However, other participants highlighted that the community hasn't solved many of the SSA challenges related to current commercial space activities and asked if there is risk of distracting from that by looking at novel activities; that is to say, is there possibility of losing track or attention on the long standing LEO & GEO challenges by focusing on the newer activities? A commercial SSA provider argued that, in terms of services available, that the market will drive what is offered and that currently defense needs ("space domain awareness") and large constellations are the primary influences. This is despite the assertion at the starting point of the discussion that novel activities are happening now.

Key Themes

Following the introductory remarks and conversation, the Dialogue moved to a broader discussion of the evolution of novel commercial space activities and the SSA ecosystem, including the role of policy and regulation. Throughout this broader discussion, three key themes emerged.

THEME 1: AT WHAT POINT DO YOU GET BEYOND "BASIC SPACEFLIGHT SERVICES"?

There was extensive discussion during the DIalogue around the level or threshold at which SSA information, provided by government systems, should be available as a basic public safety function. This discussion centered on the question of what is the basic minimum information or service that should be provided as a public good. Most participants agreed that providing the minimum service necessary to ensure spaceflight safety is the level that should be provided by government SSA services, and beyond that is the realm of commercial or fee-based value added services. However there was not uniform agreement as to what constituted basic spaceflight safety level. Generally, all participants agreed that two-line element sets (TLEs) should not be used for spaceflight safety services. Some participants suggested that providing conjunction alerts, using the Consultative Committee for Space Data Systems (CCSDS) Data Message (CDM) recommended standard, would be the minimum level as a public good. However, some SSA providers questioned whether just access to CDMs is good enough as the baseline. In particular, it was noted that not all new operators are capable of doing conjunction assessments, which increases risks for everyone, and suggests that a higher level of service might be needed from government systems.

THEME 2: POSSIBLE "BIFURCATION" OF SOPHISTICATION OF NEED FOR, AND USE OF, SSA INFORMATION

The discussion of the level or threshold at which SSA information should be available as a basic public safety function led into a related discussion of a potential bifurcation in the needs of the SSA user community. Essentially, more sophisticated operators and operations (including many of the novel commercial space applications, but also more advanced traditional activities, such as large constellations) might require more detailed information and services than new entrants do.

A commercial SSA provider noted that they continue to work with new satellite operators who initially believe that that access to TLEs will be enough for spaceflight safety. This provider argued that there is a need for education of new operators / new entrants to make them aware of what SSA data is available and what purpose/uses it has. For example, some incorrectly believe that TLEs are sufficient for spaceflight safety. Other participants identified a number of other gaps and challenges related to new actors' use of SSA information. These included:

- Not sharing maneuvers – or sharing them too late.
- Lack of expertise in smaller or newer countries to provide SSA service, including launch collision avoidance (LCOLA).
- Moving toward automation in operator to operator coordination may pose challenges to smaller or new entrant operators who do not have that capacity.

Most of these challenges are not specifically related to novel commercial applications, but rather are tied to the operators' degree of technical capacity and/or resources.

In this discussion, it was noted by some that if the government is unable to meet these challenges for new actors, then it might be an opportunity for commercial SSA providers to step in. A counterpoint was offered that government provision of basic SSA information serves an important openness and transparency function. As an example, while all may agree that TLEs are not sufficient for operational space safety, it was noted that they have valid use for other things, including academic research. The fact that they can be misused does not mean that there isn't value in making them available broadly. In essence, there's a need to balance the development of the SSA industry segment with encouraging broad access to, and use of, space safety data.

THEME 3: INTERPLAY BETWEEN STANDARDS AND REGULATION IN OVERSIGHT OF NOVEL SPACE ACTIVITIES

The Dialogue's discussion of the role of SSA in oversight of novel space activities largely focused on the relationship between regulation and standards, as well as discussion of the need for specific regulation at this time, given the novel-ness of many of these mission areas. A regulator present in the discussion did note that while they do use SSA information to monitor compliance, regulators need a critical understanding of a sector before they can regulate it (novel activities in this case) and want to avoid bad licensing in the interim. This particular regulator noted that they might use SSA information to monitor to see if operators continue to be responsible and to promote increased transparency.

Operators in the discussion initially focused on transparency as a key attribute, noting that as more novel commercial activities are conducted, and more operators join, it is beneficial to the industry to encourage the practice of transparency, and that SSA information can support this. Many operators in the Dialogue noted the existence of a number of voluntary industry guidelines and best practices for responsible space operations, several of which address novel space activities (such as the principles and practices published by CONFERS). Some operators thought that current evidence suggests these best practices are achieving results, and that it might be premature to codify them in regulation. In which case, the recommendation was that if best practices and standards work, then the focus of effort should be on internationalization/adoption of those standards, not adopting new regulatory frameworks. However, others asked if there is evidence that a broad base of operators are indeed adopting these practices, especially given some of the challenges around new actors noted earlier in the discussion.

Most participants in the Dialogue agreed that we are still learning about the operational realities of the novel commercial activities that were the focus of the discussion, and therefore is is likely too soon to include a direct link between SSA information and the regulation of those activities (beyond the basic need for registration with SSA services). A former regulator noted that authorization and supervision doesn't necessarily mean detailed regulation. Perhaps one option might be to focus on providing standards and monitor those for compliance; in this regard, SSA can help inform standards. Another participant noted, "Standards might provide the how, while regulations provide the must." Finally, another participant noted that it is important to think about regulators' capacity to understand and apply this type of information, with that thinking that those regulators that have the most experience with novel space activities might have a role to play in providing leading examples or case studies. One take was that the United States, even though it is a leading domicile for commercial space companies, it arguably is behind on providing these examples.

525 Zang Street, STE. D
Broomfield, CO 80021 USA
v: + 1 303 554 1560

1779 Massachusetts Ave. NW
Washington, DC 20036 USA
v: + 1 202 568 6212

e: info@swfound.org

SWF Publication: PP26.03

Published: 26.02