International SSA Data Providers and Satellite Owner/Operators Workshop
September 20, 2023
Key Findings

EXECUTIVE SUMMARY

The workshop was organized into a not-for-attribution main session followed by a roundtable discussion. The workshop's goal was to provide insights to policymakers on operator perspectives. The main session included a kickoff presentation, a report on a pre-event survey sent to international participants, and a panel discussion. The kickoff address was an update given by Mariel Borowitz, Director of International SSA Engagement, Office of Space Commerce (OSC), National Oceanic and Space Administration, (NOAA), U.S. Department of Commerce (DOC). Jordan Denamur-Paul from the Aerospace Corporation presented the pre-event survey findings. The panel provided an opportunity to hear US and European governmental and commercial perspectives on defining SSA basic services.

The key takeaway from the workshop is that coordination and shared understanding will be needed among an emerging system of national and regional, independent federated SSA centers. The ultimate goal is that when the different centers put out collision avoidance (CA) information, differences in conjunction predictions or risk assessments are well understood.

BACKGROUND

The Maui Economic Development Board (MEDB) and The Aerospace Corporation led the 8th annual International SSA Data Providers and Satellite Owner/Operators Workshop on 20 September 2023. This was the latest in a series of invitation-only workshops held in conjunction with the Advanced Maui Optical and Space Surveillance Technologies (AMOS) Conference. The workshop included government, and non-governmental organization (NGO) representatives from Australia, Canada, EU, France, Germany, Japan, Poland, the Republic of Korea, Thailand, the United Kingdom, and U.S. government (Department of Commerce, Department of State, Federal Aviation Administration, NASA, and U.S. Space Force).

The enduring goal of the International SSA Data Operator Exchange Workshop is to provide an opportunity to develop and advance relationships and share insights among key international SSA data stakeholders including military, academic, civil, and commercial entities. To accomplish this, workshop organizers choose timely topics relevant to the global SSA community and encourage open discussion from all participates in a small to medium sized group setting. This year's session was cohosted by the Space Agency of the Deutsches Zentrum für Luft- und Raumfahrt (DLR) and the Centre National d'Etudes Spatiales (CNES).

DESIRED OUTCOMES

Desired outcomes were to 1) build relationships and operational familiarity across the international SSA operator community; 2) identify new challenges and opportunities for SSA operators in the presence of multiple sources of Space Traffic Coordination (STC) information;

and 3) identify SSA operator community priorities for actionable STC information. Ultimately, the workshop's goal was to provide insights to policymakers on operator perspectives.

KEY FINDINGS

1. Coordination and shared understanding will be needed among an emerging system of national and regional, independent federated SSA centers. The ultimate goal is that when the different centers put out collision avoidance (CA) information, differences in conjunction predictions or risk assessments are well understood.
    a. Transparency among SSA centers in order to understand differences in data collected and how the data are processed (including any differences in input assumptions, processing algorithms and modeling) is key.

2. Decision quality data that enables collision avoidance is the number one priority. Government basic services include providing such collision avoidance information.

    a. Government organizations and space vehicle operators identified a set of core spaceflight safety services that are considered foundational for STC These include activities related to conjunction assessment, enabling and facilitating contact between owners and operators, and risk assessment.
    b. Anomaly resolution support is not a SSA basic service unless the anomaly creates collision risk.
    c. A commercial perspective is that US government (USG) data products have not been consistently "good enough" for collision avoidance. Sometimes USG data is exquisite but sometimes it lacks accuracy.
    d. For the purpose of sustainability, participants are considering how to shape additional services and mentoring for new entrants.
    e. Industry is beginning to understand and drive responsible behaviors, but regulation has a place.
        i. Relying on voluntary compliance with standards, best practices, and responsible behavior guidelines is not sufficient when not all owner/operators and service providers might not agree on them.
        ii. Need to understand inputs, assumptions, data processing and modeling to achieve 'decision quality' results.

3. Lack of notification about satellite maneuvers and integration of predicted locations in conjunction assessment cause even the best SSA predictions to degrade unexpectedly. As more maneuvering spacecraft are launched, and as more and more maneuvers occur autonomously— this becomes an increasingly frequent and sophisticated challenge.
    a. Pre-notification of maneuvers is an increasingly critical factor for safe flight safety but an increasingly complex problem.

4. SSA antenna/tracking calibration issues have been significantly mitigated by EU SST and US DOD through more frequent calibration checks. Today, US DoD flags all deviations between US and EU SST data/solutions/alerts and works to understand the cause of such deviations.

5. The U.S. STM community is evaluating approaches for future, transparent sharing of SSA data and predictions. As the DOC/OSC architecture for TRACSS is evolving, DOC/OSC is planning to make data products available to all TRACSS users, possibly replacing SSA Sharing agreements with a more general TRACSS User agreement. The U.S. DOC/OSC approach does not foresee numerous bilateral agreements such as the current US Department of Defense (DOD) approach to bilateral SSA Data Sharing Agreements.

6. Internally, the EU SST consortium's governance structure has resolved data fusion issues among military, civil, and commercial SSA data providers.

7. As part of the effort to define requirements and strategies for TRACSS, the US government has formed working groups, hosted listening sessions, and is developing strategies to address associated challenges such as data transparency, data quality, data/result reconciliation, best practices, and appropriate mechanisms for coordination and information sharing.

8. US communication with China on space flight safety issues has improved, but while efforts continue to improve communication, SSA info sharing continues to be insufficient. Recent efforts to share ephemerides from the Chinese Space Station were universally recognized as a step toward transparency in spaceflight safety information sharing.

9. The pre-event survey provided to international participants served as a forcing function, causing some international particpants to consider some SSA issues for the first time. Future events should continue to provide pre-event surveys to help level-set the discussion and stimulate new ideas among particpants.

10. The 2019-2022 priorities list for development of SSA/STM standards, guidelines, and best practices continues to provide direction. Continuing priorities are to develop the following:
    1. Operationally useful, consensus-based standards for timely, transparent, trustworthy, secure, SSA/STM data sharing (data base/data repository/data exchange) that is capable of automation.
    2. A reliable, 24/7/365 system of rapid communication among operators that enables transparency and coordination for the operational community.
    3. National SSA/STM regulatory frameworks that can evolve into an international framework.
    4. Operationally useful standards for on-orbit operations.
    5. Methods for incentivizing positive behavior.

International SSA Data Operator Exchange Workshop Program September 20, 2023

12:30 pm Welcome Remarks,
Leslie Wilkins, Maui Economic Development Board
Jamie Morin, Aerospace Corp, Center for Space Policy and Strategy

12:35 Review discussion at April 2023 Policy Exchange.
Mick Gleason, Aerospace Corporation

12:45 **Kickoff presentation** – Dr. Mariel Borowitz for Richard DalBello, DOC/OSC

1:00 Q and A

1:10 **Panel** – Moderated by Jamie Morin

Scene-setter: Review pre-workshop questionnaire responses – (Jordan Denamur-Paul).

Panel Discussion
Topic: Perspectives in Defining Public Services (i.e., SSA basic services)

Goals:
- Show where there is agreement on information that is essential to operators.
- Discuss new or emerging data fusion challenges.
- Discuss what it means to operators if different sources have different Collision Avoidance (CA) solutions.
- Identify which information is the most important to get right.
- Highlight areas where different countries have different approaches to government provided data.

Panelists:
- US Dept of Commerce DOC/OSC (Dr. Mariel Borowitz for R. Dalbello)
- EUSST (Pascal Faucher)
- USSF – (Barb Golf)
- U.S. Commercial SSA provider (Dan Oltrogge)
- Non-U.S. commercial SSA provider (Arianespace - invited)

2:10 Break

2:20 **Roundtable Discussion** – Moderated by Mick Gleason, Aerospace Corporation
Purpose: Start to define the most important basic services.

Participants:

Governmental reps; Australia, France, Germany, ROK, Thailand, UK, United States: USSF, US DOC/OSC, DOS, OSD, NASA

Academia and Others: CASI, SWF

3:15 Opportunity to provide brief organizational updates.
Progress in data sharing, transparency, and 24/7/365 system of rapid communication among operators.

3:30 pm Closing remarks: Leslie Wilkins, Jamie Morin