

SUMMARY NOTES

SSA/STM Workshop Colorado Springs, Colorado 10 April 2019

Presented by



In partnership with



The Maui Economic Development Board (MEDB) and the Aerospace Corporation led the SSA/STM Workshop on April 10, 2019 at the Broadmoor Golf Club during the Space Symposium in Colorado Springs. This year's workshop included government, industry and non-governmental organization (NGO) representatives from Australia, Canada, France, Germany, Japan, New Zealand, Philippines, Poland, Republic of Korea, Thailand, Switzerland, the United Kingdom, and the United States of America.

The enduring goal of the International SSA Data Operator Exchange workshop is to provide an opportunity to develop and advance insights and relationships among key international SSA data stakeholders including military, academic, civil, and commercial entities. To accomplish this, the workshop chooses timely topics relevant to the global SSA community and allows each participant time to present their views.

Executive summary of discussion

The roadblocks, barriers, and pitfalls of information sharing are fairly well understood.

Keys for making progress:

- Strong leadership is critical. Need a champion on each side of the partnership to take a personal interest in the activity and push to overcome bureaucratic and other barriers
- Need formal, written agreements. Treaties, MOU's, MOA's, Frameworks, or other formal written instruments are key to overcoming bureaucratic and other barriers
- Need an adequate level of mutual trust among partners (perfect trust may not be obtainable)
 - o Transparency facilitates trust
 - o Exercises, combined training, working through problems together facilitates trust building
 - o Keep it simple/Keep it easy
 - For example, using or adapting existing technical cooperation agreements rather than developing new agreements might make progress easier/quicker
- Agreement among partners on basic assumptions first.
- Agreement among partners on a common ontology and terminology upfront.
- Including partners in requirements and acquisition processes early is crucial for designing interoperable and/or compatible system
- A major crisis serves as a forcing function for overcoming barriers, but of course that is not a desirable path. (Mentioned but not discussed)

Summary of workshop

The session kicked off with a lively discussion surrounding the US Space Policy Directive 3, "National Space Traffic Management (STM) Policy, SPD-3 <https://www.whitehouse.gov/presidential-actions/space-policy-directive-3-national-space-traffic-management-policy/>. Clearly STM is important, complex and urgent. The US is planning a transition STM data services for Non-Department of Defense (DoD) to the Department of Commerce (DoC) in 2024. As the number of constellations and satellites within constellations is projected to sharply increase, it is imperative that a /US national space policy be implemented sooner rather than later. SPD-3 indicates that the DoC is the face of STM, but the US is taking a "whole of Government" approach. The goal is to move fast by eliminating bureaucracy. DoC is currently working four thrusts:

- 1) People – Developing a highly talented and integrated and embedded lean team to understand exactly what it takes to implement this mission. Imbedded personal at Vandenberg AFB is scheduled for late June
- 2) Industry engagement – Will there will be a broad Request For Information (RFI) <https://www.federalregister.gov/documents/2019/04/11/2019-07169/request-for-information-commercial-capabilities-in-space-situational-awareness-data-and-space> to understand capabilities and standards and best practices and regulation? A consortium proposing good ideas is the best model. Not just traditional space companies e.g., cloud providers. We are going to start with the catalog.
- 3) Standards and best practices – it is not that there are none it is that there might be too many. It is important to remember that not one size fits all.

- 4) Open architecture repository – DoC will provide conjunction analysis before 2024 for use by commercial sector. We have to provide the basic public safety piece first. We need to understand how to deal with “data layers” and how decision aids could be useful.

Basic services – the Space Situational Awareness (SSA) sharing agreements with USSTRATCOM will remain as is but the concept of basic services must be adjusted. Allied commercial participation is currently being reviewed, it is not the US intent to be the “Yankee cop”. Clearly owners/operators have the highest fidelity data and are incentivised to traffic themselves. DoC is looking at using cloud computing and whole of government approach.

DoC does not have use rights of allied data; a Space Enterprise summit is taking place in June to address that <https://www.state.gov/e/oes/sat/spacesummit/>. Investigating how to make data public via traditional channels, Spacetrack.org or other census organizations or data managers. We also need to determine how commercial providers fit into the picture. We all know that more data is better, but we need to be able to evaluate the data and will assess established cloud computing models that do just that. DoC will look at historical data first before moving to real time data.

Will there be an international aggregating authority? What exists in the US today will not be touched. How are we going to test and analyse the data and how are we going to learn and disseminate lessons learned? We know it isn't a one-way street which means we have to have an open architecture repository using new and modern techniques that allow us to share data, but also protect data. DoC has been brought in because of the speed of commercialized space.

Currently in the US, sensor assets are owned by USAF. DoD catalog is the base layer. What is the future, cooperation of sensors? Dual use sensors, data from commercial, crowd sourced data? The key is an open architecture.

AMOS Summary:

The focus of the 2018 AMOS SSA Operators forum was on data strategy as an enabler for modernizing data sharing. The forum agreed that a data strategy was a solid basis for improving data sharing and adopting modern data practices. It was decided that the data strategy that emerges needs to be a combination of policy and operations. This was a good segue into the data policy and sharing topic of today's workshop

Relevant outcomes from AMOS

- Global data should be the starting point of a data strategy and it must have unified agreement.
- There are some pre-requisites that need to be addressed first, defined mission objectives across all, data needs for each mission and common metrics.
- There are also some challenges – trustworthiness, extensibility (evolving mission need) flexibility, releasability and ontology – common interpretations.
- Hardest challenges are discussions versus actions, maintain momentum, change policies that go against the shared mission, involve non aligned countries and improve the situation in time to prevent a major catastrophe.

There was a review of the following paper https://aerospace.org/sites/default/files/2018-05/US-Canada_0.pdf “Alliance Rationales & Roadblocks: A US-Canada Space Study” to help frame the discussion and dialogue from the three speakers. The paper found there are five barriers to partnership: legal and policy in terms of domestic law, policy and industrial strategy; organisational – bureaucracy, clearances etc and scale; technological – interoperability and FMS; budgeting – complexity versus synchronicity; cultural – language, values, openness and education.

There were three main lessons learned from this study that were necessary to overcome the barriers to success: leadership – find a champion; formalising the partnership – need a treaty or an MoU; planning for allied contributions to systems and capabilities – align the budget cycles.

CSpO Policy and Legal Working Group

There was an update on the Combined Space Operations (CSpO) effort including the timeline from 2012 when CSpO was set up to today with seven allied nations, working on command and control and broader issues eg space control. The allies leverage the USSTRATCOM SSA sharing agreement and Space Surveillance Network, which implies that the

DoD is foundational. There are space flight partners such as Global Sentinel which is the follow on from the SSA Table Top Exercises where modelling and simulation are used to exercise cooperative space operations against real world threats

A pivotal change occurred in 2017 when Gen. Hyten and Gen. Raymond had parallel visions of improving SSA data sharing. Their leadership became the catalyst needed to affect real change. Resourcing is coming slowly, Sapphire, Fylingdales etc. There were discussions about bilateral versus multilateral agreements and the lack of classified data sharing agreements. The CSpO is looking at this, but it is a difficult challenge that will not be resolved easily. The key area of most potential is data sharing. The challenge is burning through the bilaterals and looking at the multilaterals but, as is usually the case, there are not enough resources to put against this challenge. The operations working group, Olympic Defender is looking at a multinational approach. The hand over from StratCom to SpaceCom means there may need to be a rewrite to include partners. We do not want to lose any momentum in this shuffle. The Combatant Commander for SpaceCom will be double hat for the next 3 years.

There was a lot of discussion around how the bilats and multilats work and the fact that they are all unique to their own country's circumstances and relationships with the US.

EUSST Consortia

There was a presentation about how data sharing works in the EUSST consortium. There is an eight-member steering committee that reports to the European Commission. The members are UK, France, Germany, Italy, Spain, Poland, Portugal and Romania. Members use existing national assets and networking. The consortium has a political objective and involves MoDs and Space Agencies. Members retain their own control and operate their own assets. Telescopes and sensors are brought together under a project and contribute data to an EU database with an annual review to assess availability, frequency and quality to pick the best assets. There was a 2018 initiative put forward by Germany to create a database that went operational on 1st April 2019. There is a common platform for efficient databasing known as the EU Catalog.

There are 100 user accounts, 50 organisations, 11 member states for civil military and commercial. There are 48 satellites in LEO, 30 in MEO and 58 in GEO. They are studying different architectures for the future based upon best value for money. 2021 is the next periodical review and its findings will last until 2028. There are 32 architectures under consideration. There is work to be done on sensor optimisation. They are trying to establish the appropriate level of authority. Full authority is too expensive and there is duplication and competition. They want to act as a good partner with other nations such as the US.

There is not much sharing within the EUSST consortium of classified data except between France and Germany. The Security Committee mainly focuses on the future. The EC selects the EU SST members which are in place until 2021. There isn't a collective voice on political matters but rather collaboration and complementary capabilities. There could be additional services in the future, but it depends on investment in the architectures under consideration. Participants bring data or money. They need to be able to access a sensor and be able to process the data. All EU members get access to common repository. Sensors cannot be located outside of the EU nations nor can non-EU nations have access to the data. Decisions for access are taken on a case by case basis. Use both our own CDM and CSPOC.

German Space Situational Awareness Center

Following on the EUSST topic of the support framework initiative of the European Union, the German Space Situational Awareness Center GSSAC gave an overview about data sharing and respective lessons identified. As of today GSSAC's mission is to provide a recognized space picture for mainly German governmental users. Due to it's civil-military construct, support to space operations is part of their mandate. The growing footprint on the data acquisition side enables Germany to implement an end-to-end capability in the area of operational SSA and serves as an enabling function for expanding respective international collaboration efforts. The latter aspect was underlined by introducing the key functional elements of GSSAC's data processing chain where interfaces for robotic data exchange are already part of the framework. In conclusion it was outlined that the development and implementation of processes for data sharing are basically dominated by technical and security requirements whereas the contextual environment in which data and information are shared is seen as key for categorizing and attributing the input. In a

typical C2 structure only the transformation of data and information received into relevant knowledge provides the key foundation for further decision making in an operational context. Here, GSSAC stresses the emphasis regarding relevant education and training of operators who in a chain-of-command logic fulfil a critical task in handling and operating with often sensitive but always tactical relevant data and information.

During the workshop, the participants took notes on the topics they felt were the most important to address and broke into teams to brainstorm data sharing considerations and best practices as aligned to the US/Canada study on alliances and roadblocks. That list of topics have been categorized below:

- Legal and Policy
 - a. How to improve trust for classified data sharing necessary to analyse behaviour in space?
 - b. EU SST is “free” to users. Does this discourage development of European commercial SSN providers? (Difficulty with competing with “free” if you need to be commercial) – How to encourage innovation?
 - c. Survivability of Bilats/Multi-lats when there is a change of government
 - d. Perhaps a technical use agreement vs legal agreements?
 - e. Protection of proprietary commercial data
 - f. There is no appetite for an international STM regulation similar to ICAO for civil aviation
 - g. Multilateral processes are slow
 - h. Need multi-lateral classified SSA data-sharing agreement
- Organizational
 - Needs to be recognized at a high level in organizations to receive necessary support
 - Keep it simply/keep it easy
- Technological
 - a. Corroborate/reconcile data: How to determine “truth”
 - b. Sharing of detailed technical information at raw and pre-processed data to build trust in data supplied
 - c. DoC should consider emulating EU SST process for enhanced sensor tasking support & safety (collision avoidance) mission. This will require non-SSN sensors – since DoC can not task SSN.
 - d. In implementing your own data sharing service or architecture, have you had to define any data formats to share, disseminate, transport or collect it? Has it worked well?
- Budgeting
 - a. Economic incentive for other commercial companies to participate in SSA data sharing
 - b. How will the European consortium fund new sensors?
- Cultural
 - a. Crossfeeding between military, commercial and civil (synergy – Lexicon – standard procedures) or well understood
 - b. Regardless of cultural differences some issues are the same: trusted data, protected data, classified data
 - c. Use the same language to discuss SSA/STM
 - d. Cultural change necessary within countries/defence ministries
 - e. Use SSA as tool for building partnerships with non-traditional allies
 - f. Need to agree on a common ontology/lexicon/terminology
 - g. Agree to common assumptions

Actions that need to be taken for success

- Leadership and a champion
 - Needed to set a well-defined goal (with a fixed deadline) to drive progress rapidly and change behaviors. i.e. CSpOC stand-up in 1 year, EU SST initial service provision
 - Clear direction and mandate by a champion
- Formalizing partnerships
 - Need high-level of mutual trust which is obtained by: transparency, exercise to work through barriers/problems

- Multi-lateral sharing agreements vs bi-lateral sharing agreements
- Planning for allied contributions to systems and capabilities
 - What is the future of Global Sentinel?
 - How can Allied collaborations on SSA/STM contribute to spaceflight safety in newer spacefaring nations?
 - US must plan for clarifying a process to incorporate international sensors; data verification, connectivity and security of link
 - Bi-lats with US need to be open to sharing with others; that is a bi-lat with US should not prevent data sharing with other allies
 - How could US and Allies approach a more efficient use of sensors to maximize efficiency of capabilities and tracking of objects so we are not all tracking the same small subset of objects

Not discussed, but raised via notes as something that needs to be addressed:

- A crisis is a forcing function for overcoming barriers/threats (not ideal of course)
- Need transparency and confidence building measures to ensure norms of behaviour in space. However, wider risks and threats to the domain not acknowledged within general public; what will drive this forward?

Agenda:

- 0800 Light refreshments
- 0810 Welcome address
 - **Gina Galasso**, Managing Director, Vaeros Ltd, subsidiary of The Aerospace Corporation
 - **Leslie Wilkins**, President, Maui Economic Development Board
 - **Marty Whelan**, Senior Vice-president, Defense Systems Group, The Aerospace Corporation
- 0820 Status of US Space Policy Directive-3, National Space Traffic Management Policy)
<https://www.whitehouse.gov/presidential-actions/space-policy-directive-3-national-space-traffic-management-policy/>, **Kevin O'Connell**, Director of the Office of Space Commerce at the U.S. Department of Commerce. (Q&A)
- 0850 Summary of AMOS operator's forum, **Craig Lindsay**, Principal Director, Space Control Directorate, The Aerospace Corporation
- 0900 Challenges of data sharing identified at AMOS, **Andy Ash**, SSA Project Technical Authority DSTL.
- 0915 US/Canada exemplar/introduction of sharing benefits, challenges, and lesson learned as outlined in US/Canada paper [US/Canada policy paper](#), **Michael Gleason**, Senior Project Leader, Center for Space Policy and Strategy, The Aerospace Corporation
- 0930 Break
- 0945 Introduction to the speakers and moderator of exercise, **Jamie Morin**, Vice President, Executive Director, the Center for Space Policy and Strategy, The Aerospace Corporation.
 - 1000 CSpO Policy and Legal Working Group (**Lynne Tatro**, Senior Advisor, Operations, International and Space Law & Policy, **Michael Syintsakos**, JFSCC Multinational Space Collaboration Lead)
 - 1015 EU SST Consortia (**Pascal Faucher**, EUSST Consortia Chair, **Regina Peldszus**, EUSST Consortia Co-Chair)
 - 1030 German Space Situational Awareness Center (**Uwe Wirt**, Director Operations, DLR Space Administration/GSSAC)
 - 1100 General Q&A and posting of notes to flip charts
- 1115 Summary of results, open for further discussion and final comments. Reporting out and next steps (**Jamie Morin**)
- 1200 Close