



Promoting Cooperative Solutions for Space Sustainability

Possible SSA Futures: A Report of the 2017 AMOS Dialogue

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- 5th iteration was held during the 2017 Advanced Maui Optical and Space Surveillance Technologies (AMOS) Conference, in Maui, Sept. 19-22, 2017
 - Co-hosted with the Maui Economic Development Board (MEDB)
- Goal of AMOS Dialogue: facilitate stakeholder discussion
- The topic of the 2017 AMOS Dialogue was the future of SSA, and how it might support future space traffic management (STM) regimes
 - Looked at four theoretical scenarios for future STM regimes, how current trends compare with the scenarios, implications for governments and commercial operators, and policy considerations
 - The discussion supported a study the Science and Technology Policy Institute (STPI) is doing for the U.S. government
 - Discussion was not for attribution

Evolution of AMOS Dialogue

- 2013 Dialogue: current status of SSA programs and sharing initiatives
- Feb. 2014: Co-hosted a dialogue in Tokyo along with MEDB and the Japan Space Forum
- 2014 Dialogue: relationship between government and commercial/non-governmental SSA
- 2015 Dialogue: an enhanced STM and bringing in civil/international partners
- 2016 Dialogue: SSA challenges posed by smallsats



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2017 Dialogue: Four SSA Scenarios

- Created by STPI and SWF in order to highlight different potential futures for SSA and STM
 - Designed to create discussion – not intended to be predictive
- Differed by degree of government control and degree of internationalization
 - Government vs private
 - Domestic vs. international

- Extension of the current U.S. government-led system
- USG remains primary source of SSA data and services for the global space community
- USG-owned sources would remain primary source of data for the U.S. catalogue
- USG continue issuing conjunction and collision warnings for free

- Private sector-led SSA system dominated by U.S. entities, where a consortium of primarily U.S. companies is the primary provider of SSA data
- U.S. consortium would collect and process data and provide SSA data and services to operators and governments that are either members of the consortium or otherwise pay for information services
- SSA information come from all levels from mainly non-governmental providers, but also may incorporate data from governments of all participating countries
- Build an in-house database and sell products and services

- Globally governed SSA system, where the main source of SSA data is a global, government-led SSA system with centralized operations fed by government and private nodes spread worldwide
- Data collection, fusion, and global database generation in this scenario would be led by an international intergovernmental organization (IGO)
- The database would be open and transparent and all participating stakeholders would have access to the data

- Many national SSA systems, where each government owns and runs SSA and STM systems, sharing data as they see fit
- Not have to depend on the USG or international public/private databases
- Each country's catalog will contain data from its own sensors, supplemented by data from domestic private vendors
- USG might still provide free services to the world similar to what it currently does; however, other countries would no longer depend on the service



Four Scenarios

- **Scenario 1: Extension of the Current U.S. Government-Led System**
- **Scenario 2: Private Sector-Led SSA System Dominated by U.S. Entities**
- **Scenario 3: Globally Governed SSA System**
- **Scenario 4: Many National SSA Systems**

Which scenario is most realistic?

- Questions about whether any one scenario was “right”
 - Scenarios 1, 2, 4 were most likely to arise/co-exist, even with questions about whether a government would be willing to give up control of SSA data
 - Scenario 3 perceived as least likely
- USG do national security SSA, civilian/commercial entities doing SSA for spaceflight
- How do you define SSA? For what, and for whom? How do you define data-sharing? How do you trust external data?
- Need for global governance – regime that sets rules for how to share SSA data and trust other SSA sources

Which scenario is the most desirable?

- Dispute about whether scenario 1 is the least desirable
- If scenario 4 is the future, what does that mean for cost to access to space?
- Air traffic control is a combination of scenarios 3 and 4; we are a ways out from that for space
- The most desirable end state probably depends on what the needs are
- Challenge of communicating impacts of not figuring out future of SSA to non-space people

Voting by Participants (1)

- Vote where everyone got 2 votes
- Most realistic scenario
 - **Scenario 1: 15**
 - Scenario 2: 3
 - Scenario 3: 0
 - **Scenario 4: 15**
- Most desirable scenario
 - Scenario 1: 1
 - Scenario 2: 4
 - **Scenario 3: 14**
 - Scenario 4: 9

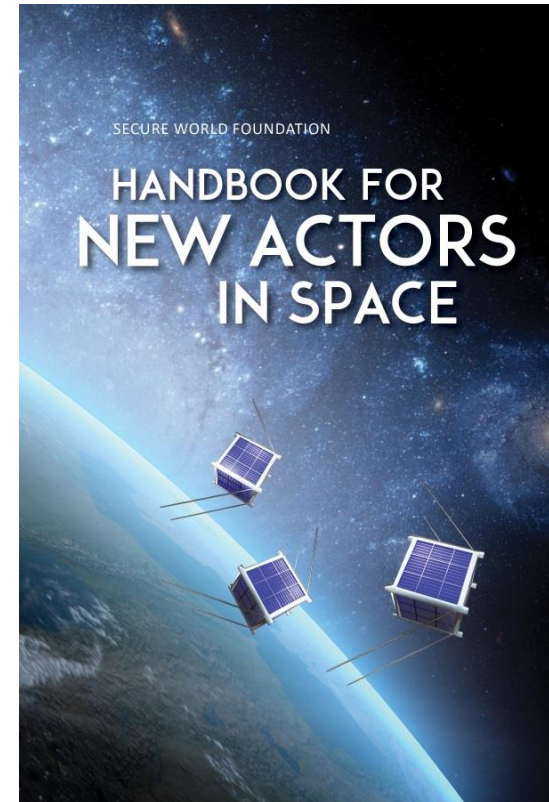
Voting by Participants (2)

- Vote where everyone got 1 vote
- Most realistic scenario
 - **Scenario 1: 14**
 - Scenario 2: 0
 - Scenario 3: 0
 - Scenario 4: 6
- Most desirable scenario
 - Scenario 1: 0
 - Scenario 2: 2
 - **Scenario 3: 10**
 - **Scenario 4: 8**

- Dubiousness about governments giving up control entirely of SSA
- Questions of trust raised repeatedly, as well as technical challenges of sharing data
- Need for guidance at the international level; enforcement at the national level
- Broaden existing notions of what constitutes SSA capabilities
- Many saw an evolution from 1-4, skipping 3
 - 3 seen as most challenging but perhaps most desirable

SWF Handbook for New Actors in Space

- **Goal:** Create a publication that provides an overview fundamental principles, laws, norms, and best practices for safe, predictable, and responsible activities in space
- **Two specific audiences:**
 - Countries developing space programs and/or having to oversee and regulate their first satellites
 - Universities and start-up companies that are developing/operating satellites



www.swfound.org/handbook

- **Chapter 1: The International Framework for Space Activities**
 - Freedom and Responsibility
 - Registration of Space Objects
 - International Frequency Management
 - Remote Sensing
 - International Standards
 - International Export Control
 - International Liability
 - Dispute Settlement
 - Environmental Issues
 - Advanced Issues

- **Chapter 2: National Space Policy and Administration**
 - Public Policy
 - Public Administration and National Oversight
 - Case Study: Remote Sensing Policy and Administration

- **Chapter 3: Responsible Space Operations**
 - Pre-launch
 - Launch
 - On-orbit
 - End-of-life



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Handbook Next Steps

- The Handbook was officially released in February 2017
- Electronic copies are available on the SWF website, free of charge, at www.swfound.org/handbook
- Printed copies are also available through Amazon
- Feedback is welcome!



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Questions?

Thanks.

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