



Promoting Cooperative Solutions for Space Sustainability

Cybersecurity Risks to the Space Domain

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Importance to Space Stability

- Increasing number of and diversity in *new actors*, concurrent with increasing *importance of space* in daily activities globally
- Stability rests upon *reliable and predictable access to space*
- *Lack of clarity* of the cause when satellite capabilities disappear

Cyber as a Counterspace Option

- Space capabilities become an *attractive target for counterspace* efforts
 - Kinetic attacks less likely option
 - Electronic warfare/cyber attack seen as more usable
- Destabilizing because *laws of armed conflict for space are unclear*
 - International law and military rules of engagement still being worked out
 - Manual on International Law Applicable to Military Uses of Space (MILAMOS)

- Possible cyberattacks: *jamming, spoofing, attacks on ground infrastructure*
 - Can be done by state and non-state actors
- Already seeing interference with satellites
- New entrants to space means *new entry points* for attacks
- Blurring of lines between different types of satellites means *hard to ensure resiliency*
 - Example: hosted national security payloads on commercial launch vehicles

- Many *satellites are old* and based on even older technology
- *Increased use of commercial-off-the-shelf* allows for possible entry
- *Internet of Things (IoT)* means that a lot more devices are going to be connected

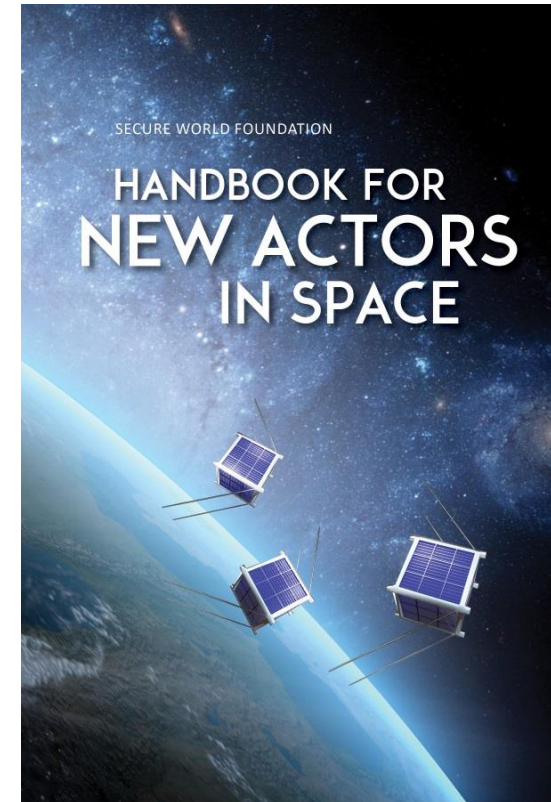
- Manage risk
- Share information about interference
- Make cybersecurity efforts become the norm for space-related companies
- Improve space situational awareness
- Strengthen the supply chain

- Development of a multilateral space and cybersecurity regime
 - Flexible approach
 - Incorporate all actors
- Discussions in international fora
 - United Nations Committee on Peaceful Uses of Outer Space
 - Group of Governmental Experts on Transparency and Confidence-Building Measures in Outer Space Activities (*GGE-Space*)
 - Group of Governmental Experts in the Field of Information and Telecommunication in the Context of International Security (*GGE-Cyber*)

- September 2016 publication: *“Space, the Final Frontier for Cybersecurity?”*
- *Recommendations for cybersecurity*
 - Raising awareness
 - Encourage vigilance
 - Recognize vulnerabilities
 - Build in resilience and measured responses
 - Regulatory requirements
 - Establishment of good practice

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

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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