



Promoting Cooperative Solutions for Space Sustainability

Orbital Debris: Dynamics in Mitigation Innovation Panel Remarks

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CabSat 2018: GVF Satellite Hub
Dubai, UAE – January 16, 2018

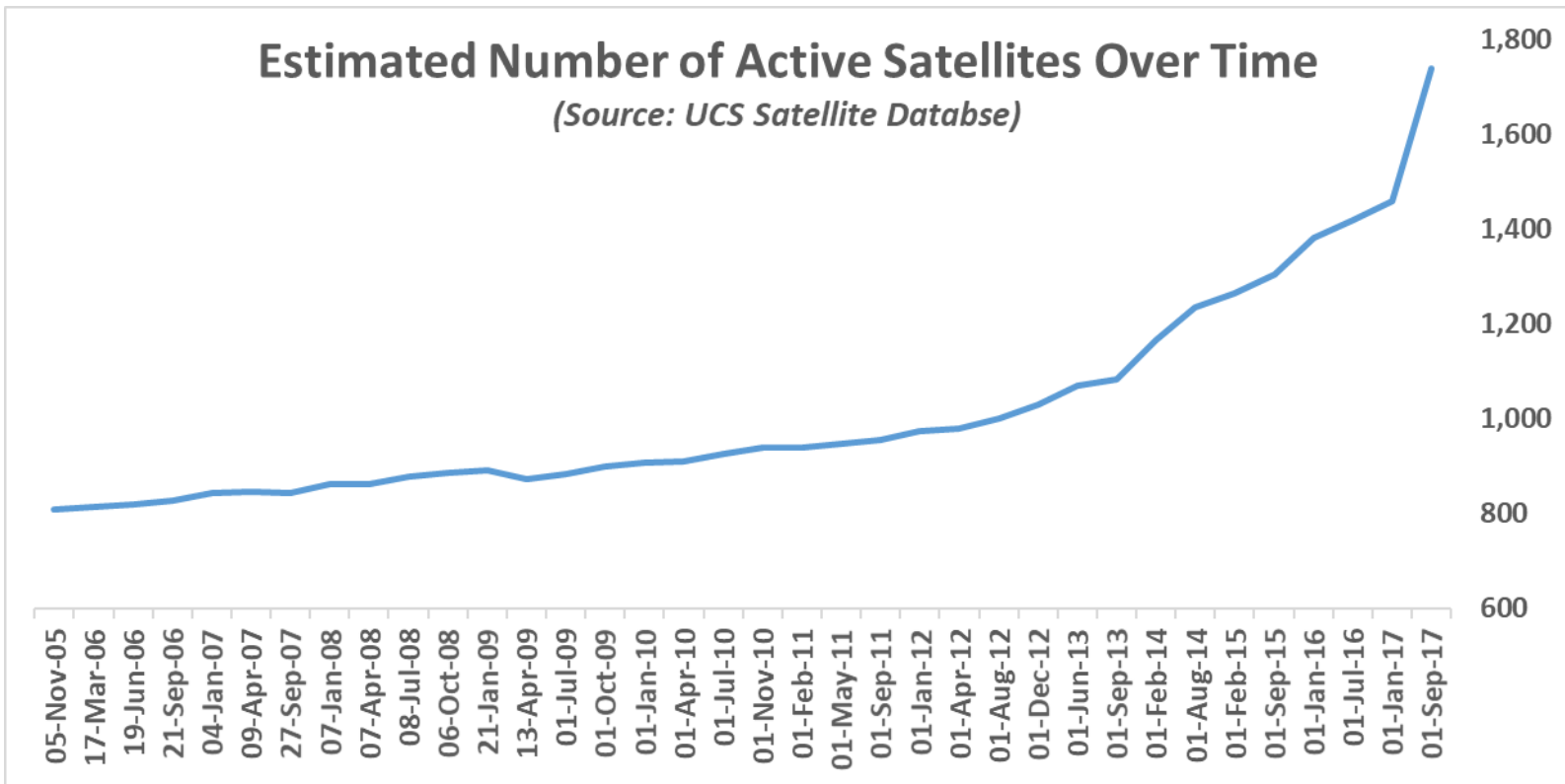
swfound.org

- Secure World Foundation *is a private operating foundation* that promotes cooperative solutions for space sustainability
- Why **space sustainability**? Increasing reliance on space assets coupled with potentially destabilizing trends
- **Our mission:** SWF works with governments, industry, international organizations and civil society to develop and promote ideas and actions for international collaboration that achieve the secure, sustainable, and peaceful uses of outer space for the socioeconomic and environmental benefits to Earth

A Fundamental Change?

Estimated Number of Active Satellites Over Time

(Source: UCS Satellite Database)

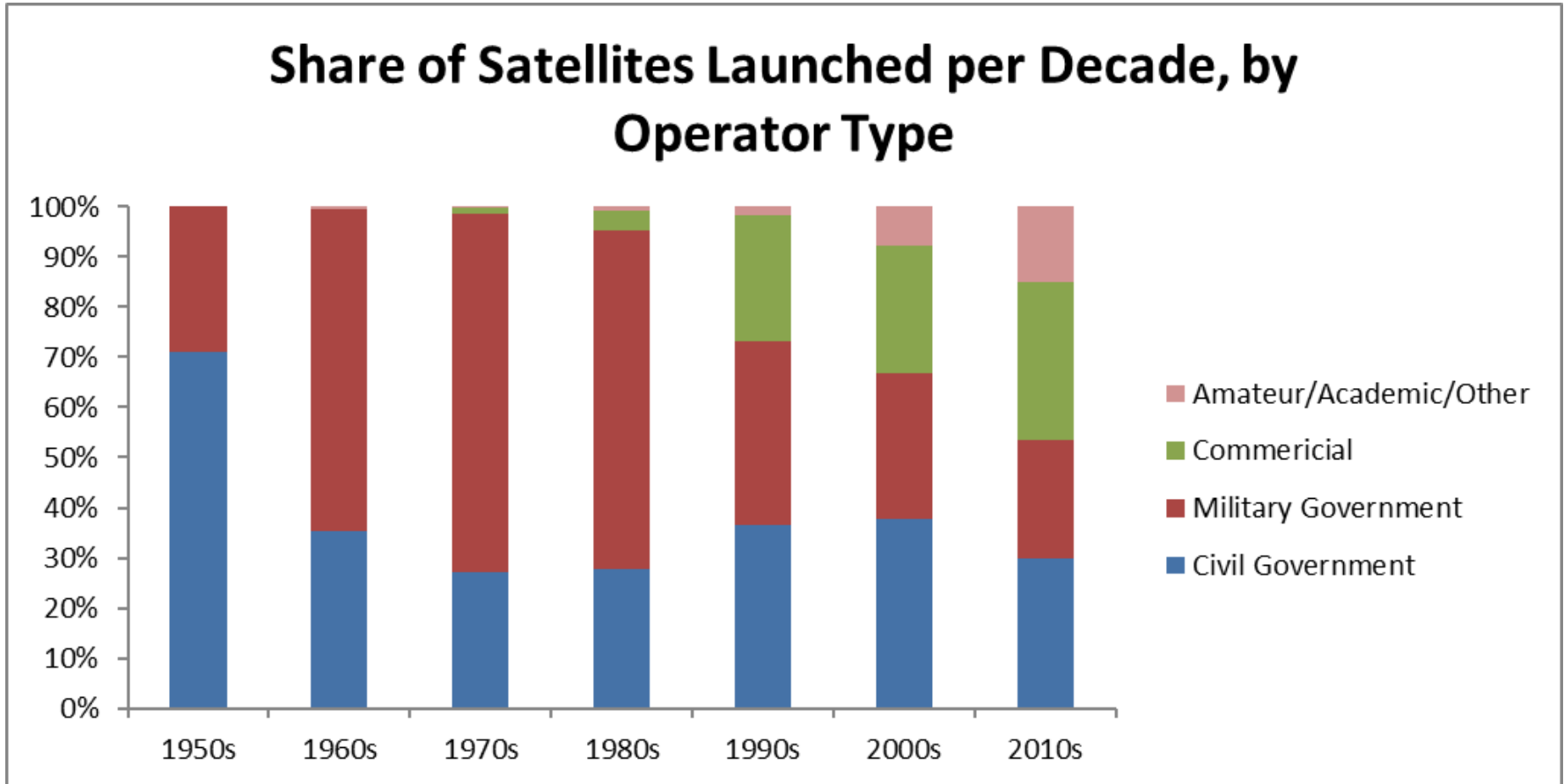


As of September 1, 2017: Estimated total number of operating satellites: 1,738

1-50 kg Forecast: Up to 2400 micro/nanosatellites to launch by 2023 (Spaceworks)

NGSO Constellations: 16,000+ planned satellites – based on US filings alone

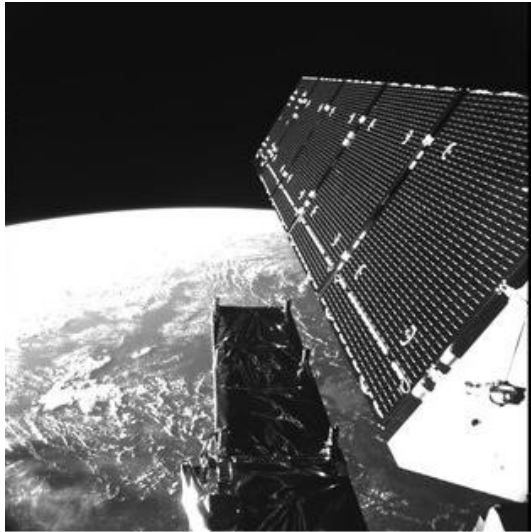
Space is Becoming More Commercial



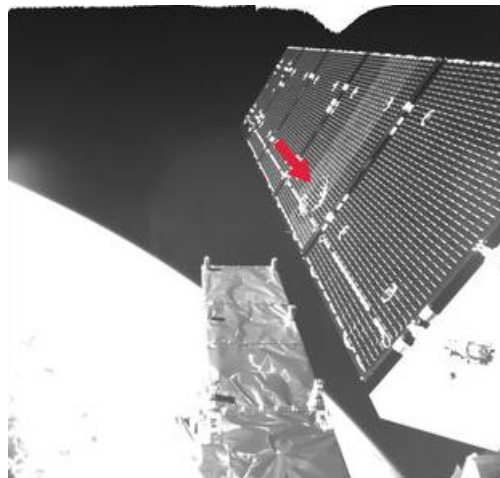
Source: McDowell, Jonathan C, 2017—*Satellite Statistics*
http://www.planet4589.org/space/log/stats2/own_categ.txt

Space Debris Population

Millimeter Sized Debris Impact



BEFORE

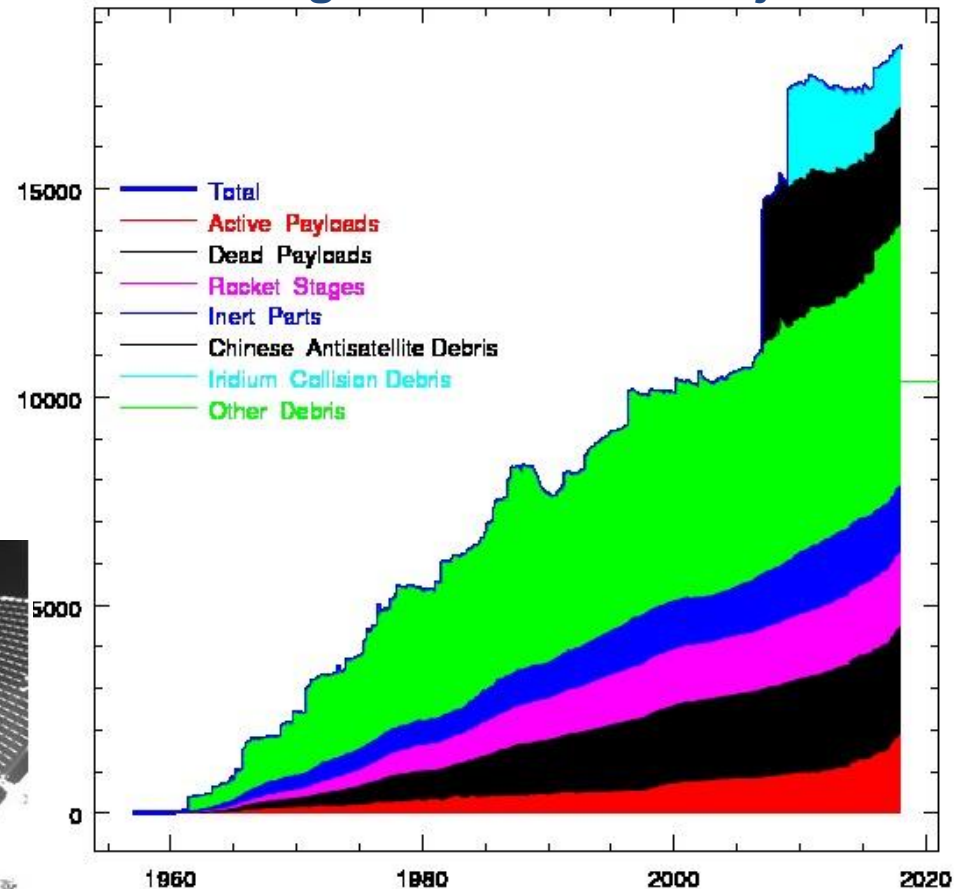


AFTER

Source: European Space Agency, http://www.esa.int/Our_Activities/Observing_the_Earth/Copernicus/Sentinel-1/Copernicus_Sentinel-1A_satellite_hit_by_space_particle

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Catalogued Number of Objects

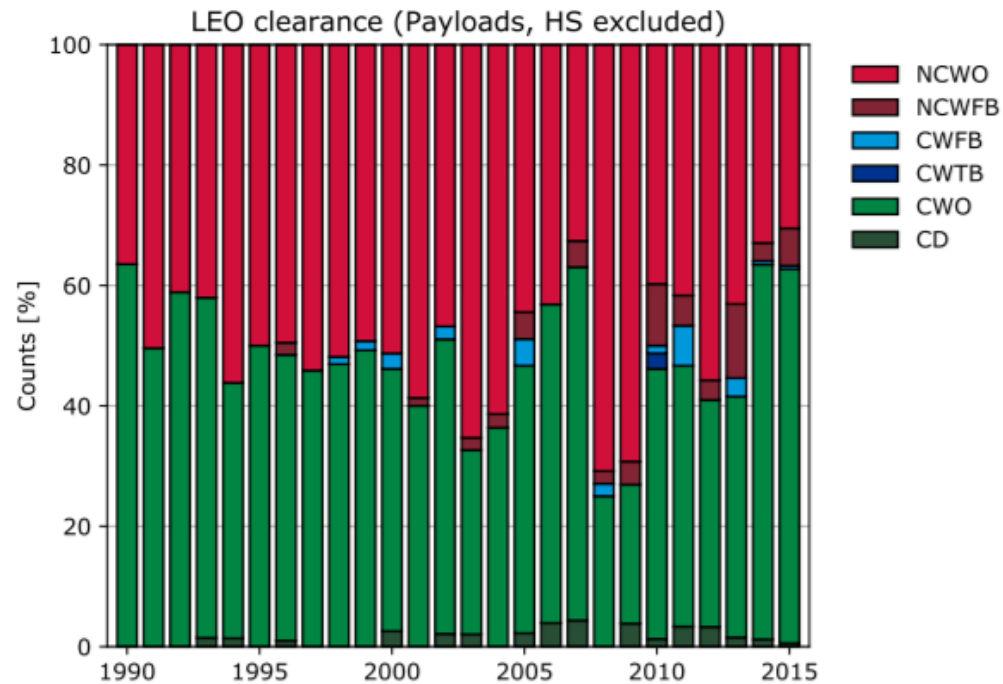
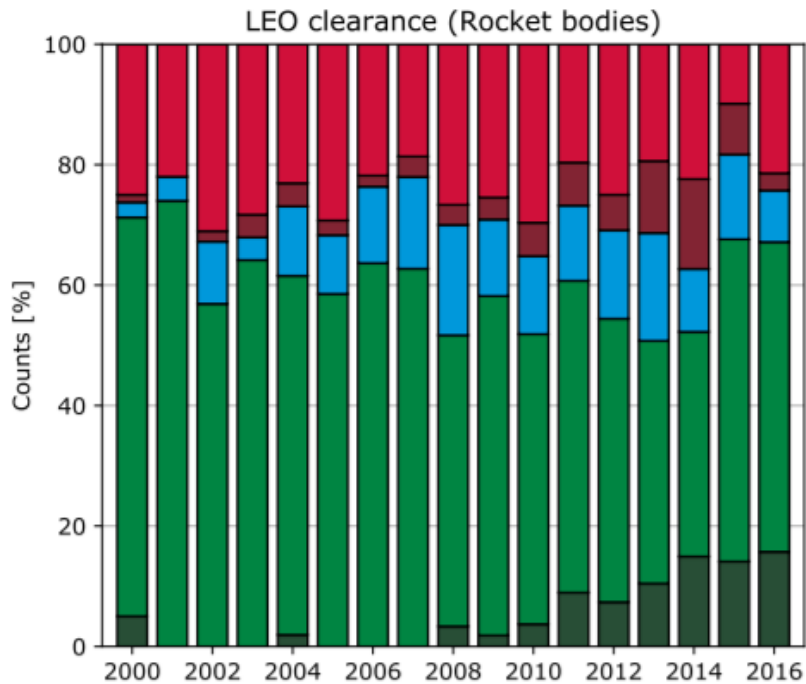


Most objects >10cm in diameter are tracked

Source: McDowell, Jonathan C, 2017—Satellite Statistics, <http://www.planet4589.org/space/log/stats1.html>

Space Debris Mitigation Guidelines

- Inter-Agency Space Debris Coordination Committee (IADC)
- Some progress on national implementation
- ESA research indicates 40-60% compliance with 25-year rule



Source: ESA Space Debris Office, "ESA Annual Space Environment Report." April 27, 2017.

https://www.sdo.esoc.esa.int/environment_report/Environment_Report_I1R2_20170427.pdf

Principles for Responsible Space Actors

In an increasingly competitive orbital environment, how can operators cooperate on responsible operations principles?

How can operators work with government(s) to ensure safety of operations for all users of the space environment?



*** Satellites not to scale**

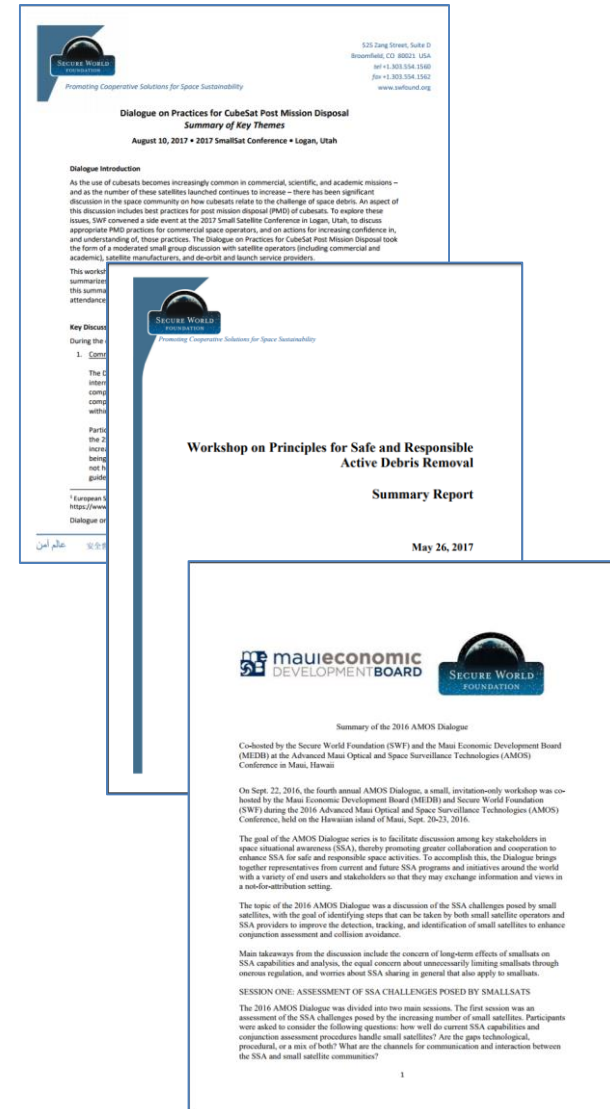
- Satellite tracking capabilities
- Constellation separation
- Satellite reliability and end-of-life passivation commitments
- Adequacy of space debris guidelines
- Spectrum management & coordination
- Information sharing and transparency

Areas of Opportunity to Develop Norms of Behavior

During 2016 and 2017 the Secure World Foundation (SWF) has held a series of workshops discussing best practices in several areas:

- Satellite operator best practices for minimizing collisions
- Space situational awareness (SSA) and smallsats
- Cubesat launch and deployment best practices
- Cubesat post-mission disposal best practices;
- Principles for safe and responsible active debris removal
- Operations principles for large commercial satellite constellations

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Conclusion: A Stable, Predictable, and Sustainable Operating Environment in Space

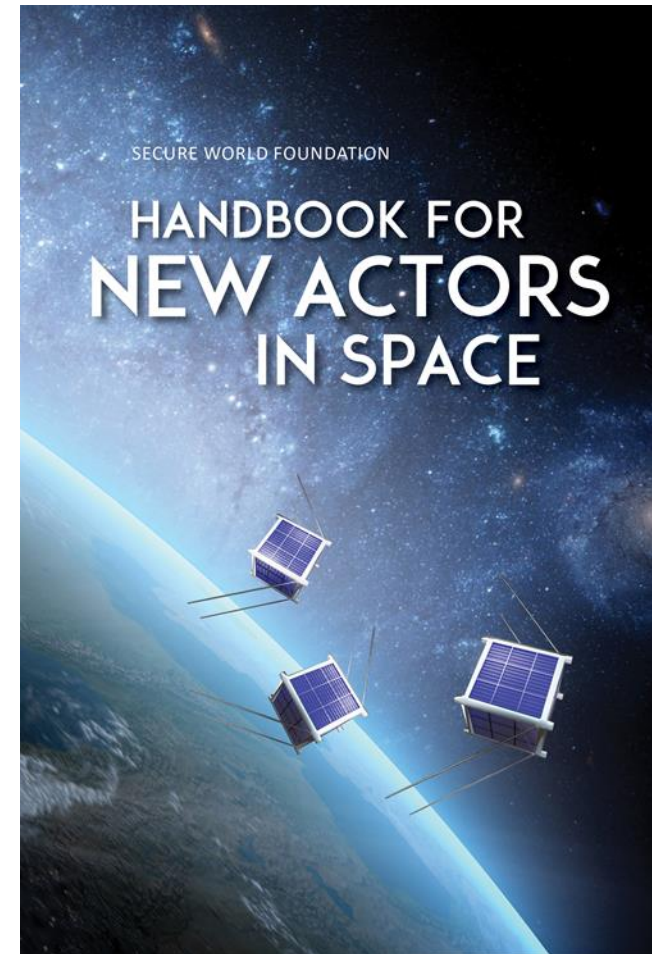
How can governments and the private sector work together to ensure sustainability of the domain?

Issues/Topics

- Policy context for identifying and obtaining benefit
- Regulatory authority, structure & process
- Space traffic management
- Norms of behavior
- New actors & best practices
- Government role as both customer & operator

Example Efforts

- UNISPACE +50 and High Level Fora
- Agenda-setting for future multilateral discussions
- Industry-led principles and norms of behavior
- Efforts to develop consensus statements and practices
- SWF Handbook for New Actors in Space
- Overview of fundamental principles, norms, and best practices for safe, predictable, and responsible activities in space





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Thank You

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