



*Promoting Cooperative Solutions for Space Sustainability*

# Trends in the Space Domain and Security Challenges

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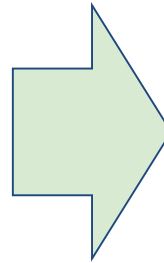
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- Space is becoming more like other domains (air, land, sea, etc)
- Space situational awareness (SSA) and rendezvous and proximity operations (RPO) are key capabilities to deal with increasing risks, but also present security challenges
- Improving safety of spaceflight hinges on broader access to SSA data, and more robust governance structures for private sector oversight
- Diversification and resilience are the best options for dealing with threats to space objects
- Canada can play a key role in spurring international enforcement, developing verification capabilities, and facilitating discussions on “rules” for military activities

# Broad space domain trends

## Old Space Paradigm

- National
- Secret
- Military-led
- Independent
- Strategic



## New Space Paradigm

- International
- Transparent
- Commercial-led
- Interdependent
- All levels of war

Space is becoming “normalized”

- Private sector will have increasing share of space activities
  - Driver of innovation, capability development, & norms of behavior
- Unilateral military strategies and power increasingly less effective
  - Overall diffusion of power, more complex geopolitical environment
- Growing diversity of space actors, rationales, and interests
  - Less likelihood of global consensus, growing importance of regional issues and relationships
- Space activities will become more transparent for all actors
  - Non-military sources of data will proliferate & innovate faster than controls
- Military activities in space will look more like military activities in air/land/sea
  - Space more likely to be part of future conflicts, but also more “rules”

# Technology (capability) linkages

- **Rendezvous and proximity operations (RPO)**
  - Ability to maneuver into same/similar orbit as another space object
  - Critical capability for human spaceflight, on-orbit satellite servicing, active debris removal, and on-orbit assembly and manufacturing
  - Also enables co-orbital ASATs and intelligence collection/inspection
- **Space situational awareness (SSA)**
  - Ground and space-based sensors to collect information on the space environment, human activities, and determine potential threats
  - Enables targeting of satellites for counterspace capabilities

# Improving safety of spaceflight

- Biggest challenge at the moment is ***lack of information***
  - Goal should to be to ***provide as much data, from as many diverse sources***, about the space environment ***to as many space actors as possible***
  - Single “keeper” of data = single point of failure
  - More sources = more likely to find/fix errors
  - More open access = more eyeballs & innovation in analytics
- Create more ***robust governance structures to encourage & oversee private sector activities***
  - Old regime of licensing remote sensing & spectrum ill-suited for current trends
  - What does “space traffic management” look like?

# Addressing safety & security challenges

- Environmental threats will continue to be a challenge
  - Adoption & enforcement of debris mitigation guidelines
  - Development & demonstration of remediation technologies
  - Broader international cooperation on space weather forecasting/warnings
- Intentional threats will be difficult to protect against directly
  - Harder/more expensive to protect than to attack (at least for time being)
- Key is diversification and resilience
  - Focus on national niches (specific technologies/sectors, geographical advantages, relationships)
  - Complement with international partnerships and commercial capabilities

- Call for ***enforcement of existing treaties and commitments***
- Help develop ***verification groundwork for future binding agreements***, including test bans
  - Focus on verifying actions and behavior, not objects/capabilities
  - Foster international, public, & commercial SSA capabilities and information
- Facilitate discussions on ***“rules” for military space activities***, including RPO, close approaches, and kinetic testing
  - Define and distinguish between “normal” and “hostile” actions
  - Define “self-defense” in context of space, and application of Law of Armed Conflict





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# THANK YOU

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