Trends in the Space Domain and Security Challenges

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Main points

• 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”
Promoting Cooperative Solutions for Space Sustainability

Implications

• 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
Role for Canada

• 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
THANK YOU

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