Rendezvous and Proximity Operations: New Options, New Issues

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Overview

• Role of norms for space governance

• Evolution of rendezvous and proximity operations and on-orbit servicing technologies

• Examples of efforts to establish norms for responsible space behavior
Norms in Space Governance

• Much of the existing space governance framework is based on norms
  – Example: Freedom of overflight for satellite reconnaissance
    • Launch of Sputnik in 1957 helped set the norm that satellite overflight did not breach territorial sovereignty
    • By mid-1960s, freedom of overflight was a generally accepted norm
    • Was not codified into “hard law” until Outer Space Treaty of 1967

• Norms are likely going to be the main mechanism to address future challenges
  – Far more space actors than ever before, with diverse interests and goals
  – Increasingly challenging to get global consensus on new “hard law”
Development of OOS and RPO Capabilities

- On-orbit servicing (OOS) and Rendezvous and Proximity Operations (RPO) are key to enabling future of on-orbit activities

- Benefits and challenges
  - Greatly increase the viability of and benefits from space activities
  - Raises a number of diplomatic, legal, safety, operational, and policy challenges that need to be tackled

- OOS and RPO are not new, and are already international
  - 50+ years of experience in doing it with human spaceflight, but increasingly shifting to robotic/autonomous
  - Multiple countries/companies developing and testing RPO capabilities

- How to develop norms and standards to enable cooperative OOS/RPO and mitigate challenges?
Current Activities in OOS & RPO

- **Satellite Inspection**: Chandah
- **Life Extension**: Orbital ATK
- **Satellite Refueling**: Airbus Defence & Space
- **Modular Satellite Assembly**: NovaWurks, IBOSS
- **Deorbit / End of Life Services**: Astroscale, di-orbit

And future activities and applications, which would leverage technology, norms, and standards.

Selected examples of active organizations, not intended as complete listing.
DARPA and Satellite Servicing

- The Defense Advanced Research Projects Agency (DARPA) has had a long history with developing cooperative OOS technologies
  - Orbital Express, Robotic Servicing of Geosynchronous Satellites (RSGS)
  - Goal is to develop/demonstrate core technologies, and spin them off to industry
- Establishing norms and standards is essential to creating a vibrant commercial OOS industry
- Consortium for Execution of Rendezvous and Servicing Operations (CONFERS) program is meant to be a forum where industry and other stakeholders can engage to develop standards and norms
Advanced Technology International (ATI)
• Prime, lead for consortium development

Secure World Foundation (SWF)
• Lead for outreach and engagement

University of Southern California Space Engineering Research Center (SERC)
• Conducting research into existing standards and practices

Space Infrastructure Foundation
• Space-related standards development expertise
• Leverage best practices from government and industry to research, develop, and publish non-binding, voluntary consensus standards (technical and operations) for cooperative OOS and RPO
• These standards would provide the foundation for a new commercial repertoire of robust space-based capabilities and a future in-space economy
• Be open to participation by private sector stakeholders in the satellite servicing community
• Focus on RPO in the first year, and OOS in the second year
• Initially supported by DARPA, CONFERS intends to transition to fully private-sector operations over a period of several years
• Information on membership application process is available on the CONFERS website at: www.satelliteconfers.org
• **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
• Woomera Manual on the International Law of Military Space Operations
Questions?

Thanks.

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