

**Technical presentation on
Consortium for the Execution of Rendezvous and Servicing Operations
Given at the United Nations Committee on the Peaceful Uses of Outer Space
Scientific and Technical Subcommittee
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The Consortium for Execution of Rendezvous and Servicing Operations (CONFERS)

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TODD MASTER

Thank you, Madame Chair. As this Committee is well aware, rendezvous and proximity operations (RPO) are not new to space activities, but over the last decade there has been increased development of RPO capabilities to support on-orbit satellite servicing (OOS) missions such as satellite inspections, repair, refueling, life-extension, and on-orbit assembly. There have been many discussions in this Committee and other fora over that same period about how to promote the development of such capabilities to enhance our ability to use space while also ensuring the long-term sustainability of space activities.

CONFERS Objectives




- Independent industry forum to advocate and promote on-orbit satellite maintenance, servicing, and rendezvous operations
- Collaborate to research, develop, and publish voluntary, consensus technical and safety standards
- Engage with governments on policy and oversight of satellite servicing activities
- Open to participation by private sector stakeholders in the international satellite servicing community
- Initially supported by DARPA, CONFERS intends to transition to full private-sector funding over a period of several years

The Consortium for the Execution of Rendezvous and Servicing, or, “CONFERS” is an independent industry forum created to advocate for, and promote commercial on-orbit satellite maintenance, servicing, and rendezvous operations. Its goal is to encourage commercial stakeholders to research, develop, and publish voluntary, consensus-based technical and safety standards. The consortium helps to advance the principles and goals of the U.S. National Space Traffic Management Policy, including leadership in the development of operational standards and best practices to promote safe and responsible behavior in outer space. Although the initial creation of CONFERS began with on-orbit servicing programs at DARPA and NASA, CONFERS will be transitioning to a fully-independent, private-sector funded entity over the next few years. To provide more details on the Consortium, I would like to introduce Dr. Brian Weeden, the CONFERS Executive Director.

BRIAN WEEDEN

Distinguished delegates, many of you know me from my work with Secure World Foundation and our efforts over the last decade to facilitate multistakeholder discussions on steps to improve the long-term sustainability of space activities. It is my privilege today to speak to you about CONFERS.

CONFERS: A Holistic Approach To Standards



- Interfaces and Designs**
 - Engineering and design to increase the safety, viability, and interoperability of satellite servicing
- Operational Practices**
 - Behavior of satellite servicing and RPO activities
- Data Exchange and Sharing**
 - Information sharing between servicing companies, clients, and governments
- Transparency**
 - Mechanisms to reduce misperceptions and clarify intent about the dual-use activities

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The main mission of the Consortium is to bring together experts from industry, governments, and academia to develop voluntary consensus technical standards for commercial satellite servicing in four different categories. The first category are interfaces and designs that can increase the safety, viability, and interoperability of satellite servicing. The second are operational practices that can help establish norms of responsible behavior for close approaches and proximity operations. The third are data exchange and sharing standards that

can improve information sharing between servicing companies, clients, and governments. The fourth category are standards that will improve the transparency of commercial servicing activities to reduce misperceptions and clarify intent.

CONFERS Secretariat



- **Advanced Technology International**
 - consortium start-up and formation activities
 - consortium operations and general management functions
- **Secure World Foundation**
 - overall technical lead
 - coordinate all research and standards development activities
- **University of Southern California Space Engineering Research Center**
 - execute a comprehensive study of past and present RPO actions
 - catalog the past programs both nationally and internationally
- **Space Infrastructure Foundation**
 - identify the proper standard strategy for publication by qualified Standards Development Organization (SDOs);
 - identify an SDO to work on a core standard on RPO;
 - coordinate intersessional meetings with national and international stakeholders

The CONFERS Secretariat is comprised of four organizations. Advanced Technology International is a not-for-profit company that specializes in managing consortia and has demonstrated success in developing standards in industries ranging from medical devices to aviation. My organization, Secure World Foundation, is responsible for managing the technical activities of the Consortium and international outreach. A team from the University of Southern California's Space Engineering Research Center is contributing research on existing practices and standards on satellite servicing. And finally, the Space Infrastructure Foundation provides expertise on standards and is the lead for our engagement with Standards Development Organizations (SDOs).

Current Members



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Since its formal launch last May, we managed to grow the Consortium to include twenty-four industry members across three different tiers: Sustaining, Contributing, and Observer. Our members represent a diverse cross-section of the global satellite servicing industry and include well-established companies, start-ups, servicing providers, potential servicing clients, manufacturers, and ancillary service providers such as insurance and commercial space situational awareness companies. Our members are based in Canada, France, Germany, Japan, the United Kingdom, and the United States.

2018 Activities



This slide shows more detail about our first year of activities. The first six months was spent creating the organizational structures and charter for the Consortium while simultaneously conducting academic research on existing RPO standards and practices. During the second six months, we held three workshops in the United States and Germany that brought together experts from industry, academia, and government to discuss how to begin developing technical standards for RPO.

Over the course of the discussions, a three-tiered approach was developed. The initial focus would be on a set of high-level guiding principles that would outline the overall values and goals for commercial RPO, followed by a more in-depth set of recommended design and operating practices. The practices would initially be based on government experiences from historical RPO missions but would be updated as commercial missions take place. Specific practices that needed more definition and validation would then be candidates for the third tier

of future technical standards. In parallel, we also began developing a lexicon of terms and definitions for use throughout the Consortium's work.

In November of 2018, we held the first Global Satellite Servicing Forum in Washington, DC, which brought together nearly 150 people for a day-long discussion of the satellite servicing community. The event included more than twenty "flash talks" by a wide range of industry representatives that highlighted specific RPO and OOS technologies, capabilities, and services under development, along with supporting services such as insurance, manufacturers, and launch. The program also included two panel discussions that looked at market and business trends in satellite servicing and discussed policy and regulatory considerations with government representatives from the United States, the United Kingdom, and France.

The event was livestreamed and several presentations and recordings from the conference can now be found on the CONFERS website. Our plan is to make the GSSF as the premier annual event for discussing the global satellite servicing technology, market, and policy developments.

CONFERS Products



- **Guiding Principles for RPO and OOS (published 7 Nov 2018)**
 - Consensual operations
 - Compliance with relevant laws and regulations
 - Responsible operations
 - Transparent operations
- **Design and Operating Practices (published 4 February 2019)**
 - Design for mission success
 - Design satellites to improve mission safety
 - Design operations to minimize mishaps
 - Avoid interference during all operations
 - Share info on anomalies and resolutions
 - Promote space sustainability guidelines/practices

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CONFERS has published two documents as a result of these efforts. The first document is the CONFERS Guiding Principles for Commercial Rendezvous and Proximity Operations (RPO) and On-Orbit Servicing (OOS), which was published in November 2018 and is available on the CONFERS website at satelliteconfers.org. It highlights consensual operations, compliance with relevant laws and regulations, responsible operations, and transparency as the key principles that will underpin commercial RPO and OOS. The document also provides definitions for terms in the context of these principles and the work of CONFERS in general.

We are also extremely proud to announce that earlier this month our members approved the first iteration of the CONFERS Recommended Design and Operational Practices, which provides more specifics on steps that can be taken to improve the safety, transparency and sustainability of commercial satellite servicing. The practices document, which is also available on the CONFERS website, includes recommendations on how to design for mission success, improve

mission safety, minimize mishaps, avoid interference with other space activities, share information on anomalies and their resolutions, and promote space sustainability.

The next step in our process is to engage with existing SDOs and leverage their processes to continue the work we've done and eventually develop one or more formal international standards for satellite servicing. We are currently working with our members to participate in the meetings of the International Organization for Standards (ISO) Subcommittee 14 in June of this year where we hope they will introduce a new work item on satellite servicing. At the same time, we will continue our own work to support efforts in ISO or other or other SDOs.

2019 Activities



- University of Southern California Space Engineering Research Center research into existing practices/standards on satellite servicing and interfaces
- Election of Executive Committee
- CONFERS Workshops
 - April 8 (Colorado Springs)
 - May 9-10 (Washington, DC)
 - June 7-8 (London)
 - Sept (TBD)
- General Assembly/Global Satellite Servicing Forum
 - October 3-4 (Washington, DC)

I would like to conclude my presentation by giving a quick overview of our plans for this year's activities. Our teammates at the University of Southern California are busy conducting additional research on existing standards for satellite servicing interfaces and hardware, and we are also in the process of electing our first Executive Committee. Later this spring, we plan to hold another series of workshops to continue the technical discussions among our members and government subject matter experts, and we plan to hold another Global Satellite Servicing Forum in early October. Throughout the year we will also be participating in several international conferences to broaden our engagement with industry and governments.

Contact Info



- Consortium publications and further information are available on the CONFERS website at: www.satelliteconfers.org
- Contact Information:
 - Technical/Standards questions: Dr. Brian Weeden (bweeden@swfound.org)
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Much more information about the Consortium, our activities, and how to join can be found on our website. Membership is open to private sector entities with a direct and material interest in satellite servicing activities. We also have a signup link for our mailing list that we use to announce publications and events.

Thank you for your kind attention, and I look forward to any questions you might have.