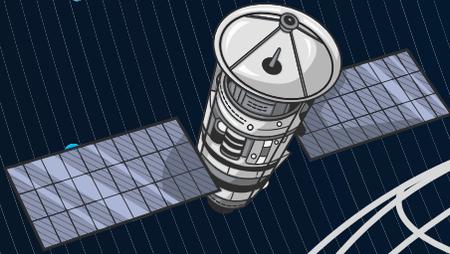


# CONFERENCE PROGRAM AND EXHIBITOR GUIDE



**CONFERS**

FOSTERING THE SATELLITE SERVICING INDUSTRY

7<sup>TH</sup> ANNUAL

**G S S F & E**

November 13 - 14, 2024

The space sector's *premier* in-space  
infrastructure and operations event

# Welcome from CONFERS President



November 13, 2024

Dear Colleagues and Friends:

Welcome to Arlington, Virginia and the CONFERS 7<sup>th</sup> Annual Global Satellite Servicing Forum & Exhibition!

As President of CONFERS, I want to thank each of you for taking the time and making the investment to be here. I also want to call out the volunteer members who put this outstanding, peer-developed program together; the speakers who agreed to participate and share their insight; and our sponsors, exhibitors and advertisers for their financial support to bring all this together.

The speakers that you will hear from, and the topics that will be discussed over these next two days are driving the continued acceptance and maturation of the burgeoning OOS (On-Orbit Servicing) industry. Together we are creating an ecosystem that has the potential to be transformative for the space economy, driving sustainability and creating business. CONFERS members and the broader ISAM (In-Space Servicing, Assembly and Manufacturing) community are developing technologies and working on policies that will lead to a host of services on orbit – maintenance, repair, manufacturing, re-purposing, assembly, inspection, refueling, life-extension and debris removal, to name just a few. And this business is not limited to Earth Orbit, but to cislunar and beyond. The goal of CONFERS is to position each of you and your companies – whether start-ups or legacies – to realize the opportunities of the new space economy and be prepared to act on them.

So please, enjoy our keynote speakers and panel discussions; ask questions and contribute to the dialogue; visit our table-top exhibitors; and don't forget to interact with your colleagues during our networking breakfasts, breaks, lunches, and reception. We are all a part of the creation of a sustainable, serviceable, orbital ecosystem – it is all about flexible and sustainable space infrastructure and logistics, thus, OOS ≠ Only One Solution!

So, add your voice to the CONFERSations!

Sincerely,

A handwritten signature in black ink, appearing to read "Joerg Kreisel". The signature is stylized and fluid.

Joerg Kreisel  
President, CONFERS  
Chairman + Co-Founder, iBOSS

## Sponsors and Supporters

A sincere Thank You! to our sponsors and supporting organizations for their generous contributions to the success of the 7th Annual Global Satellite Servicing Forum & Exhibition.



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Thursday Networking Lunch Sponsor



Spotlight Talk



Name Badge Lanyard Sponsor



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CONFERS Patrons Program is a year-long partnership that delivers quality business opportunities to showcase *your* company's products and services; raises its profile within the industry and with current and future clients; and, distinguishes it as a company committed to advancing the satellite servicing industry and contributing to a sustainable, safe, and diverse space economy.



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Thales Alenia Space • Valor Robotics, LLC

## Government Observer Members

German Space Agency @ DLR • ICASI  
Mexican Space Agency • National Reconnaissance Office  
Naval Research Laboratory - Naval Center for Space Technology • PIAP Space

*\*CONFERS members as of October 22, 2024*

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a member of CONFERS*



# CONFERS Volunteer Leadership

## Executive Committee

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President  
iBOSS

Jon Beam  
Vice President  
Rogue Space Systems Corporation

Dr. Brien Flewelling  
Secretary  
ExoAnalytic Solutions, Inc.

Joseph D. Anderson  
Treasurer  
SpaceLogistics, LLC

## Directors

David Barnhart  
Arkisys, Inc.

Vanessa Clark  
Atomos Space Corp.

Adam Harris  
Orbit Fab, Inc.

Dr. Tim Maclay  
ClearSpace Holding, S.A.

Dr. Brian Weeden  
The Aerospace Corporation

## Immediate Past President

Chris Blackerby  
Astroscale Holdings

## Committees and Task Forces

### CONFERS Communications Committee (CCC)

*Co-chair:*  
Dave Hebert, Astroscale, U.S.

### CONFERS Policy Committee (CPC)

*Co-chairs:*  
Morgan Martell, True Anomaly, Inc.  
Dr. Brian Weeden, The Aerospace Corporation

### CONFERS Technical Committee (CTC)

*Co-chairs:*  
Ronald J. Birk, The Aerospace Corporation  
Stephen J. Leete, Northrop Grumman Corp.

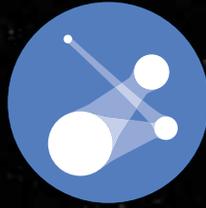
*Active Debris Remediation Task Force*  
Chair: Dr. Tim Maclay, ClearSpace Holding, S.A.

*AI and Autonomy for ISAM Task Force*  
Chair: Meera Towler, Southwest Research Institute

*Cryogenic Fluids Transfer Splinter Group*  
Chair: Dallas Bienhoff, Off-World, Inc.

*Power and Data Splinter Group*  
*(Mission completed July 2024; meets as needed*  
*during the AIAA standards development process)*  
Chair: Victor Nifo, MDA Space

*RPO Safety Task Force*  
Co-Chairs:  
David Barnhart, Arkisys, Inc.  
Rahul Rughani, Arkisys, Inc.



**SPACELOGISTICS**  
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**Pioneering the  
future of space.**



## Table-Top Exhibitors



### **a.i. solutions**

4500 Forbes Boulevard, Suite 300  
Lanham, MD 20706 USA

**Contact:** Michael Barton, Director, Sales and Service  
**Phone:** (901) 485-1464  
**Email:** michael.barton@ai-solutions.com  
**Website:** <https://ai-solutions.com/>

Founded in 1996, a.i. solutions is a mature small business focused on providing innovative products and services that enable access to space and ensure national security. Customer-centric since our inception, we provide mission-critical technical services and infrastructure supporting our customers' space launches and satellite operations. Our products and services span mission systems engineering, spacecraft ground systems development and sustainment, spacecraft systems engineering and pre-mission analysis, human and robotic space operations, modeling and simulation, and missile systems and launch vehicle engineering services in support of the nation's major space and defense agencies. We have supported the design, development, mission assurance, and operations of more than 250 space missions including the International Space Station, Orion, GPS, and the James Webb Space Telescope. We are also the creators of FreeFlyer®, an industry-leading commercial spacecraft flight dynamics, analysis, and operations software. a.i. solutions also offers the Meridian modern flight dynamics operational system, ObsSIM space event generator and simulator, and the Deep Space Trajectory Explorer (DSTE) for cislunar mission design.



### **Arkisys, Inc.**

10751 Noel Street  
Los Alamitos, CA 90720 USA

**Contact:** David Barnhart, Founder & CEO  
Rahul Rughani, Chief Systems Engineer  
**Phone:** (866) 275-4797  
**Email:** dave.barnhart@arkisys.com  
rahul.rughani@arkisys.com  
**Website:** <https://www.arkisys.com>

Arkisys is building one of the first Business Platforms in Space for new Technology Hosting, Satellite Integration, Assembly and Resupply. "The Port" is a lighthouse on orbit and a beacon to enable existing and new customers and markets in Earth orbit, the Moon, Mars and beyond. The Arkisys Port supports scalable rapid prototyping, new payload and technology testing, assembly and integration of new free-flying space platforms, and destinations for orbital transfer vehicles and on-orbit assembly and manufacturing. We are unlocking undiscovered markets and enabling pioneering technologies for the new ecosystem of space development.

# Enduralock

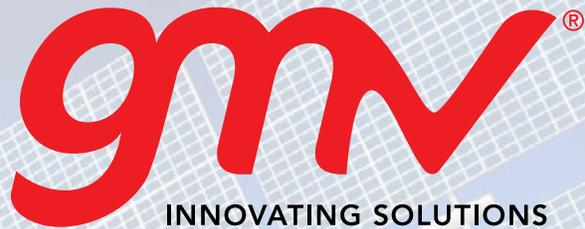
### Enduralock

14847 West 95 Street  
Lenexa, KS 66215 USA

**Contact:** Harold Hess CEO  
**Phone:** (913) 515-1970  
**Email:** [hshess@enduralock.com](mailto:hshess@enduralock.com)  
**Website:** <https://enduralock.com>

Enduralock has focused on two aspects of ISAM:

- 1) A universal satellite connector has been designed that has a mechanical linkage sufficient for in-space transport, data/power transfer, and fuel transfer in one connector with mechanical self-aligning features to supplement RPO. It is currently being developed for use with ASCENT.
- 2) Enduralock developed mechanically locking, high vibration resistant, reversible, and reusable fasteners that are unaffected by the thermal extremes of space. Self-aligning nut plates were developed that will engage off-axis bolts and then self-align during tightening. Their combination provides for the perfect mechanical building block for robotically assembling a space structure. Enduralock developed an end effector for robotic assembly of structures in space using its fasteners and nut plates. Through a current TACFI contract, a fastener magazine is being developed to store the fasteners prior to insertion or after removal in space. Enduralock anticipates that its washers will be pre-installed on structures prior to launch. As the washers have a unique geometry, an intelligent vision-based system will be developed that will recognize the spatial orientation of each washer and will then insert and tighten Enduralock's fastener at each location for assembly of space structures. The system will allow for variance in the location of the assembly points as well as their locations within the 6 degrees of freedom for movement in space. The result will be the ability for autonomous robotic assembly of structures in space prior to human arrival.



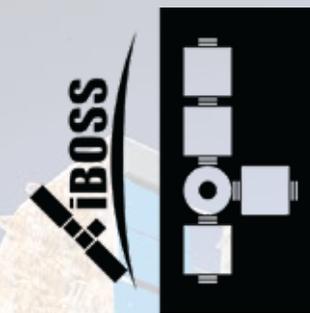
### GMV

Isaac Newton, 11  
Tres Cantos, Madrid 28760 Spain

**Contact:** Jose Miguel Lozano, President-North America  
**Phone:** + 34 918072100  
**Email:** [jmlozano@gmv.com](mailto:jmlozano@gmv.com)  
**Website:** <https://www.gmv.com/en-es>

GMV is a trusted partner that supplies products, systems and services to space agencies, public institutions, satellite-manufacturers and almost 40 operators worldwide. GMV is also involved in more than 900 satellite missions and has a presence in 12 countries, including the U.S. from 2004. Since its very beginnings back in 1984, it has taken part in practically all space missions of the European Space Agency (ESA) and EUMETSAT. Some of the most important projects it is currently working on are Europe's satellite-navigation systems (Galileo and EGNOS), commercial telecommunications operators (EUTELSAT, Hispasat, SES, etc.), Earth observation and meteorology (ESA Earth Explorers, Copernicus, Paz, MTG and EPS SG), planetary defense (Hera), space surveillance (SSA and EUSST/STM), technology demonstration missions (PROBA-3), space exploration and robotics (Exomars), operations (DLR, ESA, CNES) and user applications (security, agriculture, maritime, among others).

## Table-Top Exhibitors



### iBOSS

Dennewartstraße 25-27  
52068 Aachen, Germany

**Contact:** Joerg Kreisel, Chairman + Co-Founder  
Thomas A. Schervan, CEO

**Phone:** +49 176 84035014

**Email:** joerg@iboss.space  
thomas@iboss.space

**Website:** <https://www.iboss.space>

iBOSS develops interfaces for space infrastructure and logistics based on modular architectures, hence ISAM (In-Space Servicing, Assembly and Manufacturing). iBOSS focuses on "Connect + Transfer" with its core products iSSI and iFEX.

The iSSI (intelligent Space System Interface) is a multi-functional connector – already demonstrated and tested in space in 2022 and used by international stakeholders in laboratory testing and ISAM development. It provides mechanical connection, power, and data transfer, saves time and money, solves integration problems and facilitates modular architectures by doubling as a robotic end effector or foot.

The iFEX (intelligent Fuel EXchanger) is an innovative fuel transfer interface solution for all propellant types, designed for in-space refueling to extend system life and increase mission flexibility.

Founded in 2017 and with offices in Germany and the United States, iBOSS contributes to space industrialization and enables ISAM stakeholders to develop new systems and applications, and operational and business models.



### Kurs Orbital S.r.l.

Corso Vittorio Emanuele II 83  
Turin, TO 10128 Italy

**Contact:** Roberto Morano,  
Head of Communications

**Phone:** +39 339 49 48 280

**Email:** [roberto.morano@kursorbital.com](mailto:roberto.morano@kursorbital.com)

**Website:** <https://kursorbital.com>

Kurs Orbital expands human activities beyond Earth by providing rendezvous and docking technology to start-ups and companies which would like to offer in-orbit servicing or logistics missions, but cannot afford the development time and cost for this technology.

ARCap is a standardized module, which enables any kind of spacecraft to perform such missions in a totally autonomous way, dealing also with non-cooperative targets like space debris, malfunctioning or out-of-fuel spacecrafts.

The algorithms running the ARCap module come from the Soviet Kurs rendezvous-acquisition system, used continuously since 1985 and responsible for more than 300 successful dockings in orbit between Soyuz-Progress vehicles, the MIR and the International Space Station.



**Orbital Transports**  
1623 W. Fulton Street  
Chicago, IL 60612 USA

**Contact:** David Hurst, CEO  
**Phone:** (773) 218-6151  
**Email:** [dhurst@orbitaltransports.com](mailto:dhurst@orbitaltransports.com)  
**Website:** [www.orbitaltransports.com](http://www.orbitaltransports.com)

Space logistics and orbital infrastructure for low Earth orbit and Cislunar space.



**SEDS-USA (Students for the Exploration and Development of Space)**  
108 Timberland Trace NW  
Madison, AL 35757 USA

**Contact:** Sara S. Alvarado, Executive Director  
**Phone:** (941) 565-0474  
**Email:** [sara.alvarado@seds.org](mailto:sara.alvarado@seds.org)  
**Website:** <https://seds.org>

SEDS-USA was founded as a national group in 1982 by Peter Diamandis, Bob Richards, and Todd Hawley. The largest student-run space organization in the world, it consists of an international community of high school, undergraduate, and graduate students from a diverse range of educational backgrounds in chapters all over the world, including Canada, India, Israel, Mexico, Nepal, Nigeria, Philippines, Spain, United Kingdom, and United States.



**SPACELOGISTICS**  
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**SpaceLogistics**  
45101 Warp Drive  
Sterling, VA 20166 USA

**Contact:** Joseph D. Anderson, Vice President  
**Phone:** (703) 280-2900  
**Email:** [joseph.anderson@ngc.com](mailto:joseph.anderson@ngc.com)  
**Website:** <https://www.northropgrumman.com/space/space-logistics-services>

SpaceLogistics, a wholly owned subsidiary of Northrop Grumman, provides in-orbit satellite servicing to geosynchronous satellite operators using its fleet of commercial servicing vehicles - the Mission Extension Vehicle, the Mission Robotic Vehicle, and the Mission Extension Pods.

## Program

**[Location note:** All sessions take place in the F. Scott Fitzgerald Ballroom. Registration, the table-top exhibits, breakfast service, breaks, lunch service and the Wednesday evening reception take place in the F. Scott Fitzgerald Ballroom Foyer.]

### Wednesday, November 13, 2024

7:00 AM – 5:00 PM **Registration**

7:00 AM – 8:00 AM **Networking Breakfast**

8:05 AM – 8:20 AM **Opening Welcome & Volunteer Service Recognition**

Joerg Kreisel, CONFERS President; Chairman + Co-Founder, iBOSS  
Kelli Kedis Ogborn, Program Facilitator; Vice President, Space Commerce & Entrepreneurship, Space Foundation  
Brian Lagana, CONFERS Executive Director

8:25 AM – 8:45 AM **Opening General Session Keynote**

*In-Orbit Servicing Missions and Technology Activities at ESA: Vision for a Sustainable Space Environment*

Tiago Soares, Clean Space Lead Engineer, European Space Agency

8:50 AM – 9:10 AM **Fireside Chat**

*Observing, Moving, Sustaining, Securing: Clarifying the Military Utility of In-Space Servicing, Assembly, and Manufacturing (ISAM)*

In this fireside chat, Retired U.S. Army Colonel Dennis Wille, Senior Director of Business Development for National Security, Astroscale U.S., will be interviewed by Laura Winter, Journalist, Editor and Host of *The DownLink Podcast (Defense & Aerospace Report)*, to push past the jargon and delve deep into the use cases and advantages



that partnerships with commercial ISAM providers can offer to inform and meet the U.S. Department of Defense's strategic objectives for the space domain. In their conversation, they will also dispel common misconceptions and identify the remaining pain points, risks, and gaps that must be overcome to further strategic stability and to accelerate the transition to more sustainable space operations and architectures.

**9:15 AM – 9:35 AM General Session Keynote**

*Dual Use Dynamic Space Operations*

Retired U.S. Air Force Major General Brook Leonard, Chief Operations Officer, Rogue Space Systems Corporation

**9:40 AM – 10:00 AM General Session Keynote**

*An Update from the German Space Agency at DLR*

Adam Kaczmarczyk, Project Manager, Department of Robotics, Digitalization, and AI, German Space Agency @ DLR

**10:00 AM – 10:25 AM Networking Break**

**10:30 AM – 11:10 AM Panel**

*What are the Odds? Managing Risks in On-Orbit Servicing*

Panelists will hold a lively discussion on risk management and insurance as an incentive of good behavior in space. How can operators, clients, policymakers, insurers, and others manage the unique risks associated with On-Orbit Servicing (OOS)? How are liabilities allocated? How will availability of routine OOS change the landscape of risk management and insurance?

**Panel Facilitator:** Christopher T.W. Kunstadter, CEO, Triton Space, LLC

**Panelists:**

Chris Blackerby, CONFERS Immediate Past President; COO, Astroscale Holdings  
 Laura Cummings, Esq., Associate, GreenbergTraurig  
 Mark Quinn, CEO, Willis Towers Watson, Global Inspace

**11:15 AM – 11:35 AM General Session Keynote**

*The ISAM National Strategy: Progress, Plans and International Collaboration*

Dr. Jinni Meehan, Assistant Director for Space Policy, White House Office of Science and Technology

**11:40 AM – 12:10 PM General Session Keynote**

*NASA's ISAM State of Play: Employing Testbeds and Proving Grounds to Accelerate Confidence-building in ISAM Capabilities*

Jill McGuire, Associate Director for the Exploration and In-Space Services (ExIS) Projects Division, National Aeronautics and Space Administration

**12:15 PM – 12:50 PM Networking Lunch**

**12:40 PM – 12:50 PM Luncheon Keynote**

*Update from the United Nations Summit for the Future*

Dr. Aarti Holla-Maini, Director, United Nations Office for Outer Space Affairs (pre-recorded)

12:55 PM – 1:55 PM **Panel**

*Proving ISAM Works: Demonstrations and Standards*

**Panel Facilitator:** Jill McGuire, Associate Director for the Exploration and In-Space Services (ExIS) Projects Division, National Aeronautics and Space Administration

**Presentations:**

*COSMIC Demonstration Infrastructure: Designing the Ideal Testbeds*

Dr. Max Spolaor, Senior Engineering Specialist, Vehicle Engineering and Autonomy Department, The Aerospace Corporation

The Consortium for Space Mobility and ISAM Capabilities (COSMIC) is a nationwide coalition that aims to invigorate a domestic in-space servicing, assembly, and manufacturing (ISAM) capability. COSMIC is designed to harness the creativity, energy, and resources of the nation to ensure the United States is at the forefront of ISAM capabilities. This presentation we will outline initial results of the work carried out by the Demonstration Infrastructure team - one of the five focus areas composed of interested members of COSMIC's general membership. Specifically, the DI focus area has been developing an on-line ISAM testbed inventory with information on demonstration infrastructure within the three DI domains: digital, ground and space test infrastructure as outlined in the COSMIC ISAM testbed taxonomy.

*In Orbit Validation and Verification Methods and Activities*

David Barnhart, CONFERS Board of Directors; CEO, Arkisys, Inc.

Currently, both CONFERS and COSMIC are looking at ground testbeds for pre-launch validation/verification, but once on orbit, the issue of validation and verification (V&V) remains unanswered. Attributes such as various connecting interfaces, electrical and data connections, the potential for compliance chain error building from launch and how to compensate, etc., are all issues that still remain to be resolved.

*Waypoint Persistent Platforms - Destinations in Space*

Barbara Plante, Chief Space Architect, Rogue Space Systems Corporation

*REACCH-ing for the Stars with Astrobee*

Troy M. Morris, Co-Founder & CEO, Kall Morris Inc

REACCH is a multi-armed articulated soft robotics device that universally and reversibly docks, to enable in-space solutions to legacy, adversarial, or otherwise unprepared objects. The REACCH technology uses a combination of segmented, rigid linked tentacles, along with a novel combination of both soft robotics and mechanical gecko adhesion, for a controllable, directional, reversible grip that can adhere to unprepared materials without residue or damage. Testing with Astrobee aboard the International Space Station (ISS), with launch planned for September 2024, will involve a variety of surface plates with differing roughness attached to a free-floating Capture Cube. REACCH, hosted on an Astrobee, will then grab the Capture Cube, proving the technology's viability in the micro-gravity environment. The lessons learned covered in this presentation will focus on best practices discovered during preparation for the Astrobee testing with both internal and external communication, operations setting and monitoring of timelines, schedules, and deliverables, balancing the need to keep Operations budgets within the constraints of the project while ensuring Engineering time and results are optimized, learning from and developing on previous ISS gecko adhesion projects conducted on the ISS by other organizations, and defining and mitigating risks to both ISS crew and vehicle, both real and perceived of the "tentacle monster."

2:00 PM – 2:15 PM **Spotlight Talk**  
**Presented by Sho Nakanose, CEO, GITAI**

2:20 PM – 3:05 PM **Space Infrastructure Games (Part 1)**  
*The Merits and Pitfalls of Standardization and Modularity*

**Exercise Facilitator:** Vanessa Clark, CONFERS Board of Directors; Co-Founder & CEO, Atomos Space Corp.

**Exercise presented by:** Kevin Barry, Co-Founder, LightBridge Strategic Consulting, LLC

This audience participation activity is a dynamic game to design and iterate on products in a changing market-place. It will explore the economic incentives of standardization and modularity at multiple levels of abstraction from within a company, between companies, and in an international setting. The exercise will encourage group interaction and participation with physical activities such as molding clay to working with LEGOs - all designed to engage informed play to explore these concepts quickly and without the layers of unnecessary jargon. Thoughtful and engaged participation from the audience can lead to their market success in the games and real prizes for the winning table.

3:10 PM – 3:35 PM **Networking Break**

3:40 PM – 4:45 PM **CONFERS Town Hall: Updates from Committees and Task Forces**

CONFERS committees and task forces leadership will provide updates on the activities of the Communications Committee; the Policy Committee; the Technical Committee, and its ADR Task Force, AI and Autonomy for ISAM Task Force, Cryogenic Fluids Transfer Task Force, Power and Data Interfaces Task Force, and the RPO Safety Task Force. An opportunity for Q&A will follow.



# REACH FURTHER

Meet **MDA SKYMAKER™** – a suite of commercial robotics products and services made to match your venture, sized to your needs, and delivered on your timeline – from lunar surface rovers and landers, to satellite servicing in all orbits, or in-space assembly and manufacturing.

[MDA . SPACE / SKYMAKER](https://www.mda-space.com/skymaker)

# Program

4:50 PM - 5:30 PM **Panel**

*Do You Want Maple Syrup with That? Canada's Past and Future in ISAM*

Canada has a long heritage in space robotics for In-Space Assembly and Manufacturing (ISAM) with past successes in ISS assembly and robotic refueling paving the way for Skymaker's future in LEO and Canadarm3 anchored on the Gateway. Complementing this heritage, emerging players are making their mark through in-space demonstrations of key technologies such as the mission operations tool Spacefarer and turnkey docking solution RPOD Kit. Panelists from agency, industry, and academia will discuss Canada's ambitions in ISAM, along the way exploring the challenges and opportunities of international collaboration in larger ISAM activities.

**Panel Facilitator:** Adam C. Vigneron, Postdoctoral Research Fellow, Carleton University

**Panelists:**

Kaizad Raimalwala, Senior Manager, Business Development, Mission Control  
Daniel Rey, Gateway Chief Engineer and Systems Manager, Canadian Space Agency  
Chris Scarpelli, Senior Manager, New Business MDA Space  
Kevin Stadnyk, CEO, Obruta Space Solutions

5:35 PM - 5:45 PM **Daily Wrap-up**

**Program Facilitator:** Kelli Kedis Ogborn, Vice President, Space Commerce & Entrepreneurship, The Space Foundation

5:50 PM - 6:50 PM **Networking Reception**



## SUSTAINING A RESILIENT SPACE ENTERPRISE

The Aerospace Corporation leverages unmatched expertise to solve the most complex challenges associated with operating and innovating in the space domain, so you can develop and deploy new technologies, leverage real-time data, and drive exploration. For more information, visit us at [aerospace.org](http://aerospace.org).



Explore Aerospace!



**Thursday, November 14, 2024**

7:00 AM – 5:00 PM **Registration**

7:00 AM – 7:30 AM **Networking Breakfast**

7:35 AM – 7:40 AM **Morning Welcome**

**Program Facilitator:** Kelli Kedis Ogborn, Program Facilitator; Vice President, Space Commerce & Entrepreneurship, Space Foundation

7:45 AM – 8:05 AM **General Session Keynote**

*Government LEGOS: Building a Supportive Policy Framework for ISAM*

Gabriel W. Swiney, Director, Space Policy, Advocacy, and International Issues, Office of Space Commerce, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

8:10 AM – 9:10 AM **Panel**

*A Short Time from Now, In a Galaxy Very Close By: Envisioning ISAM's Future*

**Panel Facilitator:** Gabriel W. Swiney, Director, Space Policy, Advocacy, and International Issues, Office of Space Commerce, National Oceanic and Atmospheric Administration, U.S. Department of Commerce

**Presentations:**

*Build Trust in Supply Chain Transparency*

Amy McDougall, Chief Commercialization Officer, The Provenance Chain™ Network

Keeping space safe and sustainable for all humankind is paramount. As the military prioritizes complex satellite systems and satellite servicing, a weakness has been exposed in the U.S. space industrial base with regards to availability of parts and parts that are not defective. Top U.S. Space Force officials have criticized supply chain issues across the space industry, saying defense contractors have the ability to do a better job addressing these issues. Yet, it will take the adoption of a standard that provides incentives, not just for the Prime contractors, but also for the lower-tier suppliers, ensuring guarantees of data ownership and sufficient IP protection to solve this problem. It's critical that we build trust in our global supply chain to prevent a catastrophic event in space.

This presentation discusses the challenges of understanding today's supply chain networks, including insufficient supply chain illumination solutions that use artificial intelligence and publicly available data and presents a novel and disruptive solution that provides a global standard for a more complete solution. The Commercial Trust™ Protocol (CTP) incorporates a Requirements, Incentives, Claims, Evidence (RICE) methodology to enhance data trustworthiness through structured commercial interactions operating on several key principles: Data Verification and Integrity; Confidentiality, Property Rights, and Privacy; Minimal Necessary Disclosure; Decentralized Trust; Smart Contracts for Automated Compliance; Interoperability and Flexibility; and, Data Sovereignty and Ownership Rights

By implementing these principles, the CTP secures and validates data while ensuring a higher level of trust, efficiency, and accountability in digital transactions.

*Findings of the NIST-funded Roadmapping of In-Space Service, Assembly and Manufacturing*

Dr. John Roth, Director, John Olson Advanced Manufacturing Center, University of New Hampshire

## *Towards an In-Orbit CubeSat Factory*

Maximilian Muhlbauer, MSc, Technical University of Munich

Current satellites must be designed to withstand the vibrations of a rocket start and are manufactured long before their operational start in orbit, thus creating long lead times, high expenses, and mission inflexibility. Our concept of an In-Orbit Factory aims to solve those problems, by providing an adaptive just-in-time production of customized CubeSats at the place of their deployment within hours after their specification.

The envisioned factory brings together three technologies to form a pioneering solution: an automated and adaptive robotic Assembly, Integration and Testing (AIT) process, a robotic teleoperation process using advanced Virtual Fixtures (virtual force fields) for commissioning of the factory, maintenance, and recovery and a digital representation through a Digital Process Twin (DPT). The DPT computes the required CubeSat configuration based on customer requirements and supervises the AIT process. The teleoperation process is the human interface to the factory which is first required for the commissioning phase when optimizations are needed to ensure smooth operations of the In-Orbit Factory and to tune the process for optimized throughput. At a later stage, it allows for recovery operations or to perform rare high-precision manipulation.

A core benefit of our factory using CubeSats is that it allows us to utilize existing and relatively cheap components, with the vision of a cost-effective in-orbit validation. As challenges in robotic handling of components as well as the in-orbit testing process remain the same for larger structures, our methods are also suited for production of e.g. large satellites.

This presentation presents the concept of our envisioned In-Orbit Factory, its current implementation on Earth, as well as the near-operational evaluation of core concepts on a space-ready robot.

## *The Gray Area: Developing an Orbital Circular Economy*

Kyle Cybul, Co-Founder, Clean Orbit Foundation

A Circular Economy (CE) is a concept gaining traction over the past few years, and it could have a major impact on the space economy. The benefits of a CE for the environment are clear, and some attention has been given to its benefits for business, but its potential in space has yet to be fully explored.

This presentation explores developing an orbital CE and how transitioning from a linear economy to a circular one can revolutionize space operations. We'll examine the limitations of the current linear approach and the critical need for a mindset shift that redefines space debris as more than just waste and a liability, but also as a resource. We will then transition into the vision and benefits of a circular economy model, focusing on how it can help stabilize the debris problem and simultaneously maximize the value of materials in orbit.

Key concepts such as Rendezvous and Proximity Operations (RPO), On-Orbit Servicing (OOS), and In-Space Servicing, Assembly, and Manufacturing (ISAM) will be discussed, showing how each plays a pivotal role in transforming space operations toward a CE. By leveraging these technologies, a CE approach can extend satellite lifespans, reduce operational costs, minimize launch needs, and much more. Adopting a CE could become the foundation for sustainable, long-term space exploration and utilization, ultimately driving innovation and promoting responsible space practices.

## *Challenges and Opportunities with Life-cycle Management of Very Large Satellites*

Dr. Edward D. Tate, CTO, Virtus Solis Technologies

The largest single object in orbit is the ISS, at approximately 450 tons. Decommissioning will cost a billion dollars. As the space economy expands, even larger satellites will be built with potentially higher costs of decommissioning. The largest proposed satellites are for space based solar power. By necessity, they will be larger and heavier than the ISS in order to efficiently beam power wirelessly from orbit to the ground. Proposals range from hundreds

to thousands of tons. These satellites largely present unique challenges and opportunities. They will have components that are damaged, fail, and wear out generating waste streams over the satellites' life. One challenge will be managing these waste streams during assembly, operation, and decommissioning.

This waste stream can be a liability that increases satellite development and deployment costs. However, this large quantity of material, located in valuable orbits, can alternatively be a huge opportunity. With proper planning and development, satellite developers can leverage this residual value to decrease overall investment and life-cycle costs.

There are five major strategies to manage these waste streams: repair, repurpose, salvage, recycle, and disposal. The costs and benefits of each approach, conditions for successful application of each strategy, and the implications for future satellite programs are reviewed.

9:15 AM – 9:35 AM **Networking Break**

9:40 AM – 10:40 AM **Panel**

*Going Boldly – and Prudently: An ISAM Policy Review*

**Panel Facilitator:** Dr. Akhil Rao, Research Economist, Office of Technology, Policy, and Strategy (OTPS), National Aeronautics and Space Administration

**Presentations:**

*On-Orbit Insights: Regulatory Updates for ISAM Licensing and Authorization*

Steven A. Rowings, Partner, Akin Gump Strauss Hauer & Feld, LLP

The space industry is rapidly innovating and accelerating its ability to conduct economic activity in space. Part of this effort involves companies investing in on-orbit capabilities, which include activities like satellite refueling, orbital relocation, removing orbital debris, and performing spacecraft inspections and repairs. The changing industry landscape naturally lends itself to novel regulation in space. The Federal Aviation Administration, the Federal

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Communications Commission, and the National Oceanic and Atmospheric Administration are all federal agencies leading the regulatory scheme. Additionally, the implications of on-orbit activity on space and lunar governance, especially in regard to spectrum access, creates additional regulatory implications for those seeking to operate missions on orbit. This presentation highlights the various regulatory pathways for licensing and operating on-orbit activities, with an emphasis on where regulation is heading in the years to come.

### *Debrief on the Federal Communications Committee's ISAM Rulemaking*

Laura Cummings, Esq., Associate, GreenbergTraurig

The existing legal framework in the United States was not designed to accommodate the breadth or variety of novel space activities presently contemplated by the commercial space industry. In February of this year, the FCC released its Notice of Proposed Rulemaking, officially kicking off its proceeding to set a regulatory foundation for U.S. commercial in-space servicing, assembly, and manufacturing (ISAM) operators and U.S. market access applicants.

The FCC is mandated to authorize radio frequency spectrum use in a manner that serves the public interest. For ISAM, this rulemaking proceeding has been a prime opportunity to inform how the FCC can lead the world into a bold new space future with clearly defined, reasonable, and competitive governance of ISAM.

This presentation will review the FCC's proposed rules and an overview of CONFERS' positions, which were submitted to the Commission via public comment and reply comment responses into the proceeding in spring of this year, and discuss the path forward.

### *Export Control Reform for The Space/Satellite Industry*

Charles A. Hamilton, Associate Attorney, Akin Gump Strauss Hauer & Feld, LLP

Space technologies are closely-guarded under U.S. export controls and there have been calls to lighten the burden of compliance on space companies. Now the Departments of State and Commerce are in the process of the first substantive review of space technologies under the ITAR and EAR in over a decade. How does the current export control regime affect your business? What changes does the ISAM community want to see? On what points can the ISAM community speak with one voice and achieve maximum impact during the government's review?

### *Navigating the Legal and Commercial Landscape for Lunar Missions*

Dr. Tony Lin, Partner, Cooley, LLP

This presentation will provide an overview of the current legal frameworks governing lunar missions, discuss updates and developments in international treaties and agreements related to lunar exploration, and the role of governments in regulating and overseeing lunar activities for both public and private entities.

#### 10:45 AM – 11:05 AM **General Session Keynote**

##### *ESA Close Proximity Operations Working Group: From Need to Guidelines*

Adina Cotuna, System Engineer, Systems and Concurrent Engineering Section,  
European Space Agency

#### 11:10 AM – 12 Noon **Panel**

##### *Connecting the Dots, Docks, and Systems: Rendezvous and Proximity Operations Functions*

**Panel Facilitator:** David Barnhart, CONFERS Board of Directors; CEO, Arkisys, Inc.

##### **Presentations:**

##### *Modern RPOD Solutions to Enable the In-orbit Economy*

Kevin Stadnyk, CEO, Obruta Space Solutions

This presentation provides an overview of Obruta's RPOD Kit, a turnkey subsystem that equips a spacecraft with the hardware and software to safely and semi-autonomously approach and dock with other space objects. Obruta

is leveraging the immense progress in artificial intelligence to rebuild RPOD using modern technology in a way that is financially accessible to new space companies. Obruta is creating a new business model: docking as a service; Obruta supplies RPOD capabilities to others so they can focus on the in-orbit service they want to provide.

### *RPO Radars and Other Rare Beasts*

Richard A. Jacklin, Plextek Services Limited

Rendezvous and Proximity Operations (RPO) radars are, by their nature, bespoke to the space application, and typically difficult pieces of kit to find. Radars use radio waves to determine the distance or range to an object, and can also determine the object velocity and trajectory. They can perform an essential task in assisting in the graceful coming together of two space craft or satellites in orbit. RPO radar will also work in the dark, work when the sun is in the boresight, and, being solid state, will not suffer the shock phenomena associated to optical/mechanical ranging devices like LIDAR.

This presentation will tell the story of Plextek's evolution producing space qualified radar, its mission heritage, the challenges it has faced, and some useful lessons learned.

### *Post Orbit Insertion Upgrade Modules for Space Systems*

Jason V. Herman, Vice President, Strategy, Katalyst Space Technologies, LLC

This presentation will discuss the need for near-field situational awareness, SIGHT features and capabilities, test programs, and future pathways towards realizing an upgrade economy.

Satellite designs, especially platforms developed for regimes beyond low Earth orbit, are locked years prior to launch with lifetimes longer than 10-years. The result are platforms that cannot leverage the current state-of-the-art in sensors and other technologies. Katalyst Space Technologies is developing products and services to upgrade spacecraft, post-launch, so that customers have a second chance to add features, leverage the latest technologies, and maintain their competitive edge.

Development is initially focused on SIGHT, a Space Domain Awareness (SDA) upgrade that provides electro-optical (EO) data and Resident Space Object (RSO) characterization for objects within 1,500-km of a host satellite. SIGHT integrates COTS space-qualified components with an SDA payload and a custom Client Attachment System. SIGHT attaches to the launch adapter ring of our client satellite and provides at least 5-years of SDA services, allowing clients to make better-informed and more timely decisions about potential threats and response actions.

The surge of RSOs and space actors has led to a congested, contested, and complex space environment for defense and commercial operators. Upgrading existing high-value assets with new SDA capabilities provides both near-field monitoring for space debris, as well as deterrence for would-be aggressors. Paired with Katalyst's Advanced RSO Characterization (ARC) software, SIGHT provides automated data analysis, pattern-of-life reporting, RSO characterization, and, importantly early warnings for defined criteria, such as unknown RSOs that deviate from a previous pattern-of-life.

### *RPO Safety and Operations*

David Barnhart, CONFERS Board of Directors; CEO, Arkisys, Inc.

This presentation will provide an overview of CONFERS RPO Safety Task Force; discuss what it should consider key for "safety"; look at how safety translates into business risk; and how development of safety standards can help mitigate risk.

# Program

12:05 PM – 12:50 PM **Networking Lunch**

**Sponsored by Astroscale Holdings**

12:30 PM – 12:50 **Luncheon Keynote**

*Bandwidth to Build On: A Briefing on ITU's Spectrum Strategy for ISAM*

Mike Lindsay, CTO, Astroscale Holdings

12:55 PM – 1:25 PM **Space Infrastructure Games (Part 2)**

*The Economics of In-Situ Resource Utilization (ISRU)*

**Exercise Facilitator:** Vanessa Clark, CONFERS Board of Directors; Co-Founder & CEO, Atomos Space Corp.

**Exercise presented by:** Kevin Barry, Co-Founder, LightBridge Strategic Consulting, LLC

To explore the concepts of ISRU, this game is designed to abstract money into simple games of probability and a race against time. Through the use of dice, wooden cubes, and specific roles, each table will form a mini-economy with "home" and "on-site" locations (other city, country, planet...) to produce the most value on-site. Direct experience in this game will showcase different strategies and the impact of an evolving marketplace, including the impact of learning curves on development. Complementing this activity will be a short interlude of information about ISRU, and how it is and is not employed terrestrially and in space. As with yesterday's game, the most active participants who engage with these ideas stand to win real prizes at the end of the games.

1:30 PM – 2:20 PM **Panel**

*Trending Upward: An Update on ISAM Technologies and Capabilities*

**Panel Facilitator:** Thomas A. Schervan, CEO + Co-Founder, iBOSS

**Presentations:**

*Enhancing Space Safety and Sustainability through On-Orbit Visibility*

Courtney Sayles, Vice President, Product and Technology, SCOUT Space Inc.

In the rapidly evolving domain of space activities, the need for robust space safety and sustainability measures has never been more critical. We'll reveal how advanced on-orbit visibility technologies play a pivotal role in supporting these objectives. By providing real-time, comprehensive situational awareness, on-orbit visibility enhances collision avoidance; mitigates the risks of space debris; and facilitates efficient satellite operations.

This presentation will delve into the latest advancements in optical payloads and sensor technologies that enable high-fidelity monitoring of space objects, explain how these innovations contribute to the broader framework of Space Domain Awareness (SDA) and improve the coordination and transparency among space-faring entities. Additionally, you'll hear about case studies demonstrating successful applications of on-orbit visibility in enhancing operational safety and promoting sustainable space practices.

In the end, you will have gained insights into the critical importance of on-orbit visibility in maintaining the long-term viability of space activities, ensuring the safety of valuable assets, and fostering an environment of cooperation and shared responsibility in space.

*RVS@3000-X LIDAR – Experience with Reflector Pattern & Lessons Learned*

Dr. Max Moeller, Jena-Optronik GmbH

The RVS@3000-X LIDAR combines a high resolution scanning LIDAR with robust image processing algorithms for autonomous rendezvous and docking. It represents the latest variant of the RVS@3000 LIDAR product family which has reached TRL9 via several flights on Cygnus to ISS and during the first GEO satellite servicing missions of MEV-1 and MEV-2.

For successful operation of LIDARs in Rendezvous, Proximity Operations and Docking (RPOD) scenarios, robust

concepts of operation (CONOPS) and image processing techniques are required. In this context, Jena-Optronik GmbH has gathered large experience over the last 20 years via a variety of supported missions, ranging from applications using retro reflectors, purely model-based pose estimation and combinations of both. The number of RPOD vehicles and missions is trending upwards over the last years. More and more satellites are designed to be serviced in the future. The engineering of suitable targets, especially retro reflector patterns, therefore has become a key interest in the GNC community. In the presentation, we present lessons learned from designing LIDAR CONOPS and algorithms for various targets from a simple orbiting sample to gateway retro reflector patterns such as the Perimeter Reflector Target (PRT) and Centerline Docking Target (CDT). Based on this, suggestions for future reflector targets are made.

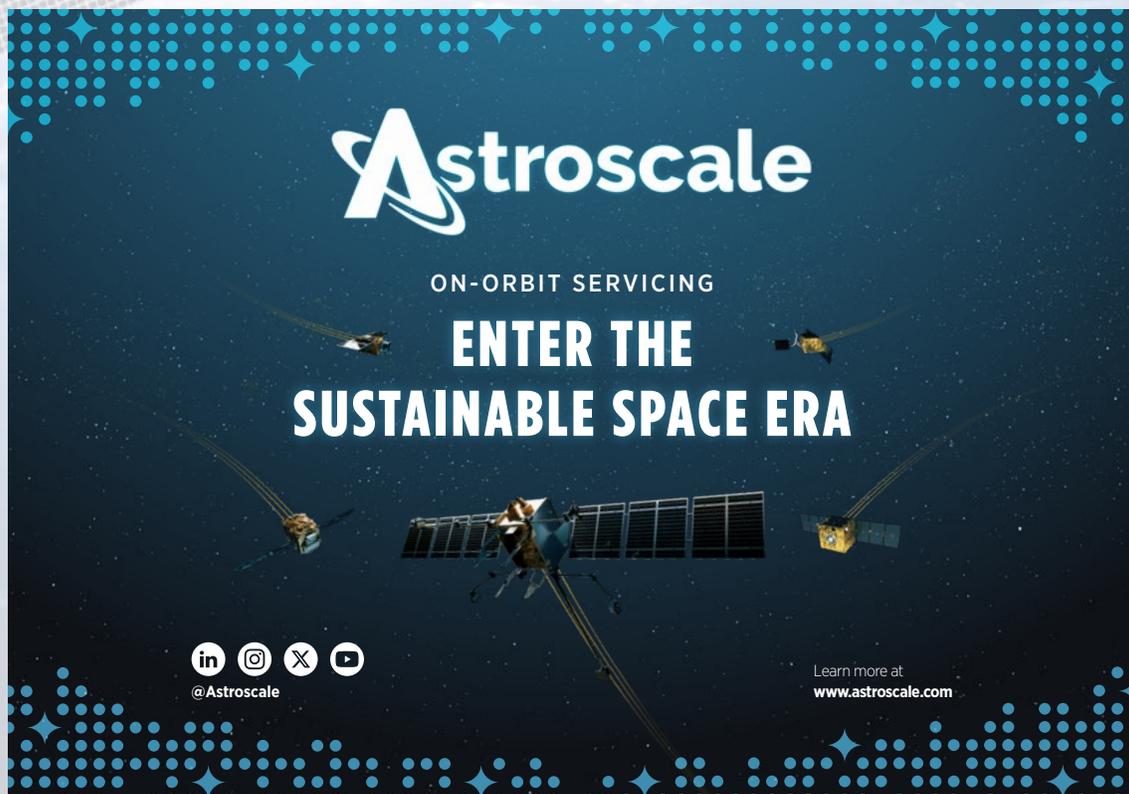
*Extending the Life Cycle of Satellites - Developing a New Docking System*

Marcin Dobrowolski, CEO, PIAP Space

This presentation will delve into a scenario analysis of different docking system options, exploring their potential applications such as on-orbit refueling, servicing, space debris cleanup, and the repositioning of target satellites to extend their operational lifespan or relocate them to a graveyard orbit.

PIAP Space is developing a Docking System aimed at capturing client satellites by utilizing the Launch Adapter Ring (LAR) interface or similar mechanical interface. The Docking System is based on the LARIS Gripper. PIAP Space's portfolio includes two basic docking system architectures. The first is deployable, fitting snugly within the servicing satellite when stowed, while the second utilizes PIAP Space's TITAN robotic arm externally placed on the servicing satellite. These architectural variations have been refined to cater to specific customer requirements such as connection stiffness, size, and cost. The Docking System is adaptable to various types of LARs .

The development of these systems draws upon foundational building blocks provided by PIAP Space, including the LARIS Gripper, Force and Torque Sensor (FTS), elements of TITAN robotic arm , Standard Gripping Fixture (SGF) docking interface, BLDC Controller, and a 3D vision system. The utilization of these components varies depending on the specific architecture, yet the core modules remain consistent.



### *Key ISAM Capabilities: Connection + Transfer via Modular Architectures + Robotics*

Thomas A. Schervan, CEO + Co-Founder, iBOSS

On-Orbit Servicing (OOS) will become routine as collaborative design is implemented, which is still a chicken and egg situation. While other next-generation space solutions such as On-Orbit Assembly (OOA) and On-Orbit Manufacturing (OOM) have become popular and have been added to OOS, thus OSAM, it is now logically called In-Space Servicing, Assembly and Manufacturing (ISAM). Besides life extension services - the only commercial routine OOS operation so far - ISAM in general requires cooperative design, basically modular architectures - actually plug-and-play systems and operations. In this context, building blocks and interfaces, as well as supporting robotics, are paramount. These will become standards. There is still some confusion about how to use and integrate such building blocks, especially robotics. In addition, even proposed logistic scenarios often do not fully exploit the ISAM potential. While the focus is on mission flexibility and value, the core impact of components and key functionalities is often overlooked. Future and ISAM-based space infrastructure and logistics rely on key connectivity and transfer capabilities at both the system and support logistics level (i.e., robotics and supply). This presentation highlights such connectivity and transfer capabilities and selected features in the context of simplified mission scenarios, but will also incorporate audience feedback to generate ad hoc facts on the ground and provide a snapshot of the community's understanding.

2:25 PM – 2:55 PM

#### **Panel**

#### *Stop Worrying, Start Maneuvering: Updates on In-Space Refueling*

**Panel Facilitator:** Dallas Bienhoff, Space Systems Architect, Off-World, Inc.

#### **Presentations:**

#### *On the Development of RAFTI: A Commercial In-Space Refueling Valve*

Kevin D. Smith, Chief Engineer, Orbit Fab, Inc.

The current state of the art for Satellites with storable propellants is one-time propellant tank use. This has numerous downstream effects in satellite design and operation. To benefit space sustainability and upend the current single-use paradigm, the Orbit Fab team has developed an in-space fueling valve. This in-space fueling valve is a novel design to address the rigors of Ground and In-Space Fueling Operations. In this presentation, the successful valve development and qualification will be described, and lessons learned will be reviewed. The future development of the in-space valve to enable expanded capabilities will be highlighted.

#### *ASCENT-based Spacecraft Refueling Architecture*

Jack J. Fox, President & CEO, Black River Space, Inc.

Several technical challenges must be overcome in order to fulfill the strong business case of refueling spacecraft for life extension including rendezvous and docking or grappling, coupling mate, fuel transfer, coupling demate, undocking or release, and repositioning. Given sound engineering, time, and funding, these challenges can be overcome in the foreseeable future. We examine a potential generation-beyond modular and mobile spacecraft refueling architecture. This presentation will discuss the use of green monopropellant as a replacement for hydrazine, increased efficiency and capacity for fuel storage and transfer, increased resilience, and ability to reconfigure the architecture to perform other missions.

#### *Orbital Refueling of Cryogenics in Space*

Dr. William Notardonato, CEO & Co-Founder, Eta Space, LLC

With the development of Starship and its capabilities of launching larger tonnage into space as well as a direct call to action for on orbital refueling of space vehicles to extend space exploration, Eta Space has developed a new technology that will revolutionize the space industry. Eta Space has developed and is currently prototyping a refueling station that will service Low Earth Orbit (LEO) assets which include LOX, LH2, and/or LCH4.

This presentation will answer the question “Why Cryogenics?” Starship will introduce the ability to place large mass payloads into Earth orbit and these payloads will need to be transported to their final destination in a rapid manner. Lower energy storable propellants are not up to the task. Advantages of in-space depots have been known since the beginning of the space program. Cryogenic Propellants offer the highest specific impulse of all chemical propellant combinations such as critical high mass system with high delta-V requirements. Cryogenics enables rapid deployment across multiple orbits with high energy maneuvers and enables “maneuverability without regret”. Cryogenics have not been baselined for smaller, long duration missions due to the incorrect perception of not being “storable.” Eta Space has demonstrated long duration Zero Loss storage and transfer of LOX and LH2 on the ground and will demonstrate a similar capability on a Long-Term 9 month mission with LOX in orbit in 2024. After a projected successful mission, Eta Space will announce that oxygen can and will be considered a storable space propellant for future use of space exploration.

3:00 PM – 3:20 PM **Networking Break**

3:25 PM – 4:10 PM **Panel**

*On the Job, On Their Own: An Update on Robotics and Autonomy for ISAM*

**Panel Facilitator:** Victor Nifo, Technology Portfolio Manager, MDA Space

**Presentations:**

*GITAI’s Robotic Innovations for On-Orbit Servicing*

Sho Nakanose, CEO, GITAI

GITAI’s general-purpose robots are tailored for pivotal space applications, notably on-orbit servicing and lunar exploration. This presentation will delve into GITAI’s ISAM initiatives, highlighting our advancements from a robotics perspective.

In March 2024, GITAI successfully executed external vehicular robotics demonstrations at the International Space Station (ISS). GITAI’s goal is to offer on-orbit satellite servicing in both Geostationary Orbit (GEO) and Low Earth Orbit (LEO). The company is actively developing in-house robotic satellites capable of performing tasks such as rendezvous, docking, inspection, de-orbiting, and life extension services for customer satellites. In this external demonstration at the ISS, the GITAI 1.5-meter-long autonomous dual robotic arm system (S2) successfully executed all planned in-space servicing, assembly, and manufacturing (ISAM) tasks outside the ISS Bishop Airlock. Although all tasks for this demonstration have been completed, reliability evaluation tests will continue for the remaining five months of the six-month demonstration period. In this presentation, the detail of this project and the outcomes will be explained. An overview of this next phase in GITAI’s endeavor to enhance on-orbit servicing capabilities will also be presented.

*Test As You Fly for Zero-Gravity Robots*

Brad Lotocki, Senior Staff Software Development Engineer, Maxar

The proliferation of robotic arms in space is accelerating a future where satellites, telescopes and other systems could be serviced and assembled from components, enabling much larger assemblies that would otherwise not fit into a standard rocket fairing. In order to assemble large and complex structures in space, highly capable robotic arms are needed with exceptional reach. However, as reach grows it becomes highly impractical to build arms that are capable of supporting their own weight due to Earth’s gravity. This limitation presents a unique challenge particularly during assembly and verification where flight-like operations become challenging or impossible on the ground. This presentation will provide an overview of Maxar Space Robotics Offloader System. The uniqueness of this facility is the active offload design which enables the robot-under-test to perform full 6 degree-of-freedom (X-Y-Z, Roll-Pitch-Yaw) motion throughout a large 3-dimensional workspace. The presentation will outline the motivations for building the facility, a high-level comparison to other offloading methods, the capabilities of the Maxar Offloader, and an overview of a reflector assembly demonstration completed in support of the SPIDER project.

## *GMV Interfacing Solutions Towards a More Standardized On-Orbit Servicing*

Mariella Graziano, Director of Science, Exploration and Transportation Strategy, GMV

Fostering efficient and sustainable space operations is a present and growing interest of agencies and industry alike. An emerging on-orbit servicing and transportation system is driven by fast paced technology evolution. At the same time, for an ecosystem to be healthy, some degree of interoperability between service providers is desirable, if not a must. As a first step, four of the six upcoming NGCS have adopted the Design for Removal (D4R) guidelines produced by ESA and are taking the required actions to implement it.

It is hoped that in the future, other European missions could follow D4R guidelines to enable its uncooperative capture on malfunction and deorbiting at End of Life. To make this possible, client-side prescriptions are proposed to make every spacecraft ready for capture/docking. Spacecraft preparation can be a driver for cost effective OOS and would probably make many new servicing use cases possible.

In this presentation, GMV proposes the consolidation of interfacing technologies capable of meeting new and highly demanding needs both from performance and cost perspectives, presenting some examples of developments done by GMV in meeting new interfacing needs. Active robotic technologies for capture and removal at the servicer side, including the development of a Mechanical Interface for Capture at End-of-Life (MICE) compatible end-effector; clamping devices; optical navigation; avionics; and control functions will be among the solutions discussed, and will make the case that standards are required for developing a safe, efficient, and sustainable space economy.

4:15 PM – 4:55 PM **Panel**

### *Student Supply & Demand: Bridging the Gap Between Industry and Academia*

The future of the space industry is in the hands of our students, but as the needs of industry change, are universities and the skills they teach keeping up? In this panel we will meet with student leaders to discuss the current state of space education and activity on campuses nationwide, what is lacking, and how companies can do their part to prepare students for a life in the space industry.

**Panel Facilitator:** Chris Blackerby, Group COO, Astroscale Holdings;  
CONFERS Immediate Past President

#### **Panelists:**

Andres Permuy, Students for the Exploration and Development of Space (SEDS) Member-At-Large  
Anna Kelly, Georgetown University SEDS Co-President  
Kate Lampo, Columbia Space Initiative Co-President  
Owen Chabani, Georgetown University SEDS Co-President

5:00 PM – 5:30 PM **Closing General Session Keynote**

### *A Visionary's Outlook*

Dr. George S. Pullen, Chief Space Economist & Co-Founder, The Milky Way Economy;  
Co-Host, *The Space Economy Show*; Adjunct Professor, University of New Hampshire  
School of Law

5:35 PM – 5:45 PM **Wrap-up and Closing Remarks**

Joerg Kreisel, CONFERS President; Chairman + Co-Founder, iBOSS  
Kelli Kedis Ogborn, Program Facilitator; Vice President, Space Commerce &  
Entrepreneurship, Space Foundation  
Brian Lagana, CONFERS Executive Director

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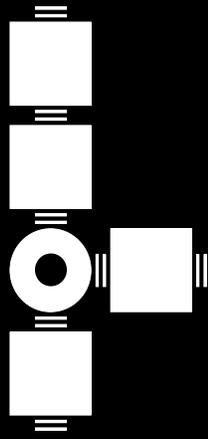
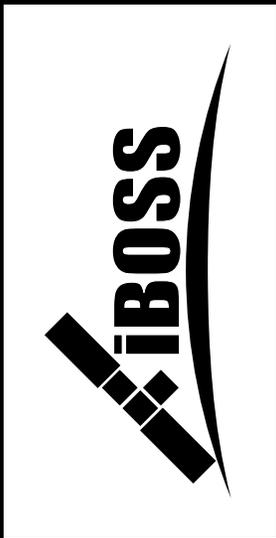
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# Notes

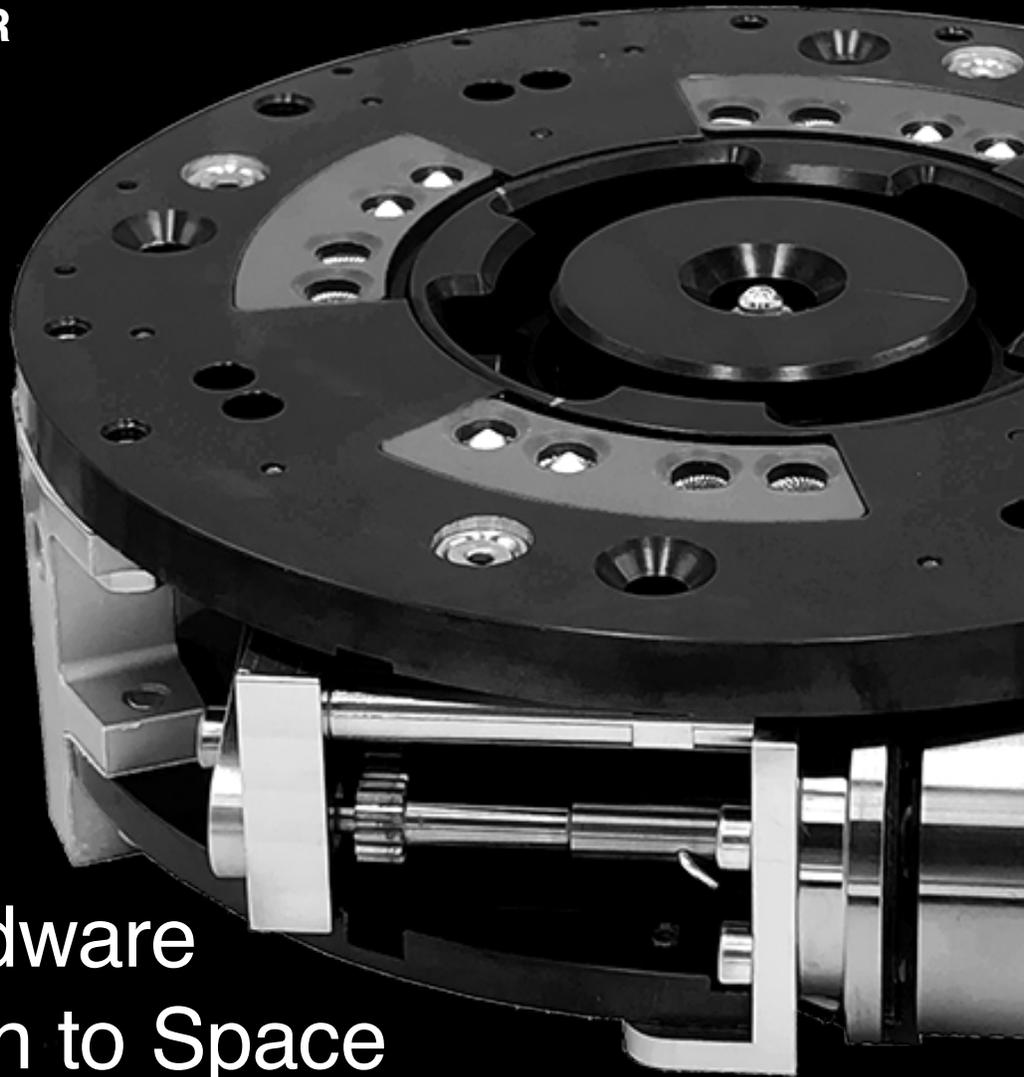
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