



CONSORTIUM FOR SPACE MOBILITY
AND ISAM CAPABILITIES

COSMIC Capstone Challenge (C3) Design Track Student On-Boarding

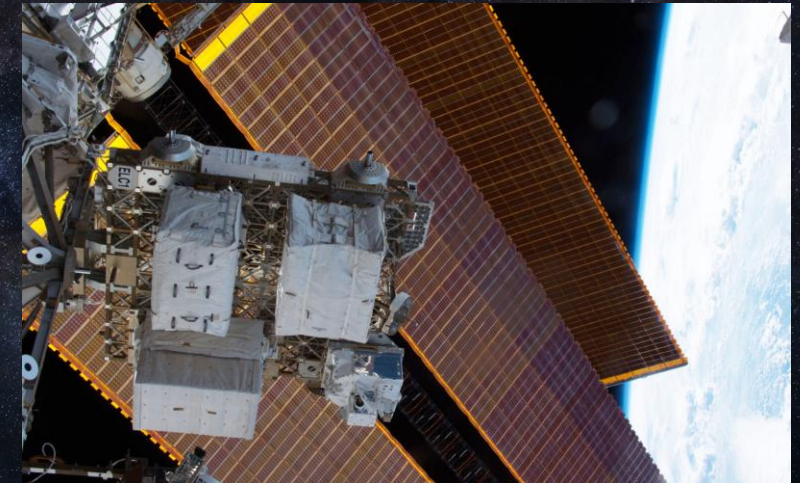
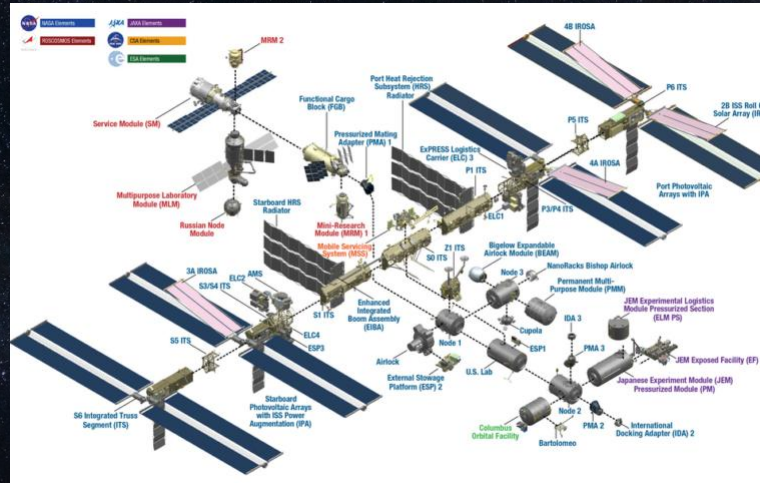
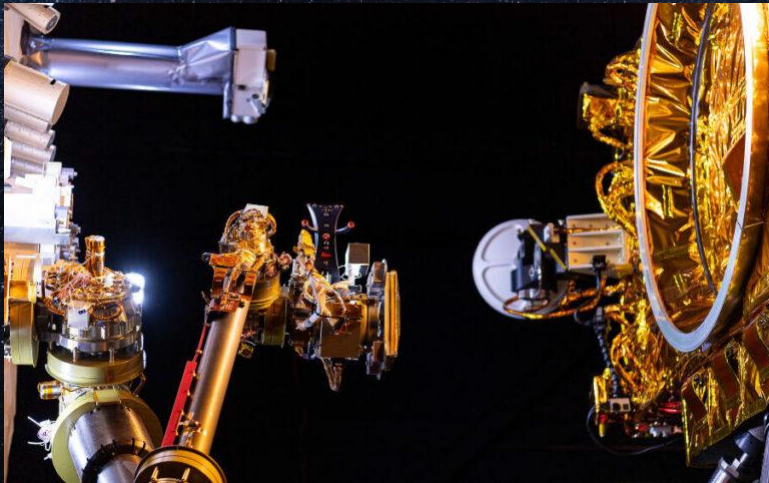
Noah Gladden
C3 Champion for Track 1

September 15, 2026

What is ISAM?

In-space Servicing, Assembly, and Manufacturing

- Design of modular, serviceable, upgradeable, and evolvable systems
- Assembly of simple to complex space systems
- Manufacturing in space using Earth- and locally-sourced materials



COSMIC: A Nationwide Alliance for ISAM



- Vision:

- Create a nationwide alliance that enables the U.S. space community to provide global leadership in ISAM.

- Mission:

- Making ISAM a routine part of space architectures and mission lifecycles.

Design Tracks for C3



- There are 6 design tracks that teams can participate in:
 - Track 1 Challenge: Orbital Manufacturing and Assembly (C3-Manufacturing)
 - Design a payload to be hosted aboard Arkisys's Bosuns Locker that would demonstrate a chain of 3 or more operations providing a capability important for orbital manufacturing or assembly.
 - Track 2 Challenge: Lunar Operations (C3-Lunar)
 - Design a payload to be delivered by Astrobotic's Griffin lander that can prepare the lunar surface for a Fission Surface Power reactor with humans residing within 1km. Prototype required.
 - Track 3 Challenge: Orbital Servicing (C3-Servicing)
 - Using Northrop Grumman's Mission Robotic Vehicle (MRV) and Mission Extension Pod (MEP) as a fixed servicer capability, design and analyze candidate on-orbit attachable components (OACs) that the MRV could use to alter a client spacecraft already on-orbit in geostationary orbit (GEO) or cislunar space.
 - Track 4 Challenge: In-Space Construction (C3-Construction)
 - Design orbital or surface infrastructure element(s) and outline the mission describing its construction using autonomous robotic assembly technologies. Teams should leverage previous work in modular building blocks and "builder robots" as referenced; teams may choose NASA's Project ARMADAS or other types of building blocks and robotic systems to address their mission needs.
 - Track 5 Challenge: In-Space for Earth (C3-Return)
 - Design a manufacturing payload hosted by Dispatch's Free Flyer 1 reentry vehicle to produce materials in space with properties that are impossible to achieve on Earth.
 - Track 6 Challenge: Architecture of Autonomous Space Clusters (C3-Cluster)
 - Develop an architecture and key elements that would enable a cluster of vehicles that would autonomously perform important functions in orbit or on the lunar surface (U.S. persons only).



ARKISYS

Introduction to Bosun's Locker 2025-2026 COSMIC Capstone Challenge Teams!

Noah Gladden, Lead Assembly Integration & Test
Engineer

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September 2026

What is Arkisys?

Spacecraft Infrastructure Startup – our goal is to make space more accessible and affordable.

- We leverage ISAM techniques and technologies
- We provide services that enable in-space demonstrations at a reduced price point compared to dedicated missions
- We specialize in integrating disparate systems through a streamlined Verification and Validation process

The Fast Track for In-Space Testing

Arkisys Testing Services

Astrobee

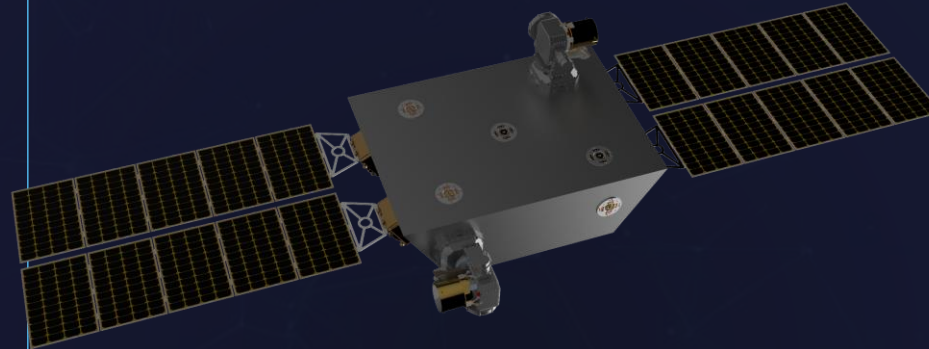
- 6-degree of freedom free-flying testing platform onboard the International Space Station
- Perfect for testing RPO algorithms, vision systems, capture systems, etc.
- As of Fall 2025, Arkisys is the official Implementation Partner responsible for its maintenance and operation.



Courtesy of NASA

ARKISYS

The Cutter



- Our Orbit Transfer Vehicle (OTV) and last-mile transport.
- 250 kg class spacecraft capable of hosting 6-8 payloads at a time.
- Fully RPO capable, our workhorse vehicle for cargo/fuel/payload transport.

Distribution Unlimited. For Public Dissemination.

The Port

- Our flagship in-space testing platform in Low Earth Orbit.
- 2000+ kg, and capable of hosting 60 payloads at a time.
- Provides data and power to payloads, and onboard robotics suite aids in payload transfer and management.



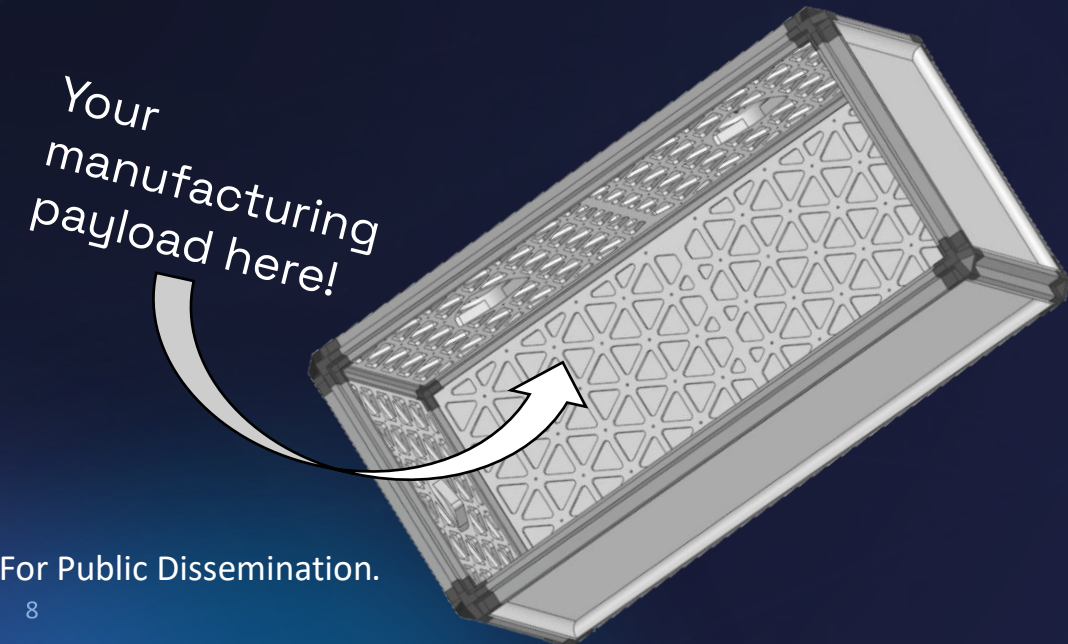
Introducing the Bosuns Locker

- The Port Module takes care of data, power and pointing for its payloads
- What about structure and the space environment?
- The Bosuns Locker is an encapsulation device that further enables developers to focus on their technology without having to worry about how to connect to or fit into a satellite



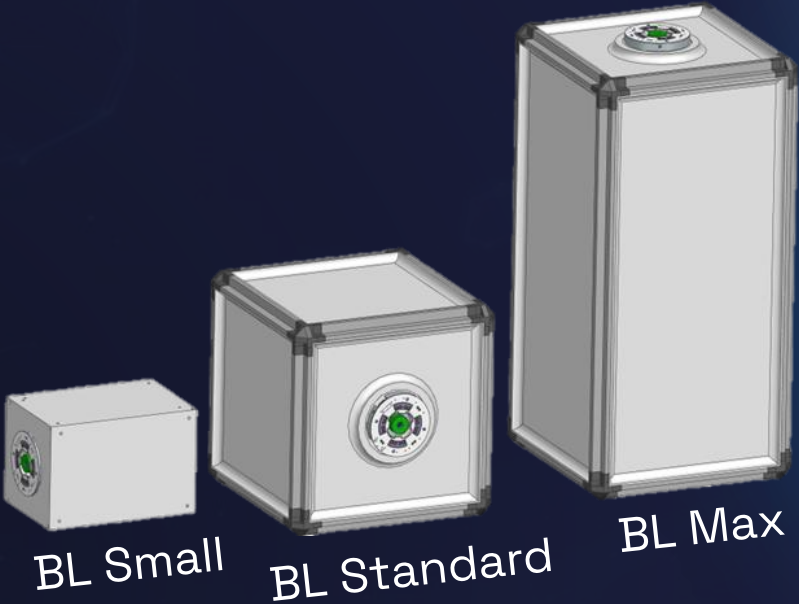
Nautical Roots:

Bosuns 'lakar: a ship's locker for the small equipment (such as tackle) used by the deck force

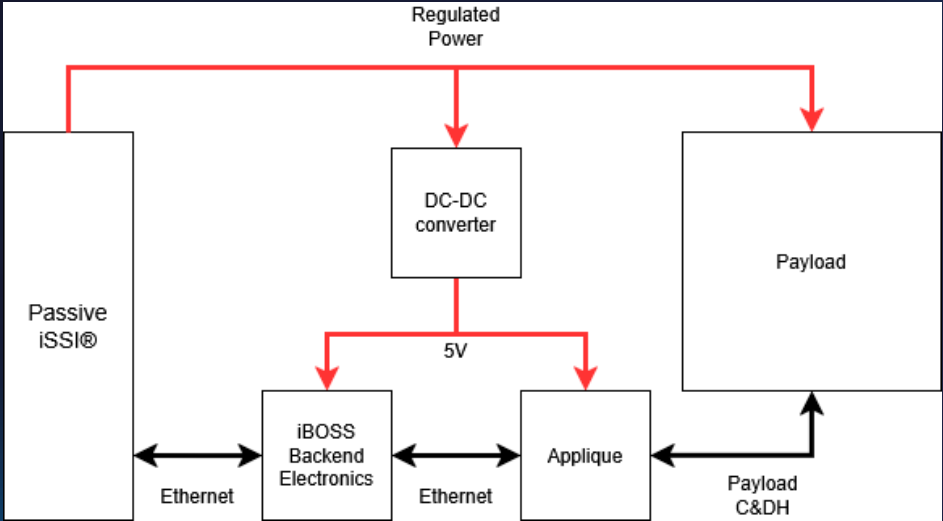


Bosuns Lockers represent a family of different sizes

	BL Small	BL Standard	BL Max
EXTERIOR Size	~23x33x23 cm	~46x46x46 cm	~46x46x92 cm
INTERIOR Payload Volume	~19x29x19 cm	~41x41x41 cm	~41x41x87 cm
Electrica/Data Interface			
Peak Power	50 W	500 W	500 W
Continuous Power	25 W	50 W	100 W
Voltage	5-28 V	5-28 V	5-28 V
Data Protocol	Any	Any	Any
Mechanical Interface			
Fasteners	M3 screws	M4 screws	M4 screws



• For the Cosmic Capstone Challenge, use the Max!



Elements that make Bosuns Lockers flexible for Customers

- **Mechanical/Electrical/Thermal Connectable Interface:**
 - Payloads will connect to the Port Module primarily via the iBoss intelligent Space Systems Interface (iSSI)
 - The iSSI can provide Data & Power to the payload
 - Data is transferred through an optical connection at the center
 - Power is transferred through pins
 - Note: The Bosuns Locker and Port can use any interface, not just the iSSI



- **Universal Data Protocol Translator: Applique**
 - The Arkisys Applique is a universal data protocol adapter which allows payload data conversion from any protocol to Ethernet
 - Applique's can support multiple payloads at once, and accepts most spacecraft data protocols
 - The Applique allows remote V&V to take place for Onboarding to connect to Arkisys Digital Twin

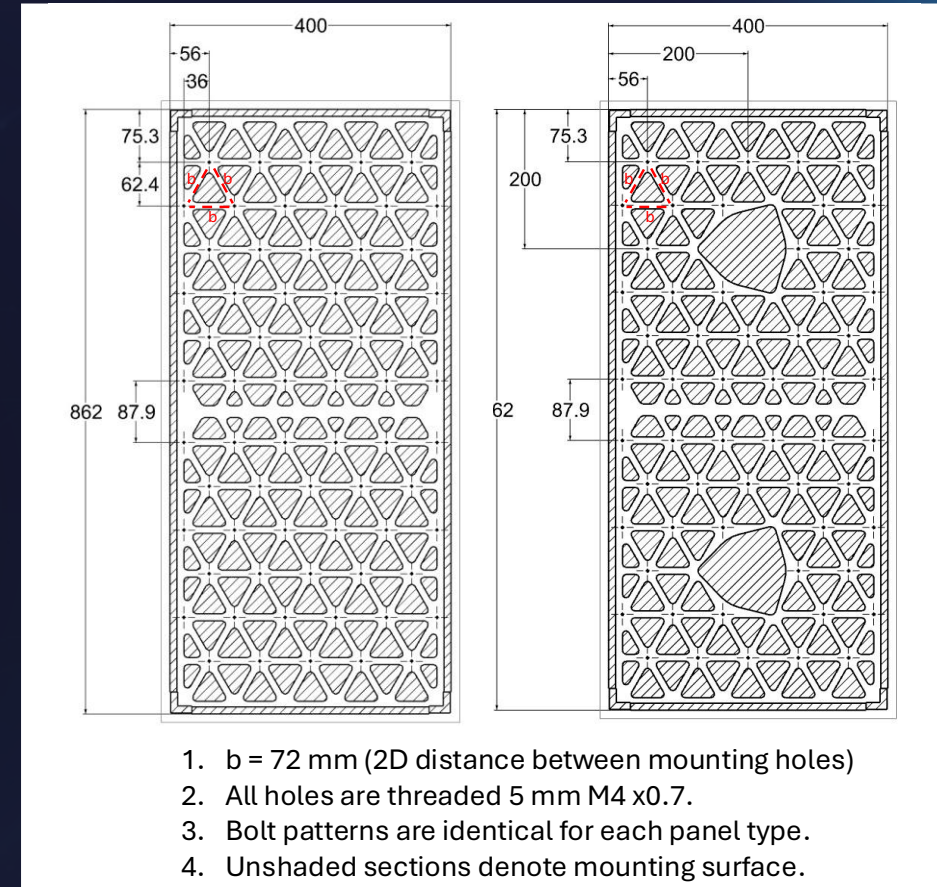
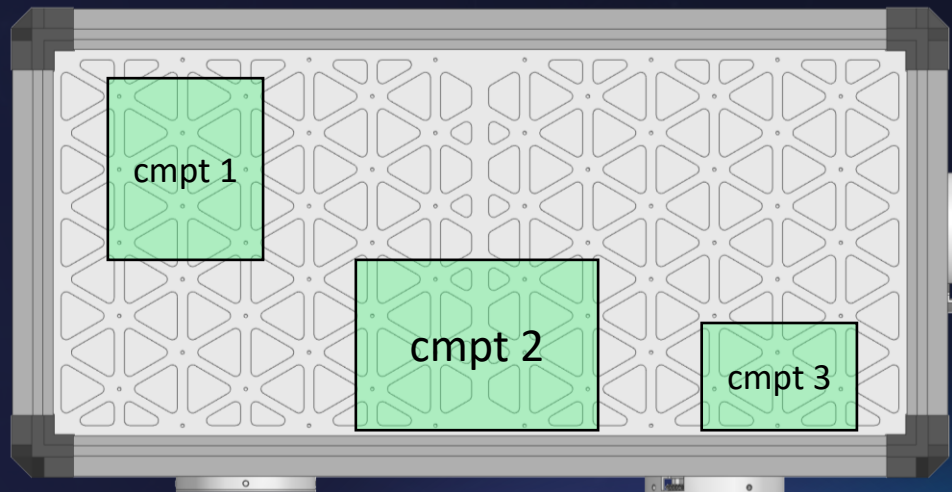


Radiation-Hardened Appliqué™
TRL 9

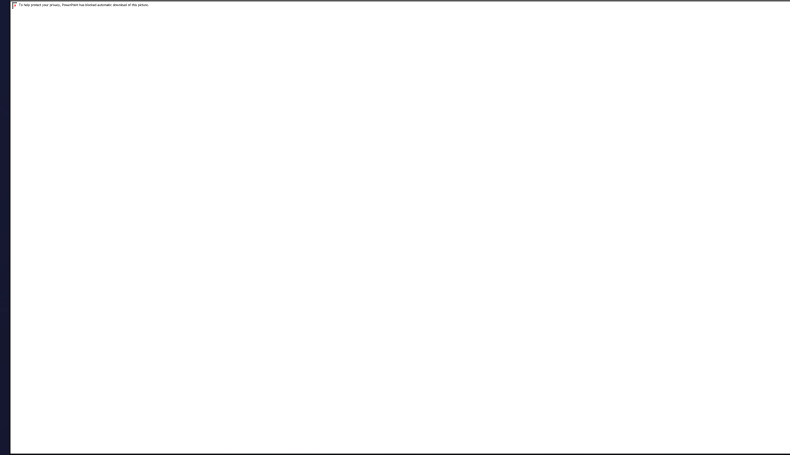


Configuring your Payload to the Bosuns Locker

- Payloads are mounted to specified bolt-holes on any interior surface or multiple surfaces per component
- C.G. specifications in ICD are guidelines for entire payload, not for each component, and is for stowed payload configuration.
- **Panel cutouts are custom!** If your payload needs to be partially exposed to space, Arkisys designs cutouts in panels based on your configuration's needs.



Example concepts from previous years



Microgravity-compatible Textile Mfg. Facility – Ohio State University



Thermal Shielding Mfg. Experiment – Univ. Hawai'i at Mānoa



PCB Manufacturing Facility – Kennesaw State University

Advice for teams / Additional questions to consider

- The Bosuns Locker is *not* a pressure vessel!
- Are you using the Bosuns Locker as demonstration environment or a scalable platform?
- Do you need to extract what your system produces? How will you do so?
 - You are welcome to make cutouts in the payload attachment panels!**
- And of course, be creative!

** but do not modify
the Power and data
interfaces please

