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CONSORTIUM FOR SPACE MOBILITY AND ISAM CAPABILITIES (COSMIC)

Frequently Asked Questions

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1. Purpose

1.1 What is COSMIC?

The Consortium for Space Mobility and ISAM Capabilities (COSMIC) is a nationwide U.S. coalition that will invigorate domestic in-space servicing, assembly, and manufacturing (ISAM) capability.

1.2 What is the goal of COSMIC?

COSMIC's mission is to make In-space Servicing, Assembly, and Manufacturing (ISAM) a routine part of space architectures and mission lifecycles to achieve the benefits described in the ISAM National Strategy (Apr 2022).

COSMIC has high-level goals in the areas of Capability Development (i.e., technology push), Ecosystem Economics (i.e., matching ISAM supply and demand), and Mission Applications (i.e., mission pull):

1. **Capability Development** will develop, mature, and demonstrate ISAM technologies that enable and enhance mission utility. It's not sufficient to demonstrate components or technologies in isolation; ISAM-based services must become sufficiently mature to be included as part of a commercial or government service offered to clients to improve the performance, resilience, lifecycle cost, and robustness of their spacecraft.
2. **Ecosystem Economics** will promote U.S. leadership in ISAM technologies and capabilities that change the business model away from single-use space assets, and toward an ecosystem that leverages frequent, reliable, and safe in-space servicing, assembly, and manufacturing. The integration of ISAM into the space economy will not only improve client spacecraft, but also help organizations be better stewards of the space environment.
3. **Mission Applications** will encourage and guide missions to use ISAM capabilities as part of commercial and government program lifecycles. Not every mission will or should include ISAM in its mission design or in its on-orbit operations plan, but ISAM techniques, capabilities, or services should become a routine part of the trade space.

Overall, COSMIC works towards a whole-of-nation approach to ISAM capability maturation.

1.3 What type of business cases or mission applications will COSMIC be investigating?

COSMIC helps enable the advancement and implementation of ISAM for all U.S. missions and assets in Earth orbit and cis-lunar space, including commercial missions, government missions, public/private partnership missions, and U.S. participation in international cooperation missions.

1.4 Will COSMIC define interfaces or standards?

COSMIC is not a standards development organization, but COSMIC will identify, support, and promulgate standards developed by others to encourage widespread adoption on flight programs. Though COSMIC does not develop or own standards, it does recognize that ISAM standards must be global. COSMIC will maintain awareness of and share the work being performed by

CONFERS, which is a not-for-profit trade association to develop industry-led standards for satellite servicing that contribute to a sustainable, safe, and diverse space economy.

1.5 How is COSMIC different from CONFERS?

CONFERS is an international trade group open to industry, academic research institutions, governments, and for-profit organizations and individuals who are interested in furthering the commercial satellite servicing industry. Additionally, CONFERS is evaluating international policy on servicing, deorbit after removal, and bringing operational capability to market to support a viable revenue stream while being safe and interoperable globally.

COSMIC is a U.S.-only organization open to industry, academia, and government organizations with an interest in fostering U.S. leadership in ISAM as an enabling technology and a vehicle for workforce development. COSMIC assists U.S. government, industry, and academia with sharing and coordinating plans, technologies, and capabilities, along with U.S. policies related to ISAM.

As COSMIC stands up in 2023, CONFERS will continue to lead ISAM standards efforts while COSMIC fosters a broad domestic ISAM community and marketplace which will adopt those standards.

1.6 CONFERS is focused more on the Servicing in ISAM. Does this imply that COSMIC may focus more on the Assembly and Manufacturing?

COSMIC is a broad umbrella that includes the entire mission area of Servicing, Assembly, and Manufacturing. While some COSMIC members may choose to focus on just one element, technology, or mission set, COSMIC as an organization takes the broadest definition of ISAM.

1.7 Will the use of lunar resources be a thrust for COSMIC?

While in-space manufacturing on planetary bodies (or using material from planetary bodies) does fall under the umbrella of ISAM, other consortia such as the Lunar Surface Innovation Consortium (LSIC) are already focusing on that topic. COSMIC will work with these consortia to identify where COSMIC can add value without duplicating efforts and will encourage COSMIC members who are interested in these topics to participate in those consortia.

1.8 How will COSMIC work with other consortia like the Lunar Surface Innovation Consortium (LSIC), Manufacturing USA Institutes, etc.?

COSMIC will lean heavily on the expertise of other consortia and seek to support their goals where appropriate. For example, LSIC has extensive expertise in lunar surface capabilities and technology gaps, and boasts a tremendous network of industry, academia, and other private individuals with a wealth of knowledge in lunar surface and spaceflight technologies to include existing, near-term, and proposed future developments. Manufacturing USA Institutes like the Autonomy and Robotics in Manufacturing (ARM) Institute's expertise involves all aspects of autonomy and robotics, specifically focused on (terrestrial) manufacturing. ARM has brought together U.S. industry partners with comprehensive expertise in technology development, infusion, and integration, ecosystem creation, and workforce development. Collaboration

between COSMIC and other consortia will occur when either organization can benefit from the other's expertise and experience.

2. Organization

2.1 What is the organizational structure of COSMIC?

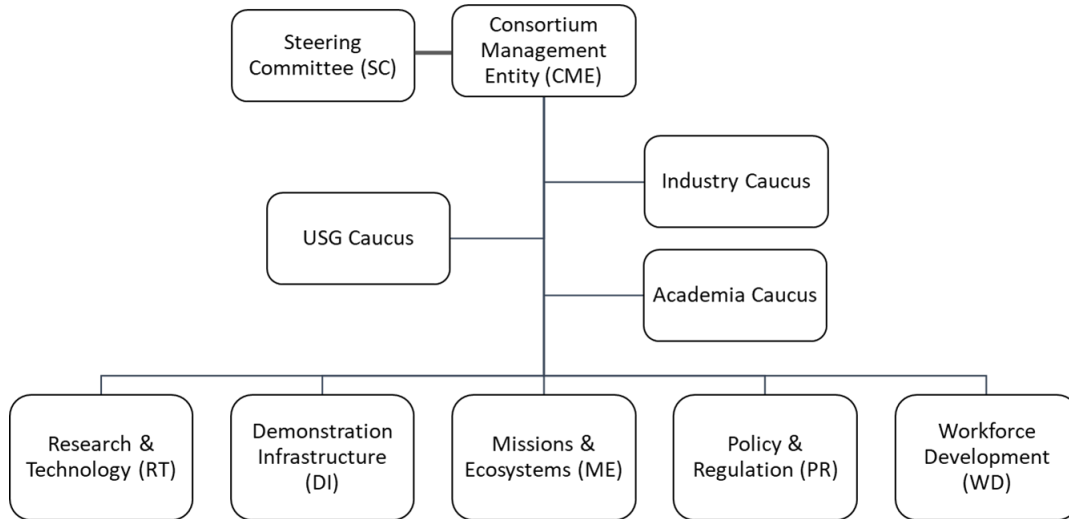


Figure 1. COSMIC org chart.

COSMIC has a Steering Committee who prioritizes COSMIC activity and products, a Consortium Management Entity, three caucuses and five Focus Area working groups.

2.2 Is this a NASA consortium?

In response to the White House’s National ISAM Strategy and National ISAM Implementation Plan (Dec 2022), COSMIC was founded as a nationwide effort to bring together stakeholders from communities who have a vested interest in the nation’s leadership in ISAM. NASA sponsors the consortium, but the priorities and deliverables are selected by a Steering Committee (SC) that includes members from government agencies, commercial companies, and academia.

2.3 Who will be on the COSMIC Steering Committee?

The Steering Committee has a total of 12 members, with 11 voting members and one non-voting chair. The membership includes three representatives from non-defense space agencies, three from national security space agencies, four from industry, and two from academia.

2.4 How will Steering Committee members be selected?

For the first year, the CME has invited members of the ISAM community to be on the initial Steering Committee. The CME ensured there was adequate coverage within the Steering Committee in the following areas:

- Government, industry, and academia
- ISAM providers, users, and researchers
- Experience and expertise that maps to each major element of ISAM: servicing, assembly, and manufacturing
- Experience and expertise that maps to each of the five Focus Areas: Research & Technology, Demonstration Infrastructure, Missions & Ecosystems, Policy & Regulation, and Workforce Development

In subsequent years, Steering Committee members will be voted in by COSMIC members via the Caucuses. The non-voting chair will always be a civil servant employee. Steering Committee terms will be defined in the COSMIC Operating Plan.

2.5 Who leads the operations of COSMIC?

The Aerospace Corporation is contracted by NASA to act as the Consortium Management Entity (CME). The CME manages COSMIC operations, ensures coordination among the members (industry, government, and academia), leads communication activities and events, provides focus area leads and coordination, and provides administrative support.

2.6 What is COSMIC's decision making process?

All parts of COSMIC – the Steering Committee, Focus Area working groups, and caucuses – strive to achieve unanimity on decisions and approval of products. When unanimity cannot be achieved, democratic voting processes will be used, with dissenting opinions documented.

2.7 Will the governing plan and structure change as ISAM continues to evolve?

Yes. The Steering Committee will have the latitude to create new and retire old Focus Areas as needed to address the needs of the ISAM community. Products produced by the Focus Areas are expected to evolve to address the needs of the community as it grows and changes.

2.8 How will COSMIC ensure opinions from all sectors are considered?

The government, industry, and academia caucuses ensure that opinions have a path to their representatives on the steering committee. The membership of the steering committee will always include representation from these sectors.

2.9 What types of organizations will be involved in COSMIC?

COSMIC will be a nationwide alliance of:

- Commercial Companies
- Universities

- Nonprofit Research Institutions
- Industry Groups
- Existing ISAM Organizations
- Civil and DoD Government Departments and Agencies

2.10 How can our agency / company / institution participate in COSMIC?

After the kickoff in Fall 2023, COSMIC participation will include different paths, depending on the needs of the member organization. At minimum, all members should sign up for one or more Focus Areas (see below), where detailed discussions of Focus Area-specific ISAM implementation will be conducted in working groups that will create products specific to that Focus Area.

The five Focus Areas are:

- Research & Technology
- Demonstration Infrastructure
- Missions & Ecosystems
- Policy & Regulation
- Workforce Development

In addition, members will sign up to be included on distribution lists for their appropriate caucus: government, industry, or academia. These caucuses communicate periodically to discuss ISAM topics specific to their sector and elect members of their caucus to represent their interests within the Steering Committee.

2.11 Can a specific individual be a member of Steering Committee, Caucus, and Focus Group(s)?

Representatives to the Steering Committee will be elected by the caucuses on a regular cadence. Steering Committee members are free to participate in their caucuses and in the focus groups that align with their interest. Individuals within the general membership of COSMIC are encouraged to participate in the caucus that aligns with their stakeholder groups (government, industry, and Academia) and as many Focus Areas as they are interested in contributing to.

2.12 How are individuals assigned to a caucus?

Assignments are automatic based on the stakeholder group an organization belongs to. For example, a government civil servant will automatically be a part of the government caucus and cannot participate in the industry caucus. Organizations will identify which caucus they are a member of when signing the membership agreement, and their representatives will participate in the identified caucus. Government support contractors and FFRDCs can join COSMIC as members of the government caucus, recognizing that some government caucus meetings may be limited to just civil servants depending on the agenda. Non-profits may select between industry and academia depending on which caucus aligns best with their mission.

2.13 Can more than one member of an organization join a caucus and/or focus group?

Yes. COSMIC encourages organizations to identify as many representatives from their team to participate in the work of the consortium as they feel would maximize the benefit to themselves and the consortium. In-person attendance at general membership meetings may be limited to a subset of representatives from each organization based on venue capacity, but online attendance will not be restricted and hybrid participation from all of an organization's representatives is encouraged.

2.14 Who will integrate between Focus Areas?

COSMIC has assigned an individual to act as the integration lead for the consortium. Their role will include coordinating products that require input from multiple focus areas, identifying areas of common interest, and organizing Focus Area integration meetings as needed. The mid-year general membership meetings will act as a venue for Focus Areas to share the progress they've made with the larger community and facilitate cross-Focus Area collaboration.

3. Products

3.1 What outcomes or products will result from COSMIC?

Each year, COSMIC will produce products that could include technology state-of-the-art assessments, summaries of future ISAM-enabled missions, white papers, gap assessments and recommendations, summary roadmaps, etc. Each year, the COSMIC Steering Committee (a group that includes government, industry, and academia from across the U.S.) will prioritize member-defined product ideas to determine what COSMIC will work on for the next year.

3.2 What are some examples of products COSMIC might create?

The CME has derived an initial set of product ideas based on the National ISAM Implementation Plan (Dec 2022). Examples include an ISAM technology report, a test facility report, and inventory of commercially available ISAM products, policy white papers, workforce training materials, etc. On an annual basis, COSMIC members have the opportunity to propose additional product ideas for consideration by the Steering Committee.

3.3 Will there be a standard publishing mechanism for COSMIC products?

The CME will work with each Focus Area to create a peer review process and will establish a process for product release. Some COSMIC products are intended for COSMIC members and will help members become more aware of activities happening within the U.S. ISAM community. Other products will be released to the ISAM community at large, providing communication that represents the needs, vision, and perspectives of the entire U.S. ISAM community. A repository for products will be established for each category, and the location of those repositories will be communicated to the membership.

3.4 How will products be advertised to the larger community?

COSMIC will regularly communicate to its members about work being done on specific products and will communicate to both members and the general public when a COSMIC product has been released.

3.5 Can agencies or organizations fund COSMIC to produce a product or perform a task?

Agencies, companies, or institutions that want to see a specific product generated by the consortium should submit ideas for COSMIC products during the Steering Committee's annual request for inputs. Members should engage with other members during meetings of their Focus Area and Caucus to garner support for this product idea. Every year, the SC will evaluate the product ideas and create a prioritized list of the following year's activities and products. Input from members regarding which current products they think are important or what new products should be created is vital to keeping members engaged and keeping the consortium relevant and useful.

3.6 Will COSMIC provide funding to members to develop products?

COSMIC does not provide funding to its members. By contributing their time, members who choose to participate in creating products will be able to influence the future direction of the nation's activity in ISAM. Members who attend regular Focus Area sessions, coordinate with other members via email and message boards, and attend General Membership Meetings will have a better understanding of future mission needs, technology developments, test capabilities, and policy and regulatory concerns of the other members. These activities will help companies and universities position themselves within an ISAM market or niche and will help U.S. government agencies reduce unnecessary duplication of effort.

3.7 How will COSMIC avoid lobbying when publishing and delivering products?

COSMIC products will not be delivered directly to legislators, and COSMIC will not lobby any individual agency or government leader. COSMIC products will be created that best represent the perspectives of the U.S. ISAM community. Members can choose to use those packages to standardize their message to advocate and educate on their own behalf.

3.8 Will COSMIC fund any tech development or flight demos?

COSMIC will not release solicitations and does not fund technology development, flight maturation, flight qualification, mission studies, or other work best suited to USG agencies, commercial companies, or academia. COSMIC coordinates and facilitates communication between these organizations to reduce unnecessary duplication of effort and to increase community awareness of current and future plans.

3.9 Will COSMIC members have an advantage when competing for ISAM awards?

Future solicitations will not take membership in COSMIC into account as an explicit evaluation criterion, and no organization needs to join COSMIC to compete for an ISAM award. However, the COSMIC CME intends to regularly provide information to members about solicitations and RFPs that come to our attention. As a result, participation in COSMIC may provide members an advantage in terms of awareness of opportunities, and COSMIC members should expect to be better informed than non-members about the state of the U.S. ISAM community and the needs of specific future customers.

3.10 How will COSMIC protect my Intellectual Property (IP)?

COSMIC will never require any member to share IP with the COSMIC CME or with any other COSMIC members (i.e., government, industry, or academia). Any COSMIC member who chooses to share their IP with another member can choose to establish appropriate NDAs directly between individual members.

4. Membership

4.1 How do I sign up?

COSMIC will begin accepting applications for membership following the Kickoff in November 2023. At that time, the Consortium Management Entity (CME) will provide a Membership Agreement to all interested parties. The Membership Agreement will ask organizations (agencies, companies, and universities) to affirm that they are a U.S. organization, and that they will only allow U.S. persons to participate in COSMIC meetings, member only email lists, and other online collaboration locations. The organization will identify a primary technical point-of-contact and a list of other representatives (individuals) within their organization that can represent them at COSMIC meetings.

4.2 Can international companies or individuals be involved in COSMIC?

COSMIC membership is limited to U.S. persons representing the U.S. government and U.S.-based organizations. COSMIC encourages its members to collaborate internationally, but COSMIC as an entity will focus on domestic coordination on ISAM. The portion of the United States' ISAM National Strategy and National ISAM Implementation Plan that includes promotion of international collaboration and cooperation as one of their goals will be addressed by other mechanisms.

4.3 Will membership in COSMIC require committing to a minimum length of service?

General membership in COSMIC does not require a specific service term commitment or a minimum time commitment. All organizations who sign the membership agreement can choose whether to participate in all, some, or none of the COSMIC general membership meetings, Focus Area working groups, and Caucus meetings. However, for those on the Steering Committee a term commitment is required as defined in the COSMIC Operating Plan.

4.4 How often will COSMIC meet, either in-person or virtually?

COSMIC will convene the general membership twice a year for collaboration and coordination discussions. All General Membership meetings will include a virtual component.

Additionally, Focus Area working groups, Caucus working groups, and the Steering Committee will have their own in-person and/or virtual meeting cadence throughout the year.

4.5 How will locations for general membership meetings be selected?

COSMIC will endeavor to hold their general membership meetings at a diverse range of locations across the country to help the membership become connected geographically to the work being done. Selection of location will consider where the previous membership meetings were held, facility hosting capability, and where COSMIC members are located.

5. Future

5.1 What metrics will COSMIC use to measure progress?

The Consortium Management Entity (CME) will be soliciting ideas for metrics from its members in 2023. Potential metrics may include the number of National ISAM Implementation Plan objectives that COSMIC fulfills and contributes to for the U.S. Government, the number of products COSMIC produces, investment in ISAM capabilities by the commercial marketplace, or the number of successful ISAM missions conducted by COSMIC members.

5.2 What is the long-term sustainment plan for COSMIC?

As the sponsor of COSMIC, NASA understands that making ISAM a routine part of space mission operations will not happen overnight, given that even the fastest new space missions can take 2-5 years to develop. Each year, the COSMIC community will recommend products and deliverables to pursue based on community needs and the overarching goals and objective of the consortium. COSMIC will require dedicated attention and persistence to achieve its overall goals and will closely monitor the infusion of ISAM activities into spacecraft operations.

5.3 What happens to COSMIC when ISAM is a routine part of space architectures and mission lifecycles?

As the consortium stands up in early 2023, each servicing mission that has flown to date has encountered “firsts” where the technology, CONOPS, regulations, or legal agreements are untested, unclear, or brand new. Each subsequent mission will encounter fewer firsts, and missions that use ISAM will design, test, and operate like any other new spacecraft, mission, or architecture. When this happens, COSMIC will no longer be needed and can disband.