

IEEE SpaceTech



Strategy Workshop Summary

July 2026

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Detroit, Michigan, USA

The workshop brought together attendees from over 40 organizations, including representatives for over 20 different IEEE organizational units, to define IEEE's strategic role in space technology, expanding the focus from individual component-level technologies to a cohesive, system-level perspective across IEEE's 47 technical societies and councils. The workshop opened with a panel of industry, government, and academic experts to discuss the current state of space technology and challenges in advancing further into space. A prioritization exercise was conducted to assess where the SpaceTech initiative should focus its efforts, including strategic mission areas. Attendees offered ideas on how to best reach out and communicate to a wide audience for the greatest engagement across IEEE as well as with industry, the general public, and outside agencies and professional organizations. Key deliverables were determined, including the development of a white paper that lays the groundwork for this new initiative.

Panel Discussion: Current State and Challenges of Space Technology

Panelists: Jayfus Tucker Doswell, Founder, President, and CEO, Juxtopia, LLC
Marc Berte, Chief Executive Officer, Overview Energy
Kevin Somervill, Foundational Capabilities Domain Formulation Lead, NASA
Tim Flohrer, Head of the Space Debris Office, European Space Agency (ESA)
Vincent W.S. Chan, Joan and Irwin Jacobs Chair Professor, MIT

Overview

Discussion explored opportunities for managing space debris, improving communication networks in space, developing AI capabilities for space operations, and creating pathways for small businesses to engage in space technology development and testing.

Key Takeaways

- **Rapid pace of changing landscape in space orbit, reaching critical density in some regions.** Approximately 54,000 objects larger than 10 cm exist in orbit, increasing to over a million when smaller objects are added. Even objects of a few cm have enough kinetic energy to contribute to a catastrophic collision event and enough charge to damage electronics. Discussion covered both technical challenges of managing space debris through collision avoidance and deorbiting, as well as the infrastructure needs for communication and sensing systems to track and monitor objects in space. Removal of space debris is a significant but necessary challenge.

- **Access to space has become more affordable adding new players.** Universal traffic rules need to be established, and communication between satellite operators is required.
- **Satellites require advanced communication networks and improved infrastructure.** Satellite communications are decades behind current ground-based systems. Current network architectures in space are temporary solutions that will eventually reach their limitations. Due to distance and tracking issues, new architectures are required to develop robust satellite-to-satellite and ground-to-satellite communication systems. Better network protocols, such as the proposed Interplanetary Internet (or InterPlaNet) that is suitable for use over large distances with delay and disruption tolerance, are crucial.
- **Security challenges** are increased with potential cyberattacks on communication networks, as well as national conflict. Maintaining neutral space is essential.
- **Business challenges in the space ecosystem include supply chain transparency issues surrounding requirements and regulations, long lead times for launches that do not align with funding cycles, and misaligned standards for space components.** The commercial side is getting faster than governmental programs, which moves the valley of death closer. The timeline from contract award to funding can be lengthy, creating cash flow challenges for startups. Mission cycles need to be condensed (e.g., 18 months vs. 3 years). Consider adjusting standards to focus on robustness vs. precision for short-term space R&D projects.
- **There is more desire than capacity for flight opportunities.** Developing capacity for rideshare opportunities, increasing launch cadence, and implementing small payload challenges are opportunities to support small business research and development in space.
- **Develop dual-use technology for both space and commercial use.** Define a problem that is equivalent on earth as it is in space as a target business opportunity.
- **AI and autonomous robotics applications in space may fill key roles.** There is potential for AI in anomaly detection, in-situ analysis, medical treatments, robotic assistance, and prediction. Concerns center around AI system robustness in space environments as well as the need for **localized data centers** in space and on planetary installations.

Role of IEEE SpaceTech in partnership with IEEE Societies and Entities

- Develop standards and entrepreneurship design patterns (blueprints) to help level the playing field for small business.
- Produce a white paper analyzing business cases.
- Lobby governmental space agencies to accelerate timelines from proposals to funding.
- Educate policy makers on challenges and necessary adaptations for space technology.
- Lead effort to establish universal traffic rules and standards.
- Institute a database of international contacts within the space ecosystem and establish communication protocols between government and business (Who to Call).

- Establish interplanetary communication protocols and standards.
- Promote space as a neutral environment and develop guidelines on the ethical use of space ecosystems.

Mission Prioritization

Attendees were asked to evaluate ten potential space missions using two lenses: New Frontier/Impact and IEEE Fit, with the goal of identifying which missions would be most transformative and aligned with IEEE's capabilities.



Key Takeaways

- There were two areas that attendees noted as having the highest priority, either due to the potential impact, or due to solving an important problem that may inhibit progress:
 - **Space Mining and Manufacturing** was perceived to be an area with very high potential impact, but a relatively low fit to IEEE core capabilities, indicating the value of partnering to best serve this area.
 - **Object, Traffic, and Debris Management** was also highly rated due to the urgent problem of debris management, and an emerging need to develop protocols for new objects and traffic moving through space. Again, IEEE fit was not considered to be as high as other areas.
- **Foundational Technologies.** In considering areas of focus, three areas were identified as having a strong importance as foundational to all space activity, as well as having good to outstanding IEEE fit.
 - **Data Centers** are a key element in supporting in-space automation and support activities, as well as expanding capacity from terrestrial data centers.
 - **Communications and Networking** is another area where significant work is needed to support space operations. New protocols and technical solutions are needed to deal with the vast distances and the associated time delays.
 - **Power Generation and Distribution** was considered one of the most important areas that are vital to support everything else in space. It was also perceived to have the strongest IEEE fit.
- Other considerations included discussion on additional mission areas, including **Health and Human Factors** and **Policy and Standards**.
- Some mission areas were seen to be adjacent, e.g., Tourism and Colonization, due to a complementary focus on humans in space, which would require **new protocols for medical procedures as well as health and safety and health monitoring, as well as ethical guidelines** for appropriate colonization procedures. New technologies will be required for finding water, as well as overcoming signal noise and dust.
- Missions to or in space require new technologies including ways to find and provide water, thermal and radiation protection, and power generation and delivery. Power and water systems may need new delivery approaches.
- It was noted that **earth observation** is a key area as it provides a common ground for international cooperation and leads to useful applications for peaceful purposes, including climate study, disaster detection, and early warning systems. This could be an area of focus and an early win for SpaceTech.
 - Precise position, navigation and timing (PNT) could be treated as a stand-alone mission. Navigation and timing were noted to be foundational capabilities with communication and networking.

IEEE SpaceTech Deliverables

Attendees emphasized the position of IEEE as a neutral platform, noting that as the space ecosystem continues to expand it is imperative to consider protocols for the productive common use of space and promote international cooperation. This includes the development of best practices for inter-operability and guidelines for the use of space for the good of humanity. It was suggested that IEEE consider documentation for the United Nations on space technology governance that could unfairly raise costs.

IEEE SpaceTech could provide value to industry by convening talent and suppliers whether through workshops and trade shows, fostering industry-academia collaborations, or databases, all while increasing engagement with new entrants and startups. Conference partnerships, including working with other societies beyond IEEE and attending/convening trade shows, was seen as high value. Organizing workshops that could lead to virtual special issues in IEEE journals and magazines would provide IEEE SpaceTech with visibility. In addition, reaching out to other regional and local space technology communities and trade groups was identified as a need.

Deliverable Options:

The workshop discussed a number of potential deliverables for initial and follow-on years including:

- Slide deck to introduce different constituencies to IEEE SpaceTech
- Roadmap on future of space technologies
- Preparing an asset list of what IEEE (Societies, IEEE USA, etc.) can do to assist with space operations
- Database of IEEE talent in the space ecosystem combined with a communication platform
- Standards development for space technologies and communication protocols, including developing common standards across space agencies
- Development of data management standards and protocols
- Creation of standardized credentials for space technology workers
- Formal training programs, mentoring, and pipeline development
- Creation of a space technology testbed or platform to enable low-cost experimentation (e.g., Space Lab)
- Hosting open-source initiatives and competitions
- Hosting student competitions, hackathons, or challenges, with winners having a rideshare opportunity (potential focus: inter-operability)
- Develop bootcamps, summer schools, and course offerings in partnership with universities