

Exploring the Next Decade of Space Technologies

WORKSHOP SUMMARY

Riyadh, 04 December 2025

Background

The Centre for Space Futures (CSF), in collaboration with King Abdullah University of Science and Technology (KAUST), convened a focused expert workshop to translate global survey insights into actionable pathways for accelerating the maturation and adoption of critical space technologies over the next decade. The workshop forms part of CSF's Space Technology Foresight effort, aimed at identifying technologies with the greatest potential to reshape space capabilities, markets, and cross-sector applications.

Workshop Summary

Building on the results of CSF's global expert survey, the workshop brought together senior stakeholders from government, industry, academia, and international organizations to assess priority technology domains, identify barriers to adoption, and define system-level actions needed to unlock scale, investment, and operational deployment.

Following an opening panel on alignment between R&D priorities, policy frameworks, and demand signals, participants engaged in structured working groups covering five technology domains that emerged most prominently from the survey.

Priority Technology Domains

Participants focused on five interconnected domains expected to be most transformative:

- **AI, Autonomy & Robotics:** Onboard intelligence, autonomous operations, and robotic systems enabling reduced ground dependence and complex mission execution.
- **On-Orbit Servicing, Assembly & Manufacturing (ISAM):** Technologies extending asset lifetimes, enabling in-space construction, and supporting sustainable operations.
- **Propulsion, Power & Enabling Subsystems:** Advanced propulsion, high-density power, and critical subsystems enabling scalable and deep-space missions.
- **In-Situ Resource Utilization (ISRU) & Space Resources:** Prospecting, extraction, and processing technologies to reduce reliance on Earth-based supply chains.

- **Space Communications & On-Orbit Data Infrastructure:** Interoperable satcom, optical links, inter-satellite networking, and edge data processing architectures.

Key Barriers to Adoption

Across all domains, participants identified common constraints:

- **Qualification and knowledge gaps:** Limited know-how, access to test infrastructure, and in-space demonstration opportunities.
- **Standards and interoperability:** Lack of common interfaces, certification pathways, and modular architectures.
- **Regulatory and liability uncertainty:** Misalignment between technology development and authorization, safety, and responsibility frameworks.
- **Investment risk:** Long development timelines and insufficient early demand signals to justify large-scale capital deployment.

Priority Actions to Accelerate Maturity

Participants converged on a focused set of actions most likely to unlock adoption and investor confidence:

- **System-level demonstrations:** Shared testbeds, in-space "sandboxes," and repeatable pilot missions.
- **Standardization and modularity:** Common servicing interfaces, qualification standards, and interoperable architectures.
- **Credible demand signals:** Anchor procurement, mission-aligned public demand, and co-funding mechanisms.
- **Policy and regulatory clarity:** Predictable authorization pathways, particularly for autonomy, ISAM, high-power systems, and resource utilization.

Cross-Cutting Insights

The workshop highlighted that progress will be driven less by isolated breakthroughs and more by system-level enablers, including software-defined architectures,

miniaturization, and AI as a unifying layer across domains. Defense and national security use cases were consistently identified as early strategic drivers capable of anchoring demand and accelerating technology maturation.

Key Questions

- What are the top 10 emerging technologies that will revolutionize the space sector?
 - What are barriers to TRL advancement and scaling across these technology domains?
 - What is needed to speed the technology maturation process?
 - Which actions would most increase investor confidence (pilots, co-investment, anchor procurement, flight heritage)?
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Next Steps

- Synthesize survey results and workshop insights into a consolidated technology outlook.
 - Conduct targeted follow-on consultations to validate priorities and actions.
 - Engage the CSF Advisory Committee for strategic guidance.
 - Publish a focused paper informing a global space technology roadmap.
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Participating Organizations

The workshop convened 50+ participants, primarily from Saudi Arabia, with international participation from **Italy**, the **United States**, the **United Kingdom**, the **UAE**, and **Japan**, representing government, industry, academia, and international organizations.

Participating entities included **CSF** and **KAUST**, the **Saudi Space Agency**, **GADD**, **KACST**, **CST**, **Prince Sultan University**, **King Saud University**, **Neo Space Group**, **SAMI-Airbus**, **STC**, **Cisco**, **KPMG**, **BryceTech**, **SERCO** (+impact), **Angelantoni Test Technologies**, **Italian Institute of Technology**, **AtharX**, **Omega Space**, **SARsatX**, **MAverse**, **NCMS**, **Do-Launch**, **TEHA Middle East**, **WEF**, **Yokogawa**, and others.

Panel contributors included **Mishaal Ashemimry** (CSF), **Val Munsami** (SSA), **Rajiv Cabraal** (KAUST), and **Olga Volynskaya** (PSU) with moderation by **Veronica La Regina** (CSF).

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