

AIAA Approach to Systems Engineering: Domains & People Challenges

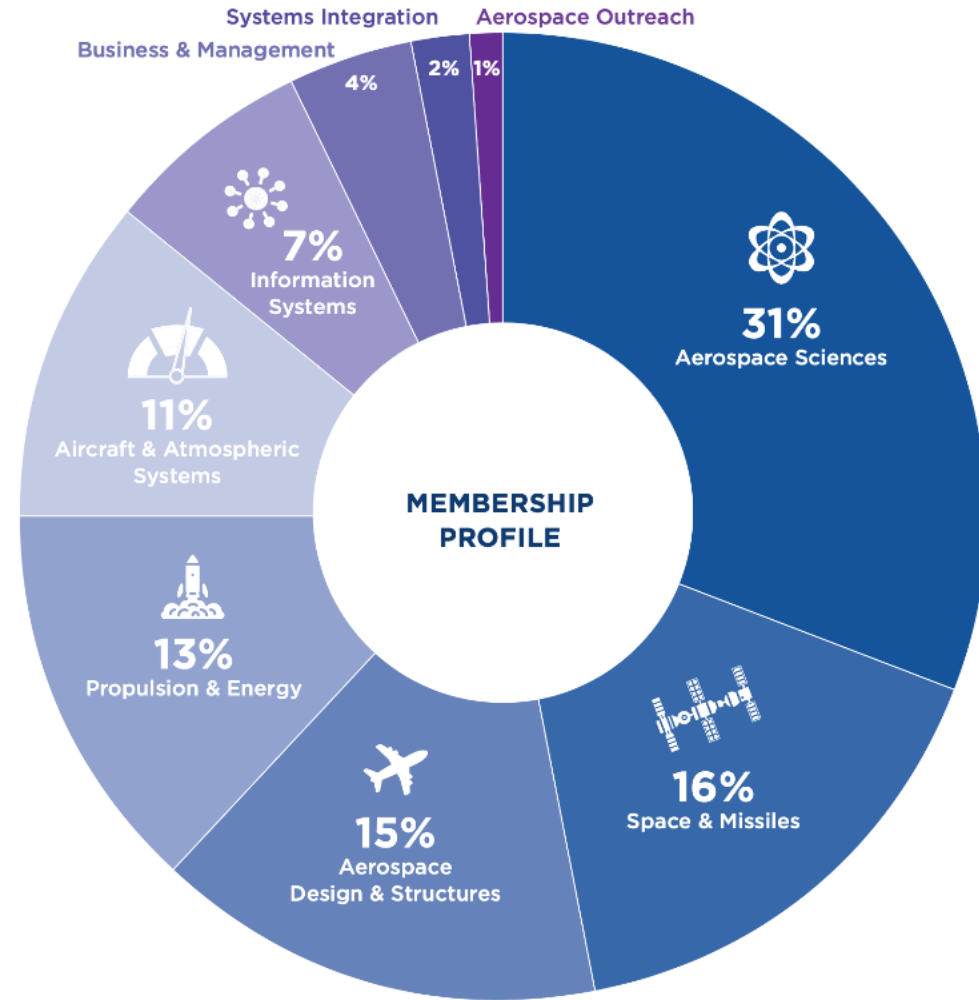
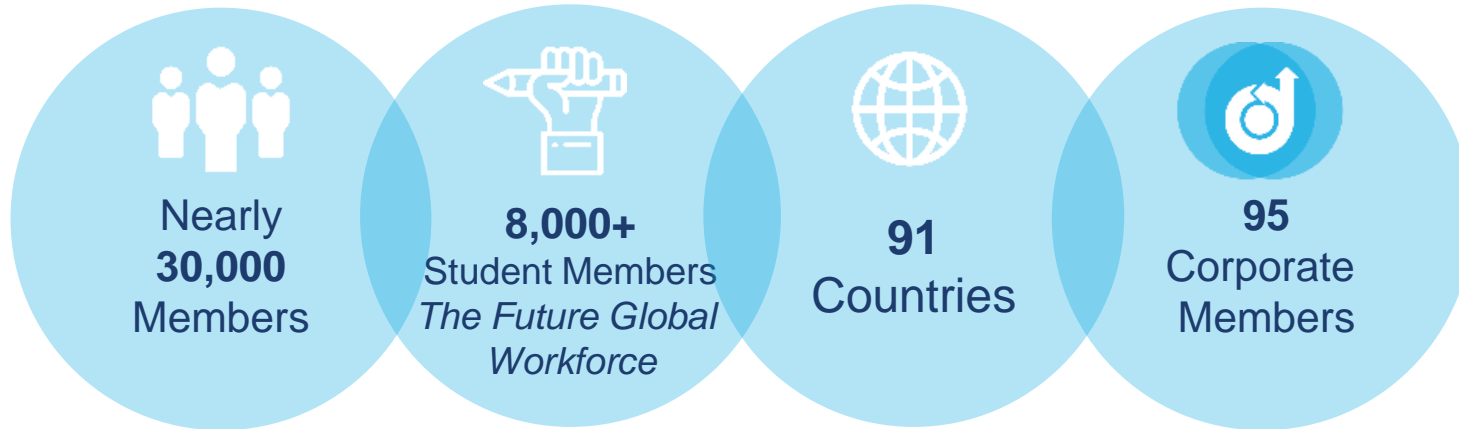
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Daniel E. Hastings, AIAA President

Who is AIAA Today?

AIAA MISSION:

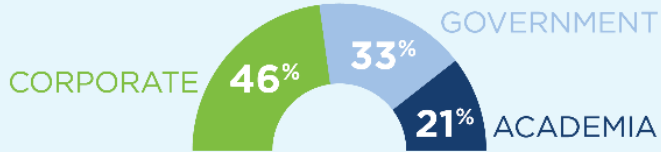
To help aerospace professionals and their organizations succeed



AIAA Members are Active and Engaged

EVENTS

In-person and Virtual



11,000

FORUM PARTICIPANTS

6,229

TECHNICAL SUBMISSIONS

SCITECH FORUM

ASCEND

DEFENSE FORUM

AVIATION FORUM

MEMBER PARTICIPATION

PARTICIPATION

71 TECHNICAL COMMITTEES

21 INTEGRATION & OUTREACH COMMITTEES

56 LOCAL SECTIONS ACROSS 7 GEOGRAPHIC REGIONS

20 COMMITTEES ON STANDARDS

TECHNICAL RESOURCES

8 PEER-REVIEWED JOURNALS

Meeting Papers/Proceedings

Aerospace America – the flagship publication of AIAA

Technical, business courses, and online learning

Aerospace Perspectives Webinars

Career Center

AIAA Corporate Partners and Members

AIAA Corporate Membership fosters an environment for aerospace leadership and technical excellence

- Expand industry presence
- Improve workforce development
- Involvement in aerospace advocacy
- Participate in purposeful collaboration.

AIAA Corporate Partners and Members provide support

- Financial contributions
- Staff volunteer engagement

AIAA Corporate Partners



CORPORATE MEMBER PARTICIPATION

3 AIAA CORPORATE PARTNERS

~95 AIAA CORPORATE MEMBERS

Strategic Plan Moves the Institute Forward

MISSION **AIAA exists to help aerospace professionals and their organizations succeed**

CORE STRATEGIES



DATA DRIVEN

Use the appropriate data in the analysis of decisions



CURATE CONTENT

Be the leader in curated aerospace content



THOUGHT LEADER

Be the thought leader in technology and capability advancement

Continuing Education Features Systems Engineering

AIAA is offering Systems Engineering courses for aerospace professionals of all experience levels

- Available this academic year
- New courses developed in response to strong interest in systems engineering training

Applied Model-Based Systems Engineering (MBSE)

Online Short Course (18–21 November 2024)

Fundamentals Model-Based Systems Engineering (MBSE)

Online Short Course (Spring 2025)



Domain Priorities Embrace Systems Engineering



AERONAUTICS

System solutions applied by private industry, government programs to address commercial and policy customer needs



R&D

Research performed by academic institutions, government laboratories, industry laboratories to be utilized by system solutions



SPACE

System solutions applied by private industry, government programs to address commercial and policy customer needs

PROBLEMS | ISSUES | PRIORITIES

- Aviation Decarbonization and Sustainability
- Advanced Air Mobility
- Certification
- Hypersonics and Supersonics

- Transformative Systems Engineering
- Autonomy / Artificial Intelligence / Machine Learning
- Advanced Manufacturing and Advanced Materials
- Resilient and Assured Systems

- Space Traffic Coordination
- Space Sustainability
- Space Exploration
- Outpacing the Space Threat
- Competitive and Burgeoning Space Economy

Systems Engineering approaches are integrated in nearly every domain priority

Spotlight: Systems Engineering in Aerospace R&D

Transformative Systems Engineering

How aerospace can embrace virtualization, emulation, digital thread, digital twin, and related concepts and accelerate adoption of model-based systems engineering into system engineering methodologies.

Autonomy, Artificial Intelligence, and Machine Learning

How aerospace can leverage autonomy, machine learning, and artificial intelligence concepts across the full lifecycle of research, development, design, test, evaluation, and mission sustainment, as well as incorporate these advances into aviation and space systems to achieve performance and mission goals.

Advanced Materials and Advanced Manufacturing

How aerospace can leverage and guide advances in material science and manufacturing to advance system performance and achieve new mission capabilities.

Resilient and Assured Systems

With increasing dependence on digital capabilities, as well as automation and autonomous control, aerospace is increasingly obligated to assure that resulting capabilities and behaviors satisfy security, legal, moral, and ethical needs.

Example Outcome:

AIAA White Paper Expected Q4 2024/Q1 2025

- *Produced by the AIAA Digital Engineering Integration Committee (DEIC), with the support and coordination of the AIAA Aerospace R&D Domain*

Digital Engineering Workforce Development: Challenges, Best Practices & Recommendations

- Acknowledges and analyzes need for a skilled digital engineering workforce and its accelerated development
- Summarizes digital engineering evolution from 1970s CAD systems through sophisticated 3D modeling and digital threads and twins in the contemporary landscape.
- Details quality and efficiency impacts of digital engineering advances
- Describes tension between 'digital natives' and traditionally-trained personnel, and imperative for leadership and culture to overcome cultural divides
- Advocates collaborative approach among academia, industry, and government to meet fast-evolving skill demands and support implementation of digital engineering implementation
- Proposes Digital Ecosystem Roles-Based Taxonomy to clarify roles and skills required across organizational levels and guide training and development
- Advocates overhaul of existing education and training:
 - *Integration of systems and model-based systems engineering, cybersecurity, data science, and visualization into undergraduate programs*
 - *Preparation students for current needs and future adaptability*
- Success stories from strategies and initiatives in academia, industry and government



**AMERICAN INSTITUTE OF
AERONAUTICS AND ASTRONAUTICS**