



Space Innovation & Defense Working Group

WHITE PAPER

Space Innovation & Defense

Building the Golden Dome for America

*Highlights from a recent roundtable, hosted
by the Advanced Technology Academic
Research Center (ATARC) Space Innovation &
Defense Working Group, August 19, 2025*

Executive Summary

This whitepaper distills insights from the Space Innovation & Defense Roundtable, convened under Chatham House Rule. The conversation centered on the **Golden Dome for America initiative**, a vision to unify terrestrial and orbital defense systems into an interoperable architecture. Key stakeholders from government, industry, and research institutions examined foundational technologies, cultural and acquisition challenges, and workforce development needs. This paper provides a synthesized view of the challenges and opportunities for achieving resilience in U.S. space defense.

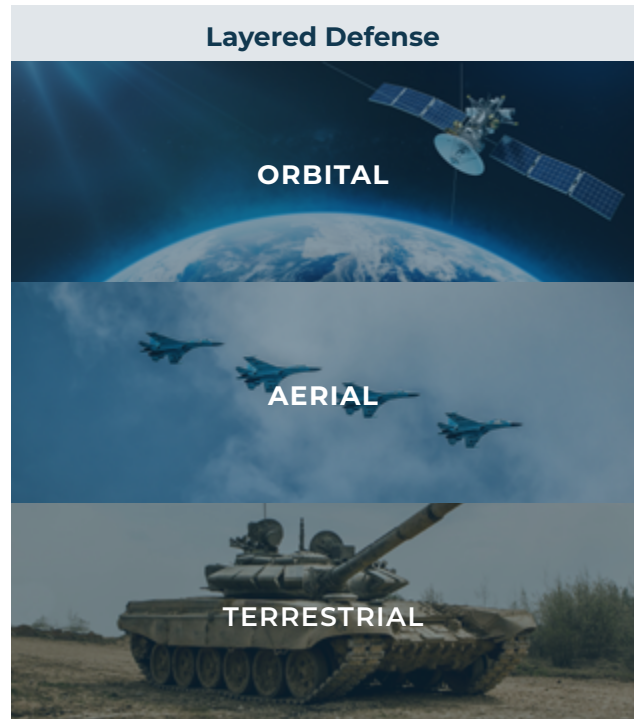
Background and Context

Space is increasingly **congested, contested, and competitive**. The U.S. and its allies face adversaries advancing in hypersonics, cyber, and anti-satellite capabilities. In this environment, the Golden Dome initiative seeks to deliver a **multi-layered, interoperable defense architecture** combining sensors, satellites, AI-driven analytics, and integrated command and control. Participants agreed that the nation that leads in space over the next 3–4 years could set the trajectory for global leadership for the next two centuries.

Key Findings

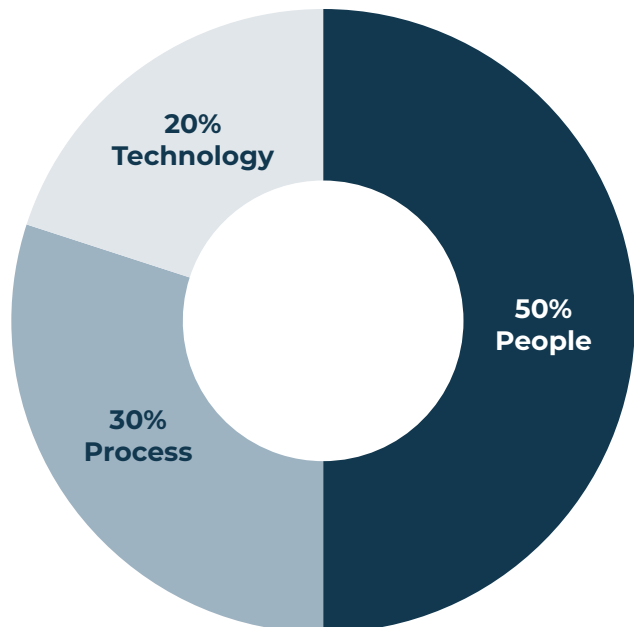
1. Foundational Capabilities for Golden Dome

- ▶ **Interoperability and Standards:** Critical to fusing legacy systems, new architectures, and diverse agencies. Without standardized data formats and APIs, errors compound and compromise effectiveness.
- ▶ **Multi-Layered Defense:** Inspired by the military's shift from linear "kill chains" to "kill webs," Golden Dome requires integration across land, sea, air, cyber, and space domains.
- ▶ **Robust Data Infrastructure:** AI and machine learning depend on **clean, reliable, and interoperable datasets**. Data quality is foundational.



2. People, Process, or Technology?

- ▶ Broad consensus: **people and processes precede technology**. Acquisition agility, contracting speed, and cultural adaptation are as decisive as technical breakthroughs.
- ▶ AI is viewed as a **decision-support tool**, not yet mature enough for autonomous lethal decisions.





3. Resilience and Redundancy

- ▶ Avoiding “big juicy targets” in GEO by dispersing constellations in **LEO and MEO**.
- ▶ The “R-words”: robust, resilient, redundant, responsive, reliable, repairable, refuelable, reconstitutable.
- ▶ Financial strategies to maintain dormant but scalable manufacturing and launch capacity in peacetime.

4. Command, Control, and Data Fusion Challenges

- ▶ The **5 V's of Big Data**: volume, velocity, veracity, value, and variety drive both opportunity and complexity.
- ▶ Rapid experimentation and iterative testing are critical to uncover blind spots (e.g., lessons from balloon incidents).
- ▶ Quantum computing and quantum-resistant algorithms will be pivotal in future-proofing data security.

5. Integrating Commercial Innovation

- ▶ Government cannot succeed alone—commercial space companies, startups, and academia are indispensable.
- ▶ Agencies should specify **“catch the mouse” outcomes**, not prescriptive methods, to unlock industry creativity.
- ▶ Procurement reform (Speed Act, DIU 3.0) aims to shorten the valley of death between R&D and operational deployment.

6. AI and Autonomy in Operations

- ▶ Proven in robotics (e.g., Mars rovers), but military-grade applications demand **reliability and safeguards against hallucination and model drift**.
- ▶ AI should accelerate threat detection and decision support, with humans **in or on the loop**.

7. Acquisition and Procurement Reform

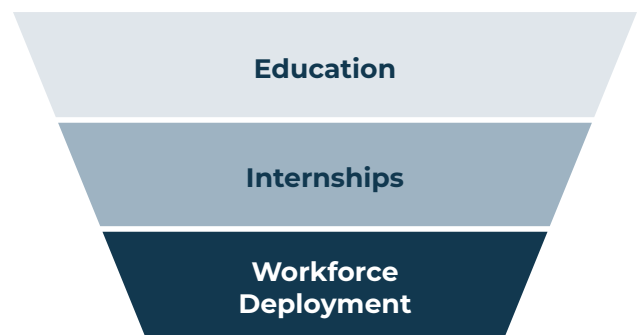
- ▶ Automation in manufacturing is vital to scale missile and satellite production against adversary numbers.
- ▶ Standardized vendor qualification and common technical documentation would eliminate inefficiencies.
- ▶ Cybersecurity and interoperability must be embedded from the outset.





8. Workforce Development

- ▶ Golden Dome is as much about **cultivating talent as deploying tech.**
- ▶ Programs should recruit and empower young engineers, build cross-sectoral training pipelines, and frame defense projects as avenues for civilian innovation.



9. Concrete Actions for the Next Year

- ▶ **Intensify industry–government dialogue** through open forums, market research, and clear signaling.
- ▶ Focus near-term R&D on **machine learning** for data prioritization and fusion.
- ▶ Create pathways for **nontraditional players** (startups, logistics firms) to enter the ecosystem.
- ▶ Expand public awareness campaigns to foster societal support.

Strategic Recommendations



Conclusion

Golden Dome for America is both an **urgent necessity and an extraordinary opportunity**. By uniting government, industry, academia, and allied partners, the U.S. can build a resilient, interoperable defense architecture for space. Achieving this vision requires not just technology, but culture change, procurement agility, and human capital development. The next 12 months will be decisive in moving from **vision to operational reality**.

Prepared under Chatham House Rule – attributions omitted by design.