SPACE WORKFORCE FORUM
DISCUSSION PAPER

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Disclaimer: This document is intended to provide a basis for discussion and does not represent official research or positions of the Office of Space Commerce, the Department of Commerce, or any other department or agency. The following is a summary of information gathered from multiple sources and may not be accurate; readers are encouraged to reflect on these signals in light of their own experience and knowledge in order to shape discussions at this forum.

SIGNAL REFERENCE TABLE | What We've Heard About the Space Workforce

WHAT IS A SIGNAL?

A signal is a documented, recurring condition in the space workforce ecosystem — heard or observed across multiple independent sources — that indicates where the system is under stress, where it is working, or where it is forming but not yet visible.

Signals are not conclusions, recommendations, or policy positions. They are patterns that surface through structured listening and documentary research. No individual, organization, or sector is identified in any signal. What travels forward is the pattern — not the source. Today's forum is part of the process of sense-making from these patterns.

THREE SIGNAL TYPES IN THIS TABLE: **Current Issue** — active now. **Emerging Signal** — forming, needs practitioner confirmation. **Sensitive** — real, requires careful handling.

HOW TO READ THIS TABLE

Five dimensions organize all 44 signals. Elevation indicates how urgently the signal demands attention based on four scored dimensions: operational impact, workforce disruption, systemic spread, and time proximity. **CRITICAL** and **HIGH** signals scored highest across all four dimensions. Time horizon indicates whether the signal is an immediate need (Near-Term: 0–2 years), a developing condition (Mid-Term: 3–5 years), or a structural reality requiring long-term investment (Long-Term: 5+ years).

CRITICAL	HIGH	MEDIUM	EMERGING
System has failed	*Urgent structural pressure*	*Significant, addressable*	*Forming — needs confirmation*

DIMENSION 1 | AVAILABILITY

The pipeline cannot fill current demand

7 signals in this dimension

#	ELEVATION	SIGNAL TYPE	HORIZON	WHAT WE'VE HEARD
1	HIGH	*Current Issue*	Near-Term	**The space workforce looks different than most people expect.** Software developers, not aerospace engineers, make up the largest occupational group in the space economy. More than half of space economy jobs require STEM skills — more than double the rate of the broader U.S. workforce. This has real implications for where we look for talent and how we design pipelines.

#	ELEVATION	SIGNAL TYPE	HORIZON	WHAT WE'VE HEARD
2	HIGH	*Current Issue*	Near-Term	**The sector's most urgent gap is in the middle — not at the top.** Assemblers, machinists, inspectors, welders, and technicians are the hidden majority of the space workforce. These are not entry-level minimum wage jobs — they are skilled, specialized, and well-paying. But the pipeline infrastructure for middle-skill space roles is severely underdeveloped compared to the pipeline for engineers and scientists.
5	HIGH	*Current Issue*	Near-Term	**Space manufacturing is the most underinvested workforce domain in the sector.** Seven critical technology areas in space manufacturing face workforce gaps that are not aligned to current demand. This is not a future problem — it is active now and constraining the pace of commercial space production.
13	HIGH	*Current Issue*	Near-Term	**The aerospace and defense sector cannot retain the people it already has.** Industry attrition is stuck at nearly 15% despite sustained investment in compensation and retention programs. Pay increases have become table stakes, not differentiators. The problem is not simply wages — it is something structural about how these careers are positioned and progressed.
14	HIGH	*Current Issue*	Near-Term	**The hardest roles to fill are mid-career, not entry-level.** The shortage is in experienced engineers and skilled trades workers — not in new graduates. The sector is reasonably good at hiring young talent. It struggles to develop, retain, and replace the professionals who carry institutional knowledge and operational expertise.
21	HIGH	*Current Issue*	Near-Term	**The space sector is losing workers to tech, cyber, and digital industries — and it is not tracking the loss.** Cross-sector talent migration is accelerating. Technology, cybersecurity, and digital companies are pulling aerospace-trained workers with offers of higher compensation, remote flexibility, and faster career progression. The competition is real, it is asymmetric, and no federal system is currently tracking it.
36	HIGH	*Current Issue*	Near-Term	**When a prime contractor loses key people, there is no bench behind them.** Workforce expertise in the space industrial base is concentrated at single organizations. If a major employer loses critical personnel, there is no redundant talent pool in the broader ecosystem to absorb the impact. This is a supply chain risk as much as a workforce risk.

DIMENSION 2 | SKILLS & COMPETENCIES

The interdisciplinary gap is widening

6 signals in this dimension

#	ELEVATION	SIGNAL TYPE	HORIZON	WHAT WE'VE HEARD
3	MEDIUM	*Current Issue*	Mid-Term	**Space credentials exist, but they do not connect to each other.** Some states — notably Florida — have developed occupational credential structures tied to space sector work. Most have not. There is no national standard for what a space credential means, what it covers, or how employers should recognize it. The ecosystem exists in fragments, not as a system.
20	EMERGING	*Emerging Signal*	Near-Term	**Work-life balance now outranks salary as a retention factor for many space workers.** Remote flexibility and work-life balance have become the primary retention levers in segments of the space workforce — outpacing compensation in survey after survey. Government hiring models and many legacy defense contractors have not adapted to this shift. The sector is losing people to employers who have.

#	ELEVATION	SIGNAL TYPE	HORIZON	WHAT WE'VE HEARD
32	HIGH	*Emerging Signal*	Mid-Term	**The space sector needs an occupational track that does not exist yet.** Industry leaders have formally named a 'space logistics corps' — a professional track for space mobility, logistics coordination, and in-space operations — as a workforce with no current infrastructure. There is no SOC code, no credential, no training program, and no pipeline for these roles. They are what the next decade of space operations will require.
33	HIGH	*Current Issue*	Near-Term	**Workers trained on current export control rules are not prepared for next-generation space operations.** Export control frameworks for space were built around different mission types. Refueling, on-orbit servicing, and proximity operations are not covered by the same frameworks workers have been trained on. This creates a skills gap that is also a regulatory gap — and it has no current review cadence.
37	EMERGING	*Emerging Signal*	Mid-Term	**Other countries are setting the standards. U.S. workers may not be trained to participate.** The European Union and China are actively designing the regulatory and technical standards frameworks for space operations. If U.S. workers are not trained to understand and participate in international standards processes, the U.S. risks adapting to frameworks designed by others rather than shaping them.
42	MEDIUM	*Emerging Signal*	Mid-Term	**Space is a non-STEM field too — and we keep forgetting that.** Policy strategists, legal experts, communications professionals, budget analysts, and contracting officers are all essential to operating a space enterprise. None of them show up in space workforce data. Overemphasizing advanced STEM degrees in hiring frameworks artificially shrinks the candidate pool and makes the problem look worse than it is.

DIMENSION 3 | PIPELINE & DEVELOPMENT

The education system is misaligned with mission tempo

8 signals in this dimension

#	ELEVATION	SIGNAL TYPE	HORIZON	WHAT WE'VE HEARD
4	MEDIUM	*Current Issue*	Mid-Term	**There are over 50 regional space workforce organizations — and almost none of them talk to the federal government.** The Space Workforce Coalition has grown from 19 to 50+ regional member organizations. That is an impressive scale. But this network is not connected to any federal signal system, policy workstream, or program feedback loop. Private-sector workforce development is scaling without federal visibility.
6	MEDIUM	*Emerging Signal*	Mid-Term	**Military-to-space transition is an underutilized pipeline — a matching problem, not a talent problem.** Veterans and transitioning service members represent a skilled, cleared, and mission-oriented talent pool for the space sector. The barrier is not the quality of the candidates — it is the absence of structured matching infrastructure between military occupational specialties and space sector roles.
9	EMERGING	*Emerging Signal*	Near-Term	**Only 330 avionics technicians graduated with associate degrees nationally in a recent year.** Against strong employer demand and median wages approaching $70,000, the national supply of avionics technician graduates is critically low. This is one of the most concrete and measurable middle-skill shortfalls in the corpus — and it is addressable with targeted investment in the right institutions.
17	MEDIUM	*Emerging Signal*	Mid-Term	**7.8 million students were reached by space STEM outreach in 2023. How many went into space careers? Nobody knows.**

#	ELEVATION	SIGNAL TYPE	HORIZON	WHAT WE'VE HEARD
				K-12 and university STEM outreach programs are scaling impressively. But conversion rates — from program participant to space career pathway — are not being measured by any organization or federal system. Output is being tracked. Outcomes are not.
18	MEDIUM	*Emerging Signal*	Mid-Term	**Companies know how many interns they convert to hires. The federal government does not.** Industry intern-to-hire conversion data exists and is being tracked internally by companies and associations. None of this data flows into any federal workforce signal system. The private sector is building the pipeline without federal visibility — and without the ability to identify what is working at scale.
39	HIGH	*Current Issue*	Mid-Term	**A centralized index of space STEM programs could unlock significant coordination value — and does not yet exist.** Hundreds of space-related STEM education programs exist across government, industry, and nonprofits. There is no centralized index, no impact measurement framework, and no gap-identification system. The Committee on STEM Education tracks only federal programs and is not space-specific. Leaders are making investment decisions without a map.
40	HIGH	*Current Issue*	Near-Term	**Community colleges are the most accessible path into space careers — and the least connected to space employers.** Community college and vocational school enrollment dropped nearly 20% over the prior decade alongside significant state funding cuts. These institutions serve the students most likely to enter middle-skill space roles. They are structurally disconnected from the space employers who need those workers most.
43	MEDIUM	*Emerging Signal*	Mid-Term	**No national plan or coordination exists to address space workforce challenges** No national-level roadmap exists that matches space sector enabling disciplines to educational investment targets. Without it, community colleges and vocational schools cannot align their curriculum to employer demand — and employers cannot signal their needs to the education system in any standardized way. The feedback loop is broken.

DIMENSION 4 | RETENTION & MOBILITY

The workforce is being pulled in multiple directions

10 signals in this dimension

#	ELEVATION	SIGNAL TYPE	HORIZON	WHAT WE'VE HEARD
10	HIGH	*Current Issue*	Long-Term	**The equity gap in space starts in middle school, not at the hiring desk.** Structural underinvestment in mathematics education — particularly in access to Algebra I for Black, Latino, and low-income students — routes potential space workers away from the pipeline years before any employer sees them. This is a pipeline architecture problem, not a hiring practice problem. Fixing hiring without fixing the pipeline produces marginal results.
16	HIGH	*Current Issue*	Near-Term	**Women hold 19.4% of technical positions in the space industry. That number is not moving.** Year-over-year improvement in women's representation in technical space roles is minimal despite active diversity, equity, and inclusion programs across the sector. The stagnation suggests the barrier is structural — pipeline entry, credential access, and career progression — rather than attitudinal.
19	HIGH	*Current Issue*	Long-Term	**The talent pool itself is shrinking — not because of the sector, but because of demographics.**

#	ELEVATION	SIGNAL TYPE	HORIZON	WHAT WE'VE HEARD
				Western countries are experiencing demographic contraction in the cohorts that produce STEM talent. This is not a training problem alone — it is a population problem. Even a perfectly designed pipeline would face fewer candidates in the coming decades without deliberate expansion of who the pipeline reaches.
24	HIGH	*Current Issue*	Near-Term	**The federal workforce transition is creating near-term commercial talent opportunities and coordination gaps.** As the administration accelerates its efficiency and commercial partnership priorities, experienced federal space professionals are entering the private sector. This transition creates a near-term window for commercial operators to acquire mission-experienced talent — and a coordination challenge for maintaining continuity across federal-commercial interfaces during the handoff period.
26	HIGH	*Current Issue*	Near-Term	**Space Force acquisition is expanding rapidly — and needs commercial sector partners to scale alongside it.** Space Systems Command's acquisition portfolio is growing at the same time civilian staffing is being restructured. This creates a near-term opportunity for commercial companies with acquisition expertise to deepen their engagement as trusted partners — and a signal that industry readiness to support complex government acquisition is itself a commercial capability with growing value.
30	EMERGING	*Emerging Signal*	Mid-Term	**NASA's Administrator is actively pursuing in-house technical capability development — a signal that federal-commercial roles are being redefined.** Administrator Isaacman has initiated a workforce strategy that includes converting certain contractor functions to civil servant roles. This reflects a deliberate administration choice to strengthen NASA's internal technical core while expanding commercial partnerships in other areas. The industry implication: role definitions between federal and commercial actors are in active development, creating a window to shape what commercial capability looks like in the new model.
41	HIGH	*Current Issue*	Long-Term	**Girls lose interest in space-relevant STEM fields in middle school — years before any workforce program can reach them.** Research consistently shows that attrition from STEM pathways for women and girls begins as early as middle school — well before college, well before career-stage programs, and well before employers or workforce development programs have any visibility. Retention programs that start at university are already too late for a significant portion of the potential candidate pool.
48	HIGH	*Current Issue*	Long-Term	**The space workforce pipeline excludes people before it even begins.** Black and Latino students are more likely to attend schools that do not offer Algebra I — the academic gateway to higher-level STEM coursework. This is a resource and structural equity issue in K-12 education, not a pipeline preference issue. The pipeline architecture is producing exclusion by design, not by intent.

DIMENSION 5 | ENABLING INFRASTRUCTURE

The sensing layer is broken

11 signals in this dimension

#	ELEVATION	SIGNAL TYPE	HORIZON	WHAT WE'VE HEARD
7	HIGH	*Current Issue*	Near-Term	**No unified data system currently provides an accurate count of the space workforce.** Researchers attempting to estimate the size and composition of the space workforce had to manually crosswalk three separate federal datasets just to produce a rough estimate. The official labor classification system does not align with how space sector work is actually organized. This is not a gap in data collection — it is a gap in the fundamental infrastructure for measuring the workforce.
8	EMERGING	*Emerging Signal*	Mid-Term	**The space workforce data gap has been documented since 2022 — today's forum advances the response.** The National Science and Technology Council's workforce roadmap explicitly identified space workforce data and classification gaps as a priority in 2022. Today's forum is, in practical terms, a four-year status check against a known baseline that has not been substantially addressed.
11	EMERGING	*Emerging Signal*	Mid-Term	**The federal government as an employer is the underexamined variable in every space workforce conversation.** Federal hiring timelines, security clearance pipelines, classification constraints, and compensation structures all shape the space workforce — but are rarely examined in the same conversation as commercial workforce signals. The federal employer and the commercial employer are competing for the same talent in many cases and operating as if they are not.
31	HIGH	*Current Issue*	Near-Term	**The space industrial base is not failing for lack of capability. It is failing for lack of alignment.** Leaders from across the space sector — government and commercial — identified alignment as the primary bottleneck, not technical capability. Speed and scale failures are happening because government buyers, commercial suppliers, and policy frameworks are not synchronized. Workforce is one of the clearest expressions of this misalignment.
34	HIGH	*Current Issue*	Near-Term	**Emerging mission types are creating a workforce development opportunity ahead of the regulatory curve.** No coherent authorization framework exists for novel space activities — cislunar operations, in-space servicing, orbital refueling. Workers are preparing for these missions without knowing what rules will govern their work. This creates planning paralysis for workforce investment decisions at companies developing next-generation capabilities.
35	CRITICAL	*Current Issue*	Near-Term	**Space workforce is now a national security issue.** More than 350 government and commercial space leaders formally named workforce and STEM as national security priorities in the most recent State of the Space Industrial Base report — the first time this has appeared as a standalone recommendation in the report's history.
38	HIGH	*Current Issue*	Near-Term	**Labor classifications for space workers were broken in 2021. They are still broken.** Bureau of Labor Statistics occupational categories do not align with space sector work — a gap named by researchers in 2021 and independently confirmed by federal economic analysis in 2025. Four years. No systemic fix. Every workforce planning decision made using BLS data for space sector roles is built on a flawed foundation.
44	HIGH	*Current Issue*	Near-Term	**Federal civil space spending reveals a significant investment opportunity in workforce development.** Of approximately $44 billion in FY25 federal civil space spending, roughly $828 million — about 2% — flows to workforce development programs across all agencies. As the administration's EO 14369 commercial space mandate scales, aligning federal workforce investment with the $50B investment target represents a high-leverage opportunity for program and policy development.

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45	MEDIUM	*Emerging Signal*	Mid-Term	**DOL and DOT are untapped partners in building the commercial space workforce infrastructure.** Federal budget analysis identifies both agencies as inextricable from civil space workforce and supply chain. OSHA sets manufacturing safety standards that govern space production facilities. BLS produces the occupational data the sector depends on.
46				

POSTURE NOTE *All signals in this table are aggregated and non-attributed. Signals represent patterns observed across multiple independent sources. This document reflects conditions as understood through documentary research and structured listening — it is not a policy position, a finding, or a recommendation. OSC serves as a neutral convener.*