NATIONAL SPACE COUNCIL

USERS' ADVISORY GROUP

General Lester Lyles (USAF, ret.), Chair, UAG

Virtual Public Meeting

December 1, 2023

AGENDA
December 1, 2023, Virtual Meeting

U.S. Eastern Time Shown – Session Times Subject to Change at Chair's Discretion

11:00-11:05 (5 min)	**Users' Advisory Group Convenes** *Call to Order, Logistics, & Announcements*	Mr. James J. Miller, *Executive Secretary, UAG, NASA HQ*
11:05-11:15 (10 min)	Meeting Goals & Objectives	Gen. Lester Lyles (USAF ret.), *Chair, UAG*
11:15-11:45 (30 min)	Strengthening International Engagement and Partnerships in Space	Ms. Valda M. Vikmanis Keller, *Director, Office of Space Affairs, Bureau of Oceans and International Environmental and Scientific Affairs, Department of State*
11:45-13:45 (2 hours)	**Subcommittee Updates (20 mins each)** *Proposed Findings & Recommendations*	**Subcommittee Chairs**
11:45-12:05 (20 min)	Exploration and Discovery	Dr. Lance Bush
12:05-12:25 (20 min)	Economic Development and Industrial Base	The Hon. Eric Fanning
12:25-12:45 (20 min)	Climate and Societal Benefits	Dr. Kate Marvel
12:45-13:05 (20 min)	Data and Emerging Technology	Dr. Dan Hastings
13:05-13:25 (20 min)	STEM, Education, Diversity, and Inclusion	Ms. Mandy Vaughn
13:25-13:45 (20 min)	National Security	Gen. Lester Lyles (USAF ret.)
13:45-13:55 (10 min)	Responses to Public Comments per Inputs to: contact@spacecounciluag.org *(Time Permitting)*	All members, led by Chair
13:55-14:00 (5 min)	Next Steps and Closing Remarks	Gen. Lester Lyles (USAF ret.), *Chair, UAG*
14:00	**Adjourn**	

ORGANIZATION
(as of December 1, 2023)

UAG Executive Committee

Lester Lyles (UAG Chair)
Lance Bush
Eric Fanning
Dan Hastings
Kate Marvel
Mandy Vaughn

James. J. Miller (UAG Exec. Secretary & DFO)
Barbara Adde (Deputy Exec. Secretary)

Exploration and Discovery

Lance Bush (Chair)
Charlie Bolden
Tory Bruno
Theodore 'Ted' Colbert
Karina Drees
Gwynne Shotwell
Robert Smith
James Taiclet
Kathy Warden

Ben Ashman (DFO)

Economic Development and Industrial Base

Eric Fanning (Chair)
Karina Drees
Bridget Chatman
Dawne Hickton
Dave Kaufman
Ron Lopez
Roosevelt 'Ted' Mercer
Melanie Stricklan

R.J. Balanga (DFO)

Climate and Societal Benefits

Kate Marvel (Chair)
Nancy Colleton
Dave Kaufman
Patrick Lin
Robbie Schingler
Sian Proctor
Jeremy Williams

Misty Finical (DFO)

Data and Emerging Technology

Dan Hastings (Chair)
Rajeev Badyal
Bridget Chatman
Nancy Colleton
Kate Marvel
Marla Perez-Davis
Robbie Schingler
Jeremy Williams

Cody Kelly (DFO)

STEM, Education, Diversity, and Inclusion

Mandy Vaughn (Chair)
Lance Bush
Bridget Chatman
Marla Perez-Davis
Harold Lee Martin
Sian Proctor
Katrina Williams

Barbara Adde (DFO)

National Security*

(*) Security Clearance Holder

Lester Lyles (Chair) *
Roosevelt 'Ted' Mercer *
Charlie Bolden *
Tory Bruno *
Theodore 'Ted' Colbert *
Eric Fanning *
Dave Kaufman *
Dan Hastings *
Dawne Hickton *
Patrick Lin
Ron Lopez *
Robbie Schingler *
Gwynne Shotwell *
Bob Smith *
James Taiclet *
Mandy Vaughn *
Kathy Warden *

Barbara Adde (DFO) *

Concise remarks from:

Ms. Valda M. Vikmanis Keller, Director

Office of Space Affairs, Bureau of Oceans and International Environmental and Scientific Affairs

U.S. Department of State

NATIONAL SPACE COUNCIL

USERS' ADVISORY GROUP

Dr. Lance Bush, Chair

Exploration and Discovery Subcommittee

December 1, 2023

EXPLORATION AND DISCOVERY
Membership

- **Lance Bush, Challenger Center – Chair**

- Charles Bolden, SGE
- Salvatore T. Bruno, United Launch Alliance
- Theodore "Ted" Colbert, Boeing
- Karina Drees, Commercial Spaceflight Federation
- Gwynne Shotwell, SpaceX
- Robert Smith, Blue Origin
- James Taiclet, Lockheed Martin
- Kathy Warden, Northrop Grumman Corp

- Benjamin Ashman (DFO)

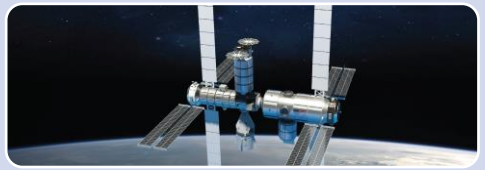
EXPLORATION AND DISCOVERY
Priorities

Overarching perspectives

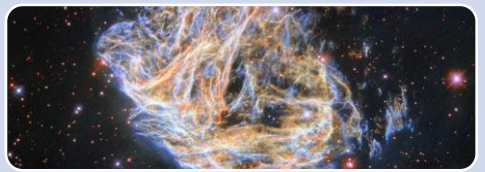
- National security, and economic and social impacts should drive our pursuits in exploration and discovery for both the immediate and future timeframe
- Engage the broadest set of citizens to maximize value and impact of E&D ventures
- Embrace collaboration with other subcommittees (e.g., Education, Economic, Sustainability and National Security)
- Conduct monthly meetings and fact-finding field trips while engaging subject matter experts

Priorities

Artemis Program



Commercial Low Earth Orbit



Science

Photo credit: NASA

EXPLORATION AND DISCOVERY Activities

- Weekly fact-finding meetings
- Guest speakers
  - Dr. Keith Crane, Science Technology Policy Institute
  - Carissa Christensen, founder and CEO of BryceTech
  - Dr. Joel Kearns, NASA Science Mission Directorate Deputy Associate Administrator for Exploration
  - Dr. Alex MacDonald, NASA Chief Economist
  - Dr. Nicola Fox, NASA Associate Administrator for the Science Mission Directorate
  - Meredith McKay, NASA Deputy Associate Administrator for Office of International and Interagency Relations
- Collected impact statements
  - Subcommittee members provided their perspectives on the positive and negative impacts to the space economy of potential mission authorization decisions, an active area of deliberation for the National Space Council

Photo credit: NASA

EXPLORATION AND DISCOVERY
Findings & Recommendations

- **Title of Recommendation:** Artemis and International Collaboration
- **Finding:**
  - The UAG emphasizes the importance of establishing clear expectations and guidelines for Artemis Program scope responsibilities for U.S. and international contributions.
- **Recommendation:**
  - NASA should continue international engagements to meet Artemis exploration objectives and communicate guidance regarding scope intended to be met by U.S. industry and opportunities for international partners.
- **Consequences of No Action on the Recommendation:**
  - Artemis implementation is dependent upon sustainable partnerships across multiple communities. Ambiguity or lack of guidance presents on-going risk of disenfranchising valued partners and duplicative investments.

EXPLORATION AND DISCOVERY
Findings & Recommendations

- **Title of Recommendation:** Artemis and Industry Engagement
- **Finding:**
  - NASA is currently working on refining the architectural framework for Artemis.
- **Recommendation:**
  - The UAG recommends that NASA accelerate the update of this framework with the full, transparent integration of industry into the process.
- **Rationale for Recommendation:**
  - This will improve the identification of areas where small or emerging participants can make meaningful contributions.
- **Consequences of No Action on the Recommendation:**
  - NASA will fail to fully leverage the total domestic commercial space industry (large and small/emergent companies) and risk losing U.S. leadership in space. This will undermine the ability of the U.S. to influence the establishment of desired norms of behavior in the lunar domain.

EXPLORATION AND DISCOVERY
Findings & Recommendations

- **Title of Recommendation:** Sustained Lunar Presence
- **Finding:**
  - The United States' successful establishment of the first sustainable lunar presence is critical to our global space leadership and geopolitical standing.
- **Recommendation:**
  - U.S. must maintain dissimilar redundancy of critical Artemis capabilities to establish a steady and predictable mission cadence.
- **Rationale for Recommendation:**
  - This will reinforce international commitments and further incentivize commercial investment critical to the development of foundational capabilities for a sustainable deep space human presence for the U.S. and its allies.
- **Consequences of No Action on the Recommendation:**
  - A failure to do so could provide an opening to our adversaries to supplant the U.S. and its international partners in deep space leadership.

EXPLORATION AND DISCOVERY
Findings & Recommendations

- **Title of Recommendation:** Artemis Plan Coordination
- **Finding:**
  - The UAG emphasizes the critical importance of the Artemis Program as a national priority and finds that additional action is required to appropriately align federal technical and regulatory agencies with this national goal.
- **Recommendation:**
  - The National Space Council must lead development of a comprehensive plan across the whole of government, international partners, and commercial industry to identify specific areas where coordination of purpose and action can be improved.
- **Rationale for Recommendation:**
  - Specific actions to achieve this outcome will ensure continued, rapid progress under the Artemis program and achieve the goal of a sustained human presence at the Moon.
- **Consequences of No Action on the Recommendation:**
  - Without this coordination, including ensuring U.S. government agencies and international bodies overseeing the commercial space sector are able to carry out their regulatory responsibilities, the U.S. risks slower than anticipated technical progress under this program and limited industry, which is unacceptable given ongoing geopolitical competition with China, Russia, and other rivals.

EXPLORATION AND DISCOVERY
Findings & Recommendations

- **Title of Recommendation:** Artemis Commercial Services
- **Finding:**
  - NASA has made substantial progress on the Artemis program, which is utilizing traditional, commercial, and international capabilities to return the nation to the Moon and establish a sustainable presence.
- **Recommendation:**
  - The commitment to the Artemis program must continue - as part of that, NASA must continue to identify and support investments in the commercial services and capabilities they need for a sustainable cislunar presence where NASA is one customer of many.
- **Rationale for Recommendation:**
  - This will ensure the U.S. retains its international leadership in this sector.
- **Consequences of No Action on the Recommendation:**
  - Without clear demand signals and leadership from NASA on the commercial services and capabilities required, the Artemis program will face significant cost growth and schedule delays in the long-term that will hinder a sustainable cislunar presence.

EXPLORATION AND DISCOVERY
Findings & Recommendations

- **Title of Recommendation:** U.S. Civil Space Initiatives
- **Finding:**
  - The UAG recognizes that it has been the established policy of the U.S. that civil space exploration and national security activities in space be separately managed within the federal Government. The UAG finds that this policy remains valid today.
- **Recommendation:**
  - The U.S. should continue to maintain its military space activities separate from civil space activities to foster trust in international relationships and maintain clean interfaces.
- **Rationale for Recommendation:**
  - National security and civil space endeavors benefit from a shared industrial base, and international partnerships/cooperation. These are instrumental to future U.S. space leadership. Civil space endeavors promote the peaceful use of space, and the pursuit of advanced technologies, capabilities and learning – all of which contribute to a conducive environment that supports U.S. and allied security interests.
- **Consequences of No Action on the Recommendation:**
  - Explicitly combining civil and national security programs in space risks alienating key allied partners and American soft power globally, without strengthening national security.

EXPLORATION AND DISCOVERY
Findings & Recommendations

- **Title of Recommendation:** Talent Capture
- **Finding:**
  - A robust, qualified federal workforce at technical and regulatory agencies is vital for the continued success of the national space sector and the viability of the commercial space industry. The UAG finds that there is an ongoing shortage of such talent compared to need as a function of aging workforces, programmatic terminations, inefficient hiring practices, lack of interagency coordination, and competition with the private sector.
- **Recommendation:**
  - The National Space Council should lead coordination of the relevant government agencies and industry to develop and implement a national strategy identifying current and future technical personnel needs within the federal government and immediately closing the workforce gaps that currently exist. The strategy must highlight specific bottlenecks to timely hiring and onboarding, identify specific expedited hiring authority that already exists across the federal government, and evaluate opportunities to leverage the extant talent pool residing within technical government agencies and industry.
- **Rationale for Recommendation:**
  - The goal of the strategy is to accelerate license and permit reviews and to ensure regulatory frameworks are appropriately designed so that the U.S. commercial space sector can maintain global leadership and grow more rapidly than our global competitors.
- **Consequences of No Action on the Recommendation:**
  - Without action to address this shortage, the U.S. may not be able to adequately manage critical space programs like Artemis or ensure the timely and thorough processing of regulatory requirements for the commercial space sector, introducing delays and limiting national achievement in space.

NATIONAL SPACE COUNCIL

USERS' ADVISORY GROUP

The Hon. Eric Fanning, Chair

Economic Development and Industrial Base Subcommittee

December 1, 2023

ECONOMIC DEVELOPMENT AND INDUSTRIAL BASE
Membership

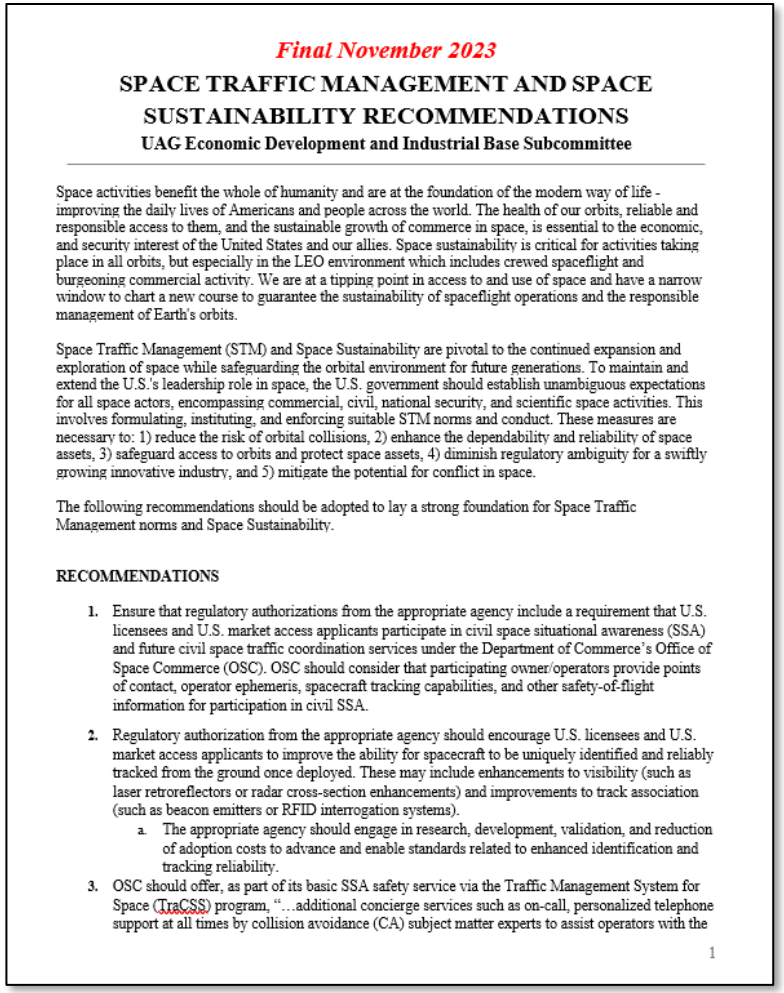
Subcommittee Members

Karina Drees
Bridget Chatman
Eric Fanning
Dawne Hickton
Dan Jablonsky
Dave Kaufman
Ron Lopez
Ted Mercer
Melanie Stricklan

ECONOMIC DEVELOPMENT AND INDUSTRIAL BASE
Space Sustainability Paper

Background

- Space sustainability is critical for activities taking place in all orbits, but especially in the LEO environment which includes crewed spaceflight and burgeoning commercial activity.
- We are at a tipping point in access to and use of space and have a narrow window to chart a new course to guarantee the sustainability of spaceflight operations and the responsible management of Earth's orbits.
- Space Traffic Coordination and Space Sustainability are pivotal to the continued expansion and exploration of space while safeguarding the orbital environment for future generations.
- To maintain and extend the U.S.'s leadership role in space, the U.S. government should establish unambiguous expectations for all space actors, encompassing commercial, civil, national security, and scientific space activities.
- These measures are necessary to: (1) reduce the risk of orbital collisions, (2) enhance the dependability and reliability of space assets, (3) safeguard access to orbits and protect space assets, (4) diminish regulatory ambiguity for a swiftly growing innovative industry, and (5) mitigate the potential for conflict in space.



Final November 2023

SPACE TRAFFIC MANAGEMENT AND SPACE SUSTAINABILITY RECOMMENDATIONS

UAG Economic Development and Industrial Base Subcommittee

Space activities benefit the whole of humanity and are at the foundation of the modern way of life - improving the daily lives of Americans and people across the world. The health of our orbits, reliable and responsible access to them, and the sustainable growth of commerce in space, is essential to the economic, and security interest of the United States and our allies. Space sustainability is critical for activities taking place in all orbits, but especially in the LEO environment which includes crewed spaceflight and burgeoning commercial activity. We are at a tipping point in access to and use of space and have a narrow window to chart a new course to guarantee the sustainability of spaceflight operations and the responsible management of Earth's orbits.

Space Traffic Management (STM) and Space Sustainability are pivotal to the continued expansion and exploration of space while safeguarding the orbital environment for future generations. To maintain and extend the U.S.'s leadership role in space, the U.S. government should establish unambiguous expectations for all space actors, encompassing commercial, civil, national security, and scientific space activities. This involves formulating, instituting, and enforcing suitable STM norms and conduct. These measures are necessary to: 1) reduce the risk of orbital collisions, 2) enhance the dependability and reliability of space assets, 3) safeguard access to orbits and protect space assets, 4) diminish regulatory ambiguity for a swiftly growing innovative industry, and 5) mitigate the potential for conflict in space.

The following recommendations should be adopted to lay a strong foundation for Space Traffic Management norms and Space Sustainability.

RECOMMENDATIONS

1. Ensure that regulatory authorizations from the appropriate agency include a requirement that U.S. licensees and U.S. market access applicants participate in civil space situational awareness (SSA) and future civil space traffic coordination services under the Department of Commerce's Office of Space Commerce (OSC). OSC should consider that participating owner/operators provide points of contact, operator ephemeris, spacecraft tracking capabilities, and other safety-of-flight information for participation in civil SSA.
2. Regulatory authorization from the appropriate agency should encourage U.S. licensees and U.S. market access applicants to improve the ability for spacecraft to be uniquely identified and reliably tracked from the ground once deployed. These may include enhancements to visibility (such as laser retroreflectors or radar cross-section enhancements) and improvements to track association (such as beacon emitters or RFID interrogation systems).
    a. The appropriate agency should engage in research, development, validation, and reduction of adoption costs to advance and enable standards related to enhanced identification and tracking reliability.
3. OSC should offer, as part of its basic SSA safety service via the Traffic Management System for Space (TraCSS) program, "…additional concierge services such as on-call, personalized telephone support at all times by collision avoidance (CA) subject matter experts to assist operators with the

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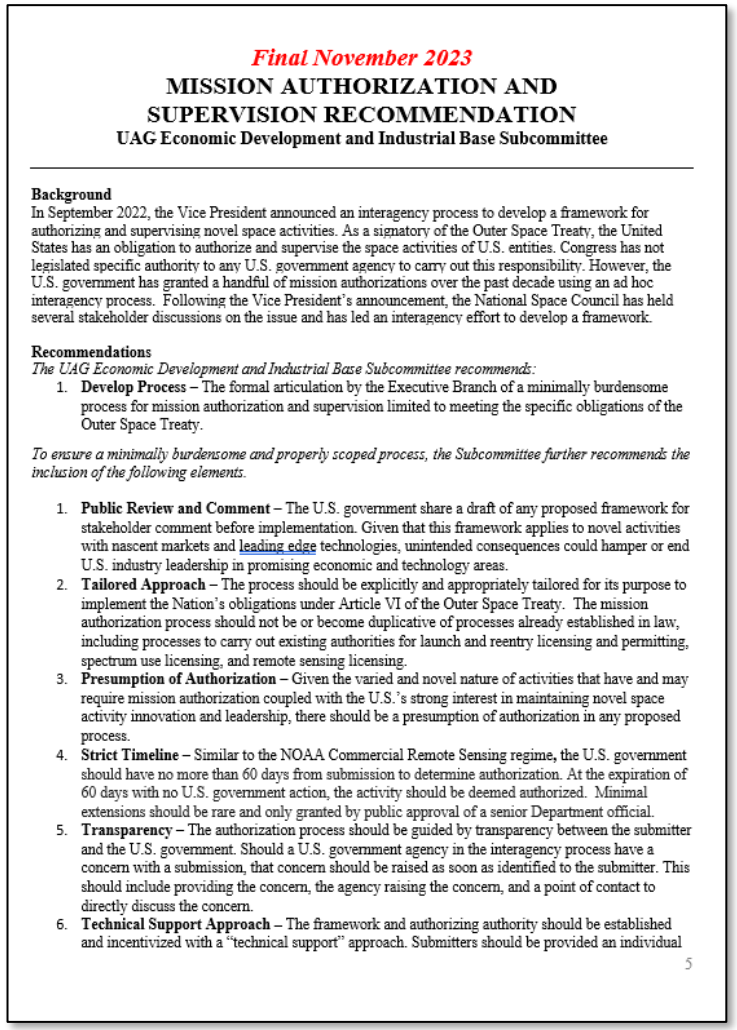
ECONOMIC DEVELOPMENT AND INDUSTRIAL BASE
Space Sustainability Paper

Summary of Recommendations (full substance in paper)

1. Require participation in civil space situational awareness and future civil space traffic coordination services
2. Encourage ability for spacecraft to be uniquely identified & reliably tracked from the ground once deployed
3. Recommendations for Office of Space Commerce TraCCS program training and expertise
4. Five-year disposal requirement after end of service life
5. Collision avoidance maneuverability requirement (technology-neutral)
6. Limitation and phase-out of ODMSP disposal requirement waivers, and evaluation of options when granted
7. Determination of agency(ies) responsibility for U.S. government orbital debris object remediation
8. Support for orbital debris remediation technology development beyond TRL 4
9. Development of international best practices and norms of behavior
10. Increase international transparency of debris mitigation and space safety efforts and standards
11. Assess spectrum needs for novel space operations, including for space sustainability

ECONOMIC DEVELOPMENT AND INDUSTRIAL BASE
Mission Authorization and Supervision Paper



Final November 2023

MISSION AUTHORIZATION AND SUPERVISION RECOMMENDATION

UAG Economic Development and Industrial Base Subcommittee

Background

In September 2022, the Vice President announced an interagency process to develop a framework for authorizing and supervising novel space activities. As a signatory of the Outer Space Treaty, the United States has an obligation to authorize and supervise the space activities of U.S. entities. Congress has not legislated specific authority to any U.S. government agency to carry out this responsibility. However, the U.S. government has granted a handful of mission authorizations over the past decade using an ad hoc interagency process. Following the Vice President's announcement, the National Space Council has held several stakeholder discussions on the issue and has led an interagency effort to develop a framework.

Recommendations

The UAG Economic Development and Industrial Base Subcommittee recommends:

1. **Develop Process** – The formal articulation by the Executive Branch of a minimally burdensome process for mission authorization and supervision limited to meeting the specific obligations of the Outer Space Treaty.

To ensure a minimally burdensome and properly scoped process, the Subcommittee further recommends the inclusion of the following elements.

1. **Public Review and Comment** – The U.S. government share a draft of any proposed framework for stakeholder comment before implementation. Given that this framework applies to novel activities with nascent markets and leading edge technologies, unintended consequences could hamper or end U.S. industry leadership in promising economic and technology areas.
2. **Tailored Approach** – The process should be explicitly and appropriately tailored for its purpose to implement the Nation's obligations under Article VI of the Outer Space Treaty. The mission authorization process should not be or become duplicative of processes already established in law, including processes to carry out existing authorities for launch and reentry licensing and permitting, spectrum use licensing, and remote sensing licensing.
3. **Presumption of Authorization** – Given the varied and novel nature of activities that have and may require mission authorization coupled with the U.S.'s strong interest in maintaining novel space activity innovation and leadership, there should be a presumption of authorization in any proposed process.
4. **Strict Timeline** – Similar to the NOAA Commercial Remote Sensing regime, the U.S. government should have no more than 60 days from submission to determine authorization. At the expiration of 60 days with no U.S. government action, the activity should be deemed authorized. Minimal extensions should be rare and only granted by public approval of a senior Department official.
5. **Transparency** – The authorization process should be guided by transparency between the submitter and the U.S. government. Should a U.S. government agency in the interagency process have a concern with a submission, that concern should be raised as soon as identified to the submitter. This should include providing the concern, the agency raising the concern, and a point of contact to directly discuss the concern.
6. **Technical Support Approach** – The framework and authorizing authority should be established and incentivized with a "technical support" approach. Submitters should be provided an individual

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Background

- As a signatory of the Outer Space Treaty, the United States has an obligation to authorize and supervise the space activities of U.S. entities.
- Congress has not legislated specific authority to any U.S. government agency to carry out this responsibility. Draft bills on this issue are pending in the House and Senate.
- The U.S. government has granted a handful of mission authorizations over the past decade using an ad hoc interagency process.
- In September 2022, the Vice President announced an interagency process to develop a framework for authorizing and supervising novel space activities.
- The White House issued a legislative recommendation on November 15, 2023.

ECONOMIC DEVELOPMENT AND INDUSTRIAL BASE
Mission Authorization and Supervision Paper

Summary of Recommendations (full substance in paper)

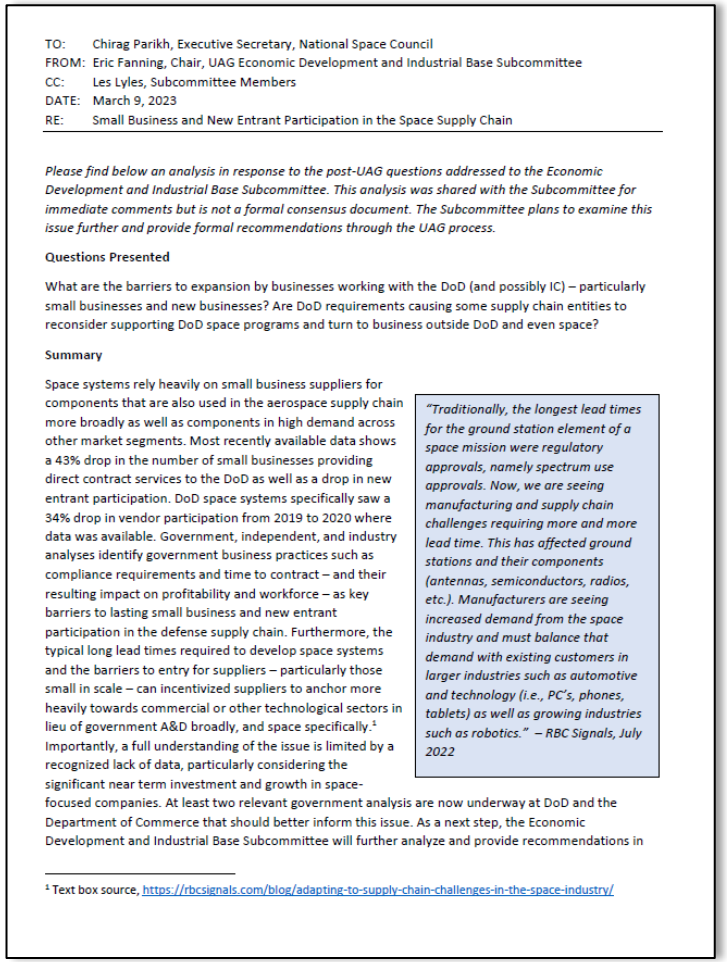
To ensure US leadership in space, the Subcommittee recommends the inclusion of the following elements in a mission authorization and supervision framework:

1. Public review and comment prior to implementation
2. Tailored approach to ensure any new regulation is not duplicative
3. Presumption of Authorization due to the varied and novel nature of activities
4. Strict timeline – not more than 60 days to determine authorization
5. Transparency between the submitter and US Government
6. Technical support approach: single point of contact and concise roadmap should be provided
7. Information requirements: no new information beyond what is already provided to US Government
8. Mission-Level Authorization should apply to entire scope of the activities
9. Protect proprietary information: documents considered confidential must be protected
10. Continued validity of existing and pending authorizations
11. Supervision conducted via self-certification
12. Managed by a single agency to minimize confusion and compliance burden

ECONOMIC DEVELOPMENT AND INDUSTRIAL BASE
Space Supply Chain Data Paper

Following the last UAG meeting, the Subcommittee developed a paper identifying barriers to small business and new entrant participation in the space supply chain. Findings included:

- Government, independent, and industry analyses identify **government business practices** as the major factor in small business & new entrant participation decline.
  - A recent survey of defense industrial bases companies identified the top challenge of remaining in the defense industrial base to be the burden of the **acquisition process** and **paperwork**.
  - In another recent survey, more than three-fourths of company respondents were seriously or somewhat concerned about new **cybersecurity requirements** (CMMC 2.0) implementation.
  - Survey findings and independent analysis also include an emphasis that the **federal acquisition process** is growing more cumbersome, which matches data on federal acquisition timelines that show the time between the release of a final solicitation to the award of a contract—procurement acquisition lead time, or PALT—rose 72% in five years.
- The impact of **government budget stability** on financial stability and **workforce** were also identified.
- For the space industry particularly, the **size and niche** nature of the industry can cause supply chain participants to not enter the market or to exit.
- Additional dynamics impacting the space supply chain ecosystem involve **timelines for technological maturation** and **scalability requirements for procurement.**
- **Spaceports and spaceport support** present a further niche within the space market due to the unique components and infrastructure required for spaceports.



TO: Chirag Parikh, Executive Secretary, National Space Council
FROM: Eric Fanning, Chair, UAG Economic Development and Industrial Base Subcommittee
CC: Les Lyles, Subcommittee Members
DATE: March 9, 2023
RE: Small Business and New Entrant Participation in the Space Supply Chain

Please find below an analysis in response to the post-UAG questions addressed to the Economic Development and Industrial Base Subcommittee. This analysis was shared with the Subcommittee for immediate comments but is not a formal consensus document. The Subcommittee plans to examine this issue further and provide formal recommendations through the UAG process.

Questions Presented

What are the barriers to expansion by businesses working with the DoD (and possibly IC) – particularly small businesses and new businesses? Are DoD requirements causing some supply chain entities to reconsider supporting DoD space programs and turn to business outside DoD and even space?

Summary

Space systems rely heavily on small business suppliers for components that are also used in the aerospace supply chain more broadly as well as components in high demand across other market segments. Most recently available data shows a 43% drop in the number of small businesses providing direct contract services to the DoD as well as a drop in new entrant participation. DoD space systems specifically saw a 34% drop in vendor participation from 2019 to 2020 where data was available. Government, independent, and industry analyses identify government business practices such as compliance requirements and time to contract – and their resulting impact on profitability and workforce – as key barriers to lasting small business and new entrant participation in the defense supply chain. Furthermore, the typical long lead times required to develop space systems and the barriers to entry for suppliers – particularly those small in scale – can incentivized suppliers to anchor more heavily towards commercial or other technological sectors in lieu of government A&D broadly, and space specifically.[1] Importantly, a full understanding of the issue is limited by a recognized lack of data, particularly considering the significant near term investment and growth in space-focused companies. At least two relevant government analysis are now underway at DoD and the Department of Commerce that should better inform this issue. As a next step, the Economic Development and Industrial Base Subcommittee will further analyze and provide recommendations in

"Traditionally, the longest lead times for the ground station element of a space mission were regulatory approvals, namely spectrum use approvals. Now, we are seeing manufacturing and supply chain challenges requiring more and more lead time. This has affected ground stations and their components (antennas, semiconductors, radios, etc.). Manufacturers are seeing increased demand from the space industry and must balance that demand with existing customers in larger industries such as automotive and technology (i.e., PC's, phones, tablets) as well as growing industries such as robotics." – RBC Signals, July 2022

[1] Text box source, https://rbcsignals.com/blog/adapting-to-supply-chain-challenges-in-the-space-industry/

ECONOMIC DEVELOPMENT AND INDUSTRIAL BASE
Space Supply Chain Data Paper

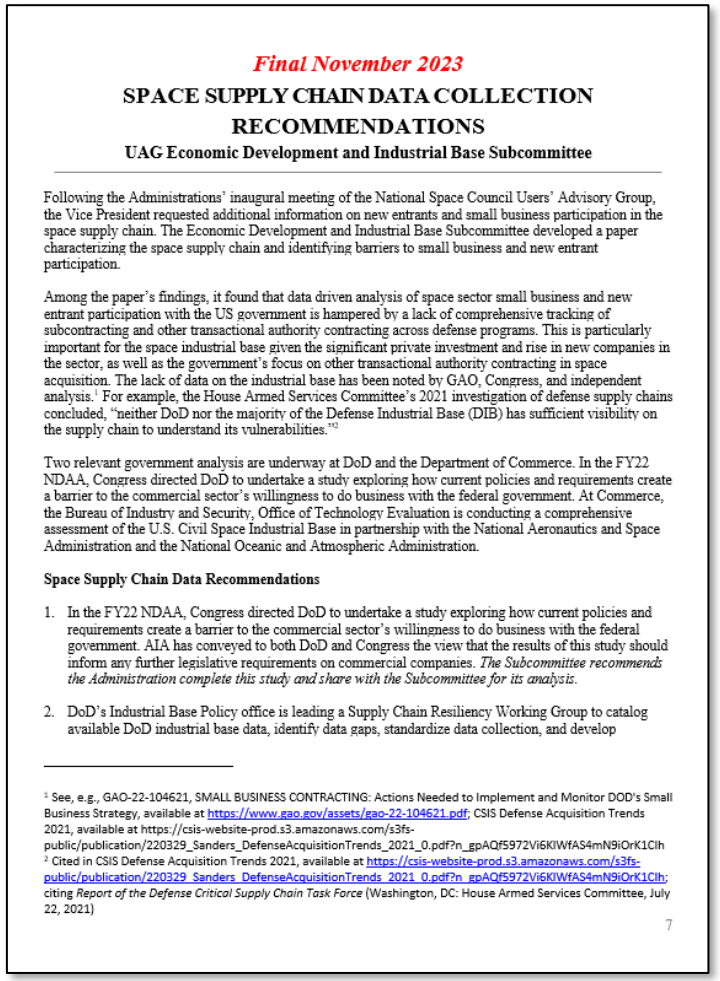
In addition to the core findings, the paper recommended additional data that could help assess small business and new entrant participation challenges.

Space Supply Chain Data Recommendations

1. In the FY22 NDAA, Congress directed DoD to undertake a study exploring how current policies and requirements create a barrier to the commercial sector's willingness to do business with the federal government. *The Subcommittee recommends the Administration complete this study and share with the Subcommittee for its analysis.*

2. DoD's Industrial Base Policy office is leading a Supply Chain Resiliency Working Group to catalog available DoD industrial base data, identify data gaps, standardize data collection, and develop proposals to integrate disparate data sources into a centralized database. *The Subcommittee recommends the Adminstration complete this effort and share with the Subcommittee for its analysis.*

3. The Bureau of Industry and Security is conducting a comprehensive assessment of the U.S. civil space industrial base in partnership with NASA and NOAA. *The Subcommittee recommends the Administration expand this study to include all government space activities and serve as an update to Commerce's comprehensive 2014 space supply chain study, coordinating with industry to ensure a practical and effective data collection process.*



Final November 2023

SPACE SUPPLY CHAIN DATA COLLECTION RECOMMENDATIONS

UAG Economic Development and Industrial Base Subcommittee

Following the Administrations' inaugural meeting of the National Space Council Users' Advisory Group, the Vice President requested additional information on new entrants and small business participation in the space supply chain. The Economic Development and Industrial Base Subcommittee developed a paper characterizing the space supply chain and identifying barriers to small business and new entrant participation.

Among the paper's findings, it found that data driven analysis of space sector small business and new entrant participation with the US government is hampered by a lack of comprehensive tracking of subcontracting and other transactional authority contracting across defense programs. This is particularly important for the space industrial base given the significant private investment and rise in new companies in the sector, as well as the government's focus on other transactional authority contracting in space acquisition. The lack of data on the industrial base has been noted by GAO, Congress, and independent analysis.[1] For example, the House Armed Services Committee's 2021 investigation of defense supply chains concluded, "neither DoD nor the majority of the Defense Industrial Base (DIB) has sufficient visibility on the supply chain to understand its vulnerabilities."[2]

Two relevant government analysis are underway at DoD and the Department of Commerce. In the FY22 NDAA, Congress directed DoD to undertake a study exploring how current policies and requirements create a barrier to the commercial sector's willingness to do business with the federal government. At Commerce, the Bureau of Industry and Security, Office of Technology Evaluation is conducting a comprehensive assessment of the U.S. Civil Space Industrial Base in partnership with the National Aeronautics and Space Administration and the National Oceanic and Atmospheric Administration.

Space Supply Chain Data Recommendations

1. In the FY22 NDAA, Congress directed DoD to undertake a study exploring how current policies and requirements create a barrier to the commercial sector's willingness to do business with the federal government. AIA has conveyed to both DoD and Congress the view that the results of this study should inform any further legislative requirements on commercial companies. *The Subcommittee recommends the Administration complete this study and share with the Subcommittee for its analysis.*

2. DoD's Industrial Base Policy office is leading a Supply Chain Resiliency Working Group to catalog available DoD industrial base data, identify data gaps, standardize data collection, and develop

[1] See, e.g., GAO-22-104621, SMALL BUSINESS CONTRACTING: Actions Needed to Implement and Monitor DOD's Small Business Strategy, available at https://www.gao.gov/assets/gao-22-104621.pdf; CSIS Defense Acquisition Trends 2021, available at https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/220329_Sanders_DefenseAcquisitionTrends_2021_0.pdf?n_gpAQf5972Vi6KlWfAS4mN9iOrK1Clh

[2] Cited in CSIS Defense Acquisition Trends 2021, available at https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/220329_Sanders_DefenseAcquisitionTrends_2021_0.pdf?n_gpAQf5972Vi6KlWfAS4mN9iOrK1Clh; citing *Report of the Defense Critical Supply Chain Task Force* (Washington, DC: House Armed Services Committee, July 22, 2021)

NATIONAL SPACE COUNCIL

USERS' ADVISORY GROUP

Dr. Kate Marvel, Chair

Climate and Societal Benefits Subcommittee

December 1, 2023

CLIMATE AND SOCIETAL BENEFITS
Mission Statement

- Our Mission: **To advance space in service of the Earth**
- Background:
  - **Space-based Earth observations (EO)** provide economic, environmental, and societal benefits that touch nearly every part of our lives, helping us to navigate **and become more resilient to a** changing world **while better understanding our impact and how to better mitigate** it.
  - **Climate change is worsening** and human activities are responsible.
  - The **transition** to low-carbon energy systems, regenerative agriculture, and a more resilient society is already underway.
  - Space-based information is crucial to **monitoring, mitigating, and adapting** to climate change at home and abroad.
  - Climate change poses threats to **national security** while climate action requires **international cooperation.**

CLIMATE AND SOCIETAL BENEFITS
Membership

Chair: **Kate Marvel**, PhD, Project Drawdown

Members:

Nancy Colleton, IGES

Dave Kaufman, PhD, Ball Aerospace

Patrick Lin, PhD, California Polytechnic State University

Sian Proctor, PhD, Maricopa Community Colleges

Robbie Schingler, Planet

Jeremy Williams, PhD, Bayer Digital Farming

DFO: **Misty Finical**, NASA

CLIMATE AND SOCIETAL BENEFITS
Fact-Finding Meetings

- **Dr. Alyssa Whitcraft, NASA Harvest/ACRES**
  - EO product and accessibility needs for agriculture
- **Jonny Pellish, NSpC**
  - Research to operations pipeline
- **Pam Sullivan, NOAA**
  - Government-private sector cooperation
- **Dr. Ed Kearns, First Street Foundation**
  - Data discovery, accessibility, and public/nonprofit cooperation
- **Dr. Waleed Abdalati, UC Boulder/NAC**
  - EO capabilities and needs
- **Gavin McCormick, WattTime/ClimateTRACE**
  - Space-based GHG monitoring, modeling, and methods
- **Stephan Nicoleau, FullCycle/The Astra Project**
  - EO data and mitigation action
- **Teri Lampoudi, Mast Reforestation**
  - Post-wildfire resilience and recovery

CLIMATE AND SOCIETAL BENEFITS
Overall Findings

- **EO is vital**: Space-based Earth observations (EO) play a critical role in real-time measurement and monitoring of the changing and evolving planet.
- **Monitoring is not enough**: The US and the global community need to move at greater speed and scale to mitigate and adapt to climate change to improve our resiliency.
- **We can do more**: Near-term opportunities exist to further EO application for societal benefits in high-impact areas such as agriculture, wildfires, greenhouse gas monitoring and reduction, and water resources.

CLIMATE AND SOCIETAL BENEFITS
Recommendation 1: Earth Information and Action Lead (EIAL)

- **Finding:**
  - The demand for Earth-related information products has increased significantly demonstrating the vital role that space-based Earth Observations (EO) play in the Nation's ability to understand, respond, and prepare for climate-related and other societal challenges.
- **Recommendation:**
  - To establish an over-arching leadership role within the National Security Council to assess, prioritize, and guide the Nation's multi-agency EO effort along with consideration of private sector capabilities for the purpose of accelerating and improving environmental information and action promoting greater resiliency.
- **Rationale for Recommendation:**
  - The urgency and complexity of climate change and its importance to our national interests demands new thinking and approaches. USG EO efforts are spread across several agencies and guided by different missions, priorities, subject areas, science versus operations frameworks, budget structures, planning processes, private sector engagement mechanisms, and end users. For the US to strengthen this critical capability, maximize its multi-billion-dollar annual investment, and capitalize on rapidly-emerging private sector offerings, an over-arching leadership position is needed to guide and advance this national effort.
- **Consequences of No Action on the Recommendation:**
  - The US will fail to meet the information needs of government organizations, businesses, and citizens who require the best, most timely, thorough, trusted environmental insights to guide decision making and ensure our national resiliency to adverse events (e.g., climate change, pandemics, etc.).

CLIMATE AND SOCIETAL BENEFITS
Recommendation 2: Engagement with the Private Sector

- **Finding:**
  - Applications enable accessibility, and the private sector excels at connecting Americans to EO data. However, there are barriers to USG engagement with private and nonprofit users on space-based data.
- **Recommendation:**
  - The USG should work to **streamline applications of EO** for societal benefit.
    - The Earth Information and Action Lead should leverage existing authorities and appropriations to create partnerships that enable public, nonprofit, and commercial applications of EO for climate action and societal benefit.
- **Rationale for Recommendation:**
  - Mitigation action is not moving with the speed and scale necessary to prevent dangerous climate change.
  - The weather enterprise is a model for a partnership that leverages freely available USG data, allows private business to add value through interfaces, and provides wider societal benefits.
  - Other public-private-nonprofit partnerships have emerged to communicate risk and shape choices in a changing climate.
  - New opportunities exist for the private sector to engage with EO data to drive innovations in existing sectors such as agriculture and nascent industries such as carbon management.
- **Consequences of No Action on the Recommendation:**
  - US fails to respond to climate change at the speed and scale required, nascent industries will not receive crucial support, and existing industries will not benefit from public and private investments in space data.

CLIMATE AND SOCIETAL BENEFITS
Recommendation 3: Modernize Data Systems

- **Finding:**
  - Outdated systems inhibit data discovery and use
- **Recommendation:**
  - The Administration should work across government agencies and missions (NASA, NOAA, USGS, DoD, IC) to **standardize and require better data architectures, standards and interoperability** for broader use and more equitable access within the USG, industry, and user communities. This process should also identify areas where EO applications can digitize workflows and incorporate advanced AI or machine learning methods.
- **Rationale for Recommendation:**
  - It is necessary but not sufficient for data to be “open”; it must also be standardized, discoverable, interpretable, and useful. Right now, it is not.
  - Small companies and start-ups have limited access to and time with experts and often insufficient resources to do much more than surface the data.
  - Advanced technologies such as AI and machine learning are under leveraged in the public sector, while insufficient, unreliable, or inaccessible data hamper the private sector’s ability to apply these tools.
- **Consequences of No Action on the Recommendation:**
  - Inequities will be perpetuated: communities and groups who might benefit from data will be unable to access and use it.
  - Government and private sector resources that could be put to better use will be wasted on accessing and downloading data.

CLIMATE AND SOCIETAL BENEFITS
Recommendation 4: Space Data Ethics

- **Finding:**
  - New capabilities raise new ethics considerations.
- **Recommendation:**
  - The National Academies should convene a group to develop a framework for space data ethics, as distinct from existing data ethics.
- **Rationale for Recommendation:**
  - Existing data ethics frameworks appear ill-equipped to evaluate responsible use of space data given different and more diverse data subjects, purposes, interests, risks, etc.
  - Given its unusually broad diversity, space data may draw from or inform related fields, such the ethics of data, AI, surveillance, intelligence, research, open data, citizen science, and more.
  - Because space data may be combined with other data, the synthesis of the two also should be examined for new ethics considerations, e.g., if new or special risks can arise.
- **Consequences of No Action on the Recommendation:**
  - Without identifying a responsible path forward, we risk both oversharing data that can be abused **and** undersharing data that could benefit us and the world. This can affect our national security, economy, and other domestic interests, as well as global interests, such as climate change.

CLIMATE AND SOCIETAL BENEFITS
Work Products

- White Paper on proposed Earth Information Action Lead location, scope, and requirements (Working DRAFT for Subcommittee Review)
- White Paper on EO for Agriculture
- White Paper on Modernizing Data Systems
- White Paper on Space Data Ethics

CLIMATE AND SOCIETAL BENEFITS
Future Directions

- **Greenhouse Gas Monitoring and Mitigation** (*early 2024*)
  - Requirements for comprehensive space-based and in-situ measurements of carbon dioxide, methane, nitrous oxide, and F-gases
  - Linking monitoring and action: policy and economic incentives for greenhouse gas mitigation
  - Monitoring, Reporting, and Verification of carbon and methane removal
- **Wildfire Warning, Prevention, and Recovery** (*mid 2024*)
  - Integrating space-based observations in improved early warning systems
  - Wildfire risk monitoring and prevention
  - Post-fire reforestation and recovery
- **The Water Cycle** (*late 2024*)
  - Water use and sustainability
  - Extreme rainfall adaptation
  - Drought mitigation strategies

NATIONAL SPACE COUNCIL

USERS' ADVISORY GROUP

Dr. Dan Hastings, Chair

Data and Emerging Technology Subcommittee

December 1, 2023

DATA & EMERGING TECHNOLOGY Membership

- **Dan Hastings (Chair)**

- Rajeev Badyal
- Bridget Chatman
- Nancy Colleton
- Kate Marvel
- Marla Perez-Davis
- Robbie Schingler
- Jeremy Williams

- Cody Kelly (DFO)

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PROJECT DRAWDOWN

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DATA & EMERGING TECHNOLOGY
What is the Driver?

- Many New Space companies operating in Low Earth Orbit.
- Large commercial constellations providing commercial communication and earth-observation services, but there are also increasing commercial efforts in space situational awareness and satellite operations.
- US organizational architecture for managing Space Situational Awareness (SSA) and Space Traffic Coordination (STC) is evolving. There are different equities between the commercial, civil and national security customers in SSA/STC.
- Some of the new operator/owners are relatively unskilled in flying satellites.
- The growing number of countries with assets in space and the increased activity associated with these assets necessitates global solutions.

DATA & EMERGING TECHNOLOGY Update

- Heard from
  - Dept. of Commerce (DOC) Office of Space Commerce (OSC) (twice)
  - Aerospace Corp
  - State Department
  - Prof. Moribah Jah, UT Austin
  - Dr. Brian Weedon, Secure World Foundation
  - SpaceX
  - Kuiper
  - Planet
  - STPI
- Meetings Pending with
  - DARPA (Pending)
  - US Space Force (Pending)

DATA & EMERGING TECHNOLOGY
Findings & Recommendations

- **Title of Recommendation:** Develop a USG National Policy for Space Sustainability
- **Finding:**
  - Space Traffic Coordination (STC) and Space Sustainability are pivotal to the continued expansion and exploration of space while safeguarding the orbital environment for future generations. Currently, the responsibility for regulating commercial space activities is spread among many different stakeholders in the USG (FAA, DOC, DoD, etc). There is a clear need for a cohesive USG approach. The government needs to more clearly communicate its strategic approach to managing space. Multiple stakeholders with overlapping and diffuse responsibilities, gives rise to confusion.
- **Recommendation**
  - A national strategy should be developed by the White House for the mission of **space sustainability**. This strategy with the corresponding allocation of resources to implement it should lay out clearly the responsibilities of each of the above-mentioned USG agencies for space sustainability.
- **Rationale for Recommendation:**
  - Clear "top-down" guidance serves to unify resources and coordinate disparate efforts, allowing for a unified voice to commercial, private and USG participants for data sharing and sustainability efforts. A model for this can be found in the US National Strategy for the Artic (https://www.whitehouse.gov/wp-content/uploads/2022/10/National-Strategy-for-the-Arctic-Region.pdf)
  - A good start is the recent proposal to allocate mission authorization between DOC and DOT.
- **Consequences of No Action on the Recommendation:**
  - Taking no action will result in proliferation of debris and uncoordinated satellite population growth resulting in hinderance of USG and commercial efforts due to increasingly dangerous (and more numerous) conjunction events.

DATA & EMERGING TECHNOLOGY
Findings & Recommendations

- **Title of Recommendation:** Take actions to build owner/operator confidence in the DOC systems
- **Finding:**
  - DOC/OSC has a great start with the Traffic Co-ordination System for Space (TraCSS).
- **Recommendation:**
  - A clear goal of TraCSS must be to reduce the uncertainty associated with predictions of collisions to the point where operators can trust them enough to make maneuver decisions with confidence.
    - This will require that Type 1 errors (false alarms) be significantly reduced.
    - US owner/operators would like a policy of catalog entry on change effectively reducing latency between launch and catalog entry to be as small as possible. Catalog maintenance is a DoD responsibility per SPD-3 and the MoA between DoD and DOC.
  - Operators should voluntarily provide their own tracking data on their systems to the DOC. This should include their best estimate of the data quality.
    - This will allow the DOC to develop a widely accessible data set with tracking data as well as with estimates of the data quality. This will help with operator competence.
    - USG (working with industry) should perform a market analysis on the feasibility, commercial viability, and other factors associated with requiring commercial operators to provide their own tracking data on their systems to the DOC as part of USG licensing processes.
  - As TraCSS develops, it must not get into vendor lock with tools.
- **Rationale for Recommendation:**
  - TraCSS must become a tool that is trusted enough by all owner/operators of space systems in order to take action.
- **Consequences of No Action on the Recommendation:**
  - TraCSS is not trusted enough for owner/operators to take actions.

DATA & EMERGING TECHNOLOGY
Findings & Recommendations

- **Title of Recommendation:** Develop the technical systems to do active removal of space debris by NASA STMD
- **Finding:**
  - While there are USG Orbital Debris Mitigation Standard Practices, they are not enough. A critical part of STC should be **active debris remediation**. This is an important part of a space sustainability strategy. This responsibility has not been assigned to any agency. The state of the art right now is rudimentary. There are many interesting ideas, but they are at a low Technology Readiness Level (TRL) level.
- **Recommendation:**
  - To cross the "valley of death", a USG agency must be directed to take the technology development from TRL 2 or 3 to TRL 8 and then pass on the knowledge to commercial industry for implementation.
    - Thus, NASA STMD should be tasked to develop the technology in partnership with industry (perhaps following a public-private partnership model).
    - NASA public-private partnerships have been a successful model in accelerating and introducing emerging technologies in addressing space exploration objectives such as commercial crew to the International Space Station as well as in the aeronautics area.
- **Rationale for Recommendation:**
  - Of the agencies that develop space capabilities, only NASA has credibility and capability to undertake this technology development. While the USSF and NRO have the capability, their national security orientations will reduce their credibility since the ability to remove debris might not be trusted by foreign countries.
- **Consequences of No Action on the Recommendation:**
  - Space Debris will worsen with no technical systems to remediate it.

DATA & EMERGING TECHNOLOGY
Findings & Recommendations

- **Title of Recommendation:** Develop an international coordination mechanism for Space Traffic Coordination
- **Finding:**
  - The US must recognize that the time for unilateral actions in space has long since passed. There is a need for international collaboration and data interoperability around space sustainability. The Europeans have developed a strategy for space sustainability which uses data accessible to them. The UK has proposed a space sustainability strategy (Astra Carta). The UN Committee on Peaceful Uses of Outer Space (COPUOS) adopted by consensus the 21 Long-Term Sustainability Guidelines in 2019. The Chinese are also developing a substantial presence in space to satisfy their needs.
- **Recommendation:**
  - Given the increased risk of collisions in space, the work of the Dept. of State with the International Organization for Standardization (ISO) should be strongly supported to establish an international coordination mechanism as soon as feasible.
    - The UN International Committee on Global Navigation Satellite Systems (ICG) might serve as *a model* for an international space situational awareness coordination mechanism.
  - Start with active coordination with the UK, Europe and Japan. There is a high need to share and low ability to trust. The USG speaking with a cohesive voice will make a difference (see recommendation on space sustainability).
    - The US might think about sharing as much as possible to encourage others to do the same. This is an example of soft power.
    - As an example, the USG should actively promote the sharing of space sustainability standards and practices to enhance transparency.
- **Rationale for Recommendation:**
  - Having an international mechanism, like the ICG, could allow for SSA providers & users to come together to develop voluntary SSA data standards & operational best practices to ensure greater compatibility, interoperability, and transparency for SSA services.
    - This kind of model works best when most of the discussions are at the technical level as opposed to the political level.
- **Consequences of No Action on the Recommendation:**
  - The danger of a serious collision in space with international consequences will only increase if all owner/operators/countries are not talking to each other and sharing data.

DATA & EMERGING TECHNOLOGY
Findings & Recommendations

- **Title of Recommendation:** Adopt best practices around finding systems, removing unnecessary systems, and maneuvering systems
- **Finding:**
  - To have effective SSA and STC, several best practices can be adopted which would enable better STC. Following practices are all based around finding systems, removing unnecessary systems, and maneuvering systems.
- **Recommendation:**
  - Satellite performance will be improved if all satellites have GNSS capabilities on board and then share predictive ephemerides data to space situational awareness stakeholders (i.e., other operators) as well as TraCSS.
  - Launch upper stages should always be deorbited if possible.
  - The FCC, NOAA, and FAA should mandate that US-licensed and US market access spacecraft can conduct effective collision avoidance, through maneuverability or other means, and these spacecraft should incorporate tracking capabilities such as a "transponder, reflect or other identification" to enable effective tracking as part of approval for launch within the US.
  - All satellite manufacturers would be asked to consider design choices that would facilitate tracking in the event they lost power.
  - All passive satellites must be highly trackable with design choices that allow for this.
- **Rationale for Recommendation:**
  - Deorbiting upper stages will reduce the growth of debris; making satellites (especially passive ones) easy to track will improve trust.
- **Consequences of No Action on the Recommendation:**
  - Orbital debris will increase, and trust will not.

DATA & EMERGING TECHNOLOGY
Conclusions

- The need for action on Space Traffic Coordination is critical.
- DOC OSC is off to a good start.
- However, their efforts need to be placed in a larger national strategy on space sustainability that clearly outlines roles and responsibilities in the USG.
  - This national strategy must also provide for the necessary international cooperation with all other space faring nations.
  - The national strategy with resources must provide a technical solution for the growing amount of space debris.
  - Finally, going forward there are voluntary best practices that will benefit all and enhance Space Traffic Coordination.

NATIONAL SPACE COUNCIL

USERS' ADVISORY GROUP

Ms. Mandy Vaughn, Chair

STEM Education, Diversity, and Inclusion Subcommittee

December 1, 2023

STEM EDUCATION, DIVERSITY, AND INCLUSION
Mission Statement

The UAG STEM Education, Diversity, and Inclusion Subcommittee has a threefold **mission**:

- To explore and recommend ways to Inspire, Prepare & Employ a diverse and inclusive workforce for the US national space enterprise.
- To collaborate, foster and highlight interagency connections with space program stakeholders to ensure the National Space Council has access to the information and conditions that contribute to strong U.S. leadership in space.
- To highlight how we can bring space to earth for our diverse communities.

STEM EDUCATION, DIVERSITY, AND INCLUSION
Membership

- **Mandy Vaughn (Chair)**

- Bridget Chatman
- Marla Perez-Davis
- Harold Lee Martin
- Sian Proctor
- Katrina Williams
- Lance Bush

- Barbara Adde (DFO)

STEM EDUCATION, DIVERSITY, AND INCLUSION
Briefings Received

Govt Programs/Studies:

- NASA
- Dept. of Education
- DoD via Stevens Institute
- National Science Board

Industry Groups:

- Space Workforce 2030
- Skilled Technical Workforce eco-system models

Outreach Activities:

- STEM City
- Advocacy campaigns

Colleges/Universities/Fellowships

- HBCU/MSI/HSIs - NC A&T, NMSU, UPRM
- Community College consortia
- Brooke Owens Fellowship
- Steve Isakowitz Fellowship
- Patti Grace Smith Fellowship
- Zed Factor Fellowship

Our own Members:

- WIA
- Challenger Center
- Community Colleges
- HBCU/MSI/HSIs
- Educators

STEM EDUCATION, DIVERSITY, AND INCLUSION
Framework of Emerging Themes

1. "Inspiration" is needed throughout the process (of Inspire, Prepare, Employ) – and is both Broad & Hyper-local.
   - Broad – needed to get the word out; show the missions the matter and show individual people that they have a place in space.
   - Hyper-local – The Eco-System & "intervention" model has shown repeated success.

2. Increase awareness that the Space workforce is comprised of STEM, skilled technical workforce, and other disciplines.

3. Underpinning to National Security increasing in importance & supports the National Strategy of Integrated Deterrence.
   - Awareness of need to have more "diverse" industrial base & workforce.
   - Role of innovation and economic power of the space industrial base in techno-economic competition.

STEM EDUCATION, DIVERSITY, AND INCLUSION
Findings & Recommendations - Release New STEM Strategic Vision

- **Title of Recommendation:** Update & Release new STEM Strategic Vision to include Space
- **Finding:**
  - The U.S. National Science and Technology Council's Committee on STEM Education (CoSTEM) released a 5-year vision document "Charting A Course For Success: America's Strategy for STEM Education which was approved by Congress and released to the public in 2018. This document addressed the importance of STEM as a national priority. This 5-year Strategic Plan expires the end of 2023.
  - Opportunities exist to have an enduring messaging campaign to highlight elements of the space sector, economy, impact and fun; through various space-related milestones (2024 Eclipse, Climate activities/awareness, GPS 50th, etc.)
  - Climate awareness and sensitivity relies on space-based sensing for data collection; awareness of the collection methodologies can increase support of space activities.
  - The impact of seeing that YOU belong in the space community.
- **Recommendation:**
  - Space Council member agencies seek Congressional approval to update and release another 5-year STEM Strategic Vision that includes sections on Space related topics with specific goals, priorities, partnerships and measurements for a space literate American society. This effort should include the US Space Force, and other agency members of the National Space Council.
- **Rationale for Recommendation:**
  - CoSTEM was established in 2011 with the purpose to coordinate federal programs associated with STEM education. The Space sector is clearly reliant on STEM education (and other sectors) for talent capture; and the community can benefit from a broader federal strategy.
- **Consequences of No Action on the Recommendation:**
  - Space and Space-adjacent industry, government and scientific community needs will miss out on the opportunity to leverage larger strategic initiatives and exposure if not considered as part of the revised Strategy.

STEM EDUCATION, DIVERSITY, AND INCLUSION
Findings & Recommendations – Expand Regional Pilot Programs

- **Title of Recommendation:** Expand Space Economic Sector Pilot Programs
- **Finding:**
  - Dept of Ed YOU Belong in STEM initiative model and need to continue the linkage to state and local levels. Assist to get the word out that resources exist; and that focused motivations are needed for individual eco-systems.
  - HBCUs, HSIs, MSIs, Community College linkages throughout industrial feeders; collaboration with co-located industry to form a complete industrial base of all functions. Linkages of various colleges, universities, industry partnerships, Govt involvement that pierce into the locality of the population and addressable student base demonstrated the most success; and realization of the most "intervention" opportunities.
  - Economic and industrial base changes to come from the energy transition changes the needed basis and distribution of work and skill sets.
  - CHIPS Act-like model of regional innovation hubs.
  - Exploration & Discovery subcommittee "Talent Capture" topics.
- **Recommendation:**
  - Dept of Education engage with industry members (we can start with the UAG representatives), state and local government and trade organizations to understand and forecast workforce and professional requirements – in terms of expertise and geography. Use these data to engage with the Depts of Commerce, Labor & Education to prioritize future eco-system development beyond the 3 pilot programs and to co-locate with STEM eco-system engagements.
- **Rationale for Recommendation:**
  - Prioritize the continued implementation of the focused, community basis seen in models like "STEM eco-systems" enabling identification of, and need for, individual "intervention" with students and young professionals to remain in the space field and community. And leverage the model across the space areas of relevance; not just STEM fields. Continue and propagate the 3 regional pilot programs initiated by the Space Council in 2022. **SEE WHITE PAPER.**
- **Consequences of No Action on the Recommendation:**
  - No action results in lack of effectiveness of other STEM and STEM related eco-systems that exist to learn from each other, reducing effectiveness of each program and severely curtailing the outcome of the model and the resulting workforce and talent pipeline into all STEM and other related workforce.

STEM EDUCATION, DIVERSITY, AND INCLUSION
Findings & Recommendations – Diversity in DIB

- **Title of Recommendation:** Update USG contractual language about diversity within Defense Industrial Base
- **Finding:**
  - National Security space missions are moving toward integration of more commercially developed capabilities. Re-thinking relevant supplier base FAR/DFAR (and other agency-pertinent) language with this in mind can invigorate a diverse set of commercial companies.
  - UAG Representative members comprise a significant portion of the sector job market through themselves & supporting supplier base. We acknowledge that even working this amongst our own portion of the eco-system can make an impact.
- **Recommendation:**
  - Initiate interagency discussion to potential refinement of/addition to FAR/DFAR etc. language about Small Business, and diversity of supplier base as part of DIB. Possible outcomes could be a FAR and FAR-equivalent update, an executive order or NDEA-like framework.
- **Rationale for Recommendation:**
  - Small business tracking has collected meaningful data about work being allocated through emerging and non-traditional industrial base. The recommendation is to look at the current metrics being collected in various national security procurements as compared to the national space-related education and industrial eco-system and suggest if changes or emerging sectors warrant specific metrics.
- **Consequences of No Action on the Recommendation:**
  - The industrial base of space and space-related technology development has changed with the developing space economy. Not adjustment various targets for national security sector development and procurement efforts could reduce the ability of this sector to enter into the defense industrial base and hamper overall US National Security technology maturation and advantage.

STEM EDUCATION, DIVERSITY, AND INCLUSION
Findings & Recommendations – Clearances for Workforce

- **Title of Recommendation:** Increasing pipeline of Cleared personnel for national security space community
- **Finding:**
  - Space industry workforce shortages across the board are exacerbated in national security sectors where security clearances are required.
  - Security clearances continue to be a barrier to entry to the community. HBCUs, HSIs and MSIs are unique cases that the student populations are largely US citizens lending themselves to be an impactful resource for potentially clearable people. Exemplar programs like the NRO's Intern program, NMSU's CREW, and NSSA's "Cleared for Success" ideas warrant discussion with DoD leadership, DCSA & DNI.
  - Leverage programs like the Defense Civilian Technology Corps (DCTC), NRO Internship program and USSF's University Partnership Program as an on-ramp into national security related positions.
- **Recommendation:**
  - DoD & DNI initiate discussion on Personnel Clearances for students and young professionals to establish guidelines and program to increase awareness about; and start processes for granting clearances. Engage with DoD, DNI, Dept of Labor to establish forecast for cleared workforce needs and create program whereby US Govt initiates clearances for students in feeder programs.
- **Rationale for Recommendation:**
  - Programs that exist are limited in scope, and in many cases, leverage an industrial (or lab) "anchor tenant" for the clearance process to begin. A more universal construct & personnel clearance support from the DoD & DNI can enable universities and other educational institutions to have the process support to clear students/young professionals.
- **Consequences of No Action on the Recommendation:**
  - There is only a need for more people in the workforce…clearances only make it harder to enter a significant portion of this industry.

STEM EDUCATION, DIVERSITY, AND INCLUSION
Next Priorities: *What is the system we would want?*

- **Creation of framework** – Based on these trends, how can we capture it to tell the story more broadly?
  - City-Gantt chart example, Stevens Institute example – link to the services that are needed in each phase in each location.
  - What is the model for coordination /reporting?
  - *Where are the data reporting mechanisms we can leverage and scale? Link with State & Local levels?*
- **Further define the role of Industry.**
  - E.g. FAR language (as appropriate for the agency).
  - Broaden concepts like the SWF 2030 effort.
- **Connection – Technical & Accessibility.**
  - Strategy & Framework for fair and balanced approach to integration of technology into the educational system.
  - Trend for more "commercial" integration into space missions (including civil, national security & purely commercial missions) distributes activity out of the major centers like NASA centers and military bases.
  - Affordability & Accessibility in the future; future of wireless communications.
- Explore into Pre-K and the earlier phases of education.
- Re-Careering and impact to Skilled Technical Workforce
  - How do you take out the fear to re-career?
  - AI, automation, climate change impacts, …

What can we leave behind for the Space & Education Community to pick up and run?

Connection with the other organizations/agencies that need to tie into this framework to make it enduring

NATIONAL SPACE COUNCIL

USERS' ADVISORY GROUP

General Lester Lyles (USAF, ret.), Chair

National Security Subcommittee

December 1, 2023

NATIONAL SECURITY
Membership

- **Chair: General Lester Lyles**
- Members:

General Charlie Bolden
Tory Bruno
Theodore 'Ted' Colbert
Eric Fanning
Dr. Daniel Hastings
David Kaufman
Patrick Lin
Ron Lopez
General Roosevelt 'Ted' Mercer
Robbie Schingler
Gwynne Shotwell
Bob Smith
James Taiclet
Mandy Vaughn
Kathy Warden

- Designated Federal Officer (DFO): Barbara Adde

NATIONAL SECURITY
Focus Areas

- Assess planned U.S. Space Force integration of commercial capabilities to support/augment/assume national security missions and needs.
- Examine opportunities for greater information sharing, partnerships, and collaboration amongst the various space sectors (national security, civil, commercial, and private).
- Examine international collaborations and partnerships.

NATIONAL SECURITY
Key Briefings & Fact-Finding Meetings (1)

Feb. 23, 2023

- Briefing to UAG Public Meeting by Gen David D. Thompson (Vice Chief of Space Operations, USSF) on Military Space Priorities
- Key Findings:
  - USSF uses commercial services for satellite communications, space domain awareness (by means of data purchases to look for threats), and space launch services.
  - Armed Forces have an increasing need to rely on low-Earth orbit (LEO) mesh satellites.
  - USSF is looking to expand upon space data relay.
  - USSF operates its own satellite command & control network, but there is tremendous capacity in commercial sector, both ground stations and satellites, that could improve resilience.
  - USSF is looking to expand rapid, reliable, and reasonably cost-efficient launches.
  - USSF is interested in the in-space servicing of satellites, which it has made clear will be met by the commercial market.
  - USSF is also working to marry venture capital and innovators, such as looking for ways to clean up the space environment from LEO to Geosynchronous Orbit (GEO).
  - Further in the future, the USSF is looking at advanced technologies such as nuclear propulsion as well as space debris migration.

NATIONAL SECURITY
Key Briefings & Fact-Finding Meetings (2)

March 17, 2023

- Classified fact-finding meeting with General Saltzman (USSF Chief of Space Operations)

NATIONAL SECURITY
Key Briefings & Fact-Finding Meetings (3)

May 8, 2023

- Briefing to UAG EXCOM by George Nield (Chair, Global Spaceport Alliance)
- Topics of interest:
  - Office of Commercial Space Transportation:
    - Created by President Reagan to ensure public safety, and to encourage/facilitate, and promote commercial space transportation.
    - The office was moved in 1995 from FAA to DOT by delegation from the Secretary.
    - In more recent years there has been an increased role from commercial space and the global space economy, currently in excess of $14B, will exceed a trillion over next 10-20 years. However, the Office of Commercial Space Operations gets less than .03% of the AST budget.
    - GAO has noted DOT could move the office through a delegation of responsibilities as in 1995.
    - The Global Spaceport Alliance recommends to formally recognize commercial spaceflight as an independent mode of transportation and move it back under DOT through a delegation of responsibilities.
  - U.S. Spaceport Infrastructure:
    - Currently not robust or resilient. It is particularly vulnerable to natural disasters.
    - Proposed a National Spaceport Policy supporting creation of a national spaceport network.
    - USG has traditionally provided substantial funding, but today there is no comparable program.

NATIONAL SECURITY
Key Briefings & Fact-Finding Meetings (4)

May 8, 2023

- Briefing to UAG EXCOM fact-finding meeting by Doug Loverro (former Deputy Assistant Secretary of Defense for Space Policy and former NASA Associate Administrator for the Human Exploration and Operations Mission Directorate) on the National security role of commercial space.
- Topics of interest:
  - There is a need for clear doctrinal use of commercial space in the event of an emergency.
  - Policy considerations need to be addressed, including the issue of indemnification of commercial space providers.

NATIONAL SECURITY
Key Briefings & Fact-Finding Meetings (5)

Sept. 6, 2023

- MITRE briefing at subcommittee fact-finding meeting, followed by Doug Loverro and Marc Berkowski on the National security role of commercial space.
- Topics of interest:
  - There is a need for clear doctrinal use of commercial space in the event of an emergency.
  - Policy considerations need to be addressed, including the issue of indemnification of commercial space providers.

NATIONAL SECURITY
Key Briefings & Fact-Finding Meetings (6)

November 9, 2023

- Panel briefing to subcommittee at fact-finding meeting by National Security Space Association
- Topics of interest:
  - Space traffic management
  - Civil space protection
  - Commercial remote sensing

NATIONAL SECURITY
Key Messages

1. **Overarching**
    1. Maintaining leadership in the exploration and use of space to protect and advance US national interests
    2. Deterring, protecting, or if necessary, defending against the threat or use of armed forces in space
    3. Protecting and defending the homeland and deployed forces against hostile uses of space
2. **Near-term**
    1. Protecting US citizens and property in space, US commercial space assets, or other designated non-US forces, foreign nationals, or property in space
    2. Leveraging the US commercial space sector for US national security
    3. Cooperating with allies and international partners for collective security or mutual defense in space
3. **Mid-term**
    1. Acquiring national security space capabilities with discipline at speeds relevant to the threat
    2. Ensuring domain awareness, indications, warning, and attribution of hostile actions or declaration of hostile intentions in space
4. **Far-term**
    1. Shaping activities in cislunar space and sustaining US strategic advantages across the Earth-Moon system

NATIONAL SECURITY
Findings

- International collaboration with both allies and adversaries is key to national security space.
- However, there is a gap between the intent of U.S. declarations on the international security aspects of space policy and how it is being implemented.
  - The processes for review/approval of exports has been overcome by the proliferation of space technology worldwide and is now actually hurting U.S. industry & security.
  - Data sharing agreements, and the processes for sharing data, need to be streamlined.

NATIONAL SECURITY
Recommendations

- Recommendation 1: Close any gaps between US declaratory policy on international security space policy, and its actual implementation
  - Modify existing agreements
  - Mechanisms for data sharing
  - Streamline export reviews / approval process
  - Additional resources within USSF
- Recommendation 2: Ensure national security considerations, and objectives are being addressed in the "National Cislunar S&T Strategy" deliberations

Joint Recommendation with STEM EDI Subcommittee: STEM EDI & Impact on National Security

- Recommendation 3a: In support of the STEM eco-system model; identified areas of DoD & DIB collaboration should be broadened by leveraging, the regional STEM/WFD eco-system efforts (but not cede to those efforts).
- Recommendation 3b: DoD & DNI leadership include STEM EDIO as part of personnel incentives for time commitments.
- Findings Address:
  - The challenges associated with STEM education efforts for the DoD & DIB and more broad Space industrial base are similar, allowing for consideration of a DoD "specific" framework to be applied more broadly. Also, problems of diversity and inclusion that exist in the space industrial base are exacerbated in the DoD & DIB portion of the eco-system in part due to citizenship & clearance requirements.
  - UAG Representative members comprise a significant portion of the sector job market through themselves & supporting supplier base. We acknowledge that even working this amongst our own portion of the eco-system can make an impact.

Joint Recommendation with STEM EDI Subcommittee STEM EDI & Impact on National Security (cont.)

- Recommendation 3c: Initiate interagency discussion to potential refinement of/addition to FAR/DFAR language about Small Business, and diversity of supplier base as part of DIB. Possible outcomes could be an executive order or NDEA-like framework.
- Recommendation 3d: DoD & DNI initiate discussion on Personnel Clearances for students and young professionals to establish guidelines and program to increase awareness about; and start processes for granting clearances. Engage with DoD, DNI, Dept of Labor to establish forecast for cleared workforce needs.
- Findings Address:
  - National Security space missions are moving toward integration of more commercially developed capabilities. Re-thinking relevant supplier base FAR/DFAR language with this in mind can invigorate a diverse set of commercial companies.
  - Security clearances continue to be a barrier to entry to the community. HBCUs, HSIs and MSIs are unique cases that the student populations are largely US citizens lending themselves to be an impactful resource for potentially clearable people. Exemplar programs like the NRO's Intern program, NMSU's CREW, and NSSA's "Cleared for Success" ideas warrant discussion with DoD leadership, DCSA and DNI.
  - Leverage programs like the Defense Civilian Technology Corps (DCTC) and USSF's University Partnership Program as an on-ramp into national security related positions.