



# NATIONAL SPACE COUNCIL



## USERS' ADVISORY GROUP

*Exploration and Discovery Subcommittee Report*

**February 23, 2023**

# UAG Exploration and Discovery Subcommittee *Membership*

**Lance Bush, Challenger Center – Chair**

Charles Bolden, SGE

Salvatore T. Bruno, United Launch Alliance

Theodore "Ted" Colbert, Boeing

Karina Drees, Commercial Space Flight Federation

Gwynne Shotwell, SpaceX

Robert Smith, Blue Origin

James Taiclet, Lockheed Martin

Kathy Warden, Northrop Grumman Corp

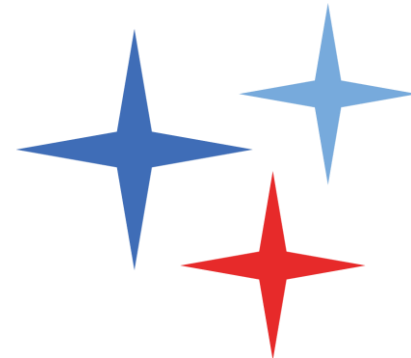
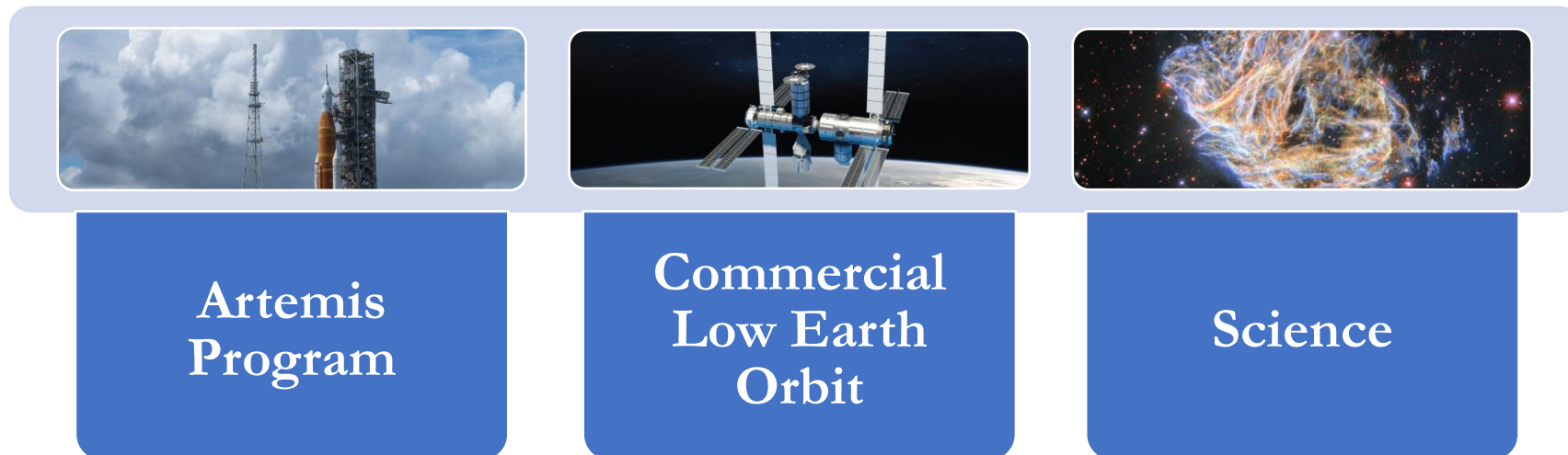
*Ben Ashman (DFO)*

# UAG Exploration and Discovery Subcommittee *Priorities*

## Overarching perspectives

- National 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)

## Priorities



# Artemis Program

## Focus areas

- Review and understand previous and recent architecture reviews to support formal annual review
- Forward perspective on Moon to Mars architecture and objectives
- Recognize science objectives in the program



# Commercial Low Earth Orbit

## Focus areas

- Government's role to further enable commerce (i.e., regulations, IP protection, etc.)
- Necessitate broader participation by multiple government agencies
- Provide commercial perspective



# Science

## Focus area

- Support continued robust discoveries made through the science program
- Support integrated and mutually beneficial exploration and discovery missions



# Forward Plan

- **Monthly meetings**
- **Fact-finding field trips**
- **Engage subject matter experts, e.g.**
  - National Aeronautics and Space Administration
  - Space Bureau at the Federal Communications Commission
  - Office of Commercial Space Transport at the Federal Aviation Administration
  - Department of Commerce
  - Department of Transportation
  - State Department Office of Space Affairs
  - Department of Energy



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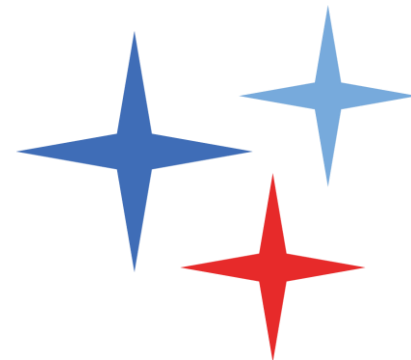
### Economic Development and Industrial Base Subcommittee Report

User's Advisory Group Meeting  
February 23, 2023



# Economic Development and Industrial Base Subcommittee Initial Focus Areas

- **Benefiting All Users / Whole of Government Focus**
- **Government-Industry Partnership Models and Lessons Learned**
- **International Trade**
- **Small Business**
  - Whole of government support mechanisms
  - Regulatory certainty
  - New business entry and accessibility
- **Space Supply Chain**
  - Application of significant Administration efforts (infrastructure bill, CHIPS, IRA, etc)
  - Critical supplies and materials
  - Joint supply chain and “agnostic” suppliers
  - Infrastructure including spaceports
- **Space Sustainability**
  - Policies and norms
  - Research and development needs





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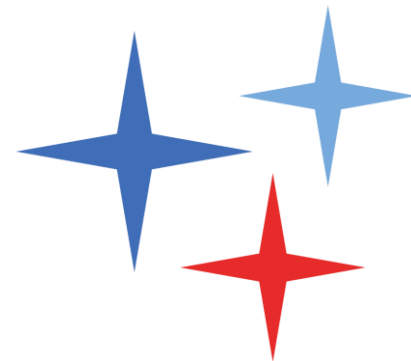
## CLIMATE AND SOCIETAL BENEFITS SUBCOMMITTEE REPORT

UAG MEETING  
FEBRUARY 23, 2023

# CLIMATE AND SOCIETAL BENEFITS

## SPACE IN SERVICE OF EARTH

- Observing Earth
  - The planet is 1.2C (more than 2F) warmer than before the Industrial Revolution
  - Space-based observations have detected changes in cloud cover, drought risk, rainfall patterns, sea levels, and other aspects of the Earth system
- Climate change is here
  - Increases in extreme weather
  - Compound events
- Climate *action* is here
  - Climate Envoy
  - Executive Orders
    - Forests
    - Public Health
  - Inflation Reduction Act
    - 40% or greater reduction in US climate pollution by 2030
  - 30x30
  - Natural Capital Standards
  - Proposed SEC regulations



# CLIMATE AND SOCIETAL BENEFITS

## ADVANCING HUMAN WELL-BEING ON A CHANGING PLANET

- **EXAMPLE: Climate-smart agriculture**
  - Agriculture and associated activities contribute ~25% of greenhouse gas pollution
  - Agricultural practices like cover crops, conservation tillage, nutrient reduction and regenerative agriculture may
    - *Reduce* greenhouse gas emissions
    - *Sequester* carbon
  - Earth observations for sustainability monitoring, reporting, verification
- **EXAMPLE: Detection, monitoring, and early warning**
  - Wildfires and other immediate hazards
  - Changing water cycle, drought/flood risk and other longer-term changes



# CLIMATE AND SOCIETAL BENEFITS

## IMPROVING THE EXPLORATORY-TO-OPERATIONAL PIPELINE

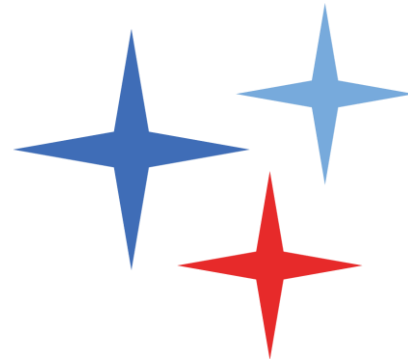
- Identify priority *operational* measurements
  - Ensure excellence in Earth observation translates to operational capabilities
  - Identify areas where operational organizations are not leveraging scientific advances
- Digitize and standardize workflows
  - Role of AI/ML tools
- Leverage the federal government and space enterprise to send powerful demand signals
  - Identify needed products
  - Identify pathways to increase availability and accessibility



# CLIMATE AND SOCIETAL BENEFITS

## MAKING EARTH DATA USABLE AND ACCESSIBLE

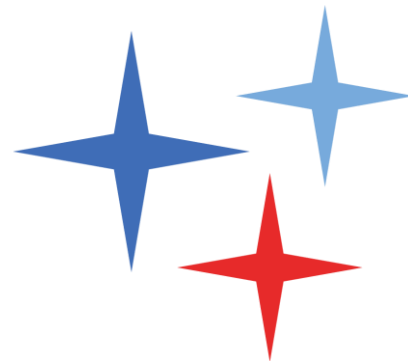
- Who is using Earth observation data?
  - Understanding the diversity of a changing and growing user base
  - Growing the use of Earth observation by traditional user communities
    - State and local governments
    - Agriculture
- Who will be using Earth observation data?
  - Capitalizing on opportunities for US business in new areas such as MRV
- Who *should* be using Earth observation data?
  - Expanding access to new users
  - Improving public communication



# CLIMATE AND SOCIETAL BENEFITS

## IMPROVING COORDINATION AND COOPERATION

- Within government
- Government and private sector
- With partner space agencies
- With non-spacefaring nations





# NATIONAL SPACE COUNCIL



## USERS' ADVISORY GROUP

### Data and Emerging Technology Subcommittee

**February 23, 2023**



# Today's Agenda – 2/23/23

- Introductions
- Review Proposed Areas of Interest

**Expected Outcomes** – Introduction of emerging data and technology-related work areas for UAG Data & Emerging Technologies Subcommittee

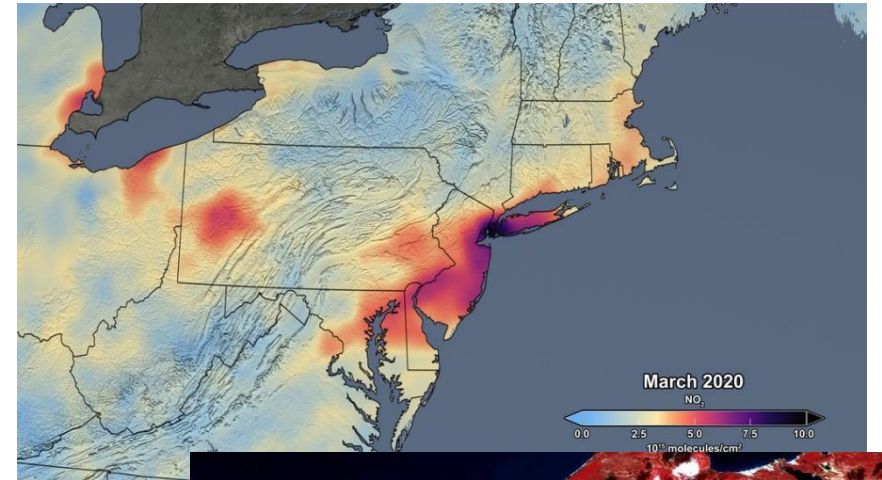


# Broadening Space-Based Remote Sensing and Analytics to Meet Today's Global Challenges

Space-Based **Remote Sensing (RS)** and other **sensor** platforms have dramatically grown in the past decade with commercial and government providers on-ramping constellations and products offering nearly persistent global coverage **and near real-time value added products.**

As industry, private citizens and governments look to solve today's climate issues, such as the emerging water resource crisis **and wild fires, and opportunities, such as measurements for natural capital,** broadening the use of globally- available **RS** and **machine learning analytics** helps align users with providers of space resources in a relevant and sustainable way.

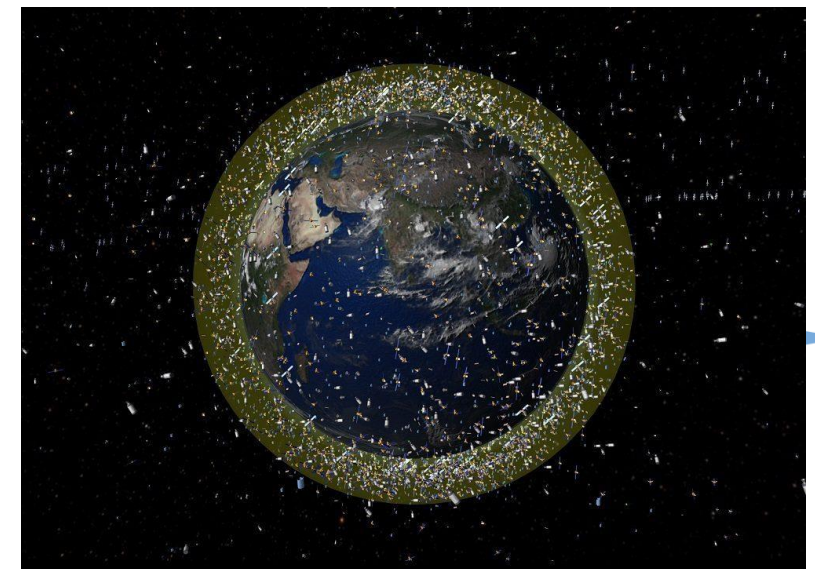
Focus on data **accessibility**, technical formats and processes for inclusive, transparent and accessible **RS** data serve to utilize these growing and crucial insights, helping to meet today's challenges with a path to protecting tomorrow's users.



# Space Standards Interoperability for Varied User Communities

Space Traffic Management (STM) and Space Situational Awareness (SSA) is **a focus for the US, it's allies, and commercial actors.**

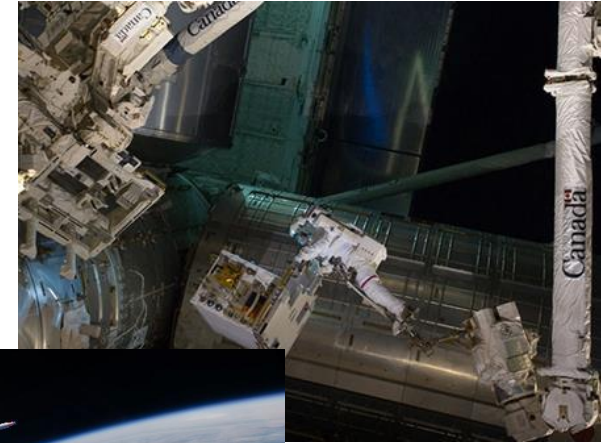
Debris proliferation, emphasis on outer space norms of behavior and shifting responsibilities for SSA and STM drive need for discussion of **a variable trust STM architecture for data collection, interoperability and insights** among earth-orbit space segment providers to provide for a **safe and secure** environment for private, civil, and national security users to operate.



# Space-based Communication and Compute for real-time connection, mission autonomy and a Connected Planet

Space-based communication constellations and architectures are rapidly evolving and attracting \$B of private investment, bringing new capacity to a connected planet and real-time connectivity between satellites. Intersatellite links and massive compute in space are enabling technologies that decrease the cost for new missions, increase mission autonomy and security, as well as open novel opportunities for real-time applications.

Focus areas include solutions for broadband terrestrial interoperability with this emerging space-based communication infrastructure, ITU and FCC evolving topics, and new mission architectures leveraging the usage of real-time connection.



# Nuclear Thermal & Nuclear Electric Tech in the Space Domain

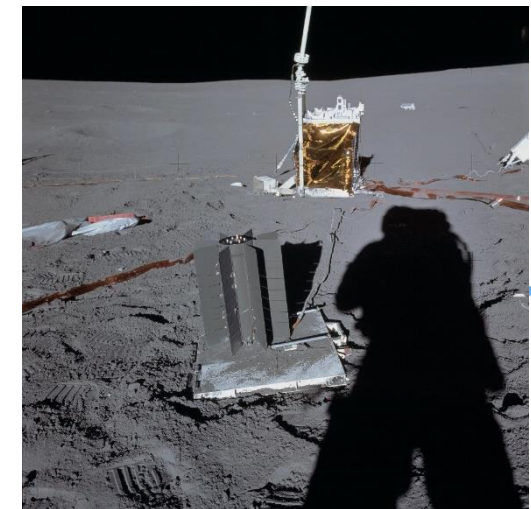
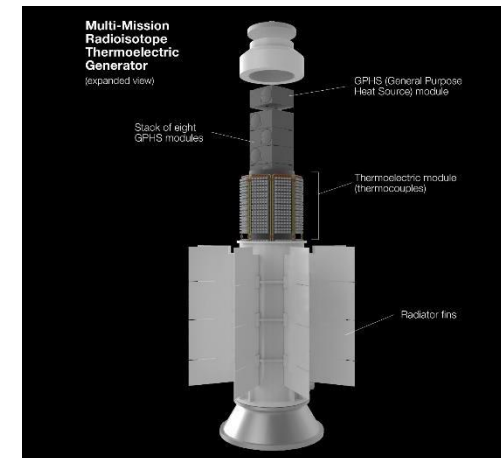
Nuclear Thermal and Nuclear Electric Propulsion and Nuclear Power Generation potentially offers enabling technologies for exploration beyond low earth orbit.

With recent and on-the-horizon interagency cooperation, nuclear thermal rockets may open the solar system to human exploration, while Radioisotope Thermal Generators (RTGs) have powered science instruments for decades.

Renewed focus on in-space nuclear normalization and long-term funding pipelines will approach this emerging technology with a refreshed policy perspective and open up the opportunity **to change the economics of space missions and infrastructure.**



NASA DARPA NTP spacecraft, artists concept — NASA/DARPA



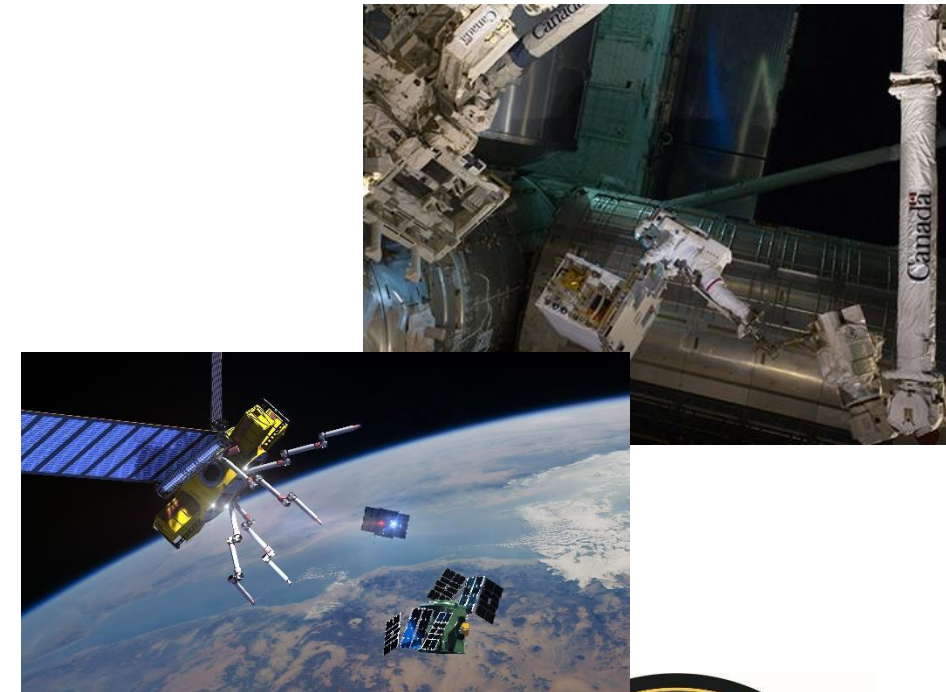
# Revolutionary Capabilities enabled by In Space Servicing, Assembly and Manufacturing

In-Space Servicing, Assembly, and Manufacturing (ISAM) as a national priority focuses on six foundational goals(<https://www.whitehouse.gov/wp-content/uploads/2022/04/04-2022-ISAM-National-Strategy-Final.pdf>):

- Advancement of ISAM R&D
- Scalable ISAM infrastructure
- Acceleration of emerging ISAM industry
- International collaboration and cooperation to achieve ISAM goals
- ISAM environmental sustainability
- Inspiring a diverse future workforce

ISAM will enable a a new, diverse, and market-focused ecosystem of autonomous persistent platforms and assets. ISAM as a revolutionary capability has potential to enable long-duration civil, private and other governmental missions and dramatically improve the economics of space activities and provide novel space architectures.

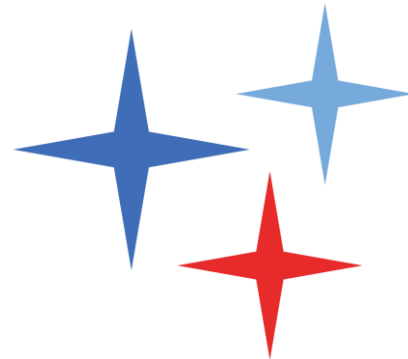
Focus on technologies and gaps in the strategy that enable systems that cannot be launched in the conventional sense



# Example products

Subcommittee will produce short white papers (a few pages)

- Area
- Issues
- Relevance to the public
- Other relevant work
- Findings
- Recommendations for UAG and National Space Council

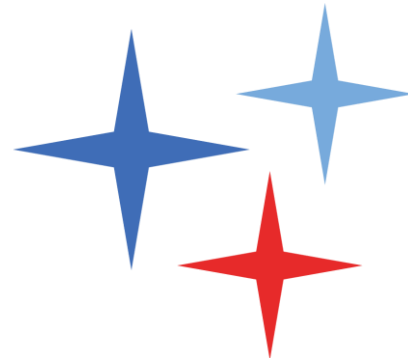




# WE WANT TO IMPROVE

Submit your inputs to:  
[contact@spacecounciluag.org](mailto:contact@spacecounciluag.org)

- What new partnership constructs should we look at?
- Future areas of exploration and scientific research
- Bureaucratic and regulatory hurdles that need attention
- Innovative technologies with potential space applications
- Big ideas for advancing American leadership in space







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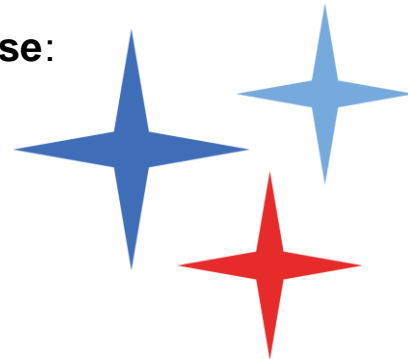
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## STEM Education, and D&I SUBCOMMITTEE REPORT

UAG Meeting  
23 February 2023

# STEM Education & D&I Subcommittee Framework & Areas of Interest

- **Acknowledge – and promote – that the space industry is more than STEM.**
  - Look no farther than the diversity of background in our group’s makeup. Space is business, policy, legal, art and other disciplines. It’s a skilled technical workforce.
  - It needs to come from everywhere. And it needs to be *taught* everywhere.
- **Support the “Inspire, Prepare, Employ” strategy:**
  - We must explore and highlight initiatives and programs that have quantifiable, measurable success in identifying and retaining STEM students and successful D&I efforts in our sector.
  - We must take these success stories and engage with State & Local levels to share, and implement, success criteria.
- **Build linkages with the Department of Education on the “You Belong in STEM” initiative:**
  - We need to explore how to amplify portions of their message which intersects with the space industry. How do we make this a whole-of-government, whole-of-education exercise?
- **Address DoD workforce issues and how we are engaging, nationally, with the defense industrial base:**
  - Linkages across to Academia via USSF’s University Partnership Program and other key assets like HBCUs, MSIs, Community Colleges, and more.
  - We need to expand the role of the Innovation Eco-system in that industrial base.





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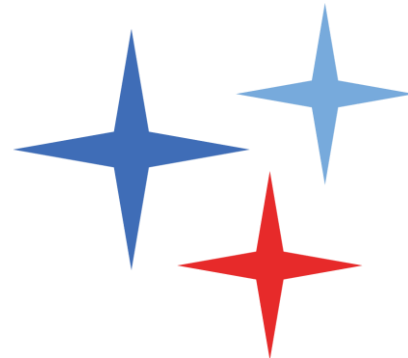
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## NATIONAL SECURITY SUBCOMMITTEE REPORT

February 23, 2023, Meeting

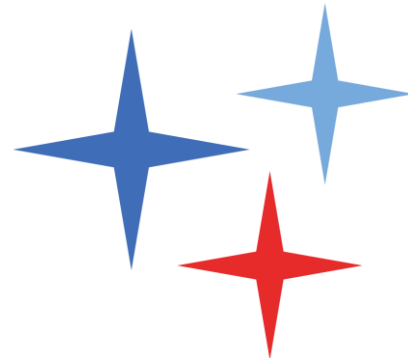
# National Security Subcommittee Membership

- Lester Lyles (Chair)
- Members
  - Roosevelt 'Ted' Mercer
  - Charlie Bolden
  - Tory Bruno
  - Theodore 'Ted' Colbert
  - Eric Fanning
  - Dave Kaufman
  - Patrick Lin
  - Ron Lopez
  - Robbie Schingler
  - Gwynne Shotwell
  - Bob Smith
  - James Taiclet
  - Mandy Vaughn
  - Kathy Warden
- Barbara Adde (Designated Federal Officer)



# National Security Subcommittee Focus Areas

- Focus on the Following Areas
  - Support to the National Security/ Intel Space Enterprise, especially the use of Commercial/Civil Space capabilities to meet National Security / Intel needs





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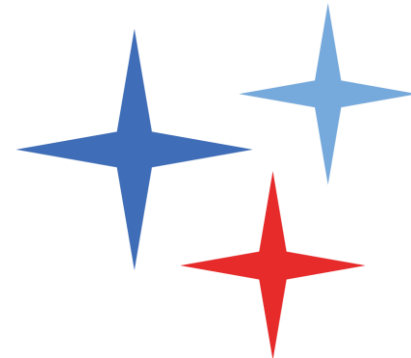
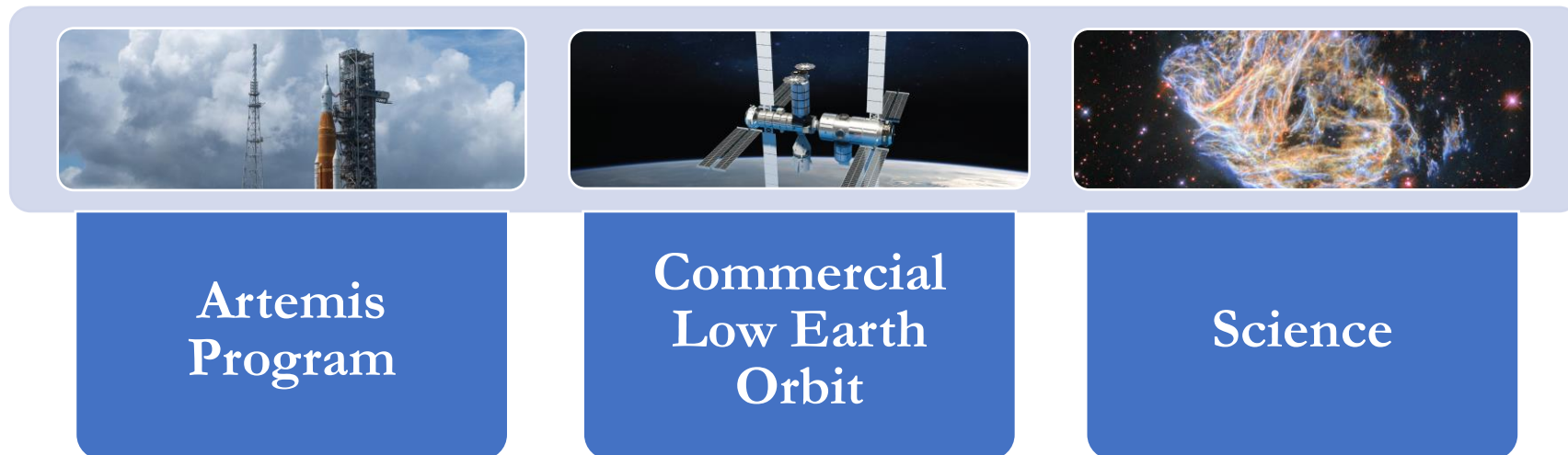
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# Forward Plan

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  - Office of Commercial Space Transport at the Federal Aviation Administration
  - Department of Commerce
  - Department of Transportation
  - State Department Office of Space Affairs
  - Department of Energy