

AGENDA for 5th NSpC UAG Mtg

- 10:00-10:05 **CALL TO ORDER**
James Joseph "JJ" Miller –UAG Executive Secretary
- 10:05-11:00 **HISTORICALLY BLACK COLLEGES AND UNIVERSITIES:
AMERICA'S INNOVATIVE ASSET**
*Dr. Victor McCrary – Vice Chair; National Science Board and Vice President for
Research, University of the District of Columbia*
- 11:00-11:05 **UAG SUMMARY OF MEETING GOALS**
Admiral James Ellis, Jr., USN, Retired –UAG Chair
- 11:05-11:25 **EDUCATION & OUTREACH SUBCOMMITTEE REPORT**
***Including Findings and Recommendations**
Colonel Eileen Collins, USAF, Retired –Subcommittee Chair
- 11:25-11:45 **TECHNOLOGY & INNOVATION SUBCOMMITTEE REPORT**
***Including Recommendations on Space Data Solutions & Standards**
Colonel Pamela Melroy, USAF, Retired –Subcommittee Chair
- 11:45-12:05 **SPACE POLICY & INTERNATIONAL ENGAGEMENT SUBCOMMITTEE
REPORT**
***Discussion on Norms of Behavior in Space**
Dr. David Wolf –Subcommittee Chair
- 12:05-12:25 **ECONOMIC DEVELOPMENT & INDUSTRIAL BASE SUBCOMMITTEE
REPORT**
***Including Strategic Propellant Reserve White Paper**
Dr. Mary Lynne Dittmar and Eric Stallmer –Subcommittee Co-Chairs
- 12:25-12:35 **EXPLORATION & DISCOVERY SUBCOMMITTEE REPORT**
General Lester Lyles, USAF, Retired –Subcommittee Chair
- 12:35-12:45 **NATIONAL SECURITY SUBCOMMITTEE**
Admiral James Ellis, Jr., USN, Retired –UAG Chair
- 12:45-12:55 **PUBLIC COMMENT**
- 12:55-13:00 **NEXT STEPS & CLOSING REMARKS**
Admiral James Ellis, Jr., USN, Retired –UAG Chair
- 13:00 **ADJOURN**

NATIONAL SPACE COUNCIL



USERS' ADVISORY GROUP

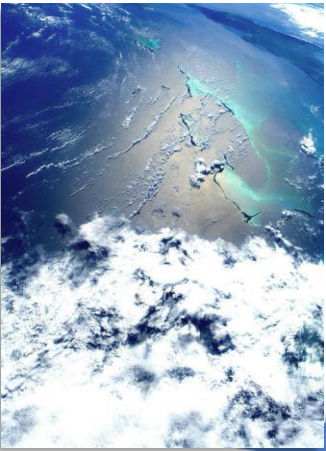
Public Input

<https://www.nasa.gov/content/national-space-council-users-advisory-group>

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As such, please **do not** send information or documents that are classified, proprietary, trade secrets, contain personally sensitive information, or are otherwise inappropriate for public release.

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NATIONAL SPACE COUNCIL

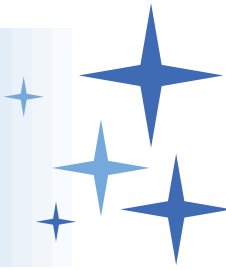
USERS' ADVISORY GROUP

USERS' ADVISORY GROUP EDUCATION AND OUTREACH SUBCOMMITTEE REPORT

Fifth Public Meeting
July 30, 2020

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EDUCATION AND OUTREACH MEMBERSHIP



Chair: Col. Eileen Collins (USAF, Ret.)

DFO: Barbara Adde, John Gainé

Members:

- Homer Hickam
- Fred Klipsch
- Pamela Vaughan
- Mandy Vaughn
- Stuart Witt

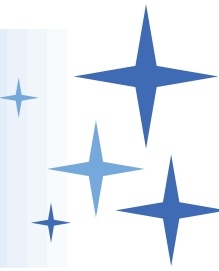
New Members:

- Dr. Bruce Jakosky
- Lieutenant Governor Jeanette M. Nuñez

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EDUCATION AND OUTREACH SCOPE



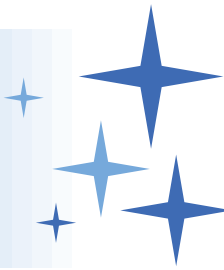
The UAG Education & Outreach Subcommittee has a twofold **mission**:

- To explore and recommend ways to improve our country's education system in an effort to strengthen technical expertise which will allow the United States to retain its preeminent global space programs.
- To collaborate with space program stakeholders to ensure the National Space Council has access to the information and conditions that contribute to strong United States leadership in space. The subcommittee will chronicle the interactions between its members and the stakeholder community.



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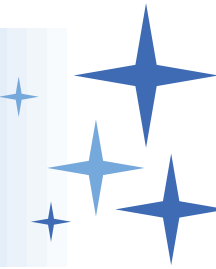
EDUCATION AND OUTREACH SUMMARY OF ACTIVITIES



- March 20 **National Science Foundation** (Dr. Karen Marrongelle, NSF Director for Education and Human Resources)
- April 21 **STEM Corp Bill** (U.S. Representatives Jim Banks and Andy Kim)
- May 7 **Arizona State University** (President Dr. Michael Crow)
- June 3 **Space Camp** (Dr. Kay Taylor, VP Education & Dr. Kim McCain, VP Sales, Marketing, Strategic Development)
- July 15 **American Astronautical Society: Glenn Symposium** (Col. Collins represented the Education and Outreach Subcommittee, panel discussion on aerospace workforce)
- July 16 **Historically Black Colleges and Universities (HBCUs):** (Dr. Victor McCrary, Vice Chair, National Science Board and Vice President for Research, University of the District of Columbia)



EDUCATION AND OUTREACH



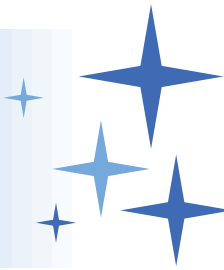
PREVIOUS RECOMMENDATION (Oct 21, 2019)

We recommend the National Space Council write a Space Policy Directive concerning STEM education in the United States with the intent to prepare the future space industry workforce.



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EDUCATION AND OUTREACH



EDUCATION AND OUTREACH OBSERVATION (July 30, 2020)

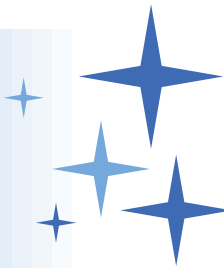
Critical issues with STEM education and with the space workforce are **matters of national security.**



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EDUCATION AND OUTREACH

National Science Foundation



The National Science Foundation presented results of the **2020 National Science Board Science and Engineering Indicators: The State of U.S. Science and Engineering**. It showed the number of women and underrepresented minorities (URMs) in the U.S. science and engineering (S&E) workforce has grown. However, these groups remain underrepresented in the S&E workforce relative to their overall presence in the workforce and the population.

Finding:

- There is a lack of trained employees to fill current available workforce positions in the space industry (NSB Sept. 2019 Report)

Finding:

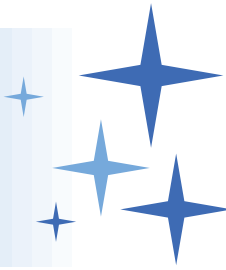
- There are opportunities to increase diversity in the workforce.

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EDUCATION AND OUTREACH

STEM Corp Bill



The bill establishes a STEM Corps to enhance the STEM and computer science workforce of the Department of Defense (DOD) and defense industry. **In exchange for tuition coverage for two years, participants will serve four years with the DOD**, to include an internship with an industry sponsor and the option to serve the fourth year of the program with an industry partner.

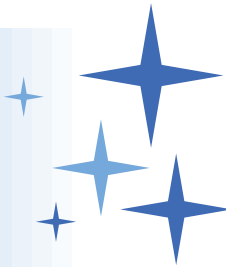
Finding:

- DOD has a critical need for computer and engineering degrees and personnel trained in cyber ops.



EDUCATION AND OUTREACH

Arizona State University



ASU has a five-year **graduation rate of 64.8% for engineering majors**, while the national average for colleges ranges between 47% and 49%.

(source: Arizona State University and American Society for Engineering Education)

Finding:

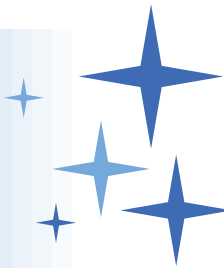
- A university has many opportunities to retain its engineering students, by using creative learning methods, incentivized faculty involvement, internships and graduate projects at earlier opportunities, aerospace company involvement, and mentoring.



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EDUCATION AND OUTREACH

Space Camp



Space Camp inspires future space workforce:

- 96% of Space Camp graduates say camp increased their interest in STEM topics
- 61% of Space Camp graduates are studying for or are now in a field related to aerospace, technology, biotech, energy, or defense.
- 50% claimed Space Camp inspired their decision to enter a STEM field

Finding:

- Surveys and data show that experiences like Space Camp have long term positive effects on the overall quality and quantity of space program employees

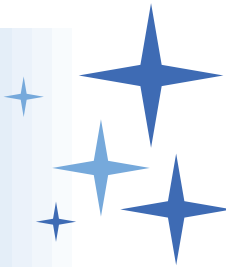


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EDUCATION AND OUTREACH

HBCUs and STW



Historically Black Colleges and Universities (HBCUs)

America's Underutilized Resource for Strengthening the STEM Workforce.

Skilled Technical Workforce (STW)

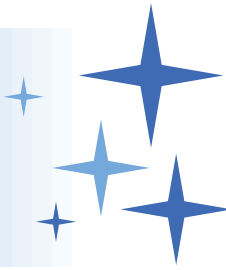


HBCUs and community colleges provide opportunities for training in specific technical skills that are in high demand by today's aerospace companies.

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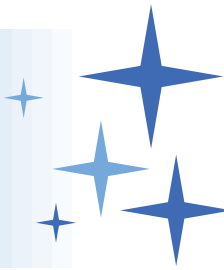
EDUCATION AND OUTREACH NEXT STEPS



- Potential speakers
 - The Council on American Workers
 - The Reagan Institute
 - Space Generation Advisory Council (SGAC)
 - Amateur Radio on the International Space Station (ARISS)
- Purpose: To better define and build the rationale for a Space Policy Directive supporting the future space workforce.



EDUCATION AND OUTREACH



EDUCATION AND OUTREACH OBSERVATION (July 30, 2020)

Critical issues with STEM education and with the space workforce are **matters of national security.**



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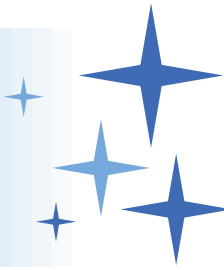
USERS' ADVISORY GROUP

USERS' ADVISORY GROUP TECHNOLOGY & INNOVATION SUBCOMMITTEE REPORT

Fifth Public Meeting
July 30, 2020

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TECHNOLOGY & INNOVATION MEMBERSHIP



Chair: Col. Pamela Melroy (USAF, ret)

DFO: Taylor Weeks

Members:

- Dean Cheng
- Tim Ellis
- The Honorable Kay Ivey
- General Lester Lyles (USAF, ret)
- Fatih Ozmen
- Harrison “Jack” Schmitt
- Dr. David Wolf

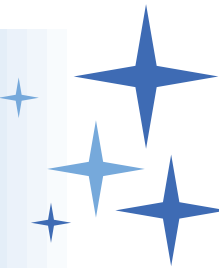
New Members:

- The Hon. John Culberson

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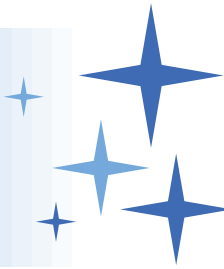
TECHNOLOGY & INNOVATION SCOPE



- Reviewing new technologies and new applications of technology, as well as business innovation practices and new business models, and...
- Making recommendations relevant to these topics on national policy, technology and operations architectures, and inter-department and agency coordination.



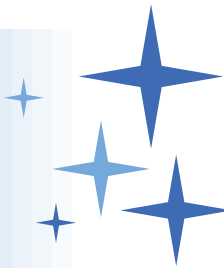
TECHNOLOGY & INNOVATION TOPICS OF FOCUS



- Lunar technology roadmap review. Review NASA lunar technology roadmap for gaps and...
- Space data as a US government capability vs buying as a service. Evaluate and recommend best practices for US government on owning data capability vs buying data commercially (Earth Observation, Space Situational Awareness, weather). Discussion initially focused on Space Situational Awareness (SSA) to support SPD-3, National Space Traffic Management Policy. Discussion has evolved to focus on trust in commercial and international SSA data.



TECHNOLOGY & INNOVATION SUMMARY OF ACTIVITIES

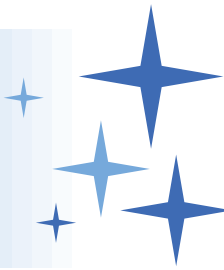


- Held 9 administrative/preparatory telecons to receive expert briefings, identify potential topics of focus, and develop a work plan.
- Received briefing from STMD on lunar roadmap January 2020. Follow up briefings have occurred on xEMU status. No specific recommendations at this time.
- Partnered with Aerospace Corporation and GW School of Policy to host a panel on trust in SSA on March 9, 2020.
- Discussed potential recommendations to bring to full UAG regarding SSA data standards and architectures.

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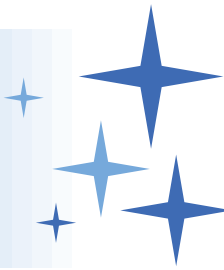
TECHNOLOGY & INNOVATION SSA TOPIC



- Space Policy Directive-3 (SPD-3) issued on June 18, 2018.
- First goal in SPD-3 is to advance Space Situational Awareness (SSA) and Space Traffic Management (STM) *Science and Technology*. “Activities include....advancing the S&T of critical SSA inputs such as observational data, algorithms, and models necessary to improve SSA capabilities, and developing new hardware and software to support data processing and observations.”
- The T& I Subcommittee has been studying some of the technical issues related to SSA data by consulting a number of experts in government and industry.



TECHNOLOGY & INNOVATION SSA TOPIC

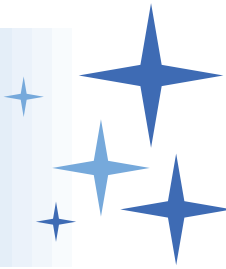


- United States Space Command (USSPACECOM) operationally tracks earth-orbiting space objects for the Department of Defense (DOD) using its own sensors
- USSPACECOM is also responsible for maintaining a space data catalog of locations of space objects, and of notifying commercial, government, domestic and international spacecraft operators of impending potential near misses or collisions
- Rapid growth in the number of space objects such as large commercial constellations, dynamic capabilities such as rendezvous, satellite servicing, and other satellite maneuvering activities has increased the challenge of providing collision avoidance support services
- The DOD will need to incorporate more multi-sourced information, data science, and analytics to provide meaningful and timely situational awareness. Trust in the reliability of the data from non-DOD sources has been identified as an obstacle to incorporating these additional sources of data.



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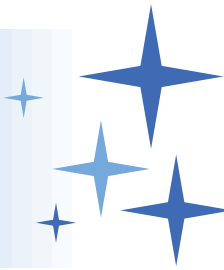
TECHNOLOGY & INNOVATION SSA TOPIC



- The DOD has a number of activities to evolve its own command and control system and learn how best to build trust and incorporate non-DOD SSA data
 - Experimentation with rapid prototyping is underway
 - New commercial software service cloud architectures are **evolving options for data distribution, storage, and analytics**
 - Activities to bring international partner data into USSPACECOM operations centers are also occurring in DOD
- DARPA's Orbit Outlook Program culminated in a demonstration in 2016 that showed that it is technically feasible to do real-time reliability analytics on SSA data from non-traditional sources; one lesson learned was how important **data architecture** is for scaling to operational needs



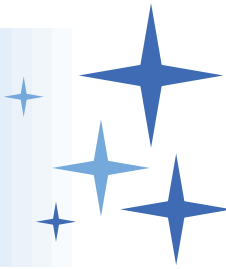
TECHNOLOGY & INNOVATION SSA TOPIC



- SPD-3 states that the Department of Commerce (DOC) should be the focal point for administering an open architecture data repository and providing space collision avoidance support services while DOD focuses on maintaining access to and freedom of action in space.
- Interoperability will remain key as there will be overlapping data requirements, and a need for communication and coordination.
- The goals of this SPD have not progressed to a large extent due to a lack of agreement on execution in the federal government
 - DOC has been coordinating with the DOD, but does not have the resources to significantly progress its own SSA open data architecture



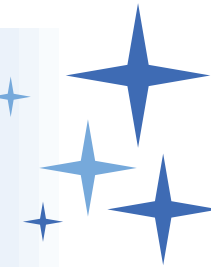
TECHNOLOGY & INNOVATION SSA TOPIC



- The DOD and DOC will be significant customers of the emerging commercial SSA industry.
- DOD and DOC must work together to avoid incompatible approaches so industry can organize around the products needed by both organizations. American taxpayers should not be paying twice for substantively the same data in different forms due to incompatible approaches within the US Government.
- The long-term viability of a commercial marketplace for SSA data is still uncertain and could be at risk if DOD and DOC do not define their needs in a timely manner.



TECHNOLOGY & INNOVATION RECOMMENDATIONS

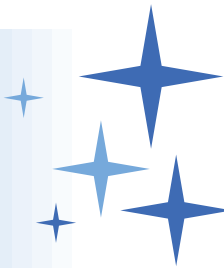


Recommendation 1:

The Departments of Defense and Commerce should work to **create an interoperable approach on multi-sourced space data modeling, data sharing, and curation architectures.** Both departments should study lessons learned and fund studies and research around technical solutions and processes that allow incorporation of properly vetted international and commercial data into the space object catalog for military, civil and commercial uses. **We further recommend that the Departments should report to the National Space Council regularly on their progress.**



TECHNOLOGY & INNOVATION SSA TOPIC

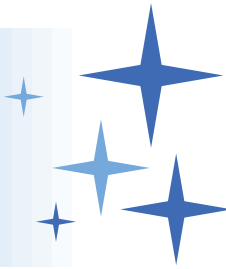


- The National Geospatial-Intelligence Agency (NGA) and others in the Intelligence Community (IC) have already experienced some of these issues with remotely sensed earth observational data; the advent and growth of commercial entities (many international) has required the issue of trust to be addressed.
- As a regulator, NGA requires a **data security plan** for safety of operations; as a customer, the government increases rigor to require a **data protection plan** which documents the “supply chain” of the data to include networks, network owners, encryption, and analytics, and other information.
- It has been a challenge to NGA to communicate these requirements; attempting to build in compliance after the fact can delay contracting efforts for critical data.

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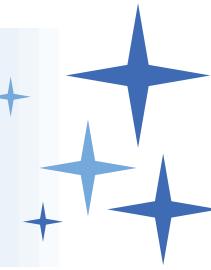
TECHNOLOGY & INNOVATION SSA TOPIC



- Experts also commented on the need for a standard method for quantifying SSA sensor uncertainty.
- Although there has been relevant research, clarity on all aspects of data vetting must be agreed to by DOD and DOC to establish thresholds for accepting the data for inclusion into the space object catalog. Standards for sensor uncertainty provides certainty for SSA businesses and international partners alike.
- The Consultative Committee for Space Data Standards (CCSDS) is a multi-national forum for the development of communications and data systems standards for spaceflight (including some SSA data standards). DOC and DOD should leverage NASA's long expertise so as not to preclude harmonization of DOC and DOD emerging standards with existing global standards.



TECHNOLOGY & INNOVATION RECOMMENDATIONS



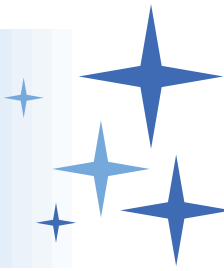
Recommendation 2:

The Department of Defense, Department of Commerce, and NASA should work to jointly **develop standards for space data protection and security plans, space data verification, and space data uncertainty quantification.**



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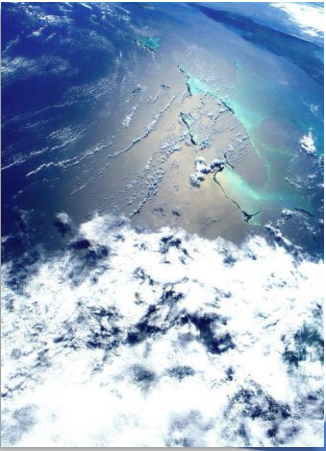
TECHNOLOGY & INNOVATION SSA TOPIC



- Potential future discussion topics:
 - Other relevant research such as sensitivity of SSA data to types of errors, and the value of new types of sensors in data fusion
 - The impact of frequent observation re-visit rates on trust/verification in SSA data
 - Different use cases for SSA data, and determining accuracy vs urgency for each use case, can impact the need for trust/verification
 - Because of the lagging quality of the current space object catalog, many others are pursuing development of their own catalog capability.
 - The USG should scope its needs and communicate clearly to commercial SSA industry what is needed to ensure entrepreneurs and investors clearly understand the size of the USG market.



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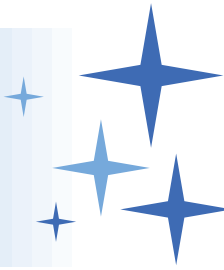
SPACE POLICY AND INTERNATIONAL ENGAGEMENT SUBCOMMITTEE REPORT

Fifth Public Meeting
July 30, 2020

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SPACE POLICY AND INTERNATIONAL ENGAGEMENT

Membership



Chair: David Wolf, M.D.

DFO: Dr. Ben Ashman

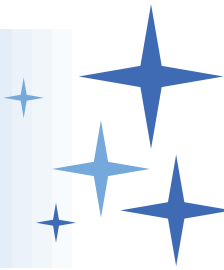
Members:

- Col. Buzz Aldrin (USAF, Ret.)
- David Calhoun
- Dean Cheng
- Dr. Mary Lynne Dittmar
- Adm. James Ellis, Jr. (USN, Ret.)
- Fred Klipsch
- Col. Pamela Melroy (USAF, Ret.)
- Eric Stallmer



SPACE POLICY AND INTERNATIONAL ENGAGEMENT

Scope (per Terms of Reference)

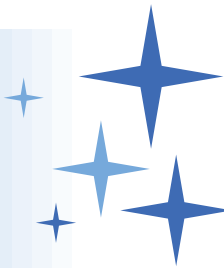


- The Space Policy and International Engagement subcommittee considers how the United States can most effectively continue to lead international space efforts to advance both U.S. and partner interests.
- The subcommittee focuses on how the United States should respond to growing international space capabilities, especially those that are potentially adversarial.



SPACE POLICY AND INTERNATIONAL ENGAGEMENT

Summary of Activities



Four fact gathering/preparatory telecons since the 4th UAG meeting (10/21/19)

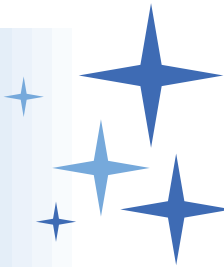
- NASA on evolving international relationships, Artemis Accords, and space resource commercialization
 - 2/18/2020 – Mr. Michael Gold, NASA Assoc. Administrator for International and Interagency Affairs (acting) and Special Advisor to the Administrator
- Dept. of State on National Security and Civil-Commercial Space Norms of Responsible Behavior, U.N. treaties, U.S. stakeholders
 - 4/24/2020 – Mr. Dave Turner, Office of Space and Advanced Technology, Dept. of State
 - 5/21/2020 – Mr. Eric Desautels, Office of Emerging Security Challenges, Dept. of State
 - 6/25/2020 – Both Mr. Turner and Mr. Desautels
- Reviewed Space Policy documents and Treaties (~15)

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SPACE POLICY AND INTERNATIONAL ENGAGEMENT

Topics of Focus



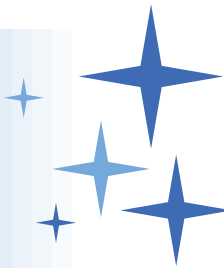
- **Promoting U.S. global leadership**
- **Norms of Responsible Behavior in Space**
- Deterrence, *Attributability*, and Stability in the Space Domain
- Unique considerations for China, Russia (Iran, North Korea)



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SPACE POLICY AND INTERNATIONAL ENGAGEMENT

Observations



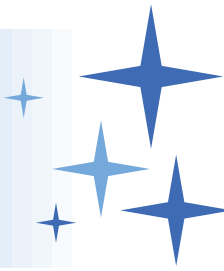
The role of space in the national security, commercial, and civil sectors is rapidly evolving

- Allies and adversaries rapidly advancing in all sectors
 - NATO recognized space as a new operational domain in its 2019 Space Policy
 - China and Russia are actively weaponizing space
 - High competition to attract global commerce
 - Many new emerging participants
- Multiple diverse stakeholders of “Norms of Responsible Behavior” (NRB)
 - NRBs are mature in maritime and arctic domains
 - U.N. voluntary measures include Transparency and Confidence Building Measures (Nat. Sec.) and Guidelines for the Long-term Sustainability of Outer Space Activities (civil-commercial) – heavy overlap
 - U.N. curated norms are necessarily slow and of limited scope to get agreement (E.U. 2015 attempt)
 - U.S./NASA Artemis Accords beginning to address Deep Space issues (e.g. mineral right claims)
 - This Monday, in Vienna, 1st U.S. bilateral Space Security Exchange (SSE) with Russia to advance NRBs in the Space warfighting domain to avoid misperceptions and miscalculations
 - U.S. Space Warfighting Doctrine about to roll out from DOD
 - State Dept., Office of Emerging Security Challenges (Nat. Sec.) and Office of Space and Advanced Technology (civil-commercial) coordinate U.S. stakeholders and represent NRBs to U.N.



SPACE POLICY AND INTERNATIONAL ENGAGEMENT

Discussion (Norms of Responsible Behavior)

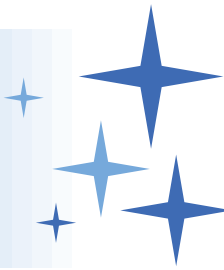


- An opportunity exists for the U.S. to lead by establishing Norms of Responsible Behavior in space
 - Promote Security, Transparency, Stability, Sustainability, and Trust in Space
 - Reduce misperceptions and miscalculations of intent
 - U.S. government and industry have historically served as examples of best practices across the global space enterprise
- U.N. Space treaties did not contemplate scope and scale of activity
 - China (CCP) aggressively attracting relationships via favorable terms (subsidies)
 - U.S. supports free market driven global space economy
 - Current U.S. EXIM Bank activity can level international playing field
 - U.S. relaxation of export restrictions to the degree possible
 - Other methods?



SPACE POLICY AND INTERNATIONAL ENGAGEMENT

Discussion (Norms of Responsible Behavior)



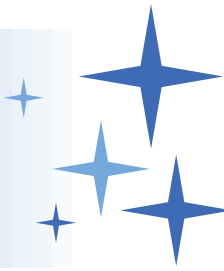
- Establishing U.S. consolidated Norms of Responsible Behavior in Space to Promote Security, Stability, and Sustainability across the National Security, Civil, and Commercial Space sectors
 - Coordinate the multiple U.S. stakeholders
 - NSpC just released, “New Era for Deep Space Exploration and Development”
 - “Roles of the Departments of State, Defense, Commerce, Transportation, Energy, and Homeland Security in space exploration and development are among the major reasons the U.S. takes a ‘whole-of-government’ approach”
 - Consolidated norms embraced by the U.S. whole-of-government could encourage trust in the U.S. and broader global adoption
 - Special cases could be accommodated
 - Unique National Security sections
 - Peacetime effectivity
 - Confidential or classified sections
 - Some terms may be dependent on mutual agreement between states

To submit a question, comment, or idea to the UAG, please use contact@spacecounciluag.org



SPACE POLICY AND INTERNATIONAL ENGAGEMENT

Discussion (Norms of Responsible Behavior)

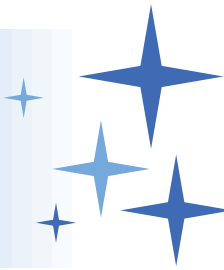


- Questions for us to consider;
 - Is such a baseline U.S. set of “Consolidated Norms” of value?
 - Several U.S. agencies already producing “Norms”
 - Allow expression of U.S. position unburdened by necessity of 100% U.N. consensus
 - State Dept. expresses value of retaining multiple approaches within U.N.
 - Could nicely support U.S. led (multilateral and bilateral) negotiations
 - Where would these be administered/curated?
 - Suggest Dept. of State, Office of Emerging Security Challenges and Office of Space and Advanced Technology (directors see value if done correctly)
 - Voluntary (Dept. of State position) vs. Mandatory?
 - Are there special considerations for China and Russia (Iran, North Korea)?
 - Or should norms evolve separately in an ad hoc manner? Recommendation?



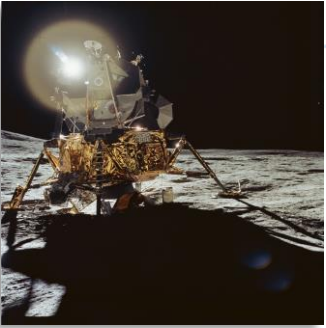
SPACE POLICY AND INTERNATIONAL ENGAGEMENT

Forward Work



- Recommend “policy” priorities to National Space Council for 2021 and beyond
 - Implement civil Space Domain Awareness plan (e.g., in Dept. of Commerce)
 - Norms of Responsible Behavior in Space
 - “Mineral Rights” claim regime
- Recommend “space” priorities for 2021 and beyond
 - e.g., DOE/NASA space fusion reactor power system
- Recommend priority bilateral topics with Russia and China
 - Reduce potential for active conflict
 - Confirm effective means of “deterrence, denial, attribution, defeat” in place
 - Promote long term positive relationships
 - Identify “small” areas of cooperation (space weather, science data sharing, SDA)





NATIONAL SPACE COUNCIL

USERS' ADVISORY GROUP

ECONOMIC DEVELOPMENT AND INDUSTRIAL BASE SUBCOMMITTEE REPORT

Fifth Public Meeting
July 30, 2020

To submit a question, comment, or idea to the UAG, please use contact@spacecounciluag.org

ECONOMIC DEVELOPMENT & INDUSTRIAL BASE SUBCOMMITTEE

Membership



Chair(s):

- Dr. Mary Lynne Dittmar
- Mr. Eric Stallmer

DFO:

- Nate McIntyre

Members:

- Tory Bruno
- Tim Ellis
- Homer Hickam
- Fred Klipsch
- Gwynne Shotwell
- Dr. Bob Smith

New Members:

- Eileen Drake
- Lt Gov Nuñez



ECONOMIC DEVELOPMENT & INDUSTRIAL BASE SUBCOMMITTEE

Summary of Activities



- Regular Consultation with National Space Council staff
- Co-chairs have participated in in Bi-weekly telecon with UAG Executive Committee discussing subcommittee issues / COVID-19 situation.
- Information gathering with several stakeholders
- Discussed committee work with members most recently during telecon on 2 June, which also featured NASA Commercialization update that was recently reviewed by the NAC
- Sought input from members on Strategic Propellant Reserve Paper
- Followed up with UAG Chair Admiral Ellis on 8 July and 24 July to finalize approach with SPR Paper

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ECONOMIC DEVELOPMENT & INDUSTRIAL BASE SUBCOMMITTEE

Stimulating Economic Development of Space

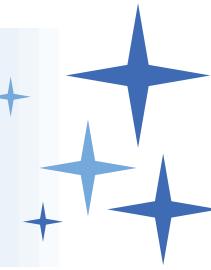


- Held 3 exploratory telecons with members to discuss issues and identify scope regarding economic development of low Earth orbit and cislunar space, and the region between them.
- Our focus has been largely in three areas:
 - Economic development/commercialization of low Earth orbit (LEO) with strategic consideration of extension to cislunar space,
 - Formulation of approaches to facilitate each.
 - Identified several areas of concern for within the Industrial Base due to COVID-19 concerns.
- Discussed plan with subcommittee members most recently during telecon on June 2, 2020.
 - Focused on USG initiative to stimulate space economy
 - Discussed final edits for Space Strategic Propellant Reserve Paper



Economic Development and Industrial Base Subcommittee

TOPIC OF FOCUS: Commercialization of LEO

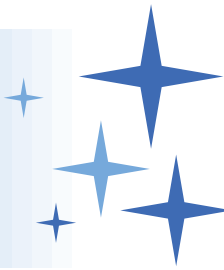


- With regard to the commercialization of LEO, discussions are ongoing within the committee regarding enabling factors to support commercialization
- This focus was deferred in April-early June in light of the discussion about COVID-19 impacts. The committee appreciates the offer of help made by NSpC staff to arrange future briefings across agencies and other entities to support the committee's work in this regard.



Economic Development and Industrial Base Subcommittee

TOPIC OF FOCUS: Economic Development of LEO and beyond



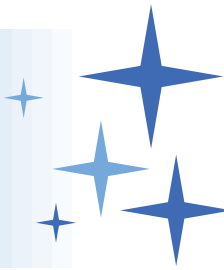
- With regard to economic development of the LEO to cislunar space “corridor”, a recommendation was brought forward by the committee to the UAG in October, 2019 (4th meeting) to develop a white paper to address the development of a plan for a strategic space propellant reserve. This recommendation was accepted by the UAG at that meeting and subsequently by the National Space Council.
- The ED&IB committee has completed a pre-decisional draft of the paper which has been forwarded to the UAG.

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Economic Development and Industrial Base Subcommittee

TOPIC OF FOCUS: Strategic Propellant Reserve (Background)

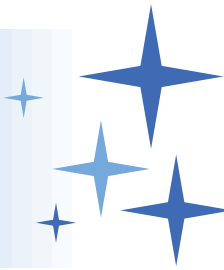


- **USG Investment In Infrastructure can enable space commerce**
 - Leverage NASA investments and programs such as SLS, Orion, and the ISS
- Overarching enabler for commercial activity is **Affordable Transportation**
 - Earth To Cislunar transportation costs \$10,000 To \$50,000 per kg today
- Driving cost of in-space transportation is **Propellant**
 - The majority of a rocket's mass is fuel
- Propellants sourced in space avoid cost of lifting from Earth's gravity well
 - 60% to 70% of energy required to reach cislunar destination is spent on Earth-to-LEO
- **USG can stimulate a large space economy by facilitating in-space propellant availability**
 - Ice Mining
 - Propellant Manufacture
 - Storage



Economic Development and Industrial Base Subcommittee

TOPIC OF FOCUS: Strategic Propellant Reserve (Approach)



- **The USG maintains strategic reserves to sustain and grow economy and protect citizenry and commerce**
 - **Strategic Petroleum Reserve**
 - Defense Logistics Agency Strategic Materials (Industrial Metals)
 - Strategic National Stockpile (Medicines)
 - Strategic Helium Reserve
 - Bill Emerson Humanitarian Trust (Grain)
- The **USG** can establish a requirement to create and maintain **Strategic Reserve of Propellant sourced in space**
 - Modeled on the US Strategic Petroleum Reserve (SPR)
- Creation of the Reserve would establish propellant production and storage infrastructure
 - Also protects future economic activity from supply interruptions



ECONOMIC DEVELOPMENT & INDUSTRIAL BASE SUBCOMMITTEE

Finding



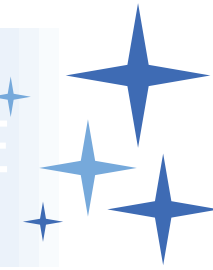
- **Finding (presented during 4th meeting of the UAG, October 2019)**
 - LEO and cislunar space are regions of strategic vital interest to the United States. Development of a space economy requires a whole-of-government approach together with investment in infrastructure to enable commerce and economic development. While NASA plays an early and critical role, the nature of economic development and assurance of the strategic interests of the United States fall outside the purview and budget of any one agency. The overarching enabler for space commerce is affordable transportation. . The USG can stimulate development, ensure stability, and assure global leadership of the space economy for decades to come by facilitating the availability of in-space propellant.





- Finding: Development of an in-space strategic propellant reserve would enable three key outcomes:
- (1) It would stimulate economic development by reducing uncertainty regarding availability of propellant, enhancing confidence for governments and private interests alike.
- (2) It would buffer U.S. future in-space economic interests from temporary interruptions in supply.
- (3) It would also provide a significant means to help stabilize a future space commodities exchange, in which forward purchases (futures) of commodities such as water, oxygen, hydrogen, metals, and propellant, could be traded





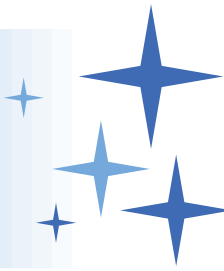
Opportunity for Discussion



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Economic Development and Industrial Base Subcommittee

TOPIC OF FOCUS: COVID-19 Actions

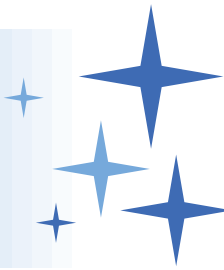


- COVID-19 impacts to the industrial base were discussed at length as part of committee fact-finding – a process that is still ongoing
- Four findings emerged, phrased here as an effort to preserve the aerospace and defense industrial base, with special attention to NASA
- These were offered for consideration at the time – some have seen progress, but we would like to understand any other issues, or issues with implementation



Economic Development and Industrial Base Subcommittee

TOPIC OF FOCUS: COVID-19 Actions

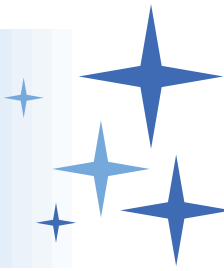


- 1) Designate the nation's entire aerospace and defense workforce and its suppliers as essential to national security, enabling work to proceed, and providing necessary Federal guarantees during the crisis and post-crisis recovery.
- 2) Authorize payment to workers furloughed as a result of COVID-19 or workers who cannot tele-work or access facilities closed as a result of COVID-19, in order to maintain capabilities and critical workforce, akin to that provided in natural disasters



Economic Development and Industrial Base

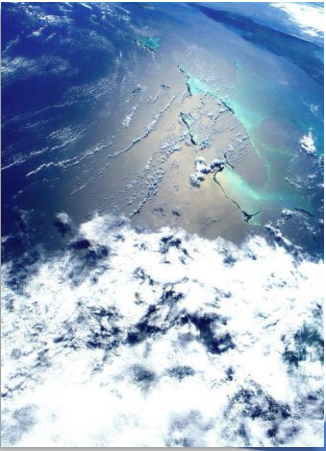
Subcommittee TOPICS OF FOCUS: COVID-19 Actions (cont.)



3) Establish an A&D Supply Chain Stabilization program. One example of actions under this program would be to back lines of credit with Federal guarantees to provide for payroll under circumstances where payment is stopped or delayed. Another would be providing for refunds for R&D tax credits so that companies may immediately access this liquidity.

4) Designate critical NASA mission activities, contractors, and supply chain as essential industry. Critical NASA missions to be determined by the NASA Administrator.





NATIONAL SPACE COUNCIL

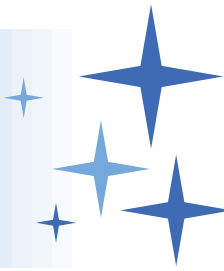
USERS' ADVISORY GROUP

USERS' ADVISORY GROUP EXPLORATION AND DISCOVERY SUBCOMMITTEE REPORT

Fifth Public Meeting
July 30, 2020

To submit a question, comment, or idea to the UAG, please use contact@spacecounciluag.org

EXPLORATION AND DISCOVERY MEMBERSHIP



Chair: General [USAF, Ret.] Les Lyles

DFO: James J. Miller

Members:

- Dr. Buzz Aldrin (USAF, Ret.)
- Tory Bruno
- David Calhoun
- Dr. Mary Lynne Dittmar
- Homer Hickam
- The Hon. Kay Ivey

- Fatih Ozmen
- Gwynne Shotwell
- Eric Stallmer
- Pamela Vaughan
- Kathy Warden
- Stuart Witt

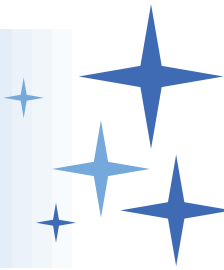
New Members:

- The Hon. John Culberson
- Eileen Drake
- Dr. Bruce Jakosky
- James D. Taiclet

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EXPLORATION AND DISCOVERY SCOPE



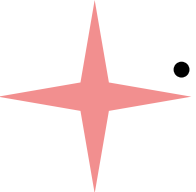
TOR :

- Assess current efforts and identify areas for further work by NASA on defining a lunar exploration architecture and the organizational and technical means mechanisms for architectural trades. Depending on information provided by NASA, consider recommending an independent evaluation of risk factors and potential mitigations for the lunar exploration architecture[s].

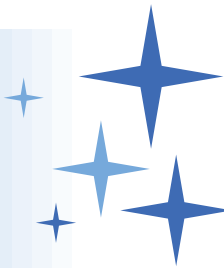
APPROACH :

- Conduct extensive discussions with the NASA Space Architects
- Establish an “UAG Task Force” to conduct detailed reviews of NASA’s proposed Lunar Architecture. The Task Force was made up of the UAG Executive Committee: Adm. (USN, Ret.) Jim Ellis, Dr. Mary Lynne Ditmar, Col. (USAF, Ret) Eileen Collins, Col. (USAF, Ret.) Pam Melroy, Dr. David Wolf, Gen. (USAF, Ret.) Les Lyles
- Report results of reviews/assessments to the E&D Subcommittee and to the full UAG
- Consider follow-on activities based on results

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EXPLORATION AND DISCOVERY SUMMARY OF ACTIVITIES

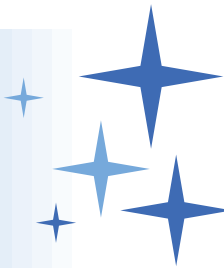


- **Conducted detailed “Artemis Overview”** and Architecture discussion with NASA/HEOMD (Attended/Joined via WebEx by E&D Subcommittee or their representatives)- 28 January 2020
- **NASA addressed notional 2024 Lunar Architecture / Missions / Vision / Trade space considerations / previous architectures / Sustainable Lunar presence / Reusability / Risks / Acquisition approaches.**
- **Held a ‘Strategic Overview’ meeting with the NASA Administrator** to discuss NASA’s “Lunar-to-Mars” sustainability and reusability planning.
- **Continuing ongoing dialogue with NASA HEOMD**
- **Reviewed NASA plans to charter a “Program Status Assessment” of the Artemis Program** (architecture, schedules, organization, acquisition approach)
 - Reviewed PROGRAM STATUS ASSESSMENT results - 16 June 2020

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EXPLORATION AND DISCOVERY OBSERVATIONS

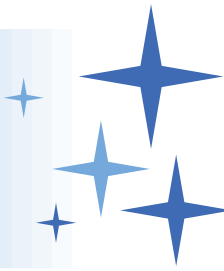


28 January 2020 Artemis Review:

- NASA has conducted a detailed, thorough review of options and trades required to return to the Moon as quickly as possible
- The elements of the Lunar Architecture appear to be appropriate for the missions planned.
- NASA's architecture addresses both **sustainability** for future lunar missions and **reusability** for subsequent missions to Mars.
 - (Note : The E&D reviews did not address cost realism)



EXPLORATION AND DISCOVERY OBSERVATIONS



16 June 2020 Program Status Assessment:

- Briefed by Maj. Gen. (USAF, Ret.) Mitch Mitchell PSA Chairman

Key Findings:

Systems Engineering:

- Current cross-program / Artemis enterprise SE processes do not support needed decision velocity to achieve Artemis 2024 timeline.
- Artemis CONOPS is not developed. There is not a detailed plan to manage mission level analysis (increases risk to crew and mission)
- Artemis Program does not have an integrated V&V plan

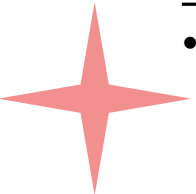
Program Organization:

- There is not a single, formal Artemis Program organization

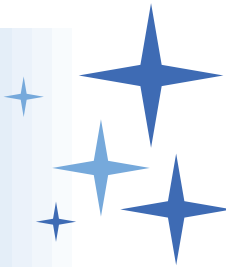
Schedule Risks:

- Artemis Phase I and AES do not have an Integrated Master Schedule.
- Assessment shows that Artemis Phase II has low likelihood of making April 2023 launch date.
- HLS aggressive schedule is the critical path for the Artemis III (2024) mission.

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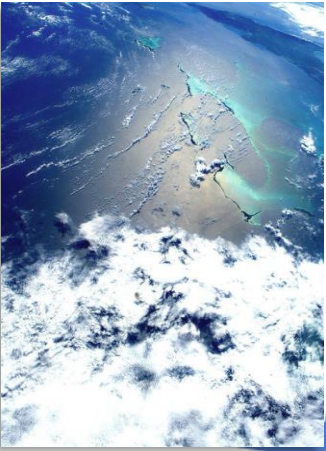
EXPLORATION AND DISCOVERY NEXT STEPS



- Review NASA responses to PSA Findings and Recommendations
- Continue to review, assess, and comment on Artemis program status



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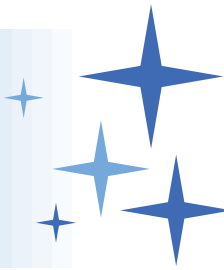
USERS' ADVISORY GROUP

USERS' ADVISORY GROUP NATIONAL SECURITY SUBCOMMITTEE REPORT

Fifth Public Meeting
July 30, 2020

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NATIONAL SECURITY SUBCOMMITTEE MEMBERSHIP



Chair: ADM James O. Ellis, Jr., (Ret.)

DFO: Ms. Jolene Meidinger, NASA

Members:

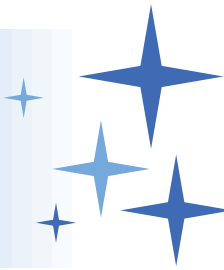
- Tory Bruno
- David Calhoun
- Dean Cheng
- Tim Ellis
- Gen. Lester Lyles (USAF, Ret.)
- Col. Pamela Melroy (USAF, Ret.)
- Fatih Ozmen
- Harrison Schmitt
- Gwynne Shotwell
- Dr. Bob Smith
- Mandy Vaughn
- Kathy Warden
- Stuart Witt

New Member:

- James D. Taiclet



NATIONAL SECURITY SUBCOMMITTEE SCOPE



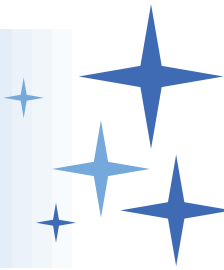
The UAG National Security Subcommittee focuses on national security space issues by:

- Reviewing national security considerations relevant to National Space Policy and National Security Space Strategy including:
 - Space systems, space capabilities, and space architecture
 - Future national security space requirements
 - System resiliency, robustness, and interoperability
 - Interagency collaboration/cooperation
 - The evolving national security space threat environment
- Making recommendations on national security considerations to the UAG affecting coordination, cooperation, and technology and information exchange among the civil, national security, commercial, and international space sectors.



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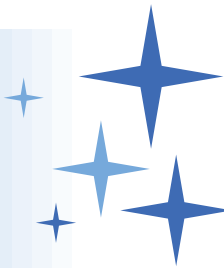
NATIONAL SECURITY SUBCOMMITTEE SUMMARY OF ACTIVITIES



- Developed Subcommittee Terms of Reference, identified potential topics of focus, and developed a work plan.
- Held three classified information gathering sessions with the Department of Defense focused on planning for the creation of the United States Space Force, implementation of the plan, and concepts for addressing areas such as organization, operations, personnel policy, and procurement initiatives.
- Have been asked to continue to monitor progress and, if appropriate, provide observations, findings, and recommendations to the NSpC for consideration by the DoD.



NATIONAL SECURITY SUBCOMMITTEE POTENTIAL FUTURE TOPICS OF FOCUS



With Space Policy and International Engagement Subcommittee:

- How should the U.S. foster the creation of norms of behavior in space that contribute to deterrence and improved crisis stability?
- What topics should have the highest priority for discussion?

With the Exploration and Discovery Subcommittee:

- How should the U.S. better align and coordinate its national security and civil space activities across the entire space enterprise?
- Where should there be clear separation between national security and civil space activities?

Independently:

- While the U.S. is currently seeking to consolidate space acquisition and architecture activities within the U.S. Space Force, how should DoD-wide space architecture, operations, and procurement activities be managed?

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AGENDA for 5th NSpC UAG Mtg

- 10:00-10:05 **CALL TO ORDER**
James Joseph “JJ” Miller –UAG Executive Secretary
- 10:05-11:00 **HISTORICALLY BLACK COLLEGES AND UNIVERSITIES:
AMERICA’S INNOVATIVE ASSET**
*Dr. Victor McCrary – Vice Chair; National Science Board and Vice President for
Research, University of the District of Columbia*
- 11:00-11:05 **UAG SUMMARY OF MEETING GOALS**
Admiral James Ellis, Jr., USN, Retired –UAG Chair
- 11:05-11:25 **EDUCATION & OUTREACH SUBCOMMITTEE REPORT**
***Including Findings and Recommendations**
Colonel Eileen Collins, USAF, Retired –Subcommittee Chair
- 11:25-11:45 **TECHNOLOGY & INNOVATION SUBCOMMITTEE REPORT**
***Including Recommendations on Space Data Solutions & Standards**
Colonel Pamela Melroy, USAF, Retired –Subcommittee Chair
- 11:45-12:05 **SPACE POLICY & INTERNATIONAL ENGAGEMENT SUBCOMMITTEE
REPORT**
***Discussion on Norms of Behavior in Space**
Dr. David Wolf –Subcommittee Chair
- 12:05-12:25 **ECONOMIC DEVELOPMENT & INDUSTRIAL BASE SUBCOMMITTEE
REPORT**
***Including Strategic Propellant Reserve White Paper**
Dr. Mary Lynne Dittmar and Eric Stallmer –Subcommittee Co-Chairs
- 12:25-12:35 **EXPLORATION & DISCOVERY SUBCOMMITTEE REPORT**
General Lester Lyles, USAF, Retired –Subcommittee Chair
- 12:35-12:45 **NATIONAL SECURITY SUBCOMMITTEE**
Admiral James Ellis, Jr., USN, Retired –UAG Chair
- 12:45-12:55 **PUBLIC COMMENT**
- 12:55-13:00 **NEXT STEPS & CLOSING REMARKS**
Admiral James Ellis, Jr., USN, Retired –UAG Chair
- 13:00 **ADJOURN**



NATIONAL SPACE COUNCIL



USERS’ ADVISORY GROUP

Public Input

<https://www.nasa.gov/content/national-space-council-users-advisory-group>

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