

2021 STATE OF THE SPACE INDUSTRIAL BASE HYBRID WORKSHOP

NEW
SPACE
NEW MEXICO

14-16 July 2021

Hosted by NewSpace New Mexico for key participants from US Space Force, Defense Innovation Unit, and Air Force Research Laboratory

US Space Force



Defense Innovation Unit



Air Force Research Laboratory



Welcome to a dynamic hybrid workshop that for the third year it is a “must attend” space industry event. Contribute to developing critical solutions to support the Space industrial base.

Objectives:

- *Establish implementable recommendations for defense policy and actions to ensure the maintenance and expansion of the US space industrial base to meet national defense needs.*
- *Provide focus on short-term recommendations and actions to preserve and expand the US space industrial base in light of the disruption to the overall US economy and particular to the Space Industrial base by the COVID 19 virus pandemic.*
- *Establish these defense policies and actions in the context of the larger set of implementable whole-of-government policies and actions required to guarantee the US space industrial base needed to ensure a space future supporting US national power.*

2021 State of the Space Industrial Base Hybrid Workshop

Agenda

Wednesday, 14 July 2021

- 8:00 NewSpace New Mexico Welcome and Introduce Lt. Gov. Morales: Casey Anglada DeRaad
- 8:00 Welcome – Lt. Gov. Howie Morales
- 8:15 Key Participant – U.S. Space Force Introduction
- 8:30 Panel: State of the Space Industrial Base - Brig Gen Olson, Brig Gen Butow, Col Felt
- 9:00 An Update on America’s Supply Chains and Executive Order 14017 from the White House – National Security Council - Jessica McBroom
- 9:30 The U.S. Artemis Program: Cislunar Spacepower in the Era of Strategic Competition - Dr. Bhavya Lal
- 10:00 Break
- 10:15 Maintaining Military & Intel Superiority - Maj Gen (Ret) Jay Santee
- 10:45 Space Economy - Economic Markets and Financial Tools - Bruce Cahan and Sean Ross
- 11:15 Investing in U.S. Commercial Space – Enabling Strategic Competition and Growth - Mandy Vaughn
- 11:45 Working Group Instructions - Brig Gen Butow
- 12:15 – 1:30 Lunch Break – On your own
- 1:30 – 5:00 Working Groups 1-5, Current State – Key Milestones
 - WG1-Evolving Space Operational and Support Concepts
 - WG2 - Delivering Space Mobility and Logistics Capabilities
 - WG3 - Space Information Services
 - WG4 - Pervasive Space Tech and Supply Chain Enablers for Expanded Orbital Regimes
 - WG5 - Space Policy, Economy & Financial Engineering
- 5:00 Working Group Leaders – Tag Up
- 6:00 Networking Reception - Q Station, 3225 Central Ave. NE, Albuquerque NM

Thursday, 15 July 2021

- 8:00 Welcome – NewSpace New Mexico
- 8:15 Key Participants – Defense Innovation Unit and Air Force Research Laboratory
- 8:30 Space Hybrid Architecture – Steve Nixon
- 9:00 Space Super Highway – Dr. Gordon Roesler
- 9:30 Geopolitical Strategic Competition – Dr. Mir Sadat
- 10:00 Leveraging the Emerging Space Economy to Meet Critical Gov't Needs. The shift is underway. Where should policymakers focus their efforts? – Chris Quilty
- 10:30 – 10:45 Break
- 10:45 – 12:00 Working Groups 1-5, Inflection Points
- WG1-2 Evolving Space Operational and Support Concepts
 - WG2 -2 Delivering Space Mobility and Logistics Capabilities
 - WG3 – 2 Space Information Services
 - WG4 - 2 Pervasive Space Tech and Supply Chain Enablers for Expanded Orbital Regimes
 - WG5 – 2 Space Policy, Economy & Financial Engineering
- 12:00 – 1:00 Lunch Break – On your own
- 1:00 – 5:00 Working Groups 1-5, Key Actions and Recommendations
- WG1-3 Evolving Space Operational and Support Concepts
 - WG2 -3 Delivering Space Mobility and Logistics Capabilities
 - WG3 – 3 Space Information Services
 - WG4 - 3 Pervasive Space Tech and Supply Chain Enablers for Expanded Orbital Regimes
 - WG5 – 3 Space Policy, Economy & Financial Engineering
- 5:00 Working Group Leaders – Tag Up
- 6:00 Dine Around (All walkable from Hotel Albuquerque) - Seasons Rotisserie; High Noon Restaurant & Saloon, Ponderosa Brewery, Gardunos, D.H. Lescombes Winery & Bistro, Sawmill Market

Friday, 16 July 2021

8:00 Welcome – NewSpace New Mexico

8:15 Space Force Association Presentation

8:30 The future of US security in space - Mark Massa, Clementine Sterling, Julia Siegel

9:00 Working Group Outbriefs (~40 min each)

12:00 Closing Remarks – Brig Gen Butow

Working Groups:

Add to the conversation and move our industry forward. Last year's event brought together 150 thought-leaders from industry, the Executive Office of the President, NASA, academia, and Departments of Defense, Commerce, and Energy. The resulting report from the event shaped the national conversation and received national media coverage.

- Current State - Key Milestones
- Inflection Points
- Key Actions & Recommendations

1. Evolving Space Operational and Support Concepts. Chair: Dr. Gordon Roesler, DIU; Vice-Chair: Dr. Venke Sankaran. This working group will explore, from a user perspective, how the U.S. (and its allies) should evolve space operational and support concepts in the near term to sustain both US military and economic leadership in the space domain, enabling modular, serviceable systems and an in-space logistics infrastructure to strengthen U.S. leadership in commercial, civil and national security space. Operational concepts include but are not limited to hybrid or disaggregated architectures which leverage military, commercial and allied systems. Support concepts include but are not limited to launch, workforce development, and cross-agency/enterprise organizational constructs needed to maximize efficiency, effectiveness and rapid decision making.

2. Delivering Space Mobility and Logistics Capabilities. Chair: Karl Stolleis, AFRL; Vice-Chair: A.J. Metcalf. This working group will explore a multi-agency effort to establish an effective, efficient and sustainable multi-agency logistics infrastructure (both physical and digital) to support and sustain operations across all orbits and space constituting the Earth-Moon system leveraging modularity and serviceability of commercial, civil and national security space systems.

3. Space Information Services. Chair: Steve Nixon, SmallSat Alliance; Vice-Chair: Payam Banazadeh. This working group will explore space communications/internet, PNT and the full range of Earth and space observing

functions which have commercial, civil and military applications. This encompasses the commercial development of the maximum exploitation of the electromagnetic spectrum to, in and from space for information services.

4. Pervasive Space Tech and Supply Chain Enablers for Expanded Orbital Regimes. *Chair: Rex Ridenoure, DIU; Vice-Chair: Dennis Poulos, DIU.* This working group will explore the enablers (e.g., Technology, Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities and Policy) required to effectively operate in orbital regimes beyond LEO, MEO, and GEO to include the cis-lunar regime and beyond.

5. Space Policy, Economy & Financial Engineering. *Chair: Mandy Vaughn, GXO; Vice-Chair: Katherine Koleski, DIU.* This working group will identify near- and mid-term regulatory, economic and financial policies and strategies that the U.S. government (and when appropriate, allies) could leverage to incubate nascent industries and ensure the long-term competitiveness of the commercial space sector.



The 2021 State of the Space Industrial Base workshop is a hybrid event. The live version will take place at the beautiful Hotel Albuquerque at Old Town at 800 Rio Grande Blvd. NW, Albuquerque, NM 87104. Hotel Albuquerque is conveniently located in the heart of Old Town, offering accommodations and amenities. This landmark Albuquerque luxury hotel is also located across the street from Sawmill Market: a 25,000 square-foot food market with an array of local cuisine and culinary traditions. Within walking distance of Hotel Albuquerque is New Mexico Artisan Market at The Bazaar, a more than 12,000 sq. ft. space located across the Sawmill Market and Hotel Chaco. New Mexico Artisan Market is a showcase of the best of New Mexico's artisans and makers.

Speaker Bios:



Brig Gen Steven (Bucky) Butow

Steve “Bucky” Butow is the Director of the Space Portfolio at the Defense Innovation Unit (DIU). He joined the team in 2015 as an early plank owner when DIU was known as the Defense Innovation Unit Experimental (DIUx) and helped establish the organization’s operating locations in Silicon Valley; Boston, Massachusetts; and Austin, Texas.

Prior to joining DIU, Butow was the Vice Chief of the Joint Staff, California Military Department with responsibilities including cybersecurity, incident awareness and innovation. He is a former Commander of the 129th Rescue Wing at Moffett Federal Airfield, CA, where his responsibilities included organizing, training, equipping, and maintaining 970 combat-ready forces and \$1 Billion dollars of MC-130P aircraft, HH-60G helicopters and special mission equipment supporting the U.S. Air Force’s combat rescue and personnel recovery missions. He has additionally served as the Deputy Director of the Joint Search and Rescue Center for U.S. Central Command in 2005, and as Chief of Personnel Recovery for U.S. Air Forces Central in 2007 supporting Operations IRAQI and ENDURING FREEDOM. He has more than 3,500 flying hours in T-37, T-38, C-130, HC-130 and MC-130P aircraft. In his reserve capacity, Butow is a Brigadier General serving part time as a Special Assistant to the Director, Air National Guard in a federal (Title 10) status.

As a researcher with the Search for Extraterrestrial Intelligence (SETI) Institute, Butow worked on instrument concepts for Mars surface soil analysis at NASA Ames Research Center in Mountain View, CA. He later served as co-principal investigator for a series of airborne science missions for which he was recognized for outstanding achievement and contributions to the Space Science Division in 1999 and received an Ames Honor Award as a member of an Astrobiology Mission Project Team in 2000.

Butow graduated from San Jose State University with a B.A. in Physics & Astronomy and earned a M.S. in Management with specialization in Air and Space Strategic Studies from the University of Maryland. He has also completed executive courses at Harvard’s John F. Kennedy School of Government, and was a member of the National Leadership Preparedness Initiative (NPLI) Cohort 16. Butow is a lifetime member of the Honor Society of Phi Kappa Phi for academic achievement.



Bruce Cahan

Bruce Cahan, JD is a Lecturer in Stanford University’s Department of Management Science & Engineering (MS&E), an Instructor in at Stanford’s Hasso Plattner Institute of Design (known as the d.school), a CodeX Fellow at Stanford’s Center for Legal Informatics, a Faculty Fellow with Stanford’s Center for Human Rights and International Justice and an Affiliated

Faculty with Stanford's Graduate School of Business' Corporation and Society Initiative. Bruce earned his Bachelor of Science in Economics from The Wharton School at The University of Pennsylvania, and his Juris Doctor from Temple Law School. Bruce is licensed as a lawyer in California, New York and Pennsylvania. Bruce is also CEO and co-founder of Urban Logic, a nonprofit that harnesses finance and technology to change how corporate and government systems think, act and feel. He is an Ashoka Fellow social investment entrepreneur. Bruce's current projects at Urban Logic range from creating a commodities exchange for outer space (the Space Commodities Exchange), to establishing a bridge between the formal and informal economies of developed and developing countries. Bruce's email is bcahan@stanford.edu or bcahan@urbanlogic.org



Casey Anglada DeRaad

Casey Anglada DeRaad is CEO and Founder of NewSpace New Mexico, a non-profit established to grow the commercial space industry from New Mexico for the nation with a mission to accelerate the pace of innovation by providing our partners with direct and faster access to the right connections, resources, and customers. The goal for NewSpace New Mexico is to create a bigger voice for the space industry stakeholders and to leverage the significant investment and R&D Space assets from the Air Force, the national labs, and local, state, and federal organizations. She is an energetic builder of partnerships and growth strategies to help all stakeholders succeed. Casey was a 30-year executive of the Air Force Research Laboratory leading programs in space technology, business development, investment leveraging, technology engagement/transfer, strategic planning, workforce development, and portfolio investment for Air Force, NASA and private industry. She was central in establishing the University of New Mexico's successful COSMIAC aerospace center with AFRL, industry, and Sandia and Los Alamos National laboratories. Casey has promoted opportunities for space industries and STEM students for her entire career. Casey earned her master's and bachelor's degrees in electrical engineering from the University of New Mexico.



Colonel Eric Felt

Col. Eric Felt is the Commander of the Phillips Research Site and Director of the Air Force Research Laboratory Space Vehicles Directorate at Kirtland Air Force Base, New Mexico. He leads a team of 1,080 military, civilian and on-site contractors who comprise the nation's center of excellence for military space science and technology, research and development, as well as advanced technologies integration and demonstration. His organization focuses on enduring Air Force space missions: communications; position navigation and timing, missile warning, space situational awareness, and defensive counter space. Colonel Felt

received his commission in 1991 from Duke University Air Force Reserve Officer Training Corps. He entered active duty in 1996 after completing a master's in science and doctorate degrees in electrical engineering. He is a graduate of the U.S. Air Force Test Pilot School and has served as a developmental engineer and program manager in lab, test, program office, and staff assignments. Prior to his current position, Colonel Felt served as the Senior Materiel Leader, Joint Mission Division, Intercontinental Ballistic Missile Systems Directorate, Hill Air Force Base, Utah.



Dr. Bhavya Lal

Bhavya Lal serves as the senior advisor to the NASA Administrator for budget and finance. She was the senior most White House appointee and Acting Chief of Staff at NASA for the first 100 days of the Biden Administration, the agency's transition under the administration of President Joe Biden. Before that, she served as a member of the Biden Presidential Transition Agency Review Teams for both NASA and the Department of Defense.

Lal brings extensive experience in engineering and space technology, serving as a member of the research staff at the Institute for Defense Analyses (IDA) Science and Technology Policy Institute (STPI) from 2005 to 2020. There, she led analysis of space technology, strategy, and policy for the White House Office of Science and Technology Policy (OSTP) and National Space Council, as well as federal space-oriented organizations, including NASA, the Department of Defense, and the intelligence community. She has applied her expertise in engineering systems and innovation theory and practice to topics in space, with recent projects on commercial activities in low-Earth orbit and deep space, in-orbit servicing assembly and manufacturing, small satellites, human exploration, space nuclear power, space exploration, and space science. She has published more than 50 papers in peer-reviewed journals and conference proceedings.



Scott Maethner

Scott Maethner (Colonel, USAF Retired) is the Strategy and Operations Lead for NewSpace New Mexico. Scott is a results-oriented leader who helps people and organizations reach their full potential. He has over 30 years of experience in the areas of science & technology, space research & operations, program management, strategy & policy development, strategic planning, studies & analysis, corporate communications, sales, marketing, and talent acquisition. Scott has a Bachelors degree in Physics and Mathematics (Concordia College), and Masters degrees in Space Operations (Air Force Institute of Technology), Military Operational Art and Science (Air Command and Staff College), and Airpower Art and Science (School of Advanced Air and Space Studies).



Lieutenant Governor Howie Morales

Soon after taking office in January, 2019, Governor Michelle Lujan Grisham asked Lieutenant Governor Howie Morales to take charge of the State Public Education Department (PED). He did that until a permanent Secretary later could be named, Dr. Karen Trujillo. During that period, Howie Morales joined the Governor in calling for a historic \$500 million budget investment in public school classrooms, part of the Governor's "Education Moonshot".

In the past, PED saw itself as a policeman of schools. Lt. Governor Morales pushed for a lasting culture shift at PED, to ensure that from now on, the agency which oversees more than 850 public schools will serve those schools and teachers in a spirit of collaboration and cooperation; lifting up schools that struggle, not shutting them down. The Governor issued her first two executive orders during that time, eliminating future use of the PARCC standardized test in New Mexico classrooms.

Lieutenant Governor Howie Morales, raised in Silver City, New Mexico, has spent his whole life working to improve the lives of people in his community and across our state. He served in the New Mexico Legislature on the Legislative Finance Committee for 11 years. A classroom teacher and proven leader who stands up for seniors and public education, he said "No more cuts to New Mexico's classrooms." Howie Morales has fought to protect our most vulnerable communities and local schools, to build a fair economy that works for all of us, and to move New Mexico forward.

Howie learned the value of a dollar at a young age. His father was a Vietnam Veteran who worked in the copper mine while his mother worked multiple hourly-wage jobs. He went to work as a teenager to help provide for the family and later worked as a shoe salesman and maintenance worker to put himself through Western New Mexico University. The first in his family to go to college, Howie went on to earn a PhD in education from NMSU.

Howie went home to teach students in special education in the Silver City and Cobre School Districts, and became active in the community. He coached local high school baseball teams to state championships, and is one of the longest serving volunteers of Big Brothers/Big Sisters in New Mexico, while raising two children ages 6 and 9. Howie earned the trust of his neighbors and was elected Grant County Clerk, where he modernized voting systems to make sure every vote counted.

Since 2008, Howie has been an aggressive leader for children and classrooms in the State Senate, fighting for his district, and to make every corner of New Mexico a better

place to live. He has pushed for progressive policies such as universal health care. He fought for rural and tribal economic development, and he fought to protect veterans' and senior services across the state, and mental health programs.



Mark J. Massa

Mark J. Massa is an assistant director in the Forward Defense practice of the Scowcroft Center for Strategy and Security at the Atlantic Council. Massa has contributed to Forward Defense programs and research on nuclear security and arms control, space security, and the Future of DHS Project. Having supported the launch of Forward Defense as the Scowcroft Center's newest practice area, he continues to carry out program administration in strategy, budgeting, business development, and event planning. His writing and commentary have appeared in the Hill, Defense News, RealClearDefense, and CNBC.

Massa earned his master of arts from Georgetown University's security studies program. He received a bachelor of science in foreign service magna cum laude from Georgetown University with a degree in Science, Technology, and International Affairs. He was awarded honors in his major for a senior thesis on a theory of nuclear ballistic missile submarine strategy. He was elected to several honors societies, including Phi Beta Kappa (national), Pi Sigma Alpha (political science), and Pi Delta Phi (French).



Jessica McBroom

Jessica McBroom is a Director at the National Security Council's Directorate of International Economics and Competitiveness. She has over a decade of experience working at the nexus of national security and economics. Jessica is currently on a detail from the Department of Defense's Office of Industrial Policy and also has significant experience working on economic sanctions at the Department of State. She has also held positions in the private sector at the National Association of Manufacturers and JPMorgan Chase.



Steve Nixon

Mr. Steven Nixon is President of the SmallSat Alliance (a 50+ company advocacy group), CEO of a specialized security company, a technology strategy consultant, and Board Member and advisor for several companies. Most recently, he was an executive at Microsoft co-founder Paul Allen's Vulcan Aerospace.

Before his current roles, Mr. Nixon was the Director of Science and Technology/Chief Technology Officer of the US Intelligence Community overseeing the science and technology activities of the 16 US intelligence agencies. He was the founder and first acting director of IARPA, the intelligence community's version of DARPA. Before that he was a long-time professional staff member on the House Appropriations Defense Subcommittee with oversight over a broad spectrum of DoD and IC programs.

In 2008, he was awarded the National Intelligence Medal of Achievement. That year, he was also selected by the National Academy of Engineering as one of the top 100 engineers in the U.S. (Frontiers of Engineering). In 2005, Space News recognized him in its global top ten list of people making a difference in space. He was also recognized that year by the National Journal's "Hill 100" as a top congressional staffer in the category of "Defense Transformation." Before working for Congress, he was an analyst at the Pentagon. He has degrees in Electrical Engineering, Mathematics (Honors and Highest Distinction at the University of Kansas), and National Security Studies (Georgetown).



Brigadier General John M. Olson

Brig. Gen. John M. Olson is the Mobilization Assistant to the Chief of Space Operations, Headquarters United States Space Force, the Pentagon, Arlington, Virginia. The Chief of Space Operations serves as the principal uniformed advisor to the Secretary of the Air Force on Space Force activities and is a member of the Joint Chiefs of Staff. United States Space Force responsibilities include developing Guardians, acquiring military space systems, maturing military space power doctrine, and organizing space forces to present to the joint Combatant Commands. Brig. Gen. Olson assists and advises the Chief with responsibility to organize, train and equip active-duty, Guard, Reserve, and civilian space forces conducting innovative, agile, and responsive space and information operations to support, protect, and defend U.S. and allied interests. Brig. Gen. Olson develops strategy, plans, policy and priorities for efficient and effective research, development, testing, operations and sustainment of technologies, capabilities and systems with partners and allies for global leadership in space and related operations. Brig. Gen. Olson also flies as an Airborne Emergency Action Officer conducting strategic deterrence and operations missions aboard the Looking Glass Airborne

Nuclear Command Post, supporting the president and National Command Authorities.



Chris Quilty

Chris Quilty is the founder and a partner of Quilty Analytics. Prior to establishing Quilty Analytics in 2016, Chris served as a sell side research analyst with Raymond James for 20 years, publishing hundreds of company-specific, macro, sector, and thematic research reports on the industrial, defense, space, wireless, and communications industries. Chris is widely acknowledged as a thought leader in Satellite & Space ecosystem. Chris received a BS degree in Systems Engineering from the United States Naval Academy in 1989 and an MBA from the University of Chicago in 1994.



Gordon Roesler

Dr. Gordon Roesler is an internationally recognized authority in the application of robotic technologies to space missions. As president of Robots in Space LLC, he provides advisory services in space infrastructure and business concepts to industry, government and academia, with a focus on robotic capabilities, logistics, advanced missions and new markets. In his previous position at the Defense Advanced Research Projects Agency, 2014-2018, he created and led the Robotic Servicing of Geosynchronous Satellites (RSGS) program. This public-private partnership program will result in the first spacecraft capable of performing repairs, upgrades, and ultra-close inspection of geosynchronous satellites when it launches in 2023. Earlier, he initiated and led the Spacecraft for the Universal Modification of Orbits (SUMO) and Front-end Robotics Enabling Near-term Demonstration (FREND) programs when at DARPA 2002-2006. At the Information Sciences Institute of the University of Southern California, he led a project resulting in an AI-based design optimization tool for the DARPA F6 space program. At Science Applications International Corporation, he participated in programs in underwater sound systems, uncrewed vehicle control, and was co-inventor of a novel underwater sound source. From 2012-2013, he was a senior physicist at the Australian Centre for Space Engineering Research, University of New South Wales, where he led the system engineering effort for an Australian earth resources satellite concept. He also helped organize the first UNSW Off-Earth Mining Forum which received international attention and participation. The subjects of his recent published papers include robotic space stations, a lunar resource launcher, and robots for lunar surface operations. He is a co-author of the multi-organization Commercial Lunar Propellant Architecture study (2018) and NASA's In-Space Assembled Telescope study (2019). He

is a member of the editorial board of the Space Force Journal. He received the Ph.D. in Physics from MIT in 1992 and is a 1975 graduate of the U.S. Naval Academy.



Dr. Sean Ross

Sean is the Deputy High Energy Laser technical area lead at the Air Force Research Laboratory Directed Energy Directorate. He has worked at the Pentagon in the office of the Deputy Assistant Secretary of Defense for Acquisition, Research and Engineering. His technical background is in laser physics and development of laser devices, most recently in the power and thermal integration issues involved in airborne High Energy Laser systems. His abiding interest is in the transition of game-changing technologies in the public interest. Sean's email is sean.ross.2@us.af.mil



Dr. Mir Sadat

Dr. Mir Sadat has more than twenty-five years of experience in private industry, higher education, and the US government. He most recently co-authored "US Space Policies for the New Space Age: Competing on the Final Economic Frontier." Mir is a nonresident senior fellow in the Brent Scowcroft Center for Strategy and Security at the Atlantic Council. Earlier this year, Sadat also founded and has served as editor-in-chief of Space Force Journal focused on lifting up the unheard voices of diverse thinkers and practitioners interested in spacepower and the Space Force. Previously, Mir was detailed to the US National Security Council (NSC), where, as a policy director, he led interagency coordination on defense and space policy issues. In that role, he supported the establishment of both the US Space Force and US Space Command in recognition that space has also evolved into a warfighting domain similar to land, air, sea, and cyber. Before his White House assignment, Sadat had spent more than 10 years in various assignments within the US national security enterprise. He is a naval officer with intelligence and space qualifications. And in his preceding two naval assignments, he served as a space policy strategist with the chief of naval operations in the Pentagon and as a space operations officer with the US Tenth Fleet/US Fleet Cyber Command. He has a PhD from Claremont Graduate University and has taught at various universities in California and Washington, DC. Sadat has written extensively on Space, US national security, Afghanistan, South Asia, and the broader Middle East.



Jay G. Santee

Jay G. Santee is vice president, Strategic Space Operations, Defense Systems Group, The Aerospace Corporation. In this role, he oversees the company's support of the U.S. Air Force's Space Warfighting Construct, which combines transformational and warfighting-focused command initiatives to maintain space superiority in the 21st century. He also leads the corporation's support to the Space Security and Defense Program and U.S.

Strategic Command.

Prior to joining Aerospace, Santee was outcome leader for Resilient Affordable Space at MITRE, where he was responsible for directing and shaping MITRE's contributions to the national security space enterprise's fielding of a resilient, affordable space force.

Santee served 33 years in the United States Air Force, retiring as a major general in 2014. Santee's last assignment was as deputy director of the Defense Threat Reduction Agency. In this capacity, he played a key leadership role in the removal and destruction of declared Syrian chemical weapons materials aboard the MV Cape Ray. Santee's other assignments in the Air Force included, among others: acting deputy assistant Secretary of Defense for Space Policy, vice commander of the 14th Air Force, Director of the Space Operations Center (now the Joint Space Operations Center), commander of the 21st Space Wing, and as an operations division chief at U.S. Space Command.

Santee earned a bachelor's degree in geography from the U.S. Air Force Academy, an MBA from Golden Gate University, and a master's degree in national security strategy from the National War College. Santee also completed the Program for Senior Executives in National and International Security at the John F. Kennedy School of Government, Harvard University. He was awarded the 2014 Ellis Island Medal of Honor, and was invested as a Chevalier de la Légion d'Honneur (Knight of the Legion of Honor), France's highest honor, in 2012. Santee serves on the U.S. Strategic Command's Strategic Advisory Group and on the Advisory Committee for the Secure World Foundation.



Julia Siegel

Julia Siegel is a program assistant in the Forward Defense practice of the Atlantic Council's Scowcroft Center for Strategy and Security. Siegel is responsible for event coordination for the Commanders Series and Captains of Industry Series and contributes research and logistical support to the Future of DHS Project. She contributes to Forward Defense's work on the space domain, having co-authored *The Future of Security in Space: A Thirty-Year US Strategy* as part of the "Atlantic Council Strategy Papers Series."

Siegel graduated with highest distinction from the University of Virginia's Frank Batten School of Leadership and Public Policy with a bachelor of arts in public policy

and leadership and a second major in Spanish. Prior to joining the Atlantic Council, she worked at the University of Virginia's National Security Policy Center, where she conducted research on the US Space Force and Chinese naval diplomacy.



Clementine G. Starling

Clementine G. Starling is the deputy director of Forward Defense and resident fellow of the Transatlantic Security Initiative at the Atlantic Council. In her role, she oversees the Initiative's programming and research, and leads on the defense policy and European security practice areas. Her own research focuses on great power competition with China and Russia, deterrence and US force posture, and transatlantic security.

During her time at the Council, Starling has produced and contributed to reports on Russia's nuclear strategy, military mobility, political warfare, Europe-China relations, and the US-UK relationship. Starling's analysis has been featured in a range of publications and she has provided commentary for National Public Radio, the BBC, and ABC News, among others. Within the Transatlantic Security team, she played a leading role in managing NATO's official public diplomacy efforts ("NATO Engages") around the Alliance's 2019 London Leaders' Meeting and other summits. Starling is also the Security and Defense fellow at Young Professionals in Foreign Policy (YFPF).

Prior to joining the Atlantic Council, Starling worked in the UK Parliament with the House of Commons Defence Select Committee providing analysis on UK defense, Middle East security, and technology. Originally from the United Kingdom, she also worked for the Britain Stronger in Europe (BREMAIN) campaign. She graduated with honors from the London School of Economics with a Bachelor of Science in International Relations and History.



Mandy Vaughn

Mandy founded GXO, Inc. in 2021 to accelerate the pace of change across the space industry. The goal is supporting new commercial space ventures quickly navigate the startup environment to start delivering capabilities and missions that matter for commercial and government customers. She was selected to serve on the National Space Council's User's Advisory Group when it was re-instituted in 2018, where she helps to streamline coordination and cooperation across the U.S. space enterprise. Mandy is formerly President & CEO of VOX Space. Mandy originally joined Virgin Orbit, VOX Space's parent company in 2015. As Senior Director of Business Development and Mission Management, she supported business development on the LauncherOne program for both government and commercial customers, and

served as mission manager for customers including OneWeb and NASA, in addition to spearheading the creation and registration of VOX Space. Prior to joining Virgin Orbit, Mandy was with General Dynamics Mission Systems' Space and Intelligence Systems Directorate, where she was responsible for the space control and space protection investment portfolios and analog—to-digital transitions for a variety of SIGINT payload families. She successfully initiated development programs for the next-generation space-based GPS receiver and managed the internal investments of GPS payload development efforts. Prior to joining General Dynamics, she was a developmental engineer and program manager in the Air Force and a Director with Kinsey Technical Services. She primarily supported programs in the Space Superiority Systems Directorate (SMC/SY) at Los Angeles AFB, CA and earlier the ICBM system program office at Hill AFB, UT. In the Space Superiority mission area, she was the ground segment lead and chief engineer on the Space-Based Space Surveillance program, and then supported a variety of space and ground-based programs for the Directorate. In that role, she supported a multiple Space Situational Awareness and command and control programs supporting integration of requirements and demonstrations between the DoD and the intelligence community. She supported the NRO AS&T and DIA Directorate of Science and Technology in a variety of collection campaigns that spanned various collection system phenomena to demonstrate new systems and operational concepts for critical space operations. Mandy has a BS in Mechanical Engineering and an MS in Aeronautics and Astronautics, both from MIT.