SFA MAGAZINE
SPACE FORCE ASSOCIATION
A PUBLICATION OF THE SPACE FORCE ASSOCIATION
ISSUE 10 • SUMMER 2024

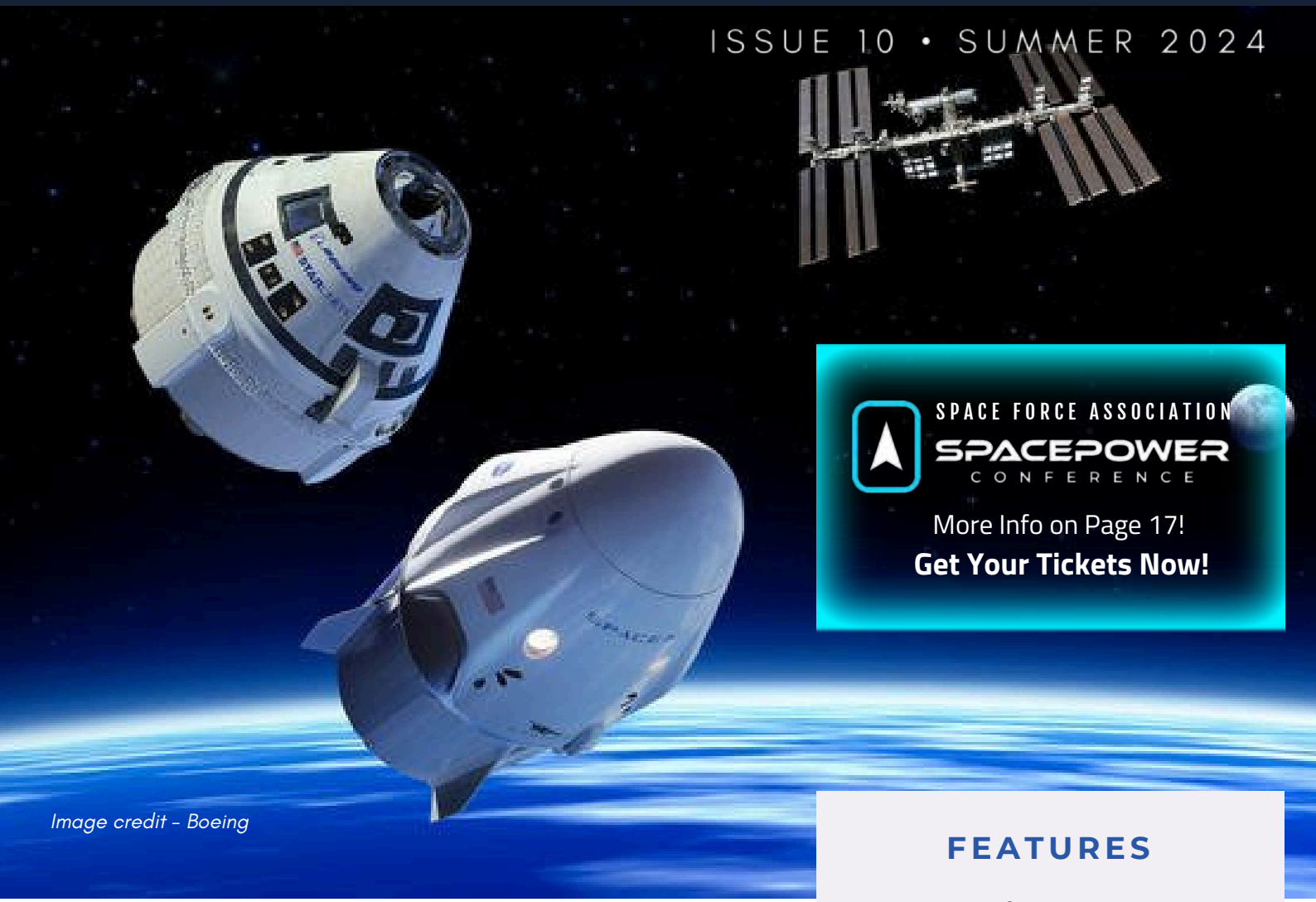


Image credit - Boeing

SFA SF WARFIGHTER FEATURE Q&A:
Colonel Kalliroi Landry Retires

BY MARTIN J AMEN, SPACE FORCE ASSOCIATION, FLORIDA CHAPTER PRESIDENT

From Dreams of Being an Astronaut to Space Force Leadership: An Interview with Col. Kalliroi Landry

Colonel Kalliroi Landry, a trailblazer in military space operations, has embarked on a transformative journey

Continued on Page 2

FEATURES

fueled by a lifelong passion for space. Her strategic leadership at the Space Development Agency (SDA) has been a testament to this passion. As she enters retirement after 27 years of distinguished service in the U.S. Air Force and U.S. Space Force, Col. Landry reflects on the innovative acquisition strides made under her guidance at the SDA. With an unwavering commitment to advancing space capabilities, she has been an essential part of the shift from traditional space programs to acquiring more agile, low-Earth orbit (LEO) constellations and supporting ground systems.

During her tenure, Col. Landry has faced and overcame challenges, steering the SDA through its foundational years with a focus on rapid, cost-effective deployment of space technologies, mainly on the ground segment. Her strategic foresight and vision for the future of space operations, coupled with her strong advocacy for leveraging commercial services, have been instrumental in the agency's success. In this candid conversation with the Space Force Association Magazine, Col. Landry shares her experiences and insights in space acquisition.

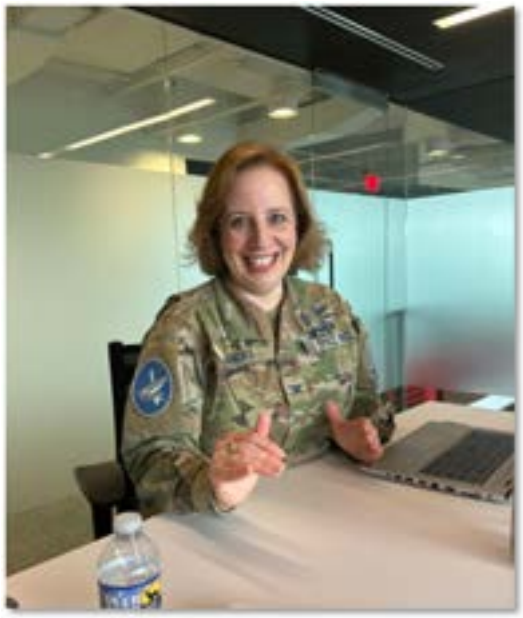
As she embarks on new horizons, Col. Landry's unwavering dedication to the space sector inspires her. Her eagerness to keep contributing to its growth and evolution, even after 27 years of distinguished service, is a testament to her passion and commitment. Her story is one of determination, innovation, and inspiration, serving as a guiding light for the next generation of guardians in the ever-expanding realm of space.

SFA Magazine, Martin Amen (MA): Col. Landry, you've been with the Space Development Agency for over four years. Looking back, how would you describe your experience?

Col. Landry: It was a challenging yet exhilarating journey. I joined SDA a year after its inception, and we were a small team with a laser-focused mission to deliver capabilities to the warfighter quickly. Despite initial skepticism and doubts, our dedicated and skilled team was unwavering in our commitment to prove them wrong. It was a testament to the power of determination and strategic foresight.

MA: Can you share more about the initial challenges and how you overcame them?

Col. Landry: When we started, there was skepticism about our ability to secure funding and execute our mission within the set timelines. The proliferated low Earth orbit (LEO) concept was relatively new, especially for a government organization. Our success hinged on demonstrating deliverables quickly and consistently, which helped us secure ongoing support from Congress.



Colonel Kalliroi Landry reflects on her tenure at SDA, accomplishments, background, and plans for the future.

A crucial part of our motto, “Semper Citius,” can also include "schedule is king," reflecting our commitment to delivering on time, even if it means trading off some performance or cost considerations.

MA: Innovation has been a critical part of SDA's strategy. How did you approach acquisition to achieve such rapid deployment?

Col. Landry: Our approach was innovative and dynamic. We utilized the middle-tier acquisition (MTA) authority, allowing rapid prototyping and fielding. This was crucial for our space vehicle deliveries. We balanced flexibility with traditional FAR-based contracts on the ground segment side to accommodate fast-moving developments. It's about using existing regulations creatively to meet our goals without breaking any rules, a strategy that keeps us ahead of the curve.

MA: You've been an advocate for women in the industry. What advice would you give your younger self or other women entering this field?

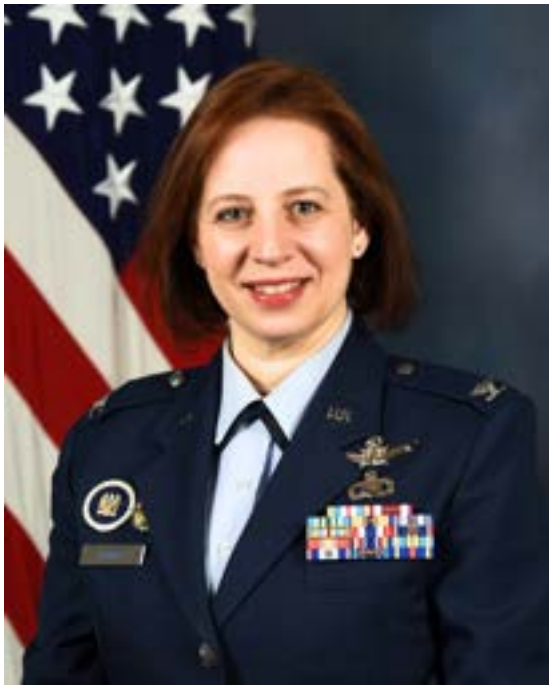
Continued on Page 3

Col. Landry: I grew up in a very traditional home. There were solid stereotypes and expectations along those lines. I still need to figure out how I managed this, but I came up with my own thing of what I wanted to do. I always thought the opportunities were out there. I just needed to break away from the expectations that I thought I was dealing with.

When I went into college, and I went to a women's college, Douglas College of Rutgers University, my understanding was broadened at that point I recognized that there was a glass ceiling, at least a perception of one. It became more meaningful to me to try to break through that. And it was not necessarily to prove any point; it was so that I could do what I wanted. And going back to myself earlier, if I can give myself advice, I would say, "Don't doubt yourself." You do have vital interests, and those are valid interests. And you don't need another person's validation to pursue those interests. The bottom line is that women need to believe in themselves and their capabilities.

MA: What advice would you offer to new guardians joining the Space Force?

Col. Landry: Space is crucial in our daily lives and military operations. Guardians should understand the importance of space capabilities and take pride in ensuring their effectiveness and reliability. Even though they might not see the enemy face-to-face, their work is vital to maintaining our way of life and national security.



Col Landry and Family at her retirement ceremony held at United States Air Force Memorial, Arlington,VA on June 7th . Completing 27 years a distinguished service in the U.S. Air Force and U.S. Space Force and looking to the future.

MA: If half a life is showing up, was there a defining moment that you showed up and that you can recall that made a big difference in your life?

Col. Landry: My dream when I was younger was to be an astronaut, fostered by my interest in space. My eyes constantly turned towards the sky, wondering what was beyond our atmosphere. That's always been of interest to me. And people always look back on who their teachers were that encouraged them. There was a teacher I had; one of our school projects was creating our own board game. And, of course, mine was all about something about space. From that, when she recognized that that was my interest, she encouraged me, asked me more questions about my interest, or fed me little encouraging statements so that I could continue to pursue that interest, which was off the board of everyone else in my cultural or school environment. I had nobody else interested in the same stuff that I was. I was the oddball.

MA: You have somewhat of an unusual first name. Can you give any background?

Continued on Page 4

Col. Landry: It was my grandmother's name. My family background is Greek. My parents immigrated from Greece to the U.S. So, the origin of my name, Kalliroi, is an ancient Greek name. It goes back to mythology, where there were nine Muses, and Kalliroi was one of them. The Kalli part, with the two Ls, means beautiful, and the Roi part means a flow, like a flow of water or a flow of a melody. So, that's the origin of my name. That's something that only some people know.

MA: You mentioned a strong Greek heritage. How does that influence your personal life and hobbies?

Col. Landry: My Greek heritage is significant to me. I teach Greek folk dancing at our local church and ensure my children learn about our culture. It's a way to stay connected to my roots and share that richness with my family.

MA: Do you have a strong mentor in your life or career?

Col. Landry: I've had several people along the way that I have talked to. I just had lunch with one of them. I wouldn't say there has been one coach or somebody saying, "Do this" every step of the way. But I've had the opportunity to have a few sit-downs with some senior leaders who have been very helpful in giving their perspectives. What I appreciated most is those who gave me the truth... not always the positive, "You're doing so great, Kalli." I enjoyed the ones that pointed out places where I could improve. So, that's been very helpful. There were a couple of occasions when somebody might have said, "No, you can't do that." And then, in my mind, I said, "Oh, watch me."

There are so many great leaders in the Air Force and Space Force, and it has been helpful to have people with experience who would have honest conversations with me regardless of position or rank.

MA: As part of a commercial strategy, do you see more automation of satellite management as a service? Especially from a ground perspective, giving somewhat up on an unnecessary man-in-the-loop.

Col. Landry: I have been working on building our ground segment for the last four years. When planning out the requirements and how to set up our system on the ground to manage this proliferated networking concept in space, we wanted to encourage as much automation as possible to flip the model that traditional space operations, DOD space operations, have followed. For example, the conventional model might include 100 operators managing the health operations and safety for one or two satellites. Now we're going to have hundreds of satellites and maybe ten operators, that's what we're working towards. So, space vehicle vendors are still responsible for operating their satellites. And they need to minimize and automate their man-in-the-loop footprint and bring that to the table. Our ground segment is focused on managing the network, not managing satellites. That's a different concept than what traditional DOD space operations have looked like. When considering commercial opportunities, SDA has a footprint of ground entry points in various locations.

MA: You previously said you wanted to reduce the number of Ground Entry Points (GEPs). What are your thoughts on this?

Col. Landry: The SDA wants to avoid building a proliferated ground segment to support the proliferated space segment. There are commercial companies with networks out there of ground apertures that could communicate with our space segment. If they comply with DOD cybersecurity requirements, opportunities may exist to leverage what they have built. I shouldn't have to create, maintain, and operate that from a government perspective. That's a very ripe opportunity for us to look at bringing that in from a commercial perspective.

Col Landry in Norway at the Groundbreaking. SDA was honored to participate in the groundbreaking efforts in Norway's High North, where an SDA temporary ground entry point (GEP) site will be established. (Photo credit Stein Hansen)

Continued on Page 5

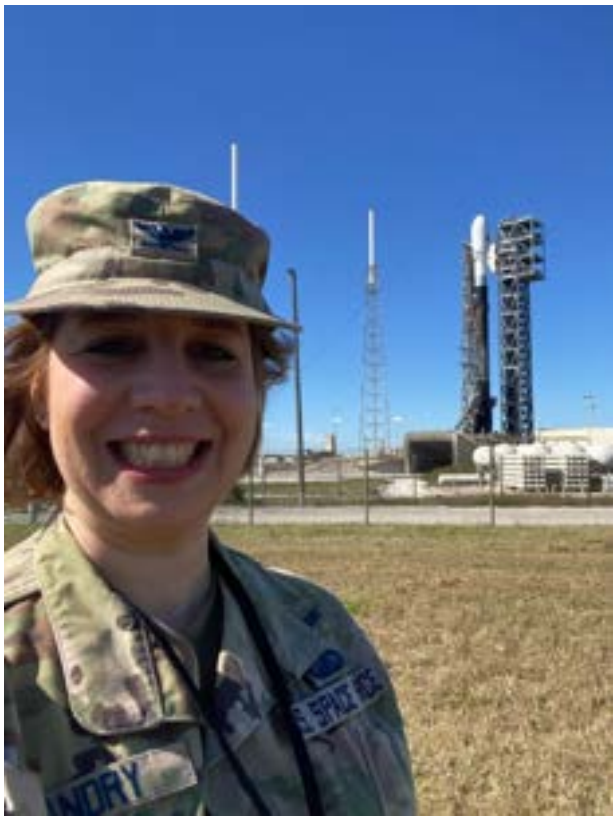
MA: What would you tell Guardians if you wanted to describe the contested space domain and the Great Power Competition (GPC) challenge?

Col. Landry: That's a perfect topic because space was just this fantastic peaceful thing when I was young. And as we have developed capabilities over the years, so have our adversaries, and space is the ultimate high ground. If you have the high ground, you have the advantage over your adversary. So, as my career has evolved, we have recognized that space is a contested environment. Our adversaries are looking at how to exploit the capabilities and space. So, our Guardians must stay two steps ahead of that and have the innovative thinking to look at how we can exploit that or prevent the adversary from exploiting it. Because the space domain is so full of potential, our guardians need to look at that potential as well, and they need to think in innovative ways about how to exploit, how to benefit from, how to prevent action by the adversary, or how to increase opportunity for action for our space force.

One of Colonel Landry's favorite hobbies is teaching her children traditional greek dance at their local church.

MA: Finally, as you retire from this role and the Space Force, what are your plans and hopes for the future?

Col. Landry: I plan to stay in the space industry, which has been a passion of mine since childhood. With so many commercial and defense opportunities emerging, it's an exciting time to be involved. I am a strong space advocate. I love space, technology, the possibilities of what space gives us or what we can do in space, and the future vision of the potential. The potential is so inspiring, and that's really what I'm excited about. I am eager to watch how it starts booming and becomes normal. Just like aviation, we're going to have standard space. Like the aviation sector, I want to continue contributing to the industry's growth and witness its normalization.



MA: Thank you, Colonel Landry, for your service and participation in SFA Space Warfighter Talks. We are sure you will continue to be a leader on the space horizon.
Colonel Landry's journey from a dream of becoming an astronaut to a pivotal role at SDA, along with her remarkable career, is a testament to her dedication and passion for space. Her leadership and vision continue to inspire, ensuring that the guardians of tomorrow are well-prepared to navigate the contested and ever-evolving domain of space.

IN THIS ISSUE

SFA Magazine sponsored by

Type One Ventures

SFA Feature Q&A:
Hack-a-Thon Coverage

BY MARTIN AMEN, SFA
FLORIDA CHAPTER PRESIDENT

Requirements Done Right: It's Magical Highlights from Space Launch Delta 45's 2nd Hackathon Data Derby II and Insights from Space Force Leaders.

As the demand for launch cadence rises, the Space Force is committed to innovation and digital transformation. This mission's heart is the unique and transformative approach of Space Launch Delta 45's second Data Derby Hackathon, held from April 22 to 26.

This one-of-a-kind event brought together Guardians and industry professionals in a collaborative environment, setting the stage for tackling challenges and refining requirements. It was a testament to the Space Force's innovative spirit, underscoring the significance of their work.

Hackathons have evolved into global phenomena encompassing diverse disciplines like healthcare and social impact. These events, including the Data Derby Hackathon, unite participants from various backgrounds, fostering a unique environment for creative problem-solving and collaboration. The cross-pollination of ideas and expertise at hackathons often leads to groundbreaking solutions, paving the way for the future of space innovation as individuals with different skills and perspectives tackle complex challenges innovatively.

The Space Force Space Launch Delta (SLD) 45 has embraced and championed the hackathon model as a catalyst for technological advancements. The Data Derby Hackathon, a testament to Space Launch Delta 45's unwavering commitment to fostering innovation, has made significant strides. These events, focusing on agility and rapid prototyping, are poised and fully equipped to address future challenges. They draw inspiration from historical exercises that underscore the excitement of embracing new technologies, instilling confidence in the future of space technology. At the event, I had the privilege of speaking with two key figures, Lt. Col. Andrew Singleton, Chief Technology and Innovation Officer, and Major Jason Lowery, Deputy Director of Technology and Innovation, Assured Access to Space Leaders in SLD 45's FORGE. The FORGE, the first Spark Cell in the Space Force at Patrick Space Force Base, is a platform that allows Guardians and Airmen to submit and develop solutions for issues identified in their organizations. Their insights on the process were invaluable, illuminating the innovative spirit driving the Space Force.

Lt. Col. Singleton on the Hackathon Process

When asked about the process, Lt. Col. Singleton shared insightful observations. He emphasized the power of assembling the right people without restrictions to demonstrate rapid acquisition potential. "This event showcased how combining users with the right team and acquisition expertise leads to swift and practical solutions," he said, clearly understanding the hackathon process.

One of the event's slogans, "Requirements Done Right," underscores its unique approach. Singleton explained, "Users generally know what they want to achieve, but not exactly how. This openness allows the team and industry experts to devise innovative solutions." The collaborative spirit was palpable, with participants focusing on solving problems for the United States, setting aside company rivalries.

"The way they collaborated was impressive," Singleton noted. "There was no 'we're on this team, you're on that team.' It was all about solving problems together." The event's success is evident in the growing scale and enthusiasm of the participants, which Singleton attributes to the continuous effort to keep the FORGE initiative dynamic and impactful.

Major Lowery on Incorporating Hackathons into Acquisition

Major Lowery believes hackathons should be integral to the acquisition process. "Oddly, this isn't standard for onboarding new technology," he remarked. Traditional methods involve lengthy periods of guessing needs, hiring contractors, and waiting months or years for solutions that hackathons can produce in days. "In three days, we can achieve what typically takes months," Lowery said, highlighting the efficiency and effectiveness of the hackathon model.

Continued on Page 8

Lowery stressed the importance of having a proactive environment, engaged end-users, and available resources. He cited examples where hackathon results directly influenced significant contracts, underscoring the practical benefits of this approach. "When a team briefed their project last year, it gave way to a $2 million Small Business Innovation Research (SBIR) contract," he recalled.

The commitment of participants, many of whom attend at their own expense without guaranteed contracts, speaks volumes about the hackathon's value. "They are eager to prove themselves and solve significant problems," Lowery said. The sense of mission and shared purpose drives developers to participate, often donning Space Force swag and looking forward to these events for months.

The Magic of Collaboration and Innovation

Both Singleton and Lowery agree that the hackathon fosters a magical atmosphere of collaboration and innovation. Motivated by a shared mission, participants work tirelessly to develop minimum viable products and prototypes. Dedication, talent, and a supportive environment led to remarkable outcomes.

"It's something so magical that I wish we could do this everywhere," Lowery concluded. "I want this to be the expectation everywhere." Singleton is leaving the FORGE this summer to head up the 2nd Space Launch Squadron at Vandenberg SFB, which has a similar concept and evolution that ensures continuity of innovation. The FORGE at Patrick SFB was the first Space Force Spark Cell and will be going through an expansion that will be completed soon. This expansion doubles the space and capabilities, ensuring the continued history of innovation.

Major Lowery looks on as teams present status of projects. Each team presenting demonstrated shared purpose in solutions to various aspect of the Launch demand.

The Space Launch Delta 45's second Data Derby Hackathon highlighted the importance of getting requirements right and demonstrated the power of collaborative innovation. Over a week, the event consisted of 4 teams with names like Velociraptors and Manifestors, presenting solutions to Space Force challenges in the launch cadence—these solutions were where judges' teams were recognized.

As the Space Force continues to explore new frontiers, events like these will undoubtedly play a crucial role in shaping the future of space technology. The Space Force Association Florida Chapter supported this event and similar events over the year at Patrick SFB.

Hackathon Teams at the final project awards recognition. The outcome clearly showed how magical it is when the military and industry come together to solve problems. Requirements done right.

A MESSAGE FROM OUR CEO

WILLIAM WOOLF

SPACE FORCE ASSOCIATION

Dear Space Force Association Members,

I am honored to be part of this community of dedicated individuals committed to advancing the mission and vision of our Space Force. As we continue to pioneer the future of space exploration and defense, it is essential that we stand united in our efforts to promote excellence, innovation, and collaboration within our organization.

The Space Force Association Magazine serves as a platform for us to share insights, updates, and stories that highlight the remarkable achievements of our members and the advancements being made in the field of space technology. It is a testament to our collective passion for ensuring freedom of action in the space domain and our unwavering commitment to pushing the boundaries of what is possible.

In the pages of this magazine, you will find a diverse range of articles, interviews, and features that showcase the incredible work being done by our members across various sectors of the space domain. From cutting-edge research and development initiatives to inspiring stories of leadership and dedication, each issue of the magazine offers a glimpse into the dynamic world of space exploration and defense.

I encourage all of you to actively engage with the magazine, whether by submitting articles, sharing your feedback, or simply taking the time to explore its contents. Your contributions and support are invaluable in shaping the future of the Space Force Association and driving our mission forward.

Together, we can make a lasting impact on the future of space exploration and defense. Let us continue to push the boundaries of innovation, embrace new challenges with determination and resilience, and uphold the values of excellence and integrity that define our organization.
Thank you for your unwavering dedication to the Space Force Association. I look forward to seeing all that we can achieve together in the exciting journey that lies ahead.

Sincerely,

Bill

William Woolf
CEO & Executive President

SFA EXECUTIVE COLUMN
Illuminating the Cosmic Horizon:

BY DR MANJIT POPE,
PRESIDENT, SFA EUROPE

A Vision for Global Space Advancements

SFA is leading the charge to cultivate international cooperation for the evolution of humanity's presence in space and the potentialities to come. Five key mission areas are critical to humanity's success in space now and in the future.

In the ever-expanding cosmic theater, the Space Force Association (SFA) takes center stage as the orchestrator of global collaboration in the pursuit of space dominance. As we propel ourselves into a future where the cosmos is the ultimate frontier, SFA member organizations can shape the narrative of space defense and strategic influence. Let's probe the expansive universe of possibilities SFA envisions for the world.

Command and Control in Cislunar Space: A Strategic Odyssey

SFA embarks on a strategic odyssey, recognizing that control over Cislunar space is the cornerstone of space defense. With member nations like the U.S.A. leading the charge, the association facilitates collaboration on missile guidance, observation, and in-orbit manufacturing, redefining the landscape of strategic advantage on Earth. The orchestration of space infrastructure by SFA networks paves the way for unparalleled command and control systems.

Unleashing Unlimited Energy and Resources: A Geopolitical Revolution

The United States' audacious foray into commercial space-based solar power is a revolutionary step towards providing Earth with an unending source of clean electricity. SFA members and networks stand at the forefront, challenging the traditional energy paradigm and positioning themselves strategically by harnessing power from the cosmos. The prospect of mineral mining in space further solidifies SFA's role in transforming global geopolitics. A new era of resource abundance dawns as the U.S.A. prepares to tap into space-based minerals. Initiatives like the NASA Psyche mission, which aims to unlock the untold wealth contained in asteroids, can potentially reshape global GDP. With a keen eye on strategic advantage, the SFA's international stakeholders are positioning themselves to secure access to these high-grade resources, altering global power dynamics.

Interplanetary Internet & Communications Grid: The Technological Paradigm Shift

In the digital cosmos, SFA recognizes the importance of constructing an interplanetary internet. Mega-constellations armed with satellites become the new frontier in advancing military communications and command capabilities. SFA will act as the guide, ensuring member nations ride the wave of automation, remote-controlled robotics, and AI-led systems, reshaping the dynamics of space warfare.

Zero Gravity: Innovation's Launchpad

As SFA member nations, we are helping our networks propel into the realm of innovation, where zero gravity becomes the launchpad for biotech applications, nanomaterial therapeutics, and clean manufacturing. SFA's guidance ensures member nations leverage this cosmic environment for strategic benefits, fostering a new era of technological advancements.

Continued on Page 11

Space Wars and the Quest for Abundance: SFA's Galactic Diplomacy

As subtle signs of space conflicts emerge, under SFA's vision, I call for a collective pursuit of abundance through space-based innovations. Recognizing the delicate balance between cosmic ambitions and earthly harmony, SFA stands as the linchpin for international collaboration in the space sector. A future where the abundance of space resources contributes to a more prosperous and peaceful Earth becomes the beacon that SFA illuminates on the cosmic horizon.

SFA, under the visionary leadership of Bill Woolf, charts a course towards a cosmic renaissance. As the cosmic odyssey unfolds, SFA envisions a world where nations collaborate, innovate, and thrive in the boundless expanse of space, forging a future where the stars illuminate the path to a more harmonious Earth."

Dr. Manjit Pope, SFA President Europe

SFA WOMEN IN SPACE HIGHLIGHT:
Volunteer Spotlight

BY DIANE WARD

Mission Excellence: Celebrating Susie Dabrowski

SFA V.P. for Chapter Operations and Outreach Susie Dabrowski will soon be known as an accomplished Legacy Guardian. Her proven track record of leadership and commitment exhibit the spirit of excellence that guides the U.S. Air and Space Forces.

Susan Dabrowski is one of the original volunteers of the Space Force Association (SFA) and had a distinguished career as a Space Officer in the United States Air Force (USAF). Her career includes significant roles in space and missile systems, where she contributed to the Titan II and Ground Launched Cruise Missile systems and flew the Defense Satellite Communications System III satellites. As Chief of Current Operations at the 3rd Space Operations Squadron, Susie managed all defense communications satellites, ensuring operational readiness and effectiveness.

Her expertise extended to guiding operational requirements for critical space systems such as the Global Positioning System (GPS), the Space Surveillance System, and the Satellite Control Network. Susie's extensive experience also includes developing policies and programs for various organizations, showcasing her versatility and leadership in military space operations.

Susie's favorite work involved providing space support to other Combatant Commands, training crew members, and operating the European-based Ground Launched Cruise Missile. Her dedication to the military space community is evident in her tireless volunteer work with the SFA. As a co-chair of the inaugural Spacepower Conference, Susie was instrumental in building the agenda, organizing volunteers, and establishing guidelines for volunteer participation. She continues her leadership as the deputy chair for the 2024 Spacepower Conference.

Susan Dabrowski, SFA Volunteer and retired USAF Officer

As Vice President for Chapter Operations and Outreach at SFA, Susie oversees and advises all existing chapters (satellites) and regions, ensuring the smooth operation of events and volunteer activities. She has been pivotal in establishing and supporting the Southeast Region, contributing to the formation of two chapters.

In her personal life, Susie enjoys spending quality time with her children. She is a proud mother of a Coast Guard officer and a Space Force Guardian and is eagerly anticipating becoming a grandmother. Susie's contributions to the space community and her dedication to her family exemplify her commitment and passion for service both professionally and personally.

SFA Thought Leader Column: Global SOF Week

BY CLINTON AUSTIN

SOF Reflection: Fortifying Security at Home & Abroad

The U.S. Space Force has a unique relationship with Special Operations Forces, providing intelligence to SOF warfighters for critical missions. While the space domain gives us a God's eye view, SOF leaders keep operators clear on what matters on the ground. For this partnership to be successful over the long term, the U.S. must redirect its focus on national security and prevent the inevitable collapse that comes with the over-extension of a global military presence.

I recently attended Special Operation Force (SOF) Week 2024, which was not only a chance to reconnect with old friends but also a valuable platform to explore the evolving needs of our HQ. The SOF Community's relentless pursuit of emerging technology underscores SOF's recognition of the competitive edge new tech offers our warfighters. The SOF community is often equipped with superior intelligence, advanced weaponry, and sound government and civilian senior leadership, allowing our warfighters to execute their missions.

Attending SOF Week also allows the force to understand how senior leadership thinks about the current state of affairs. Countless senior leadership briefs clearly focused on partnering with our NATO partners and strengthening our relationships to counter the world's troubles. These troubles include:

- The ongoing conflict in Ukraine.
- Hamas' October 7 cross-border cowardly attack on Israel.
- U.S. involvement in Niger
- China's unrestricted warfare against the U.S.

Most U.S. involvement provides advisory services, weapons to strengthen self-defense, and diplomatic services to broker solutions between nation-states. With all this effort, I am stuck with a simple question: Is the U.S. focusing too much on other nations' security and neglecting its security?

For the sake of simplicity, let's focus on China's ongoing threat against the U.S. First, we have a border issue.

According to Department of Homeland Security statistics data, encounters at the southern border with those trying to enter the U.S. without authorization have increased significantly. The DHS data show 6.5 million encounters at the U.S.-Mexico border in that time frame, including 5.8 million apprehensions between legal ports of entry – the number typically used for illegal immigration – and a little more than 700,000 migrants who arrived at ports of entry without authorization to enter the U.S. What amplifies the border issue further is that the U.S. cannot account for who has entered the country. Per the U.S. House Committee on Homeland Security, year-to-date (YTD), 24,376 Chinese nationals were encountered at the Southwest border, and 24,214 of them were apprehended illegally crossing the border. What about the other 162 Chinese nationals not accounted for?

Secondly, we have foreign advisories contesting U.S. airspace. The five known Chinese balloon flights into U.S. territory are a prime example of U.S. air space being contested. Of the five incidents, three were under Trump's administration, and two were during the Biden administration. The well-known February 2023 incident involved a 200-foot-tall balloon carrying a payload weighing over 2,000 pounds. It entered U.S. airspace over Alaska on January 28, then again over the continental U.S. on January 31. The balloon was eventually shot down off the coast of South Carolina by an F-22 fighter jet. The balloon's path included sightings in Kansas, Missouri, North Carolina, and South Carolina. It likely also traversed states such as Wyoming, South Dakota, Nebraska, and Kentucky, which host several U.S. military installations.

Lastly, China's cyber threats pose a significant and ongoing challenge to the United States' economic and national security. These threats primarily manifest in cyber espionage, intellectual property theft, and attacks on critical infrastructure. Chinese hackers, often state-sponsored, target U.S. companies and government agencies to steal intellectual property and trade secrets. Their operations undermine the competitiveness of U.S. businesses, resulting in significant economic losses. Chinese economic espionage also extends to stealing sensitive economic and technological information, which can disrupt industries and hinder economic growth.

 Continued on Page 14

On the national security front, China's cyber capabilities threaten U.S. military and defense systems. Cyber-attacks can disrupt military operations and compromise classified information. Additionally, attacks on critical infrastructure sectors can disrupt essential services and jeopardize public safety.

Furthermore, Chinese cyber operations may aim to influence political processes and decision-making within the United States, potentially undermining democratic institutions and national sovereignty.

I am not the only one who has voiced this concern. The U.S. Northern Command (USNORTCOM) and North America Aerospace Defense Command (NORAD) combatant command general, General Glen Vahherck, stated in his March 22, 2022, statement before the Senate Armed Services Committee, "For decades, the United States has been accustomed to choosing when and where the nation will employ the military lever of influence and project power around the globe from a homeland that was assumed to be secure. Our competitors have studied this operating model for the last 30 years and have developed strategies and capabilities intended to offset our military advantage and disrupt our force flows. Quite bluntly, my ability to conduct the missions assigned to USNORTHCOM and NORAD has eroded and continues to erode. Our country is under attack daily in the information space and cyber domain."

In conclusion, SOF Week 2024 provided valuable insights into the evolving needs of the SOF community and its ongoing global challenges. However, it also raised important questions about the U.S.'s focus on international security at the potential expense of its own.

The ongoing border issue, foreign advisories contesting U.S. airspace, and China's cyber threats are significant concerns that must be addressed. The U.S. must balance its role in global security with protecting its borders, airspace, and cyberspace. General Glen Vahherck pointed out that our competitors have developed strategies to offset our military advantage and disrupt our force flows.

Therefore, the U.S. must reassess its security strategy, prioritize its security needs, and develop robust measures to counter these threats. By doing so, the U.S. maintains its competitive edge and continues to safeguard its economic and national security.

TECHNOLOGICAL EVOLUTION:
The Rise of AI in Military Strategy

BY SMSGT MICHELE BROOKS

Today, the landscape of global military competition is heavily influenced by advancements in technology, with AI at the forefront. AI's applications in intelligence gathering, cybersecurity, autonomous weapon systems, and decision support systems are transforming the military landscape. For military personnel, adapting to these technological advancements is crucial for maintaining strategic superiority and national security. A complacent attitude towards these advancements could result in a strategic disadvantage, especially as competitors continue to make significant strides in these areas.

As a leader in AI talent and innovation, the United States faces significant competition from nations like China, rapidly developing technological capabilities (Schmidt, 2022). Comparing the United States and China in AI military integration reveals distinct approaches. While the U.S. focuses on enhancing existing systems, China is rapidly developing new AI applications for cyber warfare and intelligence, highlighting the diverse strategies nations adopt to combat complacency.

Furthermore, the global AI race is not limited to the United States and China. The European Union and India, each with their unique strengths and strategies in technology, are also key players. Europe's regulatory prowess and India's vast pool of technology talent are reshaping the global technological landscape (Schmidt, 2022). A pertinent case study is Israel's use of AI in military operations. The Israel Defense Forces have effectively integrated AI into their intelligence systems, enhancing their ability to preempt and respond to threats in real-time (Smith, 2023). This proactive stance showcases how continuous innovation can provide a strategic edge.

The utilization of AI by smaller nations or non-state actors to challenge larger military forces is a significant aspect of contemporary warfare. AI-enabled cyber warfare is a primary tool, allowing for sophisticated attacks on military networks and infrastructure, as highlighted in works by Clarke and Knake (2010) on cyber warfare tactics. Additionally, AI can play a crucial role in information warfare, aiding in the creation and spread of disinformation and propaganda, as discussed by Singer and Brooking (2018) in their analysis of digital manipulation in modern conflicts.

The ethical implications of AI in warfare are significant. The use of autonomous weapons raises questions about accountability and the moral responsibility of decision-making in combat scenarios. It's essential for military strategists to consider these ethical dimensions to ensure that technological advancement doesn't eclipse humanitarian considerations.

The role of AI in enhancing surveillance and intelligence capabilities cannot be understated. The application of AI in drones and surveillance tools, as explored by Scharre (2018), offers even less developed nations or groups the ability to gather vital intelligence. In the realm of asymmetric warfare, AI empowers unconventional tactics, as per Arquilla and Ronfeldt's (2001) theory on network-centric warfare, enabling smaller forces to effectively engage with larger militaries. AI also bolsters defensive systems, such as missile defense and electronic warfare, as suggested by Horowitz (2018). This is particularly useful for nations with limited resources, AI's capacity to maximize the efficiency of scarce resources is critical, as explored by Biddle (2004) in his work on military strategy.

In targeting the supply chains of larger forces, AI's analytic capabilities can identify key disruption points, an approach discussed in works by O'Hanlon (2000) on military logistics. In 2023, the U.S. Department of Defense launched an initiative to integrate AI-driven logistics and supply chain management, reducing response times and increasing efficiency (Johnson, 2023). This demonstrates a strategic shift towards embracing innovative technologies to overcome operational challenges.

Lastly, AI as a decision support tool is invaluable in strategic planning, allowing for more informed decisions, a concept elaborated by Betts (2000) in his research on military strategy and decision-making. These various applications underscore the transformative impact of AI in modern warfare, as

 Continued on Page 16

smaller entities leverage technology to compensate for traditional military imbalances. For military strategists, understanding global dynamics and employment of current and emerging technologies is essential to formulating effective and responsive defense policies.

As General Mark A. Milley, Chairman of the Joint Chiefs of Staff, remarked in 2023, 'The integration of AI into our military strategy is not just an enhancement; it's a fundamental shift in the way we approach defense in the 21st century.'

Frontier Challenges: AI's Role in Space

In the realm of space, AI's use by smaller nations or non-state actors presents challenges and opportunities, reshaping space power dynamics. The use of AI for satellite imagery analysis, as discussed by Harrison et al. (2020), enables efficient data processing, enhancing situational awareness for smaller entities. This equalizing effect in space surveillance is transformative.

Scheduled 2024 space missions, like NASA's Europa Clipper and Artemis II, demonstrate the necessity of AI in handling complex navigational and data analysis tasks. The Europa Clipper's goal is to study Jupiter's moon Europa and its subsurface ocean, while Artemis II focuses on lunar orbit, marking key steps in space exploration, largely facilitated by AI (Bramson, 2024). The VIPER mission, aiming to locate water on the Moon's south pole, will also rely heavily on AI for navigation and mission execution.

These missions, along with JAXA's Martian Moons Exploration and ESA's Hera mission, highlight the varied use of AI in space, emphasizing the need for advanced technologies in military space strategies (Bramson, 2024; Houser, 2024). AI also plays a crucial role in enhancing satellite communication and control systems, as explored by Robinson et al. (2018). Its application in satellite collision avoidance is critical for effective space traffic management, as analyzed by Weeden and Chow (2018).

As space becomes more crowded and contested, AI's ability to detect hostile actions or anomalies becomes essential, as underscored by Johnson-Freese and Handberg (2019). AI's potential in revolutionizing space exploration and resource extraction, as mentioned by Pasco (2020), shows its importance in missions typically dominated by technologically advanced nations.

Nevertheless, the use of AI in space raises ethical and security concerns, particularly regarding space militarization and AI-driven space weapons, as Mistry (2019) highlights. Effective governance and regulation of AI in space, discussed by Hitchens (2021), are crucial for maintaining space as a peaceful and equitable domain.

Artificial Intelligence (AI) plays a pivotal role in advancing space operations, particularly in the monitoring of space traffic and the detection of space debris, which is crucial for safeguarding satellites and other space assets. This area is especially significant for national security and defense, considering the strategic importance of space assets. AI algorithms, particularly those employing deep learning techniques like SDebrisNet, have enhanced the precision of space debris detection, enabling more efficient tracking and cataloging of these objects, including those with low signal-to-noise ratios (Russo & Lax, 2022; Tao, Cao, & Ding, 2023).

Furthermore, AI's integration into satellites and spacecraft manufacturing processes, through the use of AI-driven collaborative robots (cobots), not only improves production accuracy and speed but also minimizes human errors. AI also contributes to astronaut health monitoring and bolsters the capabilities of space missions with advanced navigation and control systems, such as swarm robotics trained using AI techniques (Russo & Lax, 2022). Space-based optical satellites, unaffected by terrestrial weather conditions, are instrumental in debris detection, particularly in low Earth orbit. AI algorithms optimize the scheduling of observation tasks in space-based monitoring networks (Gongqiang et al., 2023).

AI's applications extend to natural disaster response and Earth observation, with AI-driven systems on satellites facilitating data processing and analysis for various applications, exemplified by ESA's Hera mission. This mission showcases AI's potential in autonomous navigation and decision-making in space (The European Space Agency).

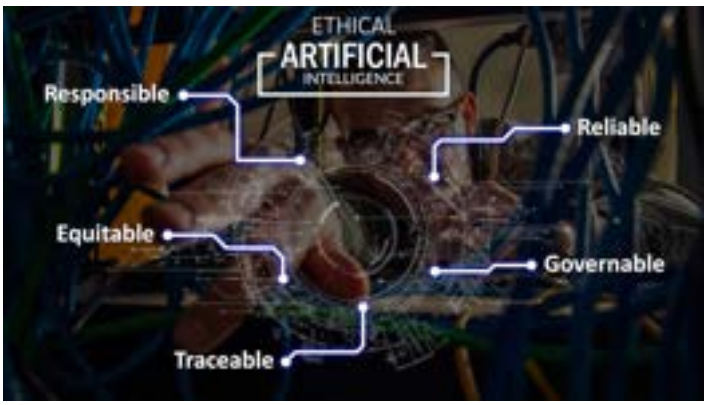
However, the advancement of AI in space raises significant ethical and security concerns, particularly regarding the potential for militarization and AI-driven space weapons. Concerns include the use of AI in autonomous weapons systems in space and the

 Continued on Page 17

associated ethical issues related to accountability and decision-making in conflict scenarios (Horowitz, 2016). The weaponization of AI in space also poses risks to global security, necessitating robust regulatory frameworks and international agreements (Marwala, 2023). The Outer Space Treaty of 1966 highlights the importance of space for peaceful purposes but requires updates to address technological advancements and increasing space activities (Winstead, 2023). The United Nations and various stakeholders are working towards establishing ethical and legal frameworks to address these complexities (United Nations, 2022; Marwala, 2023).

Finally, AI is expected to significantly impact future space exploration, including long-term missions, colonization efforts, and deep space exploration. In long-term missions, AI could autonomously navigate spacecraft, analyze environmental data, and make critical decisions. For colonization efforts, AI-driven robots and machinery could expedite and enhance the safety of building habitats and extracting resources on other planets. In deep space exploration, AI can analyze astronomical data, assist in navigation, and control scientific experiments, improving the efficiency of such missions. AI's adaptability and learning capabilities are key in these dynamic and unpredictable environments, further enhancing communication between spacecraft and Earth.

In summary, the role of Artificial Intelligence (AI) in space exploration is both extensive and transformative. AI's capabilities range from managing spacecraft and constructing habitats on other planets to analyzing astronomical data and autonomously navigating in deep space. As AI technology evolves, its applications in the domain of space are set to widen, enhancing human exploration and presence beyond Earth. Concurrently, the ethical challenges posed by AI in space, particularly concerning its use in militarization and space weaponry, call for a comprehensive and multi-faceted approach. This includes developing international regulations, fostering increased international cooperation, and integrating diverse viewpoints from various stakeholders to ensure AI is used responsibly and ethically in the realm of space.



SFA THOUGHT LEADER COLUMN:
Critical Minerals Subject

BY LANG ERIC SUNDBY

Does the Moon Hold the Key to Solving America's Critical Minerals Shortage?

50 critical minerals are essential to the future of U.S. national and economic security. While terrestrial mining may be more cost-effective, lunar and space mining presents an endless opportunity to acquire the known minerals needed and discover new minerals that will improve our future. The time is now for Washington to act in the best interests of the United States to support and facilitate space mining operations and technology development.

In February, America returned to the Moon for the first time since 1972. However, there was a distinct difference this time around – a private company, Intuitive Machines, led the charge, not the government. The new space race is being led by private sector players partnered with NASA and the Space Force to maintain America's lead in the space domain. Meanwhile, leadership in Washington needs to set forth a vision for our future use of space, namely, how we will utilize the plentiful minerals available.

The 21st century has not only seen growth in private space enterprises and other tech sectors but also a reliance on critical minerals spurred on by myriad new technologies. Aluminum, cobalt, lithium, and platinum (all found here on Earth and abundant in space) are just some of the 50 critical minerals designated by the U.S. Geological Survey (USGS) as essential to the economic security of the United States. These are resources most in the Western World take for granted, perhaps unaware that China currently controls roughly 60% of global production and 85% of global processing capacity.

Domestic mining of critical minerals has received support from President Joe Biden despite numerous calls to halt such projects due to environmental concerns, amongst others. In September 2023, the administration released a report addressing methods to improve and expand mining on public lands. The expansion of mining in the United

States can be viewed as an admirable move, but the battle is not uphill—it's up a cliff. China has signed agreements with most U.S. states that are home to valuable mines, and the amount of minerals in North America cannot viably keep up with demand. This dilemma forces us to think innovatively and is one of the catalysts for why I co-founded TerraSpace, a company developing machine learning and artificial intelligence capabilities to refine the mineral analysis process. These technologies will enable faster and more precise results in the mineral exploration process, while enabling mineral exploration in extreme environments, such as the seabed and extraterrestrial, without the need for sample return missions.

Intuitive Machines' CTO, Dr. Timothy Crain, shared with me the critical steps needed to reach a sustained presence on the Moon to access coveted resources: "From our perspective, there is a natural evolution to mineral utilization in space. The foundation is prospecting with remote orbital sensors and direct surface technology like TerraSpace is developing. We'll then move into local exploratory sampling and mining on single-mission scales. Things will really take off when we scale up infrastructure deployed over multiple missions and begin to utilize lunar and space resources for our needs in space. Finally, once a healthy in situ resource utilization economy is established, you'll see imports back to Earth as part of regular trade. This vision is no longer science fiction, it's on our doorstep.

 Continued on Page 19

With the right leadership, the United States can play a key role in this new economy." I had the honor of testifying on these exciting opportunities in front of the U.S. House Committee on Natural Resources last December. The Committee has jurisdiction over the topic of space resources, as it oversees the USGS which conducts research and mapping in this field through the Astrogeology Science Center. A lively and informational discussion took place surrounding the practicalities and opportunities facing America regarding space resources. I commend the leadership of the Committee for investing their time researching and asking questions on the complex topic of space resources. America deserves innovative thinking in Washington and a willingness to take action on our future, especially if it means setting forth a long-term vision.

In this vein, I suggest that Congress and the White House take the following steps to secure America's future access to critical mineral resources. First, form a Congressional Advisory Commission to examine and make recommendations concerning the near-term and long-term development and uses of resources from untapped environments such as space. The Commission would also examine the impact of these resources on the national and economic security of the United States. Second, create a National Space Resources Strategy with clear directions for national policy. Third, place space resources as a "Mission Area" of the USGS and increase funding to the Astrogeology Science Center. Fourth, give the USGS a slice of the existing budget for Small Business Innovation Research grants to encourage the development of dual-use technologies that benefit mining on Earth and in space. Fifth, require a yearly report to Congress and the White House from USGS on the state of space resources technologies, scientific developments in the field, and discovery and mapping of new resources.

Some commentators are doubtful of the use of space resources; they believe the market will not materialize for decades and space will not be able to compete with the costs of terrestrial mining. The math is simple, even though it is rocket science. The primary steps needed to reach a viable ecosystem of access and use of minerals in space lie in the development of super heavy-lift rockets such as SpaceX's Starship and Super Heavy systems, and landing vehicles to access planetary surfaces such as Intuitive Machine's Nova-C.

After such platforms are developed, space resources can be prospected, and then utilized in-situ (locally in space). Finally, as the cost of space decreases and access becomes more commonplace, certain space resources will be brought back to Earth for the use and benefit of our home planet.

In the meantime, the most important step we can take is to invest in dual-use technologies including new mineral exploration platforms, drilling rigs, and mine transportation systems. These technologies can grant access to resources in space while enabling easier and faster access to critical minerals sorely needed here on Earth.

STRATEGIC HARMONY:
The U.S. Response to China's Advancing Lunar Ambitions

BY COLLEEN MCLEOD GARNER

The dawn of the 21st century has witnessed a renaissance in space exploration, marked notably by China's ambitious lunar projects. The recent launch of Chang'e 6, aimed at retrieving samples from the far side of the moon, signifies a pivotal development in the celestial ambitions of a rising global power. This initiative is not just a technological achievement but also a strategic maneuver, positioning China at the forefront of space exploration and challenging the United States to reassess its priorities in the cosmic arena. As such, this moment offers both a compelling challenge and a unique opportunity for the U.S. to redefine its role in space policy, emphasizing the need for increased funding and strategic prioritization to maintain global leadership in space exploration.

Immediate Actions (Now to 1 Year) should focus on high-level advocacy and international dialogue, spearheaded by the President. This includes advocating for substantial increases in funding for space initiatives to support the establishment of a presidential commission on space policy. This commission would drive forward updates to national space policy and legislation, ensuring that the U.S. remains competitive as space becomes a key frontier in global geopolitics. Additionally, bolstering the U.S. Space Force's infrastructure and financing during this phase is crucial to enhance its capabilities for peaceful space operations, reinforcing that these advancements are for preparation and defense, not for instigation of conflict 【1】.

Short to Medium Term (1 to 5 Years) should see the enactment of comprehensive space legislation that not only addresses space traffic management and debris mitigation but also significantly increases investment in these areas. Collaboration with international partners must be reinforced by shared commitments and resources to ensure the sustainability of space activities. The U.S. Space Force's role is crucial during this period, requiring robust funding to ensure it can fulfill its mandate to protect U.S. strategic interests and foster a culture of cooperation internationally. It is essential to continue enhancing the Space Force's infrastructure and operational capabilities to ensure readiness without escalating tensions 【3】【4】.

Long Term (5 Years and Beyond) involves reinforcing U.S. leadership in space through ongoing and increased investment in space technology, STEM education, and international partnerships. This requires a sustained financial commitment to developing a comprehensive space security framework that addresses emerging threats and guarantees freedom of operations in space for all nations. The long-term strategy should also focus on further developing the Space Force's capabilities, ensuring it is equipped to support peaceful and cooperative international space endeavors. The Artemis Accords provide a foundation for these efforts, emphasizing principles such as interoperability, transparency, and sustainable use of space resources 【5】 【6】【7】.

As we look towards the future, the strategic landscape of space exploration is undoubtedly evolving. The Chang'e 6 mission serves as a stark reminder of the rapid advancements being made by other nations, and the imperative for the United States to not only keep pace but to lead. To this end, the U.S. must adopt a holistic and forward-looking approach to space policy that goes beyond traditional frameworks of competition. It must envision a strategy that fosters international cooperation and public-private partnerships, ensuring that space remains a domain characterized by peace and human advancement. By embracing these challenges with a renewed commitment to funding and prioritization, the U.S. can ensure that it continues to harness the vast potential of the final frontier for the betterment of all humanity.

 Citations on page 22

Citations (for article on page 21)

1. Young, M. (2024, January 11). Mission Authorization: Decoding the space Policy dilemma - Aerospace Security. Aerospace Security. https://aerospace.csis.org/mission-authorization-decoding-the-space-policy-dilemma/
2. The Space Review: Will a five-year mission by COPUOS produce a new international governance instrument for outer space resources? (2023, February 20). https://www.thespacereview.com/article/4534/1
3. Melillo, G. (2022, August 3). The Hill. The Hill. https://thehill.com/changing-america/resilience/smart-cities/3586125-should-the-us-government-oversee-space-traffic-some-experts-think-its-time/
4. Basham, L. G. S. L. (2024, February 8). The critical role of space in modern warfare and the imperative of joint space capabilities in Europe. SpaceNews. https://spacenews.com/critical-role-space-modern-warfare-imperative-joint-space-capabilities-europe/
5. House, W. (2023, December 20). FACT SHEET: Strengthening U.S. international space partnerships. The White House. https://www.whitehouse.gov/briefing-room/statements-releases/2023/12/20/fact-sheet-strengthening-u-s-international-space-partnerships/
6. Nato. (n.d.). NATO's approach to space. NATO. https://www.nato.int/cps/en/natohq/topics_175419.htm
7. Mallick, S. (2023, September 21). The Artemis Accords: Changing the Narrative from Space Race to Space Cooperation. SpaceNews. https://spacenews.com/the-artemis-accords-changing-the-narrative-from-space-race-to-space-cooperation/
8. U.S. Department of Defense. (n.d.). Remarks by DOD General Counsel on "Space Law: Promoting the Rules-Bas.

SFA SPACE & AI EDITORIAL AI EDITORIAL

Space, AI, and the Future of Collaboration

BY ALEC LEESEBERG,
SFA WEBMASTER

AI-Powered Guardians Are Transforming Space Missions

Guardian Lieutenant Tyler Johnson, a Guardian and Space Force Responsible Engineer assigned to the 5th Space Launch Squadron out of Cape Canaveral Florida, stands on the bustling launch pad, juggling multiple phones, each emitting a symphony of notifications, alarms, and alerts. One phone signals an incoming weather update, another buzzes with a safety notice from headquarters, and yet another pings with a crucial systems check reminder from Jira (an update from a SpaceX engineer). Amid this clamor of digital noise, Tyler meticulously inspects the towering rocket before him, ensuring mission assurance for the imminent launch. With the weight of responsibility pressing down, any overlooked detail could jeopardize the entire mission. This high-stakes environment is the daily reality for Guardians, where the relentless flow of information and the critical nature of their tasks demand innovative solutions. Enter generative AI, poised to revolutionize how Guardians operate, communicate, and execute their missions with unprecedented efficiency and precision.

In the ever-evolving landscape of space operations, the U.S. Space Force's Guardians are pushing the boundaries of what's possible with generative Artificial Intelligence. Traditional Gen AI interfaces involve isolated interactions between a human and an AI agent, but this approach falls short in the complex, high-stakes environment of the Space Force. Guardians are not typical end-users; they are forward-leaning innovators, gamers, developers, and digital enthusiasts who demand dynamic and integrated solutions.

This progressive mindset is evident in the adoption of Mattermost within the space launch community. At Space Launch Delta (SLD) 45 and SLD 30, Mattermost —a Slack/Discord-like ChatOps tool—has become integral for communication. Units like the 2nd Launch Squadron use it for everything from sharing safety notices to exchanging pictures of their dogs. However,

Mattermost is more than just a social platform; it is crucial for cross-coast collaboration in operational communications, whether on or off console.

Transforming Space Force Operations

Effective collaboration is the backbone of any successful space operation. The Space Force operates in a highly dynamic environment where precise coordination and communication among diverse groups are paramount. Operations often involve Guardians, Airmen, civilians, contractors, and other mission stakeholders. From mission planning to execution and post-mission analysis, every phase demands seamless integration of various teams, technologies, and processes.

The traditional one-on-one generative AI interaction model is inadequate for such complex scenarios. The Space Force needs collaborative generative AI tools that support multi-user environments, enabling real-time data sharing and communication. By integrating generative AI into collaborative platforms like Mattermost, routine tasks can be automated, real-time analytics provided, and communication and coordination facilitated. Allowing groups of users to interact with an AI agent introduces new, collaborative team dynamics, significantly reducing the cognitive load on personnel and allowing them to focus on critical mission aspects.

 Continued on Page 24

Realizing the Vision with Kinetic

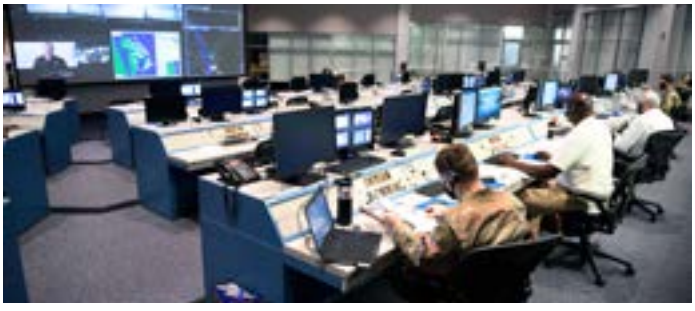
Major Jason Lowery, the acting Director of Technology & Innovation for Assured Access to Space, brought this vision to reality by soliciting the work of Velocity Explorations, a small business dedicated to delivering emerging technologies into the hands of warfighters. Velocity was awarded a Small Business Innovation Research (SBIR) contract to develop Kinetic, an iteration of Mattermost integrated with Gen AI and designed specifically for Space Force end users. As the visionary behind this groundbreaking initiative, Major Lowery articulated the overarching ambition of the project:

- "The goal of this project is to live up to the Space Force's vision for a digital service. To do that, we need to be proactive about upskilling ourselves with generative AI technologies and finding responsible ways to use them effectively. This project will allow us to start with the launch Deltas, but we can scale it to any Delta who wants to participate, and possibly even DAF-wide."

The development of Kinetic is a significant step towards creating a more interconnected and efficient communication network for Guardians, enhancing their ability to execute complex missions seamlessly. Testing and development have led to findings on how Gen AI will impact Space Operations moving forward.

New Collaborative Workflows

Multi-user interactions in which several users interact with a single AI agent foster a more dynamic and inclusive environment where team members can collectively engage with the AI, ask follow-up questions, and build on each other's queries. Collaborative interactions not only enhance the quality of the information received but also promote a culture of continuous learning and improvement. Teams can see how others use the AI, learn new techniques and approaches to extract valuable insights, democratize the use of AI, and reduce the stigma associated with relying on AI tools.



Reducing the Risk of AI Hallucinations

Generative AI hallucinations (responses an AI generates that are incorrect or nonsensical) pose a significant risk in high-stakes environments like space operations. Hallucinations are most critical when they are perceived to be correct but are false. The collaborative nature of Kinetic helps mitigate this risk. When AI responses are visible to all users, any incorrect information can be promptly identified and corrected by the team. This collective oversight ensures that incorrect AI outputs are easily and harmlessly addressed. Users can provide immediate feedback, offering additional context and clarifying any ambiguities, which is crucial for maintaining the integrity of the information used in decision-making.

The ability to correct AI hallucinations in real time not only improves the accuracy of AI-generated insights but also builds trust among users. Guardians can rely on AI knowing that their peers are also scrutinizing the outputs. This collective vetting process enhances the overall confidence in AI tools, encouraging broader adoption and more effective use. Moreover, the feedback loop between users and AI facilitates continuous improvement of the AI models, as they learn from the corrections and become more accurate over time.

The Need for Tactical Large Language Models

Current large language models (LLMs) require contextualization and specialized training to be fully effective in military contexts. The unique operational environment of the Space Force involves specific jargon, acronyms, and procedures that generic AI models do not understand. To address this, LLMs must be trained with data specific to military operations, ensuring they can accurately interpret and respond to queries in the correct context. This process involves continuous refinement and updates to keep pace with evolving terminology and operational practices. By developing tactical LLMs tailored to the needs of the Space Force, AI tools can become more relevant and useful for Guardians.

 Continued on Page 25

The contextualization of LLMs expands beyond understanding language into the integration of operational knowledge. AI models should be able to understand the implications of certain actions, predict potential outcomes, and provide recommendations based on best practices. This level of contextual understanding requires extensive training and validation, ensuring that the AI models can support decision-making processes effectively. Investing in the development of tactical LLMs will enable the Space Force to leverage AI more comprehensively, enhancing the accuracy and reliability of AI-driven insights and recommendations.

The Future of Space Operations and AI

The transformative potential of generative AI in enhancing collaboration and operational efficiency within the Space Force is unprecedented. By integrating AI-driven tools like Kinetic, the Space Force will significantly improve mission planning, execution, and post-mission analysis, ensuring that it remains at the forefront of technological innovation. Embracing these advancements not only enhances current capabilities but also prepares the Space Force for future challenges. The commitment to leveraging data and AI as strategic assets underscores the importance of these technologies in achieving mission success. Major Lowery, reflecting on the revolutionary impact of AI-driven tools, emphasizes their transformative potential within the Space Force: "GenAI is a game-changer in how humans interact with computers. It's hard to think of any emerging technology more consequential for the Space Force right now, since interfacing with computers is at the core of almost everything we do."

SFA FUTURE FICTION

The Swarm Draft

BY ALEXIS BONNELL
CIO, HEAD OF DIGITAL CAPABILITIES & AI LIASON
FOR THE AIR FORCE RESEARCH LABORATORY

The year is 2050 and China has launched a drone campaign for the ages. America's classic civil defense strategy, now manifest as the Swarm Draft, saves the country and sets a new standard for the rules of engagement.

Note 1: Assisted by AI- ChatGPT 4 (Prompts in background at end of story)
Note 2: The Heroine of the Story: "Amanda Evangelista" is an author's nod to two amazing women working in DOD AI: Dr. Amanda Bullock, AFRL and Bonnie Evangelista, CDAO

In the densely populated city of San Francisco, the skyline shimmered with the lights of thousands of drones, each one humming a soft, electric lullaby. The year was 2050, and war was no longer the domain of human soldiers—it belonged to the machines and the civilians who built them. Dr. Amanda Evangelista, once an innovator in drone technology, had withdrawn from the defense sector, disillusioned by the way her creations had been used. What she knew cost $7 in material and was charged to the taxpayer at $30,000 a pop.

She now taught mechanical engineering at a community college, finding solace in the eager eyes of her students. The world had changed in recent years. The traditional defense industry had been upended, and in its place, the Swarm Draft had emerged. Every citizen with a 3D printer had a role in national security, each household a node in the vast production network of drone swarms. On-demand production meant that citizens could create millions of drones overnight.

When the conflict with China escalated, the United Nations issued a mandate for all member states to activate their Swarm Draft protocols. China had developed a sophisticated drone army, and the only way to counteract this force was with the ingenuity and collective effort of civilians. Notifications chimed across the globe: schematics for drone parts flooded the networks, 3D printers whirred to life, and the world's populace became armament artisans. Amanda's printers had lain dormant, a silent protest of her past life.

But as the first wave of Chinese drones darkened the skies over the Pacific, she knew she could no longer stand aside. Her expertise was needed. Grudgingly, she powered up her machines and began to print. The air soon filled with the scent of melting plastic, resin, and the sound of servo motors. Amanda's living room, like millions of others, had transformed into a micro-factory, churning out components that would be assembled into the defenders of the free world.

This new kind of draft didn't care for age, gender, or physical ability. It required only a willingness to serve and a printer. The old and the young, the rich and the poor—all contributed to the swarm. Amanda's drones were a marvel of engineering, agile and resilient. They joined the ever-growing cloud of machines, each unit a testament to the collective will of humanity. The skies above the city buzzed with activity as the swarms met in combat. There were no explosions, no gunfire. Instead, the drones danced a deadly ballet, executing maneuvers designed by the best military minds and executed with civilian precision.

Amidst the turmoil of global conflict, a quieter revolution had blossomed, turning the detritus of everyday life into the sinews of war. Recycling technology had leaped forward, now a fixture in every home, as indispensable as the refrigerator or the washing machine once were. Household waste—plastics, polymers, and composites—were broken down and reborn in the crucibles of personal recyclers. These sophisticated devices could deconstruct any plastic waste down to its molecular components and reforge it into a pristine filament for 3D printers. This filament became the lifeblood of the DroneForge Network,

 Continued on Page 27

fueling the printers that churned out the drones. No longer was recycling a chore of sorting bins; it was a civic duty, a daily ritual that fed the relentless appetite of the swarm. In every kitchen, living room, and garage, citizens contributed not just their time and energy but also their garbage, transforming yesterday's soda bottle into today's aerial defender. This circular economy turned every household into a self-sustaining armory, ensuring that the means to defend the free world were as common as the will to do so.

In this new age of the Swarm Draft, the very fabric of community gatherings transformed. Book clubs set aside novels to exchange drone assembly manuals, their discussions now animated by the intricacies of aerodynamics and the ethics of unmanned warfare. Quilting circles, once bastions of traditional craft, repurposed their collective effort from stitching fabric to piecing together the lightweight bodies of reconnaissance drones. Even collectors, known for their meticulous care of stamps and coins, turned their attention to sourcing rare materials and components to enhance the capabilities of the swarm. Every hobbyist club and community group found new purpose under the united cause, their meetings now buzzing hives of tactical brainstorming and production. Gardens were tended not only for beauty or sustenance but also to cultivate bio-plastic-yielding plants that could be converted into drone parts. Sports teams adapted their strategies and plays for drone formation control simulations, fostering a spirit of teamwork that soared beyond the playing fields and into the skies. In this era, the camaraderie once reserved for leisure activities had been galvanized into a collective force, a national patchwork of civilian units diligently contributing to the greater defense initiative with each stitch, solder, and strategy devised.

Amanda watched the battle through her monitors, her drones streaming data back to her in real time. She had programmed them to disable, not destroy. Each drone carried a payload designed to neutralize its opponent, adhering to the new rules of engagement that prioritized minimal casualties. The Chinese drones were formidable, each one a perfect replica of the other, reflecting the efficiency and might of a superpower. But what they lacked was the

creativity of the human spirit, the unpredictable nature of a million individual minds working towards a single goal, self-preservation and protection of what they loved— their families, community, and freedom. As the days passed, the skies began to clear. The world watched in awe as the citizen-driven swarm gained the upper hand, disabling the Chinese drones with innovative tactics that no AI could predict. The conflict came to a head when the Chinese deployed their latest creation: a mega-drone, a behemoth capable of disrupting the swarm with powerful electromagnetic pulses. It was a gamble, a last-ditch effort to turn the tide. Amanda knew what she had to do. She gathered a team of her brightest students, and together they devised a countermeasure—a virus that would render the mega-drone harmless. It was a risky move; the virus had to be delivered by a drone that could withstand the electromagnetic assault.

Amanda modified one of her own, stripping it down to the essentials and shielding its systems. The swarm parted as the lone drone made its way across the battlefield, a single point of light against the shadow of the mega-drone. The world held its breath as the two machines converged. There was a moment of silence, and then the mega-drone fell from the sky, its systems corrupted from within. The victory was more than military; it was a statement—a declaration that the spirit of humanity could not be replicated or replaced.

Continued page 28

The citizens of the world had not just fought a war; they had redefined it. In the aftermath, Amanda stood among her students, watching the sunrise. The swarm had dispersed, each drone returning to its home to be disassembled and repurposed. War had changed, but so had the people who fought it. They had united, each contributing what they could, and together they had achieved the impossible. The Swarm Draft had proven that the future of defense lay not in the hands of a few, but in the capabilities of the many. And as the sun crested the horizon, Amanda knew that this was only the beginning. The world had been given a glimpse of what could be achieved when humanity stood together, and there was no going back.

Authors Note:
I was assisted in writing this piece by ChatGPT 4, below are the prompts and follow-on prompts I used to create this story. I hope this encourages you to explore your "art of the possible" with AI. "Prompt Engineering" is just a fancy way of saying "Giving Directions" to an AI LLM tool.

Prompts:
1. Write a sci-fi story set in 2050 that outlines a scenario highlighting future technology where war is fought way differently than it is now (the first result predictably made AI the enemy, and I was going for something different, so I tweaked it).

2. Imagine you are a sci fi writer and write a 3000 word story set in 2050 that highlight drone swarms as the major battle format and how all citizens have 3D printers and the citizens create and launch drones that the military guide, completely upending the current defense industry and creating a new type of draft and public service a citizen driven industrial complex.

3. Now make this a 2000 word short story where the adversary is China not AI (Had to correct it again as it ironically kept making technology the challenge vs. the opportunity, I had to focus it on a particular adversary).

4. Write a separate paragraph about how recycling technology meant that every citizen could recycle their own household waste into plastic for the 3-D printers to make drones out of. (As I was writing the story and getting into the concept I was struck by how this tweak might really change the future of waste and war).

5. Write another separate paragraph about how book clubs in circles, quilting groups, and ever collections across communities now had very different things they would work on to support the swarmed draft (I was inspired in thinking of the ways local communities especially women often come together and how that is redirected in a time of war, a-la- Rosie the Riveter).

6. Now based on the above, give me a great image that tells this story.

Images created by ChatGPT for Swarm Draft:
Now show more of the "everyday person" recycling their plastic garbage into plastic filament for a 3D printer while they assemble a drone and see some drones already assembled flying out of the garage to join the swarm of drones over the neighborhood. the person working on the drone should look determined, focused and positive.

SFA OP-ED:
Guardian Culture Thought Leadership

BY PAUL BOYENGA

Connection and Interconnectedness: The Difference and Why it Matters

Connection is the most important Guardian value, but mere connection is not enough. Interconnectedness throughout the U.S. Space Force is critical to a mission-focused, combat-ready force prepared to prevail in Great Power Competition.

The Guardian handbook lists four values that serve to empower us Guardians in our efforts to be a lean, agile, and advanced service. Character—our morals and principles. Courage—the charge to be bold and challenge our own ways. Commitment—to both each other and our mission. And finally, Connection—leaning on and supporting each other and the services we support. I would argue that while character fills our ranks with the soul we need to win, courage is what fuels our innovation, and commitment drives our perseverance, it is connection that ultimately raises our force to the level of cohesion and efficiency required to remain relevant in great power competition. Why is it then that despite our hyper-connected means of communication we struggle to build and strengthen connections within our ranks?

During the Guardian Field Forum (GFF), I had the pleasure of attending a seminar held by Amazon Web Services on reverse problem-solving. The insight gained from one of the most successful companies in existence was immeasurable. They spoke anecdotally about failure and success, highlighting their ability to always fail forward, and spoke of their methods for pitching ideas and workshopping their initiatives.
At the end of the seminar, I posed a question to the presenter,

- "Sir, in a company with millions of employees and numerous ongoing initiatives, how do you ensure that efforts aren't duplicated? How do you all maintain a level of self-awareness to remain efficient and effective as you chase the future of your company?"

The answer was this,

- "We strive to remain connected to each other through various means. We use small teams to tackle projects, but even with our best efforts, there are always times here and there when miscommunication happens. Overall, people know who they can reach out to and generally, we don't have lots of instances where efforts are duplicated. When it does occur, it's usually mediated quickly."

This wasn't much of a surprise to hear given the size (for occasional miscommunications) and success of Amazon—though I was sure there would be a notable story on duplicated efforts at least. The interesting part to this story is that just two days earlier when my partner and I gave our pitch to the GFF we posed a simple set of questions: who here knows what Delta 2's mission is? Of the thirty-plus people in the room, about 4 of them raised their hands. Who here knows what the 20th Space Surveillance Squadron's mission is? All the hands went down. The point was only further solidified as we watched three representatives from different deltas pitch nearly identical briefs over the next two days, and then further solidified when someone from the group noted that the specific topic was already being worked by Space Force in another Delta. The whole experience was deflating. Miscommunication is the easy target of choice in this situation, but I would go further and say that our lack of interconnectedness was the real culprit.

Connection is defined as "a relationship in which a person, thing, or idea is linked or associated with something else." So, are we connected in the Space Force? Based on the definition, at surface level it would seem so. We have relationships, and we are linked and associated through various elements—missions, offices, identity, etc. Still, with just a little ponderance it becomes clear that connection at face value is not enough to be interconnected. Interconnectedness is defined as "the state of being connected." It is the culmination of efforts to be connected — a "state" that serves as a status and an implication of efficiency and effectiveness.

The strength of any connection is tested through its use. Going back to the example of the GFF, one can see that while the Space Force is certainly connected,

 Continued on Page 30

the connections are not as strong as they should be for a combat-ready force. Relying on those connections to create a result, in this case, innovation at the GFF, demonstrated the weakness of the connections themselves. This is not the fault of any one office or even the organization. The Space Force is only 4 years old, and these connections are still being built. Learning to use them efficiently is part of our growth as a developing military service. Yet, where there is no succinct fault, there is certainly a critical gap that needs attention and addressing.

Without supporting efforts to strengthen these connections and bolster our broader understanding of our Space Force units amongst themselves, our connections will never reach their full potential. There is a great model for this concept of strong connections vs. general connections, and it exists inside all of us by the trillion: the cells of our nervous system. Nervous system cells communicate throughout our body using electrical impulses called action potentials. These impulses travel along threads of tissue called axons. The most important part of this travel is the use of myelination—a fat-rich material that insulates the axon and allows for high-efficient travel of the impulses from the head of the cell to the terminals where neurotransmitters are released. Myelination is not just important, it is pivotal. It allows for saltatory conduction, or jumping of impulses along gaps, resulting in information being passed 100 times faster than in cells without it. The nervous system of our force still needs myelination in lots of places. Our information is not being shared efficiently, and the results are evident in spotlights like the GFF.

The strength of individual connections can be tested through their use, but what about the culminating strength of our connections holistically? For this, I like to think of a much simpler example. Imagine a pile of bricks. If you were to stack the bricks and form a wall, a connection would take place. Items are linked to one another and associated by their place in the overall construction. If you were to stack the bricks and secure them with mortar, interconnectedness has taken place —a higher state of connection. Not only is the connection there but it is strengthened with a purpose. The bricks alone create a wall, but with the strengthened connection of mortar, the bricks create a wall built for purpose. Which type of wall would you put up to face a wrecking ball of combat operations?

Unlike mortar or myelination, the development of our force overtime should inherently create a higher level of interconnectedness as we harden our networking and unify our efforts. How much time are we willing to allow that natural process? It can be argued that we can't afford to let it simply occur naturally, but that we should take a more proactive approach to better connecting our force. Space Operations Command (SpOC) has taken the initiative recently with the advent of their "playing cards" idea – creating information sheets on the various deltas under their command.
Training exercises such as Space Flag are great conduits to interacting with various deltas and squadrons and testing our networking abilities toward a common objective. However, there has been feedback on a lack of cohesion or understanding. These efforts are great for concurrently creating interconnectedness through their implementation. The GFF should be a showcase for our interconnectedness. Though in its infancy, it still needs some support. If we are to create efforts to foster and bolster connection, what do they look like?

It appears the problem warrants a solution that is more on the nose. What if there was a summit or conference dedicated to educating the force itself, with attendants from across the various commands, organizations, and offices there to simply learn and better understand the connections between themselves and the force? Or a computer-based training series educating Guardians on the ins and outs of various missions and commands? These ideas are both feasible and viable, though they stop short of strengthening the connections through testing and use. Perhaps a new exercise could be developed where all participants are involved remotely —a sort of Stanley Milgram "small-world" problem experiment where random questions or correspondence are sent out to various participants and their ability to network and problem-solve is tested that way.

 Continued on Page 31

To be as lethal as possible in our "Great Power Competition" posture, our connections—and our state of connection or interconnectedness—must be ironclad. As of right now, we aren't quite hitting the mark. As we move forward and continue developing our force to meet the demands of lethality and agility that we are charged with building, I believe empowering our connections should be at the forefront. It should be a theme or lens through which we deliberate our options and efforts— a schema that we learn to fortify because we believe in the strength required to accomplish our missions together, a practice that we myelinate over time, a wall we aim to build fit for purpose. Looking to the future, I believe our competencies will not only rely on our interconnectedness but will also include it as one of its strongest pillars. After all —it is one of our core values.

SFA Legislative Update:
LGA and SFPMA

BY ERIC SUNDBY

Moving the Mission Forward: SFA Legislative Update – June 2024

SFA's Government Affairs committee works on behalf of Guardians to advocate for policies that will optimize the force and support mission success. Our efforts have moved the needle forward on our legislative priorities, ensuring the efficacy of SFA's support for the USSF.

It's been a busy couple of weeks regarding space topics on the Hill. Governors from each state and territory pushed back against Air Force Proposal (LP 480) addressing concerns about state versus federal authority regarding the transfer of Air National Guard (ANG) space missions into the United States Space Force. Additionally, language for the Legacy Guardian initiative was added to the NDAA authorizing the Secretary of the Air Force to designate certain separated members of the Air Force as Legacy Guardians.

Legacy Guardian Initiative
(Sec 522 - HASC FY25 NDAA):
Space Force Association Government Affairs was informed of the inclusion of the Legacy Guardian initiative in SEC. 522 in the Chairman's mark for the House Armed Services Committee. During SFA's inaugural Orbit the Hill event in February, Space Force Association volunteers advocated for the inclusion of the Legacy Guardian initiative with members of the House Armed Services Committee. In the previous NDAA, the Legacy Guardian initiative was later adopted during markup as an amendment and was not part of the original NDAA language. This year, the inclusion of this proposal in the Chairman's mark represents a significant step towards getting this legislative initiative passed. Since the inception of the Space Force nearly five years ago, SFA members have been proud to work with and assist Members of Congress in advocating for Guardians, space operations veterans, and the domain.

The current language authorizes the Secretary of the Air Force to "prescribe regulations that authorize an eligible individual to be designated as an honorary separated

member of the Space Force. An eligible individual so designated may be referred to as a 'Legacy Guardian.'" The language allows for the Department of the Air Force to determine many of the stipulations that may lead to a former member becoming a Legacy Guardian.

Thanks to the leadership of Chairman Mike Rogers (R-AL), Rep. Don Bacon (R-NE), and Rep. Salud Carbajal (D-CA), SEC. 522 has been included in the FY25 NDAA. SFA has worked throughout this past year alongside members from both parties in the House on getting the Legacy Guardian initiative right. We look forward to its passage and the recognition that many former personnel will have in serving their country in the critical mission in the space domain.

Air National Guard
(Air Force Proposal 480 and HASC FY25 NDAA Provision):
As the discussion about transferring Air National Guard (ANG) units to the United States Space Force unfolds, Space Force Association leadership has been informed from a trusted source on the Hill of draft legislation that would lead to a compromise, shedding light on a path forward that addresses concerns from all sides. The draft Fiscal Year 2025 National Defense Authorization Act (FY25 NDAA) provision offers a nuanced approach, allowing for the voluntary transfer of up to 580 guardsmen from six states to the Space Force. This proposal, backed by careful considerations and evaluations, carries the potential to significantly bolster the capabilities and readiness of the Space Force while respecting the choices and needs of affected Guardsmen and states. This approach seeks to ease tensions that have grown over the last few weeks between state and federal politicians.

 Continued on Page 33

The Department of the Air Force originally proposed the National Guard move all of its space operations personnel into the newly created single-component system of the Space Force. This single component blends the active and reserve personnel historically seen in other services into one force structure with both full-time and part-time Guardians serving alongside each other in the same units. While this approach has been advocated for by the current Administration, all Governors and many members of Congress from both sides of the aisle have spoken out against the proposal, raising concerns by some that the proposal could have negative impacts on the long-term relationship the States have with the Department of Defense.

Given the news of the new NDAA language that would continue to support the single component while maintaining the Guard's structural integrity, it's crucial to understand the context of this proposal of compromise by leaders in Congress. The recommendation to transfer ANG units and personnel conducting core space missions to the Space Force stems from a thorough study mandated by the FY24 NDAA. Released in May 2024, this study highlighted the advantages of consolidating these missions under a single command structure. By aligning ANG personnel engaged in core space operations with the Space Force, it is assumed that the USSF could enhance readiness, ensure unity of command, and streamline efforts, thereby maximizing effectiveness in addressing the evolving challenges of space domain operations.

However, the proposed FY25 NDAA provision outlines a different approach on several key points regarding the transfer:

- Impact on Affected Guardsmen: Guardsmen are given the right to refuse the transfer, with provisions ensuring those who choose to remain in the ANG are accommodated with new positions. For those opting to transfer, rank, enlistment terms, and duty stations will be preserved, with potential benefits from enrollment in the active/inactive personnel system.
- Impact on Affected States: The NDAA places caps on the number of transfers, prohibits deactivation or reassignment of missions for transferred units, and mandates agreement from Governors to retain units in their current locations. Additionally, a phased transition over four years provides states ample time to plan and adjust.

Comparison with Air Force Proposal: Contrasting with the Air Force proposal, the NDAA provision restricts deactivation, mission reassignment, and unit relocation, while also capping the number of transfers at 580. Furthermore, it mandates finding new positions for Guardsmen declining transfer, ensuring their career continuity and stability.


SEMPER SUPRA
SPACE FORCE ASSOCIATION
SPACEPOWER
CONFERENCE
Dec. 10-12th
Orlando, FL
Get Your Tickets Now!
www.ussfa.org