ANNUAL SPACEPOWER ISSUE

THE SPACE FORCE ASSOCIATION'S INAUGURAL

SPACEPOWER CONFERENCE

Preserving & Protecting Our Legacy In The Stars

We cannot risk a day without space.
There is no future without it.

SFA
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We Cannot Risk A Day Without Space.

Imagine a world where the sky goes dark from the loss of our space assets. Every facet of our lives—military operations, global commerce, emergency response—depends on space. Lose GPS, and we're blindfolded; lose satellites, and our world plunges into chaos. Financial markets freeze, weather forecasts vanish, and emergency services are crippled. This isn't science fiction; it's a looming reality.

Right now, adversaries are crafting weapons to sever the lifelines that space provides. We're at a crossroads, and the stakes couldn't be higher. That's why the inaugural Spacepower Conference isn't just another event—it's a call to arms.

We're tackling the most pressing challenges facing our nation and our planet, and this is your invite to not just be part of the conversation—but to be part of the solution.

Because the hard truth remains...

There's no day without space, and there's no future without safeguarding it.

Join The Conversation, And The Solution.

The Spacepower Conference is uniting over 2,000 Guardians, military leaders from multiple government agencies, private sector organizations, industry innovators, domain thought leaders, and top-tier media.

Together, we aim to share and showcase the latest in space technologies, safeguarding innovations, and future missions—all under one roof.

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A Word From Our Spacepower Partners

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GREETINGS FROM THE PRESIDENT

SPACE FORCE ASSOCIATION

It's hard to believe a little over four years ago, the Space Force Association was established. Shortly after, the United States Space Force was signed into law on 20 December 2019. Now, as we get ready to celebrate the world's strongest Space Force and host our inaugural Spacepower Conference, it is an opportunity to reflect on what Team SFA has been able to accomplish and what is still yet to be done.

Let me start by saying none of what SFA has accomplished could have been possible without the hard work of the more than 100 volunteers who keep working to set up programs and establish processes. It is this work that has allowed your SFA to grow to more than four thousand members with fifteen chapters around the globe.

We started simply with Space Warfighter Talks and Space Innovation Talks to document the discussions which have been happening for years prior to the service standup that had not been documented. If you've not had a chance, it is interesting to go back to those early recordings on SFA's YouTube channel to see how the conversations have progressed. Those conversations provided an opportunity for folks to get excited about the SFA mission and want to establish chapters to foster local communities wanting to learn more about the new service.

The Falzarano Chapter in Colorado Springs was the first to be established and hit the ground running with planning events to build a strong community and set the example for other chapters to follow. The D.C. Chapter was quickly established to help raise awareness in our nation's capital. Others quickly followed and now your SFA is up to fifteen chapters around the globe with the purpose of informing, educating, and advocating for a strong Space Force. As volunteers continued to join, opportunities to establish programs became evident.

As education is a critical component of SFA, the National Spacepower Center concept started to take hold. The Space Education Committee quickly worked to standup the Space Force Journal to provide a platform for peer-reviewed articles to allow critical thinking and thought-provoking articles to be published. They continue to work on the University Collaboration Consortium concept which will be highlighted during the upcoming conference. SFA continues to collaborate with companies to help produce compelling virtual reality training and educational experiences.

One of SFA's first priorities was to establish a relationship with our state and national lawmakers to ensure the USSF has all the support needed while helping to inform the local community about the importance of the new service. As such, we helped facilitate the establishment of the Space Force Caucus in the House and Senate and continue to work with members to create legislation supportive of current, past, and future Guardians. We are asking lawmakers to support Sec. 522 of the House-passed National Defense Authorization Act (NDAA) during the upcoming conference deliberations. This section, which mirrors H.R. 5071, the Legacy Guardian Recognition Act, is a significant piece of legislation that recognizes the many decades of service and sacrifice

by Air Force Space Operators. We at SFA believe this important language presents a meaningful opportunity to distinguish and honor the men and women who served and protected the country through forging leadership in the space domain, laying the groundwork for the existence and success of the United States Space Force.

As we get ready to celebrate the fourth birthday of the USSF, we are all gearing up for the Spacepower Conference in Orlando Dec 12-13. This is a time for each of us to come together, celebrate the new service and talk about how we can help ensure their continued success. On behalf of all SFA members around the world, thank you to the USSF for what they continue to do to ensure freedom of action in the space domain. A strong space economy rests on the ability of Guardians charged with executing this critical mission!

Semper Supra!

BILL "HIPPIE" WOOLF
SFA FOUNDER AND PRESIDENT

SPACECRAFT: The Silent Chessboard Above

DR. NATE DAILEY
SFA VP OF INTERNATIONAL

Spacecraft Definition: Spacecraft - for the purpose of this article - refers to a distinct field of expertise and body of knowledge that scrutinizes the strategic implementation of space-related policies. It integrates methodologies from space diplomacy, law, and behavioral economics. This tradecraft entails establishing a collaborative alliance with stakeholders from across the nation, including owner-operators of commercial space, to employ space assets as national policy and power tools efficiently. Strategic space integration is a critical component of statecraft and grand strategy, serving to promote scientific, political, military, and economic objectives by skillfully combining comprehensive legal, economic, and diplomatic approaches on a global scale.

A new breed of geopolitical chess is afoot. It is not upon the rolling fields of Europe nor across the vast expanse of the oceans where this game unfolds, but rather in the boundless, empyrean above us. The term, Spacecraft, once the herald of our ambition for orbital systems, now bears the standard of a new form of statecraft. In the void above, grand strategy is emerging as not merely an option but an indomitable force of necessity. For space is a stage for a drama more delicate and yet more consequential than any terrestrial conflict, a stage upon which the kinetic consequences of folly can ripple through the cosmos with unyielding permanence.

The grand strategy of "Spacecraft" is multifaceted, encapsulating both the vigorous edge of traditional power and the subtle weave of soft power. It employs acute and dynamic decision-making to counter adversarial strategies, ensuring resilience against manipulation. It leverages the sophisticated techniques of soft power persuasion

to foster international cooperation and a united front in space endeavors. Simultaneously, it harnesses the nuanced art of diplomatic compellence to subtly nudge adherence to space norms and laws.

Consider this: each satellite lofted into the firmament is not merely a machine but a gauntlet, a challenge to the aspirations of nations. The debris of conflict, the scattered remnants of a satellite undone, is the shrapnel of the future, capable of severing our connections, our security, and our very way of life. Thus, it becomes self-evident that we must craft a grand strategy, a doctrine inexorably intertwined with preserving our space infrastructure.

Yet, as one surveys the present state of affairs, one is met with a disquieting realization—a lack, a void, a chasm into which foresight seems to have tumbled. Where is the contemporary grand strategy that intertwines the sinews of soft power with the steel of hard power? Where is the hand that deftly balances the scales of diplomacy with the heft of military might, the pen of the propagandist with the ledger of the economist? Spacecraft must not be an afterthought penned in the marginalia of policy but the very thesis of our approach to the final frontier.

The urgency for such a grand vision is not merely advisable but a clarion call to space sustainability and its environmental preservation. Nations that master the symphony of diplomacy, military deterrence, information operations, and economic statecraft will lead the concerto of contemporary international space relations.

We stand upon a precipice, peering into a future of silent, cold space skirmishes that could dictate our world's fate. To falter in creating a cohesive strategy for space is to invite chaos into our backyard, to undermine the sinews that hold together the body politic of our interconnected global society.

Spacecraft—encompassing, as it must, the full spectrum of our influence—that we shall ensure the ascendancy of our values and tenets of responsible behavior, safeguarding the peaceful freedom of action in, from, and to space that spans from the heart of our cherished Earth to the outermost reaches of the firmament. Spacecraft strategy writes in the indelible ink of unwavering commitment, transparency, and enlightened statesmanship.

We must adopt a layered and sophisticated Spacecraft strategy to counter revisionist power seekers, weaving false narratives in a landscape of liberty's eclipse, to once again make a "World Safe For Democracy." Too often, we see the use of misinformation operations and reflexive control—a strategy that manipulates adversaries into disadvantageous posi-

tions through psychological means. It should be razor-sharp, capable of cutting through disinformation to reveal the truth of intentions and capabilities in space. We must develop a resilient decision-making process that is both flexible and immune to attempts at manipulation, shielding our interests from the deliberate fog of confusion that such an adversary might cast.

We counteract by embracing unpredictability by infusing our space policy with elements of surprise grounded in reason and transparency. It is not about being reactive but strategically dynamic, utilizing full spectrum courses of action. Our communications must be strategic and transparent, designed to bolster alliances and expose the false narratives from those seeking to become leaders of an unfree world.

In essence, we may apply Spacecraft in ways ready to deploy a full spectrum of responses that are as diplomatic as they are strategic, as informed as they are unexpected. Space diplomacy, Astro-Economics, and commercial space activities, together, may create an extraordinary potential for cooperation, security, and prosperity that is not entirely realized initially or individually.

Space's collective impact on global strategy may reshape it in decades beyond current foresight. The effects on defense, resource management, environmental monitoring, and international collaboration could change how states engage and solve global problems. Spacecraft -including persuasion, compellence, cognitive science, and behavioral economics, provides an integrated framework that emerges as a component of soft power, an arsenal of influence that extends beyond the blunt instruments of coercion. Persuasion can be harnessed to cultivate a narrative of collaboration and shared destiny in the normative behavioral space landscape. When woven into the fabric of diplomacy and deterrence, they are the subtle threads that enhance our ability to shape perceptions and alliances without overt force.

Through this calibrated approach, diplomatic Spacecraft can compel states to adhere to norms of behavior in space not merely through the fear of retribution but through the lure of reward, weaving a web of compellence that is as intricate as it is invisible.

The new art of Spacecraft harnesses soft power persuasion and the art of diplomatic compellence, ensuring that our ventures are as grounded in the astute manipulation of perceptions and desires as they are in rocket science and integrated deterrence. This intricate tapestry of strategies—balancing the sword of deterrence with the olive branch of diplomacy—defines "Spacecraft" as the indispensable new tool for grand strategy, navigating the new geopolitical realities of the final frontier.

Dailey, N. (2023). A Citation of Appreciation: With gratitude to General James Cartwright for his inspirational contribution to the contemporary redefinition of the term, Spacecraft. Space Force Association.

A MORE DANGEROUS SPACE ENVIRONMENT AS VIEWED FROM THE FLIGHT DECK

Brian Creighton
SFA Magazine Contributor

Protection of the space domain is not merely for the benefit of military operations and the success narratives of commercial satellite operators. In the world of commercial aerospace, a more dangerous space domain means cancelled flights, outraged customers, and increased flight risk.

Back in the "day" before my current position as an Airline Captain and before my Air Force flying career, I was training to get my Private Pilot's License. It was the early 90s and there I was in my Cessna 150 on a student solo cross-country flight west of Waco, Texas. I meticulously detailed my flight plan with headings and timing legs. On departure, I hacked the clock and began my navigation. This navigation plan was tricky because I had to take a corridor between

the Ft. Hood restricted area and military operating areas further west. In those days, a pilot was taught to check the clock, then the map, and then the ground, "clock to map to ground". This is because it is very easy **to** convince oneself something you see on the ground looks like something you see on your map. A heading taken off a feature on the ground that is incorrect then leads to more incorrect headings and finally aimless wandering if no discernable terrain features appear.

On this particular flight, the dry West Texas terrain all appeared to look the same, and soon I was second-guessing myself, and my meticulous navigation plan was nearly worthless. My attempt to tune a ground-based navigation aid and attain a radial from a known location yielded some useful information; I knew my direction from the beacon, but not my distance. At this point, my location was uncertain to the degree I was worried I was going to fly into a military-restricted area—a live fire zone no less. After some tense moments, I was able to muddle my way to my destination and I never received a call from the FAA, so I guess I didn't fly somewhere I wasn't supposed to. Those were the proverbial dark ages of navigation.

In contrast, today's aviation world has been brought into the light. Thanks to space-based assets of GPS, weather satellites, and communication satellites, pilots have an excess of tools available to determine position, assess terrain, discern current and predicted weather along a flight path, and communicate with any station on the ground or in the air. These capabilities have increased safety to levels not thought possible and allowed for efficiencies in air travel not imagined just a short 20 years ago. Crowded flight routes can fit more aircraft because of the increased accuracy of navigation provided by GPS. Approaches to remote or challenging terrain airports that use GPS for navigation have unlocked new destinations. Satellite weather forecasting reduces the need to carry more fuel. Real-time communication with dispatchers enables nimble adjustments when conflicts arise.

However, all these capabilities can be threatened or destroyed as demonstrated by recent jamming and spoofing of the Global Navigation Satellite Systems (GNSS). In November the European Union Aviation Safety Agency released a safety bulletin detailing "that jamming and/or spoofing has shown further increase in the severity of its impact, as well as an overall growth of intensity and sophistication". The geographical area that seems to be most affected is the conflict zone near Iranian airspace. Usually, unreliable GNSS signals are detected and eliminated from the navigation solution determined by the flight management computer (FMC). The new sophistication observed is defeating this error check and causing the FMC to inaccurately guide an aircraft. In several cases aircraft have nearly flown into Iranian airspace. I leave it to the reader to conclude the many undesirable outcomes

that might follow if a US military or even civilian aircraft flew into Iranian airspace.

From a commercial airline pilot's view, an environment with degraded space assets increases risk substantially and degrades efficiency severely. It is technically possible for a modern U. S. airline to execute a flight without space assets, but the process in the first days would be cumbersome to the point it would cause massive flight cancellations. Over time, the commercial system could adapt to a degraded space environment, but the efficiencies and load capacity would not recover.

Now, I sit comfortably on the flight deck with the secure knowledge that the two GPS receivers, two inertial reference units, and the flight management computer know my position to a meter or less. I can communicate with dispatch or air traffic control via text message whether I'm over land or in the middle of an ocean. With the simple touch of my iPad, the onboard Wi-Fi gives me the position of nearly all airplanes worldwide, thunderstorms, weather patterns, arrival weather, gate assignment, and even the next leg's flight plan.

So, thank you, U.S. Space Force, for creating, improving, and protecting these capabilities. My customers would thank you as well if they knew the extent to which their safe journey depends on a secure space domain.

MEMORANDUM FOR THE SPACE FORCE ASSOCIATION

FROM: Advanced Ground Information Systems, Inc.

DATE: December 1, 2023

RE: No Day Without Space

There is no day without Space. All of humanity has come to rely on Space as it does the land, sea, and air. From science to communications to industry, we have become a Spacefaring planet. Space is indelibly linked to the human experience as an amalgam with terrestrial and spectral domains. However, as with all human endeavors, where there is power there is a contest for control. We at AGIS believe that resilient awareness in, to, and from Space, is the key to securing our vital national interests and winning this contest.

Spacepower baselines the Joint all-domain fight, securing the high ground and ensuring all domains are "seamlessly integrated together into a synchronized unity of effort." In doing so, Spacepower secures freedom of action, allowing the Joint Force to achieve military objectives in all domains. Joint Publication 3-14 specifies the mission areas the Space Force, United States Space Command, and Service Space components used to integrate into Joint All-Domain Operations (JADO): Space Domain Awareness (SDA), Offensive Space Operations (OSO), Defensive Space Operations (DSO), Positioning, Navigation, and Timing (PNT), Intelligence, Surveillance, and Reconnaissance (ISR), Satellite Communications (SATCOM), Environmental Monitoring (EM), Missile Warning (MW), Nuclear Detonation Detection (NDD), Spacecraft Operations (SO), and Spacelift. These missions rely heavily on a common requirement – resilient awareness.

What if we could display the position and status of both friend and foe from all domains on one piece of glass? What if this common operating picture (COP) could operate without Global Positioning Satellites (GPS), gracefully degrading under attack and reconstituting to help maintain a relative degree of control over the adversary? AGIS's Joint All-Domain Command and Control (JADC2) program, Life Ring, provides this capability, in one display, from command centers down to the individual warfighter. Over seventeen years of development, our software integrates all-domain sources, providing video, voice, text, photos, Portable Document Format (PDF), and graphics into a customizable global display with or without GPS. Life Ring automatically translates sensor data into the COP utilizing Military Standard 2525 symbology, interfacing with Department of Defense and North Atlantic Treaty Organization Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance, and Reconnaissance (C5ISR) systems, radars, seismic devices, and a host of commercially available tracking systems in one display. By combining active and passive systems from all domains, Life Ring allows the Joint Force to maintain awareness in a domain degraded by an adversary, reconstitute, and regain control of that domain through the others. This is resilient awareness.

Life Ring enhances Spacepower. Our software builds and maintains situational awareness through resilient networks from all domains. Life Ring is ideal for SDA, ISR, EM, MW but we are poised to support other Spacepower mission areas in support of the Joint Force. No matter the mission, we remain steadfast in our goals: build resilient awareness, prevail against all adversaries, and ensure there is no day without Space.

Let us show you how.

"We believe that our JADC2 software provides a means to increase the Space Force's ability to rapidly disseminate information to our Air, Land, Sea, and Coalition forces."

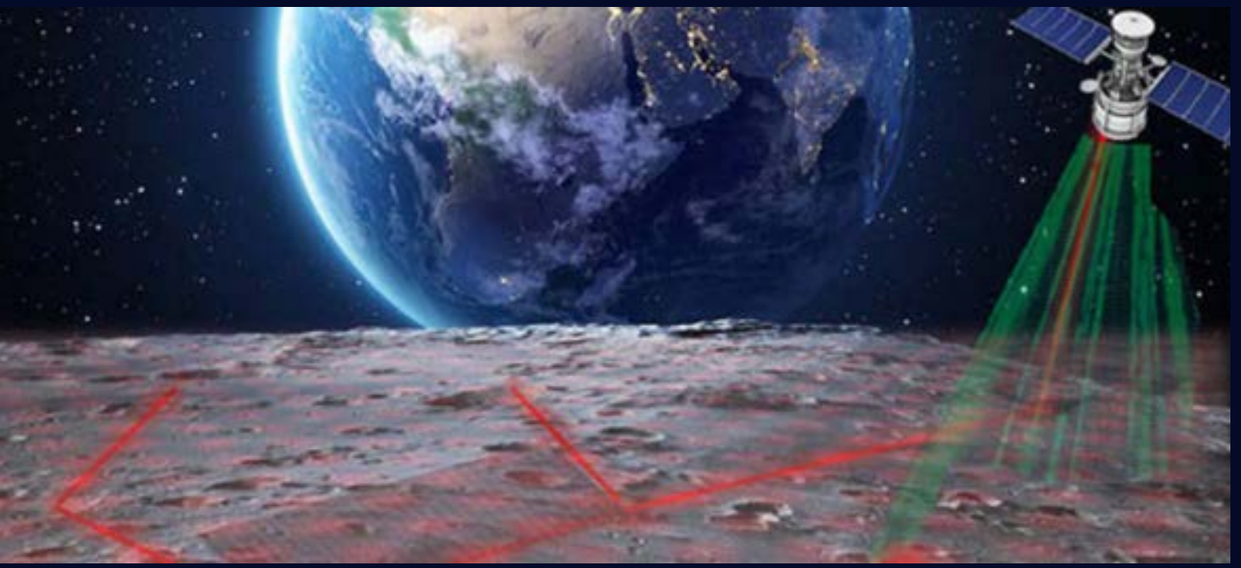
Sincerely

Malcolm "Cap" Beyer, Chief Executive Officer
Semper Fidelis

FEATURE

Accelerating Interoperability Standards for Optimized, Integrated Lunar Infrastructure

DEFENSE ADVANCED RESEARCH PROJECTS AGENCY (DARPA)



Lunar Operating Guidelines for Infrastructure Consortium (LOGIC) is bringing international stakeholders together to identify and propose interoperating standards for commercial lunar infrastructure. DARPA's LunA-10 capability study will establish a framework for bringing LOGIC's vision to life.

Lunar exploration is expanding at a rapid pace, and a robust lunar economy within the next decade is coming quickly into focus. It's clear that many shareable, scalable commercial systems will be needed to support a future lunar ecosystem. Yet a key question remains: How will these systems interface?

Through the Lunar Guidelines for Infrastructure Consortium (LOGIC), DARPA will convene stakeholders across industry, academia, and government to identify critical lunar infrastructure interoperability and interface needs. Where appropriate, LOGIC will encourage the community to develop operational guidelines and pathways to close interoperability gaps.

The Johns Hopkins University (JHU) Applied Physics Laboratory (APL) will administer LOGIC, providing technical leadership and management of the consortium. LOGIC envisions a permanent, self-sustaining, and independent forum where international industry, government, and academia can collaborate for the benefit of the entire lunar community.

DARPA recently initiated the 10-Year Lunar Architecture (LunA-10) Capability Study, which aims to spur the development of a future civil lunar framework for peaceful U.S. and international use. It seeks to rapidly develop foundational technology concepts that move away from individual scientific efforts within isolated, self-sufficient systems, toward a series of shareable, scalable systems that interoperate — minimizing lunar footprint and creating monetizable services for future lunar users.

The seven-month study includes both lunar providers and users and seeks to establish an analytical framework that defines new opportunities for rapid scientific and commercial activity on and around the Moon through collective infrastructure investments and identifies related technical challenges. DARPA anticipates making final analytical frameworks for lunar infrastructure available to the public. LOGIC will foster international engagement and the required technical discussions for the creation of interoperating standards for such commercial technologies.

"A large paradigm shift is coming in the next 10 years for the lunar economy," said Dr. Michael "Orbit" Nayak, program manager in DARPA's Strategic Technology Office. "To get to a turning point faster, LunA-10 uniquely aims to identify solutions that can enable multi-mission lunar systems – imagine a wireless power station that can also provide comms and navigation in its beam. For 65 years, DARPA has pioneered and de-risked technologies vital to civil space advancement — from the rocket technology in the Saturn V that took humans to the Moon for the first time, to the recent DARPA-NASA partnership to enable faster space travel to the Moon and beyond with a nuclear thermal rocket engine. LunA-10 continues this rich legacy by identifying and accelerating key technologies that may be used by government and the com-

mercial space industry, and ultimately to catalyze economic vibrancy on the Moon."

The study's thrust areas, derived from a subset of key sectors identified in a market analysis of the future lunar economy, include the following (with more details in the solicitation): transit/mobility; energy; communications; and other revolutionary orbital or surface infrastructure concepts.

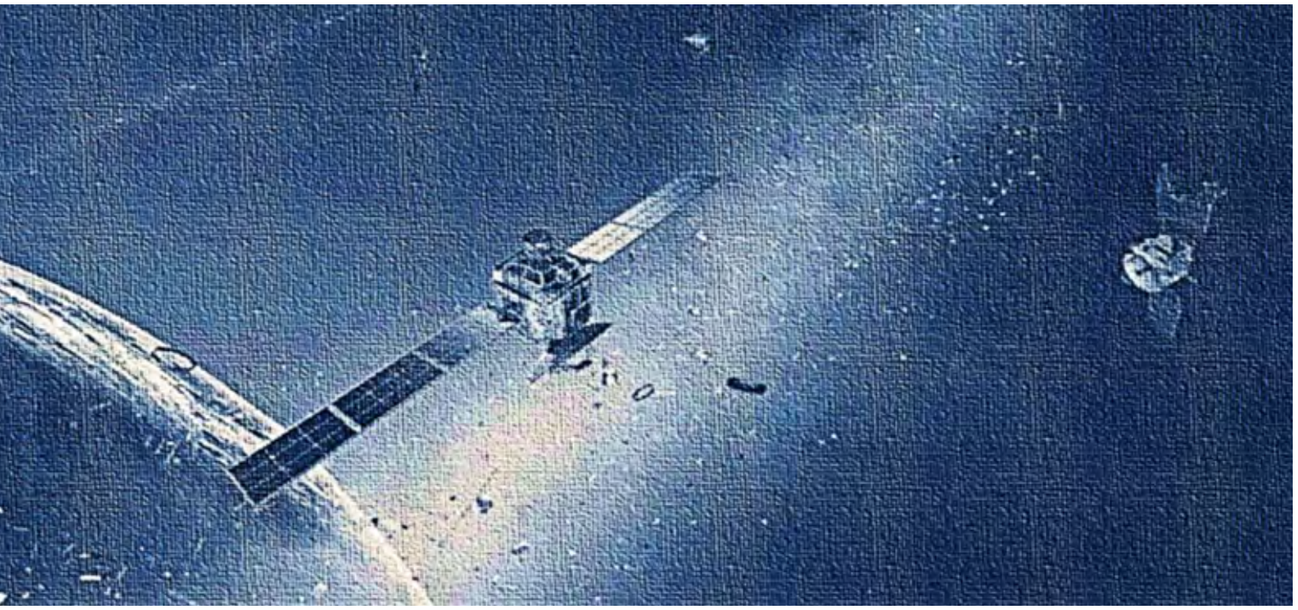
LunA-10 aims to facilitate the fusing and co-optimization of as many infrastructure sectors as possible, into key nodes that can be scaled up in the future. The study also aims to select performer companies that have a clear vision and technically rigorous business plan for providing or using one or more lunar services, and then fuel them to work together in a highly collaborative environment where they will design new integrated system-level solutions that span multiple services. Lunar transmission, energy, and communications are likely cornerstones, and the program is soliciting other sectors to create monetizable commercial services on and around the Moon by 2035. This would complement NASA's Moon to Mars Objectives focused on human exploration, science, and experimentation on the Moon.

"Widespread exploration and commerce on and around the Moon are on the horizon. With LunA-10, we're studying the technologies that can help to get us there – and interoperability needs to be part of the picture from the start," said Dr. Michael "Orbit" Nayak, program manager in DARPA's Strategic Technology Office. "Regular collaboration within the communities working on lunar technologies is key to an interoperable future that supports a diverse industrial base and facilitates efficient upgrades, maintenance, and repairability for commercial lunar services. While other efforts focus on technology development, LOGIC will zero in on how systems work together. We're looking for maximum participation from the public and private sectors and from international stakeholders."

Working closely with NASA's Lunar Surface Innovation Initiative (LSII) and Lunar Surface Innovation Consortium (LSIC), LOGIC seeks to accelerate the development of international, consensus-driven technical interoperability standards in areas such as power distribution, communications, relative positioning and navigation methods, lunar surface surveying, and cislunar air and space traffic control. JHU APL and LOGIC will facilitate working groups to identify critical interfaces that would benefit from standardization and system components that would benefit from modularity; assess the impact of potential technology decisions on the broader space community; and develop community-recommended solution paths to close interoperability gaps.

DEFYING GRAVITY

A PROPENSITY TO PREVAIL



JACOB SIMMONS, Chief Master Sergeant
Guardian, United States Space Force

The views expressed are those of the author and do not necessarily eflect the official policy or position of United States Space Command, the Space Force, the Department of the Air Force, or the U.S. Government.

DEFYING GRAVITY

A PROPENSITY TO PREVAIL

"They" said it was a bad idea. "They" said it would never get off the ground. "They" said it would fail. – They Sayers

3 – 2 – 1 … As the probability-defiant outlier overtly pushes past first stage separation, transfers inertially to its overwatch trace, and is handed over as a fully operational capability, there abides an attraction acting against it accelerating to apogee, aligning, and adjoining to the all-domain. Four years in, "they" say the sixth service "needs a brand-new culture of its own," all while the empirical evidence proves the polar opposite. Disrupting the distortions, discord, and downward pull of doubters, the defiant are *wielding the willingness to win!* … Gravity must give way!

Our oath is ours to own. Our one obligation will not be outsourced, overtaken by outside opinion, nor overridden by optionality: "*I do solemnly swear to support and defend the Constitution of the United States against all enemies, foreign and domestic; that I will bear true faith and allegiance to the same.*" Soldier, Marine, Sailor, Airman, Sentinel, AND Guardian … our charge to cling to and carry forward the cloth of our country, and keep her flying for freedom, is our calling. *"We represent the fighting spirit of those who have gone before us … We will not fail … We will never accept defeat … So be it, until victory is America's and there is no enemy, but peace!" – the Sister Services."*

In war, there is no participation prize nor victory in volunteering. The trophy goes only to the triumphant. As have all brothers and sisters in arms, the Guardian of the high ground answered to that higher calling, *the profession of prevailing;* priding in preparation, perseverance, and pursuit of purpose … a promise not to pretend, pay its portion in partial, or play its role virtually. No, this force was not forged in a firefight… but it is the fire that will forge the fight going forward; fearlessly to fend off the future foe. The Guardian does not get to fail nor expects forgiveness from our unfriendliest if we falter. More than on any front we face, the future of all that is familiar hinges on our Space Force fielded to be fight-ready. Lives and ways of life are on the line.

Space will be Phase Won. Guardians have the initiative to win. The salient statute of the Space Force should be to set the conditions, circumstances, and consequences to staunchly

We will never accept defeat.

In war, there is no participation prize nor victory in volunteering.

Guardians have the initiative to win.

Wielding the Willingness to Win!

"secure our nation's interest in, from, and to Space" … for the good of all society. To level set, the Russian Aerospace Forces (August 2015) and the People's Liberation Army Strategic Support Force (December 2015) have voted to undermine, but the United States Space Force (December 2019) has vetoed to uphold. From the sidelines, it is simple to stand star-struck by the tech science of the expanding eco-sphere and in the same glance be shortsighted of the tactical scenarios exponentially evolving an engagement epicenter. Some still superficially submit a sense of shared interest will soon lead to self-policing; arguing its safeguarding be more commercialized than militarized, and our national defense privatized while acute antagonists have actively weaponized. What is uncontestable is the Unified Command Plan unconditionally underscores threats to ops at or above 100 klicks arise to a combatant commander's Area of Responsibility, demanding of our undivided determination to project, protect, persevere, and when directed, prevail over any who would discretely or directly diminish, decay, debris-up, or destroy our ability to act, aid, or achieve the absoluteness of our aims.

Our authentic asymmetry must be accentuated. Nexus-level operations are far speedier, sophisticated, and synchronized across the spectrum of competition to conflict. A cyber keystroke can be more crippling than a cannon and more compromising than a carrier group. Misinformation can maneuver a movement into a malevolent mob. It is antiquated and counterintuitive to archive combatants only in comparison to countable wounded and casualties of war when the complexity of combat conditions calls for the champion to add up cognitive wins. Our aging advantage cannot continue to atrophy (decline in effectiveness), be thought of as amorphous (lack clear focus), or allowed to become ambiguous (open to interpretation).

Decisive Space Power gives military leaders the power of decision space. It underpins the use of unified force options that can be made available to the Commander in Chief to influence the complete campaign continuum and further our nation's interest; extending the range of operations from space domain awareness to information operations, force protection to

The United States Space Force (December 2019) has vetoed to uphold.

A cyber keystroke can be more crippling than a cannon and more compromising than a carrier group.

Our authentic asymmetry must be accentuated.

DEFYING GRAVITY

A PROPENSITY TO PREVAIL

infiltration, operations other than war to the preparation of the environment … to facilitating follow-on operations in order to influence political, economic, and military conditions abroad.

The apex AOR is always above. Space, the critical infrastructural support. Space, the sure-fire spectrum provider. Space, the silent sentry. Space, the strongest soft power. Space, the strategic presence. No theater of operation is as audaciously arrayed or advancing along as many azimuths. State of the art is only the state of the day. Where separation once was singularly significant for super powers, single second scans now separate super powers from becoming insignificant. Projection, not proximity, is now the preferred posture. Stance, stand-off, swiftness, and self-healing are the capabilities which create the conquering courses of action; controlling chaos in the Cosmos. Scene-setting our success is not simple to script or sequence. Military minds must modernize to master the mega-momentum of the Third Space Age; acknowledging the astrographic alarm. *Always alert. Always advancing. Always ascending.*

War-fighting and war winning are only the same half the time; the unacceptable second place alternative being *war losing*. Our strength should not be stowed in a storm or surged in surprise; but set to sense over-the-horizon, slewed to see and subdue the oncoming. Near peer or pacing, having an effective and resilient Space Order of Battle is the foremost operational imperative … perpetually and persistently presenting top cover left of launch; short of a shot into the stars; winning without waging. *"The simple fact is that the United States cannot project power successfully unless our space-based services are resilient enough to endure while under attack. Equally true, our terrestrial forces, Joint and Combined, cannot survive and perform their missions if our adversary's space-based operational support systems, especially targeting systems, are allowed to operate with impunity." - Frank Kendall, Secretary of the Air Force*

What is not constructively contributing to or crusading the credibility of our Guardians as combat-ready warfighters is resurrecting the naïve, nearsighted, naysaying specters who scoffed at Air Power advocate Billy Mitchell and mocked vantage point visionary Sergeant Ulysses Nero, echoing

No theater of operation is as audaciously arrayed or advancing along as many azimuths.

War-fighting and war winning are only the same half the time …

Ask the bomber and the battleship which team aced that test!

Our unwavering vow to the American people, those who entrusted the Space Force to defend this Republic … for which we stand, assuredly is "to prevent war … but be prepared to win!"
- Troy Black, 5th Senior Enlisted Advisor to the Chairman of the Joint Chiefs of Staff

"Competitive culture is curated in a crucible … not a cubicle."
- Chief Master Sergeant Jacob Simmons,

Command Senior Enlisted Leader, U.S. Space Command

of the inherent long-range lethality from above. Ask the bomber and the battleship which team aced that test! What is imperative is institutionalizing and normalizing that Space be recognized as a domain for traditional military activity and routine support to the same, most inherently suited to take place under the military chain of command as it is primary and pivotal to current crisis and the complete conflict continuum. Space, like every other domain, requires appropriate acumen, armament, architecture, authorities, and when our assets are approached or assaulted … agile, all-domain applications; able to act as do all other Title-10 instruments of national power with the talent, tools, tradecraft, and tried-and-true tactics to target and take on/out any threat.

Competitive culture is curated in a crucible … not a cubicle. The catalyst was low-end competition; the cause was high-end conflict. Our ethos emerged early: *execute to enable the entire joint force to engage any existing or existential enemy.* An emboldening executive expectation was embodied at the establishment: *elitism entrenched in exceptionalism.* At the core, our identity is not woven into the "platinum" service dress, individualism denoted in a stellar service song, or importance stamped on by a service motto … ***Semper Supra!*** What is amplifying an aspirational spirit is ***wielding the willingness to win*** … encapsulated in the tenets of our "endurance" theory of success: *avoid operational surprise; deny first mover advantage; and responsible counterspace campaigning.* We are always in the fight … and it is still the one in the ***Guardian Arena*** who deserves the credit; not the critic that counts nor the timid soul who knows.

The nature of the warrior endures but the character of the warfighter has evolved. Inward … the identity is understood and unchallenged; each a warrior, *wielding the willingness to win.* Outward … leading indicators, lasting impressions, and legacy inspiration should not bellow out in improvisation, but bridge our introduction; in touch and instinctive. Downward … the watching-world "spinning" below the guard mount rebuts. Due in reason to our rarity, every representation must reaffirm the routineness of Space affects/effects and requirements of its relevance from low intensity conflict through the confluence of irregular warfare. Failing too frequently to recognize and report

Our ethos emerged early: enable the entire joint force to engage an existential enemy.

The nature of the warrior endures but the character of the warfighter has evolved.

… the Guardian reputation seems radical and remains to be reckoned.

DEFYING GRAVITY

A PROPENSITY TO PREVAIL

the risks of a rapidly unraveling reality is the rationale for why the Guardian reputation seems radical and remains to be reckoned with. What is resolved, resonating in the ranks, and rippling across the regiment is the prime directive, our Polaris; pointed … upward toward presenting, providing, projecting, protecting, prevailing … ensuring hostiles never hinder or hold the high ground.

Propensity to Prevail is so much more than possessing patriotism and passion. It is the potential to serve (the capability to), the prepared to be put into service (the competence to), and the professionalism to be of service (the credibility to). It is when compulsion becomes purpose, purpose becomes conviction, and the *conviction is to prevail.* The Guardian pushes past the prerequisite propensity to serve. Many spectators have the natural tendency, formative engraining, or the civic sensitivity to be a "Good Samaritan," possessing a bias toward action … tackling this task takes more than temporary thoughtfulness. To pursue purpose, the price to pay is more prevalent, and for some … ultimately permanent. The compelling warrior quality that motivates and elevates the Space Force and the Guardian is the culmination of all its core values (character, connection, commitment, courage) … *it is conviction.* It is the *character* to answer the call, the *connection* to why, the *commitment* to how, and the *courage* of will for what is at stake. This predisposition to be peerless practitioners, professionally pave the path, and perform as a pack under pressure is the difference between going in to work or going all-in to win. It is having the *propensity to be a presence* on duty and not just present for duty; it is responding when all others react; it is manifesting expertise and not making excuses; it is being the change in the world juxtaposed to waiting for the world to change. It is the tenacity to train … and train … and train to be trustworthy to take charge and move out with the fortitude to remain fixed, fend off, forge on, and forcibly fight through to the finish. It is the *conviction* to be a conqueror over the condition. Our unwavering vow to the American people, those who entrusted the Space Force to defend this Republic … for which we stand, assuredly is *"to prevent war … but be prepared to win!" - Troy Black, 5th Senior Enlisted Advisor to the Chairman of the Joint Chiefs of Staff*

… the price to pay is more prevalent, and for some … ultimately permanent.

It is the conviction to conqueror over the condition.

… Spacepower will be the dominant military power by the middle of the 21st Century.

DEFYING GRAVITY

A PROPENSITY TO PREVAIL

Barring a tactical pause in technical progress, Space Power will be the dominant military power by the middle of the 21st Century. There will always be pessimistic perspectives pinned to a past paradigm -v- deliberate disrupters of those outdated designs. NEG: the Space Force *"… doesn't do organized violence, and shouldn't pretend that it does."* AFF: the perpetual pretending is in proposing our modern-day military violence can be organized to surge or scale as a joint force … absent Space. We operate in organized winning. ***Point…Space Force!***

TONIGHT … space, cyber, and intelligence Guardians are downrange with their "space kit," on theater patrol, in field conditions on forward operating bases, inside the adversary's weapons engagement zone *employing* combined combat capabilities: electromagnetic warfare to see through and shape the spectrum, integrated theater missile warning-track-defense-defeat to see and survive the salvos, and frontline intelligence exploitation and dissemination to stay two steps ahead.
TONIGHT … space, cyber, and intelligence Guardians are on combat-ready crew duty, presented to combatant commanders: remotely *operating* the world's most persistent and penetrating suite of sensors for our shooters, *passing* the positional precision for smart-strikes, *tactically-controlling* through tens of thousands of long-lived projectiles to prevent catastrophic cascading collisions, *maintaining* chain-of-custody of highly-maneuvering hypersonic-glide vehicles, *hunting* to defend our digital terrain of operations from intrusion, *protecting* our nuclear command, control, and communications to preserve the continuity of our government, and *standing the watch* to detect intercontinental ballistic threats and alert national command authorities instantly if North America is under strategic attack.
TONIGHT … space, cyber, and intelligence Guardians are *mapping* the moves and motives of the most transformational capabilities ever forwarded to a firing line, *building* target decks to protect and defend high value assets from lancing or lasing, *cross-linking* counterspace command and control capabilities to conduct maneuvers, call in ground fire, and close the kill chain. Look up! If a war ever extends into space, we will see it coming.
TONIGHT … space, cyber, and intelligence Guardians are *integrating* with Special Operators into unconventional warfare teams, redefining the *"effective and efficient kill"* through non-

We operate in organized winning.

Guardians are downrange with their "space kit," on theater patrol …

If war extends into space, we will see it coming. .

DEFYING GRAVITY

A PROPENSITY TO PREVAIL

lethal missions, new nullifying methods, and non-reversible means on-demand. As Lieutenant General DeAnna Burt, United States Space Force Deputy Chief of Space Operations for Operations, Cyber, and Nuclear is known to say … ***"Fights On!"***

Our AO is no longer an afore-oasis: academic, autonomous, or accommodating. Abnormal-to-aggressive actions have not been accidental, allusive, or unattributable. Arrant assertions of altruism to absolve affiliations with arming are not acceptable, arguable, or appealable. All axials of approach are appreciably under attenuation and attrition and are awarded our attention. Our all-domain advantage will not be arrested! This is why the Armed Forces has ascended to the Astrographic.

"The military of a great power must have the capacity to engage in protracted, day-to-day competition with its rival. Failing to do so cedes advantage. At the same time, a great power military must also prepare for high-intensity conflict, demonstrating the combat-ready credibility that underscores deterrence. Failing to do so creates vulnerability." – Gen B. Chance Saltzman, United States Space Force, Chief of Space Operations

Our Joint Force is more lethal and lasting because we have a Space Force. Our combatant commands are more capable and credible because we have a Space Force. Our society is safer and more secure because we have a Space Force. Crowds will not create our creed, bystanders will not build our brand, and the evasive, espousing, but effortless will not establish our ethos. Warfighting is warfighting; winning is winning … no matter the volume of violence … no matter how advanced the artillery … no matter the dogma of the domain. More than needing to be "new," we need to remain true! The most essential element for the Space Force to embody is not what we do, but why we must now do it. We wield so that we will win. Guardians … Be brave! ***Warrior*** is not our second nature nor a collateral duty. Be bold! ***Warfighter*** was not in the fine print. Beyond all, Be battle-ready!

- THE GRAVITY DEFIANT

This is why the Armed Forces has ascended to the Astrographic.

Our Joint Force is more lethal and lasting because we have a Space Force.

More than needing to be "new," we need to remain true!

Wielding the Willingness to Win!

A WORD FROM OUR SPACEPOWER PARTNERS

L3HARRIS IS BREAKING DOWN BARRIERS AND DELIVERING INNOVATION

Integrated deterrence begins in space. L3Harris is protecting the nation from advanced missile threats with resilient, multilayered detection, identification and tracking solutions.

A more connected and lethal Joint Force begins in space.

Space technology, norms, and doctrine are changing at a rapidly increasing pace. Coupled with an explosion of new spacecraft on orbit and an increase in debris, space has become an extremely congested, contested, and complex environment.

With U.S. Space Force (USSF) leaders acknowledging that access to and use of space is fundamental to modern war, there's never been a more urgent need to strengthen the nation's defensive and offensive space capabilities – both on orbit and on the ground. It's critical that we protect and project U.S. dominance in and from space by deploying resilient space capabilities that defend the Joint Force from adversaries' space-enabled attacks.

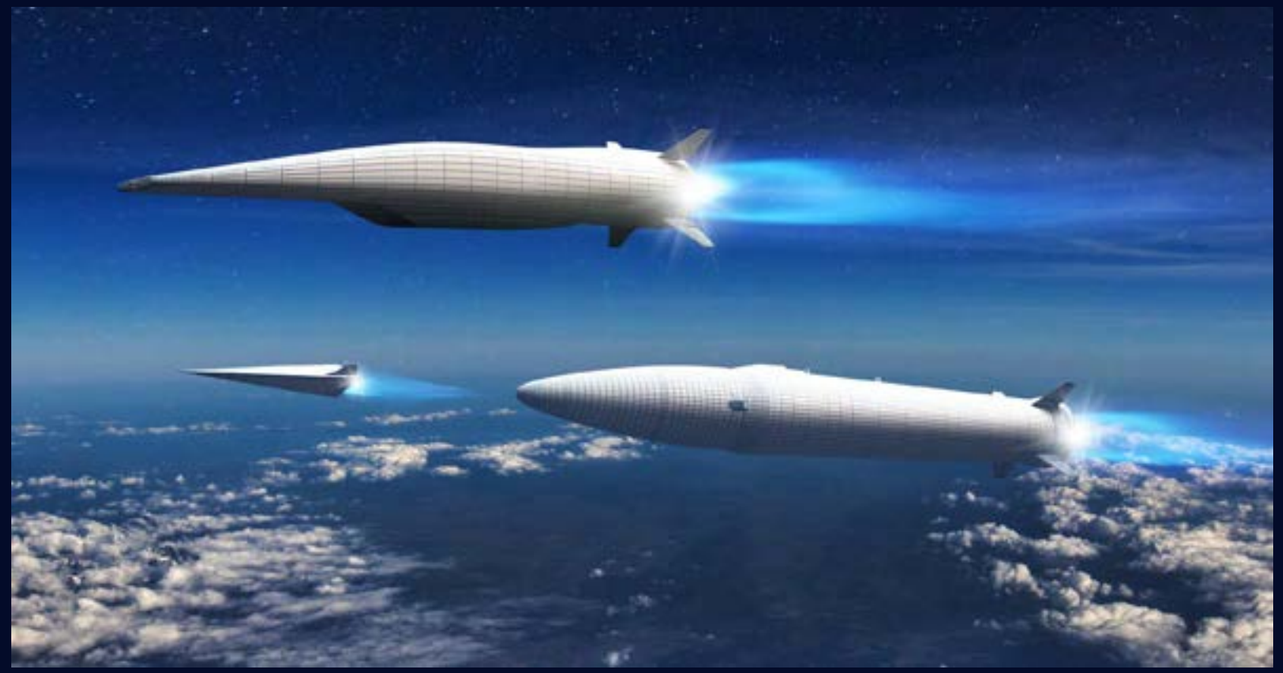
In this heightened threat environment, speed, innovation, government and industry collaboration, acquisition reform, resilient architectures, and reprogrammable on-orbit technologies are all essential to achieving sustained space superiority. The nation's security depends on multilayered solutions in an increasingly contested environment.

With these needs in mind, L3Harris delivers technological solutions to military problems on fast, mission-relevant timelines. This includes advanced missile warning; missile defense; space domain awareness (SDA); positioning, navigation, and timing (PNT); and intelligence, surveillance, and reconnaissance (ISR) technologies, which are all more important than ever in addressing shifting needs in the space domain.

L3Harris is a key partner throughout the entire chain of detection, tracking, targeting, and engagement. Analysts, policymakers, first responders, and warfighters all depend on us – and our talented experts – to ensure the right data gets to the right place at the right time. We deliver precise, accurate intelligence on what's happening in space.

As an agile space prime and Trusted Disruptor, we're also answering the call to protect against advanced missile threats, such as hypersonic missiles, with responsive, multilayered, digitally engineered end-to-end missile warning and defense solutions that build upon our 60-year heritage developing mission-critical infrared instruments for both geostationary orbit (GEO) and low Earth orbit (LEO).

From bus to payload, build to launch and operations to algorithms, L3Harris is focused on delivering mission-critical capabilities rapidly and affordably – to ensure the U.S. is always faster than the threat.



L3Harris is powering defense beyond Mach 5 with resilient, multilayered missile warning and defense solutions, because every second counts.

STRATEGIC IMPERATIVES TO REMAIN OPERATIONALLY FOCUSED AS A NEW SERVICE

Dan Dant and Jeff Leeder

Business Development Executives,
KBR US Government Solutions, Retired USAF Space Operations Officers

As the United States Air Forces faced challenges with finding its footing in the joint force, so too does the United States Space Force find itself facing challenges in carving out its identity, expertise, and mastery of capabilities in its respective domain. With a keen understanding of its next-generation arsenal and the nuance of the space domain, Guardians will be well on their way to becoming the elite force of next-generation operators.

Cambridge Dictionary defines "fledgling" as a person or organization that is "new and without experience." Our U.S. Space Force, at the young age of 4 years old, certainly meets that description. Others have gone before us and experienced the same struggles and challenges. The Army Air Corps and the subsequent US Air Force (as a result of the 1947 National Security Act)

are no exception.

The struggle for Air Force independence in the 1943 – 1947 timeframe is well documented and widely understood. Nonetheless, some lessons are worth repeating as the US Space Force seeks to secure its place as a viable Service controlling the space domain. The crucible of global combat in the Second World War created a legacy of toil and effort that shaped the service and its leadership. If for no other reason than this, the creation of the United States Air Force is seen as far more than merely the result of the emergence of atomic weaponry and a bipolar post-Second World War global environment, or that of enthusiastic impulse born of America's wartime air power experience. Stated as plainly as possible, the USAF purchased its birthright with the blood and sacrifice of innumerable air and ground crews in combat around the world. The Space Force was not born from this same fire…

The USAF grew from a strong desire to "prove" that air power could be decisive in all phases and levels of conflict. This created a laser focus on the operational mission. Doctrine, tactics, techniques, and procedures took center stage in the USAF's development as a service—not for the sake of airpower itself but more so for the sake of the joint fight. As the youngest Service, and if we can agree that this type of focus is perhaps the "best" approach, can we ever say with conviction that the Space Force is appropriately operationally focused?

As the USSF finds its stance, current global uncertainty should be the laser-focused impetus for its mission. During the Cold War, ICBM crews were on alert, bombers were postured and always in the back of their heads was a "bolt out of the

blue" execution. As such, training, exercises, and operations were a "no fail" mission; the same can be seen in the development of generations of aircraft, advanced Tactics, Techniques, and Procedures (TTP), and weapons. This is where the USSF is stepping out.

Crews pulling shifts in the dead of night, on weekends, on holidays, away from families are truly the nation's Guardians. Staying focused and fighting the monotonous routine is essential. But how does the fledgling USSF do that?

In the days of Strategic Air Command, OLYMPIC ARENA (and later as GUARDIAN CHALLENGE) was the event ICBM crews aspired to. Does USSF have an analog premier event? Challenges to this will invariably be "well, each delta has a specific mission, how can we compete with each other?" Easily. Make the competition initially about the domain itself; construct it as a thinking person's competition and, only after passing muster, can the crews compete in their weapon system (or similar classes of weapon systems) … in essence, our operators must know the domain like they know their weapon system.

Focusing Delta crews on the depth and breadth of knowledge in their weapon system and domain as well as the importance of their specific mission to securing and controlling the space domain can create the operational imperative the USSF needs to stay focused. In

today's unstable geopolitical environment, and a similarly unstable space environment, the operational imperative is evident… and it must be folded into all aspects of training and operations.

General Curtis LeMay once quipped, "Today, shooting wars are won or lost before they start. If they are fought at all, they would be fought principally to confirm which side had won at the outset." In the U.S. Space Force, we are preparing for a war that is either in space or extends to/from space. Our leadership is making the right moves at the outset: creating components at the Combatant Commands so space looks just like "any other capability" to the joint warfighters, organizing our Service to be prepared for war in a deployed-in-place stature, developing offensive capabilities to buttress deterrence in space, and integrating the force into the American Way of War. Amidst this ever-growing dynamic for our young Service, we cannot lose sight of the operational imperative.

Let's initiate a space competition that keeps our Guardians energized and aspirational to be operationally focused joint warfighters. Push their knowledge on the dynamics of the space domain and the threats therein… and then push their skills in their weapons systems to be the very best operators we can deliver for the nation.

Next Generation Mission Management in Space

GREGG WALSH, DIRECTOR OF GROWTH, TWO SIX TECHNOLOGIES

Mission management for space is still largely manual and fragmented. This limited view into infrastructure status, vulnerabilities, and task loads forces operators to be reactive to changes or outages. A mission management framework approach could bring together the data from disparate systems to provide an improved ability to understand the space domain and better support decision-making. A mission-focused framework would support common task automation for mission planning and help to identify asset availability, vulnerabilities, and alternative actions in real time.

Mission management in the space domain is still a largely manual process. Mission operators simply do not have the information or context to take a proactive risk-based approach to mission operations. Their limited and fractured view of infrastructure status, vulnerabilities, and task loads forces them to be reactive to changes or outages. New satellite and ground capabilities continue to be added in an uncoordinated approach that further complicates operations. A more comprehensive view and better situational context are required to allow space mission operators to support the growing and complex needs of the government.

At Two Six Technologies, we build, deploy, and implement innovative products that solve the world's most complex challenges today. Through private R&D, relentless innovation, and deep technical expertise in cyber, information operations, electronic systems, analytics, and secure solutions, we serve customers including DARPA, the Department of State, U.S. Cyber Command, U.S. Intelligence Organizations, and beyond.

Two Six is not a traditional defense contractor trying to do agile development. Instead, we are an agile software development company driving innovation for national security. Our company is focused on innovation, agility, and speed in developing high-quality software and algorithmic-centric systems that stay ahead of our competitors and serve the needs of our customers.

A WORD FROM OUR SPACEPOWER PARTNERS

In space and across all domains, Two Six can create a common mission management framework providing a broader set of information and context to support critical planning and execution decisions. A mission-focused framework would support common task automation for mission planning and help identify asset availability, vulnerabilities, and alternative actions in real time. Built on a zero-trust foundation, operators across the enterprise would access data from legacy and new systems to provide a more complete understanding of the mission environment. The framework does not build another data repository, but rather leverages the existing data sources to perform analytics and visualizations to provide context and decision support.

This agile framework would also allow space mission operators to evaluate new capabilities and systems early in the acquisition process to help shape requirements and understand impacts on operations. It would support the development of new business processes and functions to better leverage automation and policies such as data management. The capability would allow the government to better leverage new and emerging software practices and keep the mission capabilities resilient and leading edge. The framework would leverage industry standards and provide a more seamless integration with commercial space systems to support mission execution.

Two Six will be engaging with key DoD space mission leaders and essential partners at the Space Power conference. Mission experts, technologists, and researchers will be discussing challenges and innovative solutions for more effective space mission management and other critical space capabilities. We look forward to continuing our work in the space domain and helping to provide a strategic advantage to our nation.

U.S. Space Force Hidden Technical Debt: The Challenge of Evolving from U.S. Air Force Space Command (AFSPC)

CLINTON AUSTIN
SFA DIRECTOR OF DIGITAL OUTREACH

Standing up a new military service on the foundations of the shortcomings of the old one leaves challenges for implementation and innovation, especially in the realm of information technology. The U.S. Space Force has a unique opportunity to critically evaluate legacy tech from the U.S. Air Force and lay the foundation for a new technical framework that effectively protects U.S. interests in the space domain.

The U.S. Space Force's mission is to "secure our nation's interests in, from, and to space." To secure the nation's interest, it desires to be the first Armed Service to be 100% digital by having the ability to apply digital technologies and capabilities to space operations successfully. As the space domain becomes more contested and complex, the force must display acumen in effectively leveraging and integrating digital technologies, data analytics, artificial intelligence, and cybersecurity to enhance space operations and ensure superiority in this critical domain.

While the U.S. Space Force has expressed its desire to be this first digital service, implementing and realizing this goal would require an honest assessment of the outstanding technical debt inherited from the previous U.S. Air Force Space Command (AFSPC) days before advancing to newer and more modern systems. Overcoming this requires several critical steps, mainly establishing a technical baseline of legacy and current systems and interdependency service mappings of all weapons systems. Below are methods and recommendations to achieve these ends.

TECH COLUMN

Technical Debt

In 1992, Ward Cunningham, a computer programmer and software developer who is best known for inventing the wiki, described 'technical debt' as the "cumulative impact of expedient design and implementation on the continued evolution of a system [1]". In other words, technical debt refers to the accumulated cost and consequences of design and development decisions as well as the changes made during sustainment. It is like financial debt, where long-term costs and obligations offset the short-term benefits of taking on debt.

Negative debt comes from inefficient code, poor configuration control, neglecting documentation, postponing bug fixes, or failing to address security vulnerabilities. It also occurs from short-term solutions to get the mission back up and running without being documented.[2].

Over time, technical debt can slow development, increase the risk of errors and system failures, and make implementing future changes or enhancements more difficult and costly. Organizations must manage and address technical debt to ensure their software systems' long-term health and sustainability. What is more, it reduces the ability to implement newer solutions.

To tackle debt, the Space Force must establish a technical baseline to understand what it inherited, both programmatic and infrastructure. Based on the author's first-hand experience and continued solution development within the greater Space Force community, the documentation varies from poor to non-existent. Yet, the Space Force continues to move aggressively with new requirements on legacy systems that it needs to understand fully to avoid adding new risks or jeopardizing the mission.

Technical Baseline

As stated above, establishing a technical baseline is the first step to addressing the technical debt. Technical baseline refers to a documented and agreed-upon set of specifications, plans, and requirements that serve as a foundation for developing, implementing, and evaluating a system or technology. The DoD already has the DoDAF Architecture Framework 2.02, which the Space Force can repurpose for this effort. The framework outlines how a system or technology should be designed, built, documented, and operated. The harsh reality is that large elements of AFSPC needed this documentation. If the system or technology did have the documentation during development, it was never updated after it was deployed.

U.S. Space Command is now in a difficult position where it must slow down before it can speed up. This means spending time and energy on legacy systems to understand how said systems or software were formerly designed, built, and operated. The documentation includes how the system has evolved since moving into operations, including security patches and system changes. Space Command is also encouraged to investigate original Request for Proposal (RFP) documents, establishing grading criteria that measure if technology met mission demands over time. Then, using the same grading criteria, decide to port

legacy technology to an updated supported technology stack or build something new.

Once a technical baseline is complete, the final step is to cultivate detailed interdependency service mappings of all weapons systems to develop redundancy within the enterprise.

Interdependency Service Mappings

In the Information Technology Infrastructure Library (ITIL) framework, interdependency service mappings identify and document the relationships and dependencies between I.T. services within the U.S. Space Force.

Interdependency service mappings help illustrate how various I.T. services rely on each other and how changes or disruptions in one service can impact others. They involve analyzing the dependencies between services, including technical and non-technical ones.

The purpose of interdependency service mappings is to:

1. Identify Critical Dependencies: U.S. Space Command can identify single points of failure within the Enterprise by mapping interdependencies. For example, suppose a warning system has only one circuit to inform operators of an issue. In that case, this will be a single-point failure if the circuit goes down. The same goes for other I.T. systems. By mapping the independencies, the U.S. Space Force prioritizes and manages these dependencies effectively to minimize the impact of any disruptions or changes.

2. Assess Impact: Understanding interdependencies allows the U.S. Space Command to assess the potential impact of changes or incidents on other services within. This helps in planning and implementing changes in a controlled manner, reducing the risk of unintended consequences while lowering technical debt. Using the previous circuit example, what are the second and third ripple effects of the circuit being down? Please note that if everything is the number one priority, nothing is a priority.

3. Improve Service Resilience: By identifying and addressing interdependencies, U.S. Space Command can also enhance the resilience of its I.T. services by developing redundancy within the environment.

4. Support Incident and Problem Management: For U.S. Space Command, interdependency service mappings can provide valuable insights during incident and problem management processes. Mainly, they help identify the root causes of incidents and problems by tracing the impact across interconnected services. For example, the U.S. Space Command can apply service mapping diagrams, dependency matrices, and service catalogs to create interdependency service mappings. These tools help visualize and document service relationships, enabling better understanding and managing interdependencies.

TECH COLUMN

U.S. Space Command's desire to be the first space domain digital-focused service is driven by a recognition that space operations increasingly rely on digital technologies and capabilities. To be able to do so, it must slow down and understand what it has inherited. This will be slow and tedious work. Still, it must accommodate future capabilities to defend and protect the nation.

Leveraging AI/ML to Protect the Space Domain

BY CHRIS BELL, LEAD SOLUTION ARCHITECT FOR PARSONS CORPORATION'S SPACE ENGINEERING SOLUTIONS

Thorough and efficient Space Domain Awareness capabilities are critical to U.S. Space Force operations, as the force is uniquely positioned to master the art of strategic foresight. A classified cloud-based, scalable Ground Operations Center as a Service (GOCaaS) capability employs artificial intelligence and machine learning to support a lean and advanced force that protects the peace of today and detects the threats of tomorrow

Space and its services no longer only impact the warfighter. With assured position, navigation, and timing, and international data communications now reliant on space assets, threats to commercial, civil, and DoD spacecraft risk disruption to our daily lives. The existing congestion of space, combined with the increasing pace of spacecraft launch, has heightened the competitive nature of space and demand for Space Domain Awareness (SDA). Our ability to monitor, manage, and control space assets is foundational to maintaining U.S. space dominance. However, awareness without context and rapid response capabilities is useless.

The growing number of space, aerial, and ground assets generating data for SDA purposes is beyond the capability of human observers to consume. Currently, information is stored

A WORD FROM OUR SPACEPOWER PARTNERS

in huge databases for data trending analysis and historical reference. Training operators to see potentially aggressive actions and respond with defensive maneuver plans to avoid conflict is slow, limited in scope, and unsustainable. Leveraging Artificial Intelligence and Machine Learning (AI/ML) to correlate and propagate spacecraft maneuvers provides actionable data and drives automated responses.

The application of AI/ML in SDA allows for active and continuous monitoring of all space assets without requiring hordes of data analysts. AI/ML analyzes commercial and private data feeds for correlation with civil and DoD data to predict the probability of accuracy. This provides weighted accuracy scores for identifying hostile Unidentified Anomalous Phenomena (UAPs) to be correlated with known foreign asset libraries. Given the "high enough" probability of a UAP and observed aggressive maneuvers, the AI/ML algorithm alerts operators of possible hostile action. In parallel, AI/ML produces defensive maneuver plans, schedules antenna time on the next available ground site, and engages DoD assets to perform space-based surveillance of the UAP.

Within minutes of the threat being detected, U.S. Space Force monitors and tracks custody of the UAP and predicted threatened spacecraft. Operators maintain awareness of the situation through a virtual reality headset with a digital twin of U.S. space assets, projected orbit paths, and critical data synthesized into digestible statuses. The UAP markings, location, size, and radio frequency signature are cross referenced with the Unified Data Library to identify it as a known hostile asset. All information, plans, and actions are compiled into a report for the next round of international negotiations and discussions.

Enabling the rapid response of the AI/ML algorithm is a Parsons classified cloud-based, scalable Ground Operations Center as a Service (GOCaaS) with a human on the loop for monitoring and approval purposes. GOCaaS uses a repeatable classified architecture to fly commercial, civil, and DoD space assets. Geographically distributed data centers host operational clusters for redundancy and load balancing purposes, while the digital twin and databases are stored in replicated file structures for quick access and recovery.

Our engineers leverage the Agile process to support a DevSecOps approach with a continuous integration/deployment pipeline. Parsons creates this reality through product and service development to preserve and protect our legacy in the stars. We're leveraging domain knowledge to perform large system integration to develop solutions today for tomorrow's threats.

Cosmology and Conflict: Defending the Space and Cognitive Domains

FELICIA S. C. GOODEN,
SFA MAGAZINE EDITOR

A more dangerous space domain has the potential to spark treacherous narratives that challenge a country or the whole of humanity's perception of reality and belief. Data collected in space and analyzed on the ground can have a profound impact on humanity's collective consciousness, especially when compromised. The USSF has a higher calling to protect the peaceful uses of outer space, in turn, clarifying and protecting humanity's sense of self.

Imagine… GPS signals in the Middle East are spoofed by an adversary, causing a U.S. Navy warship to miscalculate the firing of a missile toward an enemy target. The target is missed, the missile hits barren land, but before media outlets can accurately report on the mishap, Russian troll farms use generative AI to pump out deepfake images, videos, and content that go viral on Telegram channels, X (formerly Twitter) spaces, and the wider mainstream media seeking to be first to publish a story. The disinformation campaign accuses the U.S. Navy of hitting a civilian target, killing hundreds, exacerbating the chaos of the Israel-Hamas war, and officially sparking a regional conflict that requires U.S. involvement. Who would be to blame for the data security and intelligence failure? How would the U.S. counter this new narrative?

War and the origins of life and the universe are the two most powerful narratives to capture human consciousness, from the Trojan War of ancient Greece that inspired the *Iliad* and *Odyssey* by Homer to the story of Arjuna's journey in waging war against his cousin to win the rewards of Krishna in the *Bhagavad Gita* to the creation stories found in ancient Sumer, the Levant, ancient China, aboriginal and indigenous communities, and more. The U.S. Space Force finds itself at a unique juncture between the hard sciences that drive technological innovation and the arts that translate the use or abuse of these technologies into strategic narratives. An effective synthesis is needed for the Space Force to be successful over the long term.

FINAL THOUGHTS

Cosmology is the study of the universe, its origins, life within it, and its future. The field of study involves astrophysics, particle physics, gravitational physics, and astronomy – all subfields relevant to the direction of the U.S. Space Force and emerging technologies to be developed by Guardians, industry, and academia. The pursuit seeks to answer the pressing questions mankind has asked since the first creation myth was shared through oral tradition. Speculation on new scientific, cosmological discoveries inspires the conspiracy theories of the Alt-Right that question the veracity of Area-51 and underpin vibrant alternative narratives about unidentified aerial phenomena, popularly known as unidentified flying objects (UFOs). The Space Force is strategically positioned to explore and protect the truth about the universe and humanity's place within it as well as other life that may exist.

The Space Force has a unique opportunity to command and redirect the streams of consciousness that flow through rural communities and the disenfranchised who find themselves easily swayed by deepfakes and disinformation campaigns. Through innovation, the Space Force can develop and expand on emerging technologies that outperform and outpace adversaries in peaceful research and combat. Through cybersecurity, the Space Force can ensure humanity keeps moving in an orderly and efficient manner through accurate data detection, analysis, and transfers. Through strategic narrative cultivated and overseen by a much-needed Public Affairs office, the Space Force can influence and maintain global stability by combating disinformation with

truth about U.S. interests in, to, and from space as well as humanity's true place in the universe. Through practical and project-based education programs, the Space Force can lead the way in workforce training and development, cultivating a force that sets the example for a more productive and intelligent America of tomorrow – an America that can discern dreams from reality.

It is critical that the U.S. Space Force receives the funding and public support needed to achieve its ends as the world faces the prospect of a more dangerous space domain. The future of the United States and humanity depends on it, and if there ***is*** a Galactic Federation, the U.S. Space Force will be prepared to ensure humanity is worthy of a seat at that table.

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