

Carlisle Compendia of Collaborative Research

United States Army War College Student Publications

Allied Space Training: An Opportunity for Army Leadership



May



2020

Carlisle Compendia of Collaborative Research

United States Army War College Student Publications

Carlisle Compendia of Collaborative Research is produced under the purview of the Applied Communication and Learning Lab and the United States Army War College. Each issue reports the findings of a major collaborative student or student-faculty research initiative on a topic of strategic importance to the Army, the Department of Defense, and/or the larger community of strategic leaders.

Carlisle Compendia of Collaborative Research

Larry D. Miller, Editor

Student Publications

Applied Communication and Learning Lab

Carlisle Barracks, PA 17013-5010

Design, production, and editing services provided by the [Institute for Military Writing](#), a division of Cable Creek Publishing.

Selection Process

Manuscripts are selected by the Editor, undergo rigorous vetting, and are edited for economy, clarity, and impact prior to publication.



Cover

Photo by Dottie White, U.S. Army Space and Missile Defense Command with space photo (added to class screen) from Qimono via Pixabay.

Disclaimer

The ideas and viewpoints advanced in *Carlisle Compendia of Collaborative Research* are those of the authors and do not necessarily reflect the official policy or position of Applied Communication and Learning Lab, the United States Army War College, the Department of Defense, or any other department or agency of the United States Government.

Allied Space Training: An Opportunity for Army Leadership

Colonel Bryan Shrank ▪ Colonel Scott Emmel ▪ Lieutenant Colonel Jacob Miller

Overview

[Executive Summary](#) 1

[Essential Resources](#) 3

Report and Proposal

[Allied Space Training](#) 5

[*Justification*](#)

[*Partner Cooperation*](#)

[*Existing Partnerships*](#)

[*Course Proposal*](#)

[*Implementation Assessment*](#)

[*Conclusion*](#)

Executive Summary

U.S. national strategy documents highlight the increasing significance of the space domain for today's warfighters and the importance of working with our international allies and partners in that realm.¹ In this issue, we outline and propose an Army course focused on integrating space operations into land warfare. The proposed Combined Space Officer Course (CSOC) will strengthen alliances and partnerships, increase lethality, and build greater deterrence.

The United States is investing considerable effort in cooperating and collaborating with allies in the space domain. International cooperation for Space Situational Awareness, the Combined Space Operations initiative, liaison and exchange officers, and participation in combined exercises are current examples.² The U.S. Space Force offers courses on space education through the National Security Space Institute; these are open to select allied and partner countries.³ Currently, however, no course trains allied officers to integrate space into land operations. Such a course is needed and can be built and implemented on a small and efficient budget.

History demonstrates the benefit of working with allies, including close collaboration on highly sensitive and classified projects. Indeed, cooperation among allies produced some of the most critical successes in military history. During World War II, the effort to break German secret codes—an effort based on the knowledge and risks shared by several key allies—resulted in invaluable intelligence that shortened the war and contributed decisively to the ultimate Allied victory in 1945.⁴ Britain's sharing of highly sensitive

¹ James Mattis, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge*, (Washington, DC: The Pentagon, 2018), 8, <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>; Donald Trump, *National Security Strategy of the United States of America* (Washington, DC: The White House, 2017); Joint Staff, *Description of the National Military Strategy* (Washington, DC: Joint Staff, July 2019), https://www.jcs.mil/Portals/36/Documents/Publications/UNCLASS_2018_National_Military_Strategy_Description.pdf, 3-4; United States Space Command, "Overview and Leadership," August 29, 2019, <https://media.defense.gov/2019/Aug/29/2002177208/-1/-1/1/USSPACECOM%20FACT%20SHEET.PDF>.

² SAIC admin@space-track.org, "Space-Track.Org," [Space-track.org](https://www.space-track.org/documentation#odr) (Space-Track, 2014), <https://www.space-track.org/documentation#odr>; Michael Syintsakos, E-mail response from Michael Syintsakos, Chief, Multinational Space Collaboration Division, USSPACECOM J54, in response to review, interview by Bryan Shrank, March 10, 2020; John Sheldon, "Space Wars: United States and Allies Discuss Combined Space Operations Initiative," www.SpaceWatch.Global (SpaceWatch.Global, April 15, 2019), <https://spacewatch.global/2019/04/space-wars-united-states-and-allies-discuss-combined-space-operations-initiative/>; Cody Chiles, "Canadian Space Operators Certified, Awarded Space Wings in CSpOC," North American Aerospace Defense Command, January 25, 2019, <https://www.norad.mil/Newsroom/Article/1741725/canadian-space-operators-certified-awarded-space-wings-in-cspoc/>; Clayton Wear, "Liaison Officers at Vandenberg," Vandenberg Air Force Base, November 8, 2018, <https://www.vandenberg.af.mil/News/Article-Display/Article/1686021/liaison-officers-at-vandenberg/>; Lauren Hill, "Space Flag Holds First Exercise with Coalition Partners," Vandenberg Air Force Base, August 25, 2019, <https://www.vandenberg.af.mil/News/Article-Display/Article/1943013/space-flag-holds-first-exercise-with-coalition-partners/>; Government of Canada, "United in Defence: September 2019 - Connect2Canada," Connect2Canada, September 12, 2019, <https://connect2canada.com/2019/09/united-in-defence-september-2019/>.

³ National Security Space Institute, "NSSI Public Center," Af.mil, 2019, <https://www2.peterson.af.mil/nssi/>. This website offers information on all courses provided by the NSSI.

⁴ Wladyslaw Kozaczuk, *Enigma: How the German Machine Cipher Was Broken, and How It Was Read by the Allies in World War Two* (Frederick, MD: University Publications of America, 1985), 96, 98; Peter Calvocoressi, *Top Secret Ultra* (New York: Pantheon Books, 1980), 31.

technical research during the early stages of the war led directly to multiple American scientific breakthroughs that helped speed Allied victory.⁵ Additionally, U.S.-Israeli Air Defense relationships proved successful during the Cold War and collaboration continues to satisfy American and Israeli interests while strengthening our current relationship.

Such collaborative efforts require balancing risks against potential benefits. Sharing sensitive information with allies is not risk free. Trust is critical and expectation management is an important factor in maintaining that trust.⁶ Entering into successful partnerships requires agreement on processes and outcomes, clear roadmaps and guidelines, and specific parameters—including consensus on the level of classified information and resources to be shared.

An Army course focused on training officers from allied and partner nations in how to plan for and integrate space capabilities into land warfare operations would provide multiple benefits at a relatively low cost. The proposed CSOC is a four-week course designed for officers from the United Kingdom, Canada, Australia, and New Zealand. An equivalent version would be developed separately for France, Germany, and Japan—based on bi-lateral intelligence sharing agreements.

The proposed course entails five distinct instructional blocks: space effects, adversary threat and mitigation, software, Space Operations Center (SpOC) integration and space support requests, and planning and integration. Instruction concludes with a four-day exercise focused on integrating space in a land-based, multi-domain scenario.

Our implementation analysis using the DOTMLPF-P (doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy) process indicates that designing and implementing the CSOC is not only possible but will require minimal cost for personnel, computer systems, and facilities.⁷ A three-year pilot implementation program is recommended.

The Army has an opportunity to significantly impact the way our allies and partners integrate space assets into land warfare operations. With minimal overall investment, we can develop a course that strengthens alliances and partnerships, increases overall lethality, and enhances deterrence. Space operations are vital to U.S. national interests and will be critical to the way we fight our nation's wars in the future. The Combined Space Officer Course proposed herein is a proactive means of integrating Land and Space domain operations, pursuing space training for our allies and partners, and demonstrating commitment to them and to our national security.

USAWC Student Research Group

Colonel Bryan Shrank

Colonel Scott Emmel

Lieutenant Colonel Jacob Miller

⁵ Stephen Phelps, *The Tizard Mission: The Top-Secret Scientific Mission That Changed the Course of World War II* (Yardley, PA: Westholme, Garsington, 2011), xi-xii; David Zimmerman, "The Tizard Mission and the Development of the Atomic Bomb." *War in History* 2, no. 3 (1995): 259-73, www.jstor.org/stable/26004450.

⁶ Robert H. Scales Jr. "Trust, not technology, sustains coalitions." *Parameters* 28, no. 4. 98, 1999: 4-10, <https://search-proquest-com.usawc.idm.oclc.org/docview/198054197>.

⁷ Robert Hoffman, E-mail interview with Robert Hoffman, Chief Space Operations Training Division, regarding combined space officer course, interviewed by Scott Emmel, January 27, 2019.

Essential Resources

Calvocoressi, Peter. *Top Secret Ultra*. New York: Pantheon Books, 1980.

Defense Intelligence Agency. "Challenges to Security in Space," February 1, 2019.

https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf.

Defense Intelligence Agency Public Affairs. "This Week in DIA History: Formation of the FVEY Partnership." *Defense Intelligence Agency*, May 30, 2019. <https://www.dia.mil/News/Articles/Article-View/Article/1861392/this-week-in-dia-history-formation-of-the-fvey-partnership/>.

Ham, Carter F. "USAREUR: Building Partner Capacity for the Future." *ARMY* 59, no. 10, (October 2009): 118-120. <https://search-proquest-com.usawc.idm.oclc.org/docview/237078389?accountid=4444>.

Joint Staff. *Description of the National Military Strategy*. Washington, DC: Joint Staff, July 2019.

https://www.jcs.mil/Portals/36/Documents/Publications/UNCLASS_2018_National_Military_Strategy_Description.pdf.

Lorell, Mark A. *Troubled Partnership: A History of U.S.-Japan Collaboration on the F3-X Fighter*. New Brunswick, NJ: Transaction, 1996.

Mattis, James. *Be Peerless Stewards of Taxpayers' Dollars*. Washington, DC, 28 March 2018. Memorandum for all members of the Department of Defense.

Mattis, James. *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge*. Washington, DC: The Pentagon, 2018.

<https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

McInnis, Kathleen J. "The Competitive Advantages and Risks of Alliances." *The Heritage Foundation*, October 19, 2019, 79–91. <https://www.heritage.org/military-strength/topical-essays/the-competitive-advantages-and-risks-alliances>.

National Security Space Institute. "NSSI Public Center," Af.mil, 2019. <https://www2.peterson.af.mil/nssi/>.

Office for Science & Technology of the Embassy of France in the United States. "Defence - Space Command to Be Created - Office for Science & Technology of the Embassy of France in the United States." *France-science.org*, July 30, 2019. <https://www.france-science.org/Defence-Space-command-to-be.html>.

Phelps, Stephen. *The Tizard Mission: The Top-Secret Scientific Mission That Changed the Course of World War II*. Yardley, PA: Westholme, Garsington, 2011.

Rowlands, Greg. "Aussie Space Command: Making the Case for Space Part II | Australian Army." *Army.gov.au*, August 27, 2019. <https://www.army.gov.au/our-future/blog/cyber-space/aussie-space-command-making-the-case-for-space-part-ii>.

Scales, Robert H. Jr. "Trust, not technology, sustains coalitions." *Parameters* 28, no. 4. 98, 1999: 4-10. <https://search-proquest-com.usawc.idm.oclc.org/docview/198054197>.

- Sheldon, John. "Space Wars: United States and Allies Discuss Combined Space Operations Initiative." SpaceWatch.Global, April 15, 2019. <https://spacewatch.global/2019/04/space-wars-united-states-and-allies-discuss-combined-space-operations-initiative/>.
- Soeters, Joseph and Irena Goldenberg. "Information sharing in multinational security and military operations. Why and why not? With whom and with whom not?" *Defence Studies*, 2019. 37-48. DOI: 10.1080/14702436.2018.1558055.
- Thompson, Gregg and Lou Yuengert. "Aligning Vision to Capability: Fundamentals of Requirements Determination." Faculty paper, Department of Command Leadership and Management, U.S. Army War College, Carlisle Barracks, PA, January 2015.
- Tossini, J. Vitor. "The Five Eyes - The Intelligence Alliance of the Anglosphere." *UK Defence Journal*, November 13, 2017. <https://ukdefencejournal.org.uk/the-five-eyes-the-intelligence-alliance-of-the-anglosphere/>.
- Trump, Donald. *National Security Strategy of the United States of America*. Washington, DC: The White House, 2017.
- United States Army. *2019 Army Modernization Strategy: Investing in the Future*. Washington, DC: United States Army, 2019. https://www.army.mil/e2/downloads/rv7/2019_army_modernization_strategy_final.pdf, 8.
- United States Army. "FM 3-14 Army Space Operations." *Army Publishing Directorate*, October 2019. https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/ARN19639_FM%203-14%20FINAL%20WEB.pdf.
- United States Army. *The Army Strategy*. Washington, DC: United States Army, 2018. https://www.army.mil/e2/downloads/rv7/the_army_strategy_2018.pdf, 10.
- United States Army Space and Missile Defense Command. "Space and Missile Defense Center of Excellence." Army.mil, 2019. <https://www.smdc.army.mil/ORGANIZATION/FWC/>.
- United States Department of Defense. *Quadrennial Defense Review Report*. Washington, DC: The Pentagon, 2006.
- United States Space Command. "Overview and Leadership." August 29, 2019. <https://media.defense.gov/2019/Aug/29/2002177208/-1/-1/1/USSPACECOM%20FACT%20SHEET.PDF>.
- United States Space Command Public Affairs. "USSPACECOM Expands Key Allied Space Partnerships through Multi-Nation Operations." United States Space Command, December 27, 2019. <https://www.spacecom.mil/MEDIA/NEWS-ARTICLES/Article/2047780/usspacecom-expands-key-allied-space-partnerships-through-multi-nation-operations/>.
- Wear, Clayton. "Liaison Officers at Vandenberg." Vandenberg Air Force Base, November 8, 2018. <https://www.vandenberg.af.mil/News/Article-Display/Article/1686021/liaison-officers-at-vandenberg/>.
- Weekes, John. "Space Warfare: Defence Force Wants 'Cadre of Trained Personnel.'" *Stuff*, January 15, 2020. <https://www.stuff.co.nz/national/politics/118651263/space-warfare-defence-force-wants-cadre-of-trained-personnel?cid=facebook.post>.
- Winterbotham, F W. *The Ultra Secret*. New York: Harper & Row, 1974.
- Zimmerman, David. "The Tizard Mission and the Development of the Atomic Bomb." *War in History* 2, no. 3 (1995): 259-73. www.jstor.org/stable/26004450.

Allied Space Training: An Opportunity for Army Leadership

Decades after the first satellite launched into orbit, space is now fixed in the mainstream of military thought as a warfighting domain. In 2019, the U.S. government formally acknowledged its significance with the standup of the United States Space Command as a Geographic Combatant Command and the creation of the United States Space Force as the sixth branch of the military.¹ Future performance in the space domain requires action on the ground now to maximize strategic and operational preparedness. To realize the potential of space-based military operations, two forms of cooperation will be key: cooperation with our allies and cooperation among our services. The U.S. Army is ideally positioned to provide leadership in this regard. Doing so starts with training. By delivering land-warfare focused space integration training to its closest allies and partners, the Army will create more lethal allies, strengthen alliances, and enhance our nation's ability to deter adversaries.

Creation of the Combined Space Officer Course (CSOC) proposed herein would allow the Army to efficiently prepare allied officers for space-enabled operations. By capitalizing on existing strengths, the proposed CSOC would arm graduates with a comprehensive understanding of space assets, capabilities, and architecture while simultaneously fostering the enhanced cooperation, coordination, and collaboration needed to maximize strategic potential.

Allied space cooperation is not a new concept. Recent efforts by United States Strategic Command (its space roles now undertaken by USSPACECOM) and the United States Air Force (its space roles now falling to the United States Space Force) to work with our allies in space operations and training are making significant strides. The Army also maintains a close relationship with allied partners in its space operations.

Organization of the United States military space community is much broader than many realize, and the community is currently experiencing dynamic change as it responds to the creation of the new combatant command and service component dedicated to the space domain. As of January 2020, the preponderance of United States military space forces are still Air Force airmen, but they are assigned to the United States Space Force. As the Space Force determines its policies and processes, most of those airmen will officially transfer to the Space Force.² What is still undetermined, however, is what will happen to the space trained personnel who reside in the other services. The Army, Navy, and Marine Corps all possess trained space professionals but in substantially fewer numbers. Each of those services trained, educated, and developed space officers to meet the unique needs of their respective mission sets.

¹ Donald Trump, "Remarks by President Trump at Event Establishing the U. S. Space Command," (August 29, 2019), <https://www.spacecom.mil/Portals/32/Documents/Transcripts%20&%20Speeches/Remarks%20by%20President%20Trump%20at%20Event%20Establishing%20the%20U.S.%20Space%20Command.pdf> and United States Space Force, "U. S. Space Force Fact Sheet," Spaceforce.mil, December 20, 2019, <https://www.spaceforce.mil/About-Us/Fact-Sheet>.

² United States Space Force, "U. S. Space Force Fact Sheet," December 20, 2019.

The role of the Army space operations officer is unique to the United States Army. Our allies, depending on the country, may have a few army officers who are working in the space field, but they do not have a dedicated branch or functional area. According to Field Manual (FM) 3-14, Army space forces have three core competencies: integrate space capabilities, deliver space effects, and employ space enablers.³ The Army teaches its space operations officers to conduct these functions, enabling these officers to “speak space” to space providers on behalf of the Army units they support. Since space assets and operations are so crucial to its operations, *the Army must be able to communicate its needs and coordinate appropriately, providing added lethality to land warfare and multi-domain operations*. This expertise, developed and refined over years of combat operations in Iraq and Afghanistan, cemented the Army space officer as the subject matter expert for integrating space effects into land operations and now provides the Army with an opportunity to step forward as a leader for training in this endeavor. This proposal is organized in five parts: (1) Justification, (2) Cooperation Considerations, (3) Existing Partnerships, (4) Course Proposal, and (5) Implementation Assessment.

Justification

Government documents, military organization, and past practice all feature collaboration and training as essential to U.S. national strategy and security. Aligned with both strategic guidance and historic precedent, the proposed CSOC is a logical and needed addition to space operations.

Strategic Guidance

For more than a decade, U.S. strategic guidance has consistently recognized and highlighted the criticality of our allies and partners in meeting our national interests. The 2006 *Quadrennial Defense Review* (QDR), included recognition that “future challenges can be met only through . . . the relevant contributions of our international partners.” It was in this 2006 QDR that strategic guidance started to include the terms “building partner capability” and “building partnership capacity.”⁴ U.S. efforts to build partners’ capacity continue around the globe with frequent multi-national training exercises occurring in every combatant command area of responsibility; consistent subject matter expert exchanges between U.S. forces and partner forces; and the development, formalization, and deployment of Security Force Assistance Brigades.

The 2017 *National Security Strategy* (NSS) refers to “allies” 77 times and “partners” another 112 times.⁵ The NSS also clearly recognizes the significant role that our allies and partners play in achieving our national strategic objectives. Well-nested with the 2017 NSS is the 2018 National Defense Strategy (NDS), which discusses strengthening alliances and attracting new partners while deepening interoperability for a more effective combined force.⁶ The 2018 NDS states, “Our allies and partners provide complementary capabilities and forces along with unique perspectives, regional relationships, and information that improve our understanding of the environment and expand our options.”⁷ The document also notes the importance of ensuring that we can work closely with our allies. In particular, “the Department of Defense will prioritize

³ United States Army, “FM 3-14 Army Space Operations,” *Army Publishing Directorate*, October 2019, 1-14, https://armypubs.army.mil/epubs/DR_pubs/DR_a/pdf/web/ARN19639_FM%203-14%20FINAL%20WEB.pdf.

⁴ U.S. Department of Defense, *Quadrennial Defense Review Report* (Washington, DC: The Pentagon, 2006) vii, A-5.

⁵ Donald Trump, *National Security Strategy of the United States of America* (Washington, DC: The White House, 2017).

⁶ James Mattis, *Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military’s Competitive Edge*, (Washington, DC: The Pentagon, 2018), 8, <https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>.

⁷ James Mattis, *Summary of the 2018 National Defense Strategy of the United States of America*, 8.

requests for U.S. military equipment sales, accelerating foreign partner modernization and ability to integrate with U.S. forces.”⁸ The 2018 *Description of the National Military Strategy*, in kind, “acknowledges the unique contributions of allies and partners, a strategic source of strength for the Joint Force. Building a strong, agile, and resilient force requires better interoperability and *enhancing the combat lethality and survivability of our allies and partners.*”⁹ Echoing this imperative, the mission statement for the United States Space Command (USSPACECOM) directly references ties to our allies: “The USSPACECOM mission is to deter aggression and conflict, defend U.S. and allied freedom of action, deliver space combat power for the Joint/Combined force, and develop joint warfighters to advance U.S. and allied interests in, from, and through the space domain.”¹⁰

Understanding the imperative to work with and build the capability of our allies and partners does not stop at the Joint Force level. Each of the military services consistently reference recognizing, building, and/or leveraging capabilities of our partners and allies in their respective service strategic guidance. As the Army looks to move beyond the long war on terror and prepare for future conflicts, the 2018 Army Strategy lists “Strengthen Alliances and Partnerships” as one of the four critical lines of effort for continued land power dominance in the 21st century.¹¹ The 2019 Army Modernization Strategy recognizes the certainty that the Army will continue to fight as part of a combined force with allies and partners. This recognition is included as part of the Army’s strategy for modernizing the force. In talking about allies and partners, the strategy states: “We will strengthen not only technical interoperability but also human and procedural interoperability, to ensure that we can fight as one team. We will use exercises, training opportunities, and leader exchanges to strengthen that interoperability, and to refine our approaches to [multi-domain operations] as a Joint and combined force.”¹²

It is clear from even a brief review of our national strategic guidance that sustaining and building cooperation with our partners and allies is necessary. The question is not whether we should continue to expand these partnerships, but rather how quickly and how effectively we do so.

Historical Precedent

The sharing of technical, secretive, and intelligence assets with close allies is not without risk, but there are past examples of how such sharing has reaped immense benefits. In August of 1940, a group of Britain’s best scientists embarked on the *Duchess of Richmond* to begin a hazardous voyage across the Atlantic. These scientists, led by Sir Henry Tizard, brought with them Britain’s most highly guarded scientific secrets. Tizard’s mission was to give these secrets to America with no promise of reciprocity.¹³ During the interwar period, information and technology sharing between the U.S. and Britain was limited and plagued by mistrust on both sides.¹⁴ As German aggression increased throughout the 1930s, discussions on technology sharing

⁸ James Mattis, *Summary of the 2018 National Defense Strategy of the United States of America*, 9.

⁹ Emphasis added by the authors. Joint Staff, *Description of the National Military Strategy* (Washington, DC: Joint Staff, July 2019), https://www.jcs.mil/Portals/36/Documents/Publications/UNCLASS_2018_National_Military_Strategy_Description.pdf, 3-4.

¹⁰ United States Space Command, “Overview and Leadership,” August 29, 2019, <https://media.defense.gov/2019/Aug/29/2002177208/-1/-1/1/USSPACECOM%20FACT%20SHEET.PDF>.

¹¹ United States Army, *The Army Strategy* (Washington, DC: United States Army, 2018), https://www.army.mil/e2/downloads/rv7/the_army_strategy_2018.pdf, 10.

¹² United States Army, *2019 Army Modernization Strategy: Investing in the Future* (Washington, DC: United States Army, 2019), https://www.army.mil/e2/downloads/rv7/2019_army_modernization_strategy_final.pdf, 8.

¹³ Stephen Phelps, *The Tizard Mission: The Top-Secret Scientific Mission That Changed the Course of World War II* (Yardley, PA: Westholme, Garsington, 2011), xi-xii.

¹⁴ Phelps, *The Tizard Mission*, 54.

between the two nations increased but were hindered continuously by a desire to maintain a *quid pro quo* sharing arrangement.¹⁵ Things had changed by 1940, however. Prime Minister Sir Winston Churchill, facing a growing Nazi threat and hoping to draw upon the vast resources of the U.S. industrial base, approved the top-secret Tizard mission.¹⁶ The mission, which lasted for four months, saw U.S.-British exchanges of information on radar, aeronautical engineering, explosives, anti-submarine warfare, and numerous other technologies with application to the war effort.¹⁷ The calculated risk Britain took in sharing its most treasured secrets with America was essential to eventual victory in World War II (WWII) and foundational to the development of an ongoing close relationship between Britain and the United States.

The ULTRA Program

A leading factor in the Allies' ultimate victory in WWII was a British-led intelligence program providing timely and accurate intelligence to the Allies throughout the European campaign. ULTRA was the code-name assigned to a highly guarded signals intelligence program that intercepted and decoded German radio transmissions encoded by the highly sophisticated ENIGMA machine.¹⁸ Throughout WWII, Germans knew their radio transmissions were being monitored and intercepted. However, they had complete confidence in ENIGMA and its ability to keep their traffic secret. Because of the belief that the Enigma code could not be broken, German forces continued to send copious amounts of information via radio transmissions. They failed to recognize that Allied forces were receiving and acting on the information as quickly as German forces were.¹⁹

Lewis F. Powell, who later served as an Associate Justice of the U.S. Supreme Court, was an intelligence officer in the Army Air Forces during World War II. In 1944, then Major Powell was indoctrinated into the program as an "ULTRA representative" for U.S. Strategic Air Forces Europe Headquarters commanded by General Carl A. Spaatz. Powell received training at the top-secret ULTRA headquarters located in Bletchley Park, England, where he became an expert on the German Air Force. Powell later recalled that the brilliant intelligence officers at Bletchley Park "probably knew more about [the German Air Force] than high ranking German officers."²⁰

While it is not possible to quantify the exact impact of the ULTRA program, ULTRA's significance was immense. General Dwight D. Eisenhower in a 1945 letter to the Director of British Secret Intelligence Services praised the program saying: "The intelligence which has emanated from you before and during this campaign has been of priceless value to me. It has simplified my task as commander enormously. It has saved thousands of British and American lives and, in no small way, contributed to the speed with which the enemy was routed and eventually forced to surrender."²¹

The ULTRA program remained a closely guarded secret for almost three decades after the war. On May 25, 1945, 17 days *after* Nazi Germany had surrendered, Prime Minister Winston Churchill directed the

¹⁵ Phelps, *The Tizard Mission*, 57.

¹⁶ Phelps, *The Tizard Mission*, 144-145.

¹⁷ David Zimmerman, "The Tizard Mission and the Development of the Atomic Bomb." *War in History* 2, no. 3 (1995): 259-73, www.jstor.org/stable/26004450.

¹⁸ Lewis F Powell and Diane T Putney, *ULTRA and the Army Air Forces in World War II: An Interview with Associate Justice of the U.S. Supreme Court Lewis F. Powell, Jr.* (Washington, DC: Office of Air Force History, U.S. Air Force, 1987), ix.

¹⁹ Powell and Putney, ix.

²⁰ Powell and Putney, 20.

²¹ Letter from Gen. Eisenhower to Maj. Gen. Sir Stewart G Menzies, July 12, 1945, cited in F W Winterbotham, *The Ultra Secret* (New York: Harper & Row, 1974), 2.

transmission of a message ordering all personnel indoctrinated into the ULTRA program not to divulge any information about the decryption of ENIGMA coded radio transmissions or the existence of the ULTRA program.²² This order was followed meticulously by both British and American veterans of the program. In fact, it was not until Frederick W. Winterbotham published *The Ultra Secret* in 1974, that the existence of the top-secret program became well-known.²³ Some 40 years later, the story of mathematical genius Alan Turing and his team of code-breakers was turned into the box office hit movie, *The Imitation Game*.²⁴

The widely known story of ULTRA is one of success. It highlights the tremendous benefits of sharing new and cutting-edge technologies and procedures with partners and allies. What is much less known about the ULTRA story is the role a small group of Polish mathematicians played in breaking the ENIGMA code. It turns out that three bright mathematicians in the Polish Cipher Bureau cracked an earlier version of ENIGMA by the end of 1932.²⁵ Peter Calvocoressi was a British intelligence officer working at Bletchley Park during WWII. According to Calvocoressi, the Poles were “almost certainly the only people” able to read German Enigma traffic from 1932 to 1938.²⁶ In mid-1939 the Poles made their solutions to ENIGMA available to the French and subsequently to the British.²⁷ In early 1940, Alan Turing, the British hero credited with developing the ENIGMA-breaking machine, met with his Polish mathematician counterparts to share their own experiences in cracking the German encryption code.²⁸ The role the Poles played in breaking ENIGMA was foundational to the later success of the ULTRA program.

FVEY Intelligence Partnership

Collaboration between the U.S. and the U.K. necessary to enable the ULTRA program was covered by information-sharing agreements in effect between the two countries at that time. In 1941, with the likelihood of war on the horizon, President Franklin D. Roosevelt and Prime Minister Winston Churchill entered into the Atlantic Charter. This formal agreement between the United States and Great Britain set war aims and, among other things, allowed for intelligence sharing between the two countries. The Atlantic Charter was revised in May of 1943 when “the two sides signed the British-U.S. (BRUSA) Agreement” that updated roles and responsibilities as they pertained to the collection of intelligence against Axis targets for the remainder of WWII.²⁹ The refined BRUSA agreement was in place when British forces began sharing ULTRA information with their American counterparts. Acknowledging the importance of information sharing during WWII and recognizing the growing threat posed by the Soviet Union, the U.S. and the U.K. again updated the agreement in 1946. With the 1946 update, the British Commonwealth Nations of Canada, Australia, and New Zealand were added to the partnership, which is now known as the “Five Eyes” or “FVEY” partnership.³⁰ A recent article posted by the Defense Intelligence Agency's (DIA) Public Affairs

²² F W Winterbotham, *The Ultra Secret* (New York: Harper & Row, 1974), 1.

²³ Powell and Putney, xiv.

²⁴ IMDb, “The Imitation Game - IMDb,” IMDb, 2020, https://www.imdb.com/title/tt2084970/awards?ref=tt_awd.

²⁵ Wladyslaw Kozaczuk and Jerzy Straszak, *Enigma: How the Poles Broke the Nazi Code* (New York: Hippocrene Books, 2004), 14.

²⁶ Peter Calvocoressi, *Top Secret Ultra* (New York: Pantheon Books, 1980), 31.

²⁷ Wladyslaw Kozaczuk, *Enigma: How the German Machine Cipher Was Broken, and How It Was Read by the Allies in World War Two* (Frederick, MD: University Publications of America, 1985), 98.

²⁸ Kozaczuk, *Enigma How the German Machine Cipher Was Broken, and How It Was Read by the Allies in World War Two*, 96.

²⁹ DIA Public Affairs, “This Week in DIA History: Formation of the FVEY Partnership,” Defense Intelligence Agency, May 30, 2019, <https://www.dia.mil/News/Articles/Article-View/Article/1861392/this-week-in-dia-history-formation-of-the-fvey-partnership/>.

³⁰ DIA Public Affairs, “This Week in DIA History: Formation of the FVEY Partnership.”

Office, summarized the importance of the FVEY partnership, stating: “For more than 70 years . . . the FVEY relationship has proven to be an invaluable tool in safeguarding the security interests of each country. With the formation of a formal FVEY element in 2014, as well as the creation of a deputy director for commonwealth integration within DIA, the FVEY partnership is well postured to stay ahead of emerging threats.”³¹

Air Defense Collaboration with Israel

While the U.S. certainly benefits from the FVEY partnership, the value of information sharing, defense cooperation, and shared training extend far beyond the five countries included in the FVEY agreement. Ongoing air defense cooperation between the U.S. and Israel highlights a further precedent for collaborating with partners and allies. In the early stages of the Persian Gulf War, Iraq launched scud missiles toward Israel. The scud attacks injured seven Israelis and risked drawing Israel into the war, which would significantly complicate the situation.³² Fortunately, after assurances offered by President George H.W. Bush to Israeli Prime Minister Yitzak Shamir, Israeli forces exercised significant restraint and avoided joining the conflict.³³ At the same time, the Israelis asked for the deployment of American Patriot missile batteries to defend against further scud missile attacks.

The Israeli request for Patriot missile support was arguably the catalyst for a long-term Integrated Air and Missile Defense (IAMD) collaboration, which ultimately enhanced security for Israel while meeting U.S. interests as well. More than a decade later, soldiers and equipment from the Germany-based 69th Air Defense Artillery (ADA) Brigade deployed to Israel for a combined training exercise named Juniper Cobra.³⁴ While the exercise had been planned for a long time, the timing was fortuitous as coalition forces were building up in Kuwait and preparing to commence combat operations for Operation Iraqi Freedom. When Juniper Cobra ended in February of 2003, soldiers and missiles from 69th ADA remained in Israel and became Joint Task Force (JTF) Cobra. JTF Cobra provided an additional hedge against repeated Iraqi scud attacks on Israel until Iraqi scud capability was neutralized.³⁵

The training and deterrent benefits of Juniper Cobra and the follow-on support of JTF Cobra left a positive lasting impression on both the U.S. and Israel. The exercise now occurs biennially, with its most recent iteration ending in March of 2018. Of the exercise and the U.S.-Israeli partnership, General Curtis M. Scaparrotti, then Commander of U.S. European Command, said: “We value the relationships we have with our IDF counterparts, and we will continue to work alongside them to promote stability throughout the region.”³⁶

The Juniper Cobra exercise is another example of the mutual benefit occurring when U.S. forces share information, technology, and training with our partners and allies. Summarizing his thoughts on the exercise, U.S. Air Force Colonel Justin Hickman, Chief of Staff for the Juniper Cobra headquarters said “We

³¹ DIA Public Affairs, “This Week in DIA History: Formation of the FVEY Partnership.”

³² David Fairhall and Martin Walker, “Iraqi Missiles Strike Israel,” *The Guardian* (The Guardian, January 18, 1991), <https://www.theguardian.com/world/1991/jan/18/iraq.davidfairhall>.

³³ William Thomas Allison, *The Gulf War, 1990-91* (Basingstoke, Hampshire, UK: Palgrave Macmillan, 2012), 116–17.

³⁴ Jon R. Anderson, “Patriot Missile Crews Go to Israel,” *Stars and Stripes*, January 4, 2003, <https://www.stripes.com/news/patriot-missile-crews-go-to-israel-1.634>.

³⁵ Amanda Dodd Miller, Interview with Amanda Dodd Miller, Public Affairs Officer for 69th Air Defense Artillery Brigade and Joint Task Force Cobra, 2003, regarding High and Medium Air Defense Operations, interview by Jacob Miller, January 13, 2020.

³⁶ U.S. European Command News Release, “Joint U.S.-Israel Exercise Juniper Cobra 2018 Concludes,” U.S. Department of Defense, March 21, 2018, <https://www.defense.gov/Explore/News/Article/Article/1472543/joint-us-israel-exercise-juniper-cobra-2018-concludes/>.

benefit from bringing the soldiers here for realistic training, improved mobility and the lessons we learn . . . [t]hey have the Arrow, David's Sling, Iron Dome. We have Patriot, THAAD and Aegis. It's amazing technology, and we all gain from interoperability."³⁷ This interoperability tightens and reinforces U.S. relationships with its partners.

In an article about building partner capacity for future requirements in Europe, General Carter Ham, then Commanding General of U.S. Army Europe, discussed successful security cooperation activities with European partners. General Ham highlighted activities ranging from small scale partner training activities to large-scale multi-national exercises with as many as 10 partner nations. He also discussed the value of training partners at the Joint Multinational Training Command (JMTC) with opportunities ranging from simulation exercises to force-on-force exercises, and even opportunities for non-commissioned officer education with participants from 25 different countries.³⁸ General Ham's point rings clear: time and effort invested in our allies pay dividends in the form of strengthened interoperability, more lethal partners, and better deterrence against regional aggression.

Partner Cooperation

The Army's effort to partner with other nations in space operations presents a unique set of challenges. When multiple parties join in national security endeavors, conflicts of interest inevitably surface that create friction and challenge the very unity that the alliance was formed to represent. Yet, as Sir Winston Churchill once (reportedly) observed, "There is only one thing worse than fighting with allies, and that is fighting without them."³⁹ This conundrum affects not only the Army, but more importantly, the multifaceted security relations that the U.S. maintains with partners around the world.⁴⁰ Internal politics of sovereign states, disagreements about appropriate burden-sharing, and divergence of national interests not only make maintenance of effective partnerships and alliances a challenge, but have the potential to threaten the very existence of those vital relationships. That most administrations have held serious apprehension concerning equitable burden-sharing, therefore, is not surprising. Forming alliances must be approached with caution and a certain amount of skepticism. Yet since the end of WWII, U.S. leadership has consistently surmised that numerous strategic rewards and advantages make the effort to form alliances and security partnerships worth the risk.

Risk

The Army initiative explored here is an expansion of partner activities under existing political alliances. Thus it will not require significant policy adjustment, but as with all partnership activities, it will entail a certain amount of risk. To mitigate that risk and ensure the military space partnership can thrive, the Army must invest in partner training initiatives that simultaneously develop skills and build trust while

³⁷ Barbara Opall-Rome, "More than 2,500 U.S. Troops Wrapping up Juniper Cobra in Israel," *Army Times* (Army Times, March 14, 2018), <https://www.armytimes.com/news/your-army/2018/03/14/more-than-2500-us-troops-wrapping-up-juniper-cobra-in-israel/>.

³⁸ Carter F. Ham, "USAREUR: Building Partner Capacity for the Future," *ARMY* 59, no. 10, (October 2009): 118-120 <https://search-proquest-com.usawc.idm.oclc.org/docview/237078389?accountid=4444>.

³⁹ James C. Humes, *The Wit and Wisdom of Winston Churchill* (New York: Harper Perennial, 1994), 4.

⁴⁰ Kathleen J. McInnis, "The Competitive Advantages and Risks of Alliances." *The Heritage Foundation*, October 19, 2019, 79–91. <https://www.heritage.org/military-strength/topical-essays/the-competitive-advantages-and-risks-alliances>.

avoiding divergent expectations.⁴¹ Divergent expectations result from poor alignment at the start of an endeavor or changing interests over time. The proposed CSOC is predominantly aimed at maximizing existing capability to empower standing military alliances. The ultimate goal: enhanced effectiveness of national security forces across the land and space domains. By clarifying expectations up front and ensuring each partner understands the relationship and the interests from both sides, Army and CSOC leadership can help ensure that expectations are consistent with respective desires and that consensus is achieved on the level of classified information to be shared.⁴²

FS-X Project

The U.S.-Japanese effort to build the Japanese fighter aircraft FS-X is an example of how even close allies must work to align expectations or risk project failure. The project began in the late 1980s when Japan was leading the world in electronic technological advances. They had streamlined manufacturing and produced a wide array of products that changed the lives of most Americans: efficient and reliable automobiles, televisions, portable audio devices, and video game systems. The U.S. entered the FS-X project to gain access to high-end technology that would enable improved weaponry as well as empower the U.S. economy to compete in the electronics market with East Asia on the world stage. Japan on the other hand was not interested in extensive technological reciprocity; it wanted to develop its own aircraft enabled by aeronautic input from the American defense industry. The Japanese saw this partnership as an opportunity to capitalize on their technological edge, increase their national security, and expand the prowess of their engineers in the process. The U.S., however, preferred that Japan use an existing U.S. fighter platform. Expectations between the two countries were not aligned. After many years of frustrating debate, the allies finally reached an agreement to base the aircraft on the U.S. F-16 fighter platform. The FX-2 entered production in 2000. Both parties agreed that the FS-X was a successful collaboration that should happen again.⁴³ But the process was made complex by divergent expectations. Had the allies effectively aligned the agreement at the outset to further each of the participant's larger interests and clarified expectations regarding ways the partnership would benefit all participants, the project and partnership would have enjoyed greater success on a more efficient timeline.

Rewards

As with the FS-X example, the rewards for expanding partnered activities in the space domain are significant. The anticipated increase in lethality, resilience, knowledge, interoperability, and force readiness would fully support goals outlined in the 2018 NDS which states that: "A more lethal, resilient, and rapidly innovating Joint Force, combined with a robust constellation of allies and partners, will sustain American influence and ensure favorable balances of power that safeguard free and open international order."⁴⁴

Integrating the effects provided through the space domain increases the lethality of land forces. The proposed CSOC will directly facilitate the integration of effects such as improved situational awareness, precision navigation, enhanced targeting and delivery of munitions, satellite-enabled communications beyond the line-of-sight, enhanced meteorological support, and countering adversary space-based capabilities, thus

⁴¹ Robert H. Scales Jr. "Trust, not technology, sustains coalitions." *Parameters* 28, no. 4. 98, 1999: 4-10, <https://search-proquest-com.usawc.idm.oclc.org/docview/198054197>.

⁴² Mark A. Lorell, *Troubled Partnership: a History of U.S.-Japan Collaboration on the FS-X Fighter*. (New Brunswick, NJ: Transaction, 1996), 4-6.

⁴³ Mark A. Lorell, *Troubled Partnership: a History of U.S.-Japan Collaboration on the FS-X Fighter*.

⁴⁴ James Mattis, *Summary of the 2018 National Defense Strategy of the United States of America*, 1.

contributing to greater lethality and success in the space domain. Ensuring our allies and partners can integrate these capabilities effectively builds a more lethal and resilient force that increases overall deterrence.

In addition to increasing lethality, the CSOC would likely provide the U.S. with additional opportunities to achieve greater access through their space-partnered nations. Linkages with allies in U.S. headquarters would open opportunities for the U.S. military in other nations, broadening the U.S. military's understanding of how our partners intend to fight while further strengthening the bonds between them. Additionally, by positioning space trained forces with partner nations, we will gain a better understanding of the strategic and operational picture from the perspectives of partner nations. Working with partner nations encourages cooperation in developing/sharing common interface standards, which facilitates improved interoperability. By working together on common problems, the partners learn shared processes and create synergies that help when dealing with emergencies. Further, security partnerships potentially yield valuable intelligence and situational awareness, which would otherwise prove difficult or impossible for the Army to attain. The combined benefits create conditions that enable a "warm start" in the event of a crisis.⁴⁵ Perhaps the most crucial benefit is the deterrent effect that simply results from improving security partnerships. In strengthening partnerships, the Army sends potential adversaries a clear message of deterrence by denial that revisionist agendas will not go unopposed. Additionally, allies and partners trained in the space domain may be able to more readily contribute to denying adversary space capabilities.

Existing Partnerships

Currently, the U.S. works with multiple countries in space; activities range from simple information-sharing agreements to conducting combined operations and employing exchange officers. American forces even rely on foreign space assets to augment weather, oceanographic, and environmental data.⁴⁶ Space alliance and partnership efforts, which are directly in line with the national strategy, enhance safety in space and deterrence.

One of the most widely-supported programs that the U.S. leads is in the realm of Space Situational Awareness (SSA) and the associated sharing agreements the U.S. has with other countries. Through agreements negotiated by USSPACECOM⁴⁷ with interested countries, companies, and organizations, the Combined Force Space Component Command and the 18th Space Control Squadron share information on the location and orbits of objects in space through their website.⁴⁸ This fosters a safer operating environment and increases collaboration among participating countries. As of March 2020, 112 agreements were in place with 26 of those from countries dedicated to sharing information.⁴⁹

The next higher level of cooperation is the Combined Space Operations (CSpO) initiative. This effort is focused on military space collaboration, data sharing, and discussions regarding operational concepts. It provides a direct link for current combined operations.⁵⁰ The initiative includes the U.S., U.K., Canada,

⁴⁵ The term "warm start" indicates an existing cooperative relationship that enables nations to more quickly respond as a combined force during times of crisis.

⁴⁶ U. S. Joint Chiefs of Staff, *Space Operations*, Joint Publication 3-14 (Washington, DC: U. S. Joint Chiefs of Staff, April 10, 2018), A-7, https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/jp3_14.pdf.

⁴⁷ Prior to the standup of USSPACECOM, USSTRATCOM held the responsibility for SSA sharing agreements.

⁴⁸ Objects include satellites, rocket bodies, and debris. Information gained from SAIC admin@space-track.org, "Space-Track.Org," [Space-track.org](https://www.space-track.org) (Space-Track, 2014), <https://www.space-track.org/documentation#odr>.

⁴⁹ Scott VanSant, E-mail response from Scott VanSant, Chief, Data Sharing Branch, USSPACECOM J53, in response to review, interview by Bryan Shrank, March 3, 2020.

⁵⁰ Michael Syintsakos, E-mail response from Michael Syintsakos, Chief, Multinational Space Collaboration Division, USSPACECOM J54, in response to review, interview by Bryan Shrank, March 10, 2020.

Australia, New Zealand, Germany, and France.⁵¹ During a meeting in April 2019, senior leaders from the representative countries released a formal multi-national statement affirming their commitment to work together to support common national interests in the space domain.⁵²

The Combined Space Operations Center (CSpOC) at Vandenberg Air Force Base, California, hosts space exchange officers from the United Kingdom, Canada, and Australia. Participating officers work directly on the operations floor, conducting daily space operations to integrate effects for warfighters.⁵³ The CSpOC coordinates with the space operations center from the United Kingdom, Canada, and Australia on a daily basis to support operations. The center also routinely hosts officers from the other centers to provide training and to participate in exercises.⁵⁴ Further highlighting the growth towards space collaboration, in December 2019, the Deputy Commander of the CSpOC, a Group Captain from the U.K. Royal Air Force, signed the Combined Space Tasking Order under the auspices of Operation Olympic Defender (a multi-national collaboration for space).⁵⁵

Space collaboration efforts include the support of liaison officers assigned to the Multinational Space Collaboration Division of the USSPACECOM J5 at Vandenberg Air Force Base.⁵⁶ Currently, the base hosts officers from the U.K., Germany, and France. These officers represent their respective countries; they provide excellent support and unique insight into space operations.⁵⁷ Their presence fosters greater understanding and their insights have shaped the CSOC proposal for space training introduced here.

The U.S. Army has its own strategic partnerships for space. Australian military members are assigned to the 53rd Signal Battalion, U.S. Army Satellite Operations Brigade, and serve as technicians. The battalion is responsible for operating the payload on Wideband Global System satellites and provides bandwidth to troops from multiple partner countries. The Australians have become integrated members of the unit and significantly enhance agency capabilities.⁵⁸

Exercises are critical components of training because they offer an excellent platform for collaborating with allies and partners and identifying critical gaps in interoperability. Increased cooperation in exercises, including Global Sentinel, Space Flag, and Schriever Wargame, has strengthened alliance ties and

⁵¹ John Sheldon, "Space Wars: United States and Allies Discuss Combined Space Operations Initiative," www.SpaceWatch.Global (SpaceWatch.Global, April 15, 2019), <https://spacewatch.global/2019/04/space-wars-united-states-and-allies-discuss-combined-space-operations-initiative/>.

⁵² John Sheldon, "Space Wars: United States and Allies Discuss Combined Space Operations Initiative," www.SpaceWatch.Global (SpaceWatch.Global, April 15, 2019).

⁵³ Cody Chiles, "Canadian Space Operators Certified, Awarded Space Wings in CSpOC," North American Aerospace Defense Command, January 25, 2019, <https://www.norad.mil/Newsroom/Article/1741725/canadian-space-operators-certified-awarded-space-wings-in-cspoc/>.

⁵⁴ Scott Brodeur, E-mail Interview with Col Scott Brodeur, USSF, Director of the Combined Space Operations Center, regarding allied space collaboration and proposed training, interview by Bryan Shrank, January 2, 2020; Government of Canada, "United in Defence: September 2019 - Connect2Canada," *Connect2Canada*, September 12, 2019, <https://connect2canada.com/2019/09/united-in-defence-september-2019/>.

⁵⁵ USSPACECOM Public Affairs, "USSPACECOM Expands Key Allied Space Partnerships through Multi-Nation Operations," United States Space Command, December 27, 2019, <https://www.spacecom.mil/MEDIA/NEWS-ARTICLES/Article/2047780/usspacecom-expands-key-allied-space-partnerships-through-multi-nation-operations/>.

⁵⁶ Michael Syintsakos, Telephone interview with Michael Syintsakos, Chief, Multinational Space Collaboration Division, USSPACECOM J54, regarding allied space training, interview by Bryan Shrank, January 7, 2020.

⁵⁷ Clayton Wear, "Liaison Officers at Vandenberg," Vandenberg Air Force Base, November 8, 2018, <https://www.vandenberg.af.mil/News/Article-Display/Article/1686021/liaison-officers-at-vandenberg/>.

⁵⁸ Jason Cutshaw, "53rd Signal Battalion Leads the Army's Space Operations," www.army.mil, 2017, https://www.army.mil/article/197230/53rd_signal_battalion_leads_the_armys_space_operations.

normalized these essential relationships.⁵⁹ Growth in exercise participation in recent years indicates allied interest exists for further collaboration in the space domain. The current enthusiasm and demonstrated dedication shown by our allies indicates that there is no better time than the present to pursue more enhanced opportunities for working together in space.

Course Proposal

Conducting an Army-led space training course for our allies will move existing partnerships forward. We recommend that the U.S. Army develop and implement a “Combined Space Officer Course” (CSOC). This recommendation is based on communication and interviews with the Chief of the Army Space Operations Training Division, the Director of the National Security Space Institute (NSSI), the Director for Space Policy Engagement from the Office of the Under Secretary of Defense for Policy (OUSDP), the Director of the Combined Space Operations Center (CSpOC), and the International Liaison Officers assigned to United States Space Command. Their suggestions, recommendations, and advice were invaluable in enabling us to develop a proposed training program that takes advantage of existing efforts and maximizes benefit.⁶⁰

Program Description

The end-state for any graduate of the proposed CSOC is an officer versed in space operations and capable of providing real, tangible value. This officer will possess the depth of knowledge necessary to convey the effects of space assets in a relatable way to senior leaders who may not be familiar with space capabilities.⁶¹ The officer will know how to plan for space assets, be able to integrate them into land operations and understand the procedures for coordinating and collaborating across the combined space architecture.

Developing a course that makes use of programs already in existence produces significant dividends at a relatively low cost. Many of the recommended blocks of instruction already exist in some form. They are taught in either the Space Operations Officer Qualification Course (SOOQC) or the Tactical Space Operations Course-Initial Qualification Training (TSOC-IQT) run by the Army Space and Missile Defense School.⁶² Initial upfront cost to establish the course will exist, but the CSOC will be relatively cost-effective to maintain once underway.

Initially, the development of this program should focus on our closest allies in space, those who are members of the Combined Space Operations initiative (U.K., Canada, Australia, New Zealand, Germany, and France) and Japan. To conquer potentially significant classification issues, the course would initially be built at

⁵⁹ Lauren Hill, “Space Flag Holds First Exercise with Coalition Partners,” Vandenberg Air Force Base, August 25, 2019, <https://www.vandenberg.af.mil/News/Article-Display/Article/1943013/space-flag-holds-first-exercise-with-coalition-partners/>; Government of Canada, “United in Defence: September 2019 - Connect2Canada,” Connect2Canada, September 12, 2019, <https://connect2canada.com/2019/09/united-in-defence-september-2019/>.

⁶⁰ While no single program could fulfill the aspirations of all who contributed, we made a sincere effort to incorporate as many ideas as possible into this program.

⁶¹ Robert Atchison, E-mail response from Maj Robert Atchison, British Army, in response to questions asked of Sqn Ldr Neal Henley, RAF, interview by Bryan Shrank, December 11, 2019.

⁶² U. S. Army Space and Missile Defense Command, “Space and Missile Defense Center of Excellence,” Army.mil, 2019, <https://www.smdc.army.mil/ORGANIZATION/FWC/> and Jason Cutshaw, “To Infinity and beyond: Space and Missile Defense Command Leads Army into Space,” www.army.mil, 2017, <https://www.army.mil/article/197236/to-infinity-and-beyond-space-and-missile-defense-command-leads-army-into-space>.

an FVEY level; separate bi-lateral courses would be created for Germany, France, and Japan.⁶³ This arrangement offers the opportunity to maximize training and share information to the greatest extent possible. This model also affords a reasonable way to offer the course to other nations as we gain more comprehensive working relationships. Future participant countries might include Spain, Italy, Brazil, Chile, and the Republic of Korea.⁶⁴

Prerequisites

The course will focus on training, not on basic education. Primary space education that covers the basics of the space environment should be a prerequisite. The Army makes use of the excellent programs offered by the NSSI and requires all space operations officers to attend Space 200, a mid-level space education course that focuses on space system development and the application of space power. This serves as the initial four weeks of SOOQC. Currently, the class is open to students from all of the FVEY countries. A new version of the course expected to be available later this year will be open to France, Germany, and Japan as well.⁶⁵ Ideally, prospective trainees would attend Space 200 or demonstrate mastery of relevant course concepts prior to attending the Combined Space Officer Course.

Some of the experts we solicited for input felt Space 200 might not be necessary for this program.⁶⁶ Another alternative to basic space training is a course offered by the Army. The Army Space Cadre Basic Course is a two-week course that focuses on the basics of space operations and how the Army uses space. The course provides the foundational education required for Army space enablers—individuals who work with space assets but are not considered space cadre.⁶⁷ The Army currently has a version of this course available to officers and enlisted personnel from the FVEY partner nations.⁶⁸

Combined Space Officer Course (FVEY version)

The FVEY version of this program is envisioned as a four-week course available to eligible officers from the United States, United Kingdom, Canada, Australia, and New Zealand. The course will have five distinct blocks of instruction: space effects, adversary threat and threat mitigation, software, SpOC integration and space support requests, and planning and integration. The course will conclude with a final four-day exercise focused on integrating space in a land-based, multi-domain scenario to reinforce training. Ideally, this training will be taught at the Top Secret-Sensitive Compartmented Information//Releasable to the FVEY

⁶³ Max Lantz, E-mail interview with Col Max Lantz, USSF regarding allied space training, interview by Bryan Shrank, January 3, 2020.

⁶⁴ Heidi Robinson, Interview with Heidi Robinson, OUSD Policy, regarding allied space training, interview by Bryan Shrank, December 11, 2019.

⁶⁵ National Security Space Institute, “NSSI Public Center,” Af.mil, 2019, <https://www2.peterson.af.mil/nssi/>. This website offers information on all courses provided by the NSSI.

⁶⁶ A less intense option that might suffice as a lower-level pre-requisite is Space 100. The NSSI offers an 8-day course that teaches the basics of space systems and how they interact with joint operations. This was recommended by Max Lantz, E-mail interview with Col Max Lantz, USSF regarding allied space training, interview by Bryan Shrank, January 3, 2020. Information on the course was obtained from National Security Space Institute, “NSSI Public Center,” Af.mil, 2019.

⁶⁷ Christopher Case, “Space Cadre Increase First Team Lethality,” *Fort Hood Sentinel*, January 11, 2018, http://www.forthoodsentinel.com/news/space-cadre-increase-first-team-lethality/article_ddfcef02-f644-11e7-90ca-d7f87346a379.html.

⁶⁸ Robert Hoffman, E-mail interview with Robert Hoffman, Chief Space Operations Training Division, regarding allied space training, interview by Bryan Shrank, December 12, 2019.

level. For those eligible, topics covering Integrated Joint Special Technical Operations (IJSTO) will also be discussed.⁶⁹

Block 1: Space Effects (three days)

The focus of Space Effects is to present the array of space capabilities available. This information is foundational and presents space officers with the tools to properly plan for and execute space operations. Assets from the United States and its allies will be discussed along with planning considerations for each capability. Capabilities discussed will include communications satellites, Intelligence, Surveillance, and Reconnaissance (ISR) satellites, Positioning, Navigation, and Timing (PNT), launch assets, Overhead Persistent Infra-Red (OPIR) including missile warning, space situational awareness, space control, and commercial capabilities.⁷⁰ Opportunities for allied students to present their individual nation's assets will be available.

Block 2: Adversary Threat and Threat Mitigation (four days)

During this section, students will learn the threats to allied and partner assets in the space domain. Threats presented by China and Russia will be discussed as well as others.⁷¹ While learning the threat capabilities, students will discuss various tactics, techniques, procedures, and planning considerations available to mitigate threats.⁷²

Block 3: Software (three days)

Releasable space software will be presented to the students, along with basic instruction on when and how to use it. Training will include hands-on instruction and practice time to work through scenarios to develop a fundamental understanding of the software. Lessons will be reinforced in later blocks and during the final practical exercise.

Block 4: SpOC Integration and Space Support Requests (one day)

Students will learn the role of the Combined Space Operations Center, how it coordinates with the allied Space Operations Centers and allied national processes for requesting space support. Students will learn how to request space support and how that request is communicated. A practical exercise in completing a

⁶⁹ Input into potential course content came from interviews with many space experts and liaison officers. Neal Henley, E-mail interview with Sqn Ldr Neal Henley, RAF, regarding allied space training, interview by Bryan Shrank, December 10, 2019; Robert Hoffman, E-mail interview with Robert Hoffman, Chief Space Operations Training Division, regarding allied space training, interview by Bryan Shrank, December 12, 2019; Olivier Fleury, E-mail interview with Col Olivier Fleury, French Air Force, on allied space training, interview by Bryan Shrank, January 7, 2020; Neal Henley, E-mail interview with Sqn Ldr Neal Henley, RAF, regarding allied space training, interview by Bryan Shrank, December 10, 2019.

⁷⁰ Neal Henley, Telephone discussion with Sqn Ldr Neal Henley, RAF, regarding allied space training, interview by Bryan Shrank, January 6, 2020; Terrence McDonald, Discussion with Lt Col Terrence McDonald, New Zealand Army, on allied space training, interview by Bryan Shrank, January 7, 2020.

⁷¹ Defense Intelligence Agency, "Challenges to Security in Space," February 1, 2019, 7, https://www.dia.mil/Portals/27/Documents/News/Military%20Power%20Publications/Space_Threat_V14_020119_sm.pdf.

⁷² Olivier Fleury, E-mail interview with Col Olivier Fleury, French Air Force, on allied space training, interview by Bryan Shrank, January 7, 2020; Neal Henley, E-mail interview with Sqn Ldr Neal Henley, RAF, regarding allied space training, interview by Bryan Shrank, December 10, 2019.

standard Space Support Request (SSR) will reinforce training and prepare the allied officer to be able to request space support upon return to the home country.⁷³

Block 5: Planning and Integration (three days)

This block of instruction builds on the previous blocks. Instructors will present a regional threat situation with a given order of battle and threat order of battle. Instructors will discuss how to plan for and integrate available assets to meet the commander's intent using the software and knowledge gained in the previous blocks of instruction.

Practical Exercise (four days)

The capstone to the Combined Space Officer Course is a practical exercise. Students will be presented with a multi-domain, land-based scenario requiring a combined approach and given a friendly and threat order of battle.⁷⁴ Students will incorporate lessons learned throughout the course, using the space software to develop a plan to integrate space assets and mitigate the space threat. Students will present their plan to a group of instructors acting as the Commander and staff. Students will then execute their plan in simulation and react to a set of prepared injects.

Combined Space Officer Course (Germany/France/Japan version)

This course is identical in overall design to the FVEY version but taught as a bi-lateral course.⁷⁵ Separate courses would be developed for Germany, France, and Japan. This model enables the maximum amount of shareable information possible at the bi-lateral level and should be taught at the Secret level initially.

Next Steps

Official interest from the participating and fully involved countries should be assessed prior to course development. Preliminary indicators are that further training and cooperation are being sought by our potential partners. Our allies and partners recognize the significance of space and space training. The U.K. and Canada are long-standing allies with the U.S. in space efforts. A New Zealand Defence Force spokesperson recently stated, "We will likely seek further space training opportunities from our Five Eyes partners, other select nations, commercial space companies, and academic institutions."⁷⁶ In an argument for growth in space training on an Australian Army blog, a retired infantry officer posted that: "Noting all services employ and benefit from space-based capabilities, specialist space career pathways and trade structures will be essential within the three services."⁷⁷ France vigorously reacted to the evolving threat

⁷³ Olivier Fleury, E-mail interview with Col Olivier Fleury, French Air Force, on allied space training, interview by Bryan Shrank, January 7, 2020; Neal Henley, E-mail interview with Sqn Ldr Neal Henley, RAF, regarding allied space training, interview by Bryan Shrank, December 10, 2019.

⁷⁴ Neal Henley, E-mail interview with Sqn Ldr Neal Henley, RAF, regarding allied space training, interview by Bryan Shrank, December 10, 2019.

⁷⁵ The recommendation to teach this at the bi-lateral level to overcome classification issues came from Max Lantz, E-mail interview with Col Max Lantz, USSF regarding allied space training, interview by Bryan Shrank, January 3, 2020.

⁷⁶ John Weekes, "Space Warfare: Defence Force Wants 'Cadre of Trained Personnel,'" Stuff, January 15, 2020, <https://www.stuff.co.nz/national/politics/118651263/space-warfare-defence-force-wants-cadre-of-trained-personnel?cid=facebook.post>.

⁷⁷ Greg Rowlands, "Aussie Space Command: Making the Case for Space Part II | Australian Army," Army.gov.au, August 27, 2019, <https://www.army.gov.au/our-future/blog/cyber-space/aussie-space-command-making-the-case-for-space-part-ii>.

situation in the space domain, announcing the creation of a space command to replace its Joint Space Command and placing it inside a renamed Air and Space Force.⁷⁸

Our allies know that space is important, but may not be fully aware of what a trained space officer could bring to land warfare. The interest is present; the difficulty is in turning that interest into actual demand—something only created when a real benefit is perceived. One viable option is to attach an Army Space Support Team (ARSST) to an allied nation's land forces for a major exercise to demonstrate what space officers can add to the fight.⁷⁹ This will build relationships, foster understanding, and create a demand signal for training programs to develop their own space officers.⁸⁰

Implementation Assessment

When the Army requests additional training, it usually does so in response to an existing capability gap. In this instance, however, the CSOC seeks to address a perceived capability gap for integrating allies and partners into Army operations. Minimizing this gap improves the performance and capability of the Joint/Combined Force. In a fiscally constrained environment, the Army must develop innovative ways to use resources and achieve synergy where possible.⁸¹ To ensure the sustainability of the program, we intend to use, when possible, existing resources to close the gap. Nonetheless there are additional resources required to establish the CSOC; these include the personnel necessary to develop and maintain the course materials, and the hardware necessary for instruction.⁸²

The DoD uses a standardized process (DOTMLPF-P) for evaluating requirements. The acronym stands for doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy. This process exists to determine and recommend the type of approach necessary to fill a capability gap.⁸³ The holistic approach is intended to ensure requirements are fully understood while minimizing redundancy. At the DoD, macro-level solutions for shortcomings are addressed in two forms: materiel or non-materiel. The CSOC proposal addresses the capability gap without the need for additional materiel acquisition.

We propose a three-year implementation pilot program as a start for planning and comparison. Assessed value-added and international partner interests will inform the program's way ahead beyond the pilot. Nonetheless, the first year should consist of no more than two FVEY level CSOCs conducted at the U.S. Army Space and Missile Defense Command's (USASMD) Space and Missile Defense School. Year two assumes no more than two FVEY classes. Year three continues with two FVEY level courses and implementation of the first bi-lateral class. We recommend starting with Germany or France as they are already active members of the CSpO initiative. We assess this course will require between three and five instructors. All of the courses should have a class size ranging from 6-15 students. To ensure minimum

⁷⁸ Office for Science & Technology of the Embassy of France in the United States, "Defence - Space Command to Be Created - Office for Science & Technology of the Embassy of France in the United States," France-science.org, July 30, 2019, <https://www.france-science.org/Defence-Space-command-to-be.html>.

⁷⁹ The ARSST is slated to be reorganized into Space Control Planning Teams; Robert Hoffmann, Phone interview with Robert Hoffman, Chief Space Operations Training Division, regarding combined space officer course, interviewed by Bryan Shrank, March 10, 2020.

⁸⁰ Neal Henley, E-mail interview with Sqn Ldr Neal Henley, RAF, regarding allied space training, interview by Bryan Shrank, December 10, 2019.

⁸¹ James N. Mattis. *Be Peerless Stewards of Taxpayers' Dollars*. (Washington, D.C., 28 March 2018.) Memorandum for all members of the Department of Defense.

⁸² Robert Hoffman, E-mail interview with Robert Hoffman, Chief Space Operations Training Division, regarding combined space officer course, interviewed by Scott Emmel, January 27, 2019.

⁸³ Gregg Thompson and Lou Yuengert, "Aligning Vision to Capability: Fundamentals of Requirements Determination" (faculty paper, Department of Command Leadership and Management, U.S. Army War College, Carlisle Barracks, PA, January 2015), 2.

instructor requirements, none of the CSOCs should be conducted simultaneously. These assumptions form the basis for our DOTMLPF-P assessment.

Doctrine

The existing doctrine is sufficient. CSOC familiarizes our partners with the doctrine used in the Joint Force (Joint Publication 3-14), the Army (Field Manual 3-14), and the Air Force/Space Force (Air Force Doctrine Document 3-14). Further doctrinal development is not required as the program is designed to rely on existing doctrine. As the program gathers lessons learned, however, doctrinal refinements may be necessary. Warranted adjustments would be handled through the Joint and appropriate service doctrine processes.

Organization

We assess there is no need to adjust the Army's organization to meet the requirements for the CSOC. Space and Missile Defense maintains resident capabilities to train allies in space operations. In 2018 the school trained over 8,500 Army Soldiers, space cadre, and missile defense operators through 200 formal course offerings.⁸⁴ As previously mentioned, the school already teaches most of the proposed material.

Training

The training requirements to implement CSOC are modest. There is resident expertise in the Space and Missile Defense School to construct and lead the requisite training for CSOC. Introducing allies to training incurs limitations on information sharing. Each partner outside of the FVEYs presents unique challenges for sharing classified information. As a result, we assess that the team will require ready access to a Foreign Disclosure Officer (FDO) to manage information requirements appropriately.⁸⁵ The FDO capability will empower CSOC developers with the additional tools needed to provide the best training while ensuring appropriate information security.

Materiel

We anticipate no new materiel production requirements to conduct the CSOC. There are, however, requirements for computers and associated support systems for new personnel hires and students. These systems require lifecycle maintenance as well as software licenses and credentialing. The going rate at USASMDC is ~ \$1000 per computer per year.⁸⁶ We assume that FVEY and bi-lateral classes may require different systems and therefore an increase in the number of computers needed per bi-lateral agreement. Conducting courses via Mobile Training Team (MTT) will incur additional impacts and costs as the host unit will require the applicable computers and associated software. The estimated yearly cost (based on 15

⁸⁴ U.S. Army Space and Missile Defense School and Doctrine Center, 2018 *Global Defender: A guide to SMDC / ARSTRAT*, (Washington, DC: Department of the Army, 2018), 31.

⁸⁵ According to Army Communications-Electronics Command, a “foreign disclosure officer” is responsible for categorizing and releasing information to representatives of foreign governments. The fundamental criteria for foreign disclosure include: “national interest, purpose, government to government, protection, access, third party, and compromise.” See U.S. Army Communications-Electronics Command, “Security awareness - Understanding foreign disclosure.” October 15, 2009. https://www.army.mil/article/28810/security_awareness_understanding_foreign_disclosure

⁸⁶ Robert Hoffman, E-mail interview with Robert Hoffman, Chief Space Operations Training Division, regarding combined space officer course, interviewed by Scott Emmel, January 27, 2019.

students, 3-5 instructors, and four sets of equipment) is \$72,000 to \$84,000. Materiel costs over the three years of the pilot range from \$216,000 to \$252,000.

Leadership and Education

No formal leadership or education requirements are incurred in implementing the CSOC pilot. If this program is approved, we recommend that senior leaders in USASMDC share awareness of the CSOC opportunity with allies and partners as part of their routine engagements to garner further support for the pilot program. Additionally, we recommend that once the pilot has shown progress, senior leaders should message our civilian executive leaders to ensure our government is mindful of the integration that Army space is pursuing in support of national security objectives.

Personnel

Based on the course topics proposed, we should anticipate requiring one government employee (Department of the Army Civilian) to serve as a course manager and three full-time contractors to develop and maintain the courses. At current rates, these hires would cost approximately \$690,000-\$875,000 per year. Total personnel costs for the three-year pilot program are \$2.1 million to \$2.8 million.⁸⁷ Personnel costs will be front-loaded during the first three years since that is the period in which the course manager will head the development of all of the proposed courses: one FVEY course and three separate bi-lateral courses (Germany, Japan, France). Upon completion of course development, annual costs should decrease by nearly 40% as instruction material moves into maintenance. Space and Missile Defense School already has a sub-task for Coalition Space Training built into their Project Work Statement (PWS) to hire Contract Man-year Equivalents (CMEs) against this work effort.⁸⁸

Facilities

We assume an initial facility requirement to house no more than three classes per year and that the course can be conducted within existing facilities. A constraining factor is the classification of course material. The material taught at the Sensitive Compartmented Information level requires a Sensitive Compartmented Information Facility (SCIF) to meet requirements.⁸⁹ USASMDC has SCIF facilities that can be used to conduct CSOC, but increasing course load beyond three classes would significantly affect other courses taught at that location. Construction of additional SCIF building is cost-prohibitive and unreasonable if considered solely for the purpose of this course. It is possible that an MTT could travel overseas to administer this course (e.g., in France or Germany), but any overseas facility would have to meet security requirements.

Policy

The CSOC can be conducted successfully under existing policy constructs regarding Foreign Military Sales. FVEY information sharing agreements support relatively easy course development. Information

⁸⁷ Robert Hoffman, E-mail interview with Robert Hoffman, Chief Space Operations Training Division, regarding combined space officer course, interviewed by Scott Emmel, January 27, 2019.

⁸⁸ Robert Hoffmann, Phone interview with Robert Hoffman, Chief Space Operations Training Division, regarding combined space officer course, interviewed by Bryan Shrank, March 10, 2020.

⁸⁹ United States Army, *AR 380-28: Army Sensitive Compartmented Information Security Program* (Washington, DC: United States Army, 13 August 2018), 6-8.

sharing agreements with France, Germany, and Japan should be reviewed and adjusted accordingly to maximize information sharing. The ability to conduct broader level sharing will prove more valuable to all involved, so a revamp of bi-lateral policy agreements will be helpful for CSOC and the space community writ large.

DOTMLPF-P Summary

Based on our holistic assessment, the CSOC pilot is undoubtedly worth the effort and modest cost. While the ~\$2.8 million initial startup up investment is significant, maintenance costs after the pilot could decrease to less than \$525,000 annually. The benefits stemming from this initiative are clear as the CSOC will increase the lethality and effectiveness of our partnered forces. Stronger, more capable, and more lethal allies reduce the threat risk to the U.S. Army and the Joint Force. The partner relationships established in pursuit of common security will show benefits in many other facets of our association, including intelligence sharing, increased partner access, and interoperability advancements. It will also better posture the force in the event of a call to arms.

Conclusion

The evidence supports the argument for moving forward. The establishment of United States Space Command and the follow-on establishment of the United States Space Force in 2019 demonstrate the country's commitment to expanding operations in the space domain. Space supremacy through modernization and development is further outlined in the National Security Strategy and National Defense Strategy. Historical examples in World War II with the Tizard Mission and ULTRA project, and regional access granted by alliances during the start of the 2003 Iraq War show the historical value of promulgating extensive partnerships consistent with national interests. Though the expansion of any partnership brings with it certain risks, the potential rewards seem well worth the investment. The U.S. has already established numerous relationships involving the space domain, and the Army space training program recommended here aims to further those endeavors within existing policy while requiring limited additional resources to develop the program. Evidence indicates that our partners desire the proposed training. Improving our partners' ability to implement space capabilities into the land domain is a necessity in the near and mid-term. The proposed CSOC will increase lethality, garner land force flexibility, and improve interoperability – while also preparing U.S. and partner nations for crisis or war. Space training is a vital component of present and future warfare, and we contend that this program will strengthen U.S. Army, Joint, and Allied capability. President John F. Kennedy stated that “Lofty words cannot construct an alliance—only concrete deeds can.”⁹⁰ Pursuing space training for our allies will be a deed that demonstrates our commitment to our partners as well as to our national security.

⁹⁰ John F. Kennedy, Address in the assembly hall at the Paulskirche, Frankfurt, Germany, 25 June 1963, p 30, <https://www.jfklibrary.org/asset-viewer/archives/JFKPOF/045/JFKPOF-045-023>.

The United States Army War College

The United States Army War College educates and develops leaders for service at the strategic level while advancing knowledge in the global application of Landpower.

The purpose of the United States Army War College is to produce graduates who are skilled critical thinkers and complex problem solvers. Concurrently, it is our duty to the U.S. Army to also act as a “think factory” for commanders and civilian leaders at the strategic level worldwide and routinely engage in discourse and debate concerning the role of ground forces in achieving national security objectives.

| | |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>The Strategic Studies Institute publishes national security and strategic research and analysis to influence policy debate and bridge the gap between military and academia.</p> |
|  | <p>The Center for Strategic Leadership contributes to the education of world class senior leaders, develops expert knowledge, and provides solutions to strategic Army issues affecting the national security community.</p> |
|  | <p>The Peacekeeping and Stability Operations Institute provides subject matter expertise, technical review, and writing expertise to agencies that develop stability operations concepts and doctrines.</p> |
|  | <p>The School of Strategic Landpower develops strategic leaders by providing a strong foundation of wisdom grounded in mastery of the profession of arms, and by serving as a crucible for educating future leaders in the analysis, evaluation, and refinement of professional expertise in war, strategy, operations, national security, resource management, and responsible command.</p> |
|  | <p>The U.S. Army Heritage and Education Center acquires, conserves, and exhibits historical materials for use to support the U.S. Army, educate an international audience, and honor Soldiers—past and present.</p> |

