Army People Synchronization Conference

MAD SCIENTIST COMPENDIUM

APSC's Winning Submission

LTC Leidenberg's "Virtual Intervention: People First 2035"

Changing Operational Environment

Mad Scientist's "How China Fights" and "How Russia Fights" Posts and Podcasts

APSC's Semi-Finalist Submissions

Ed dos Santo Jr's "Veritas, Agilis, Versabilis"

LTC Steve Speece's "Modernize U.S. Auxiliary Forces For New Era of Great Power Conflict".. and more!

SEE ALSO:

Maximizing the Army Team's Potential

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Executive Summary

In support of the ***Army People Synchronization Conference,*** Army Mad Scientist launched a **writing contest**. Crowdsourcing remains one of our most effective tools for gleaning ideas and concepts helping us diversify thought and challenge assumptions. This compendium includes the contest's winning entry, semi-finalist submissions of merit, and a number of ***Mad Scientist Laboratory*** blog posts exploring key relevant themes.

The Changing Operational Environment

Our two most significant adversaries -- China and Russia -- are conducting modernization efforts challenging the Army's traditional areas of dominance. Our ***How China Fights*** and ***How Russia Fights*** posts and podcasts explore how these adversaries have eroded our battlefield dominance. Their modernization efforts include new equipment acquisition and improving leader development. On the future battlefield, however, equipment advantages may be fleeting. The U.S. Army should modernize its efforts to recruit, develop, and retain our single enduring national advantage – our Soldiers' and Leaders' diversity and their ability to innovate.

In the coming decade, **five generations of Soldiers and Civilians** will serve together. **LTC James Leidenberg**'s winning submission -- ***Virtual Intervention: People First in 2035*** -- recognizes the Kindergarten Class of 2020 will be the Soldiers of 2035. Shaped by the Global Pandemic, this "Virtual Generation" will manifest extreme distrust of government institutions, media, and each other. Our Army culture can serve as a common and unifying standard, integrating this new generation of Soldiers and Civilians into a cohesive competitive and winning force.

The Soldier of 2030 will learn differently. To effectively engage these ***New Humans*** (or "homosapiens.net," per President Michael Crow, Arizona State University) and prepare them to successfully fight on future battlefields, the Army should discard old paradigms of learning and identify the requisite ***Future Jobs and Skillsets*** that our Soldiers and Leaders will need.

The physical and virtual/digital environments are quickly converging, creating new spaces for competition and conflict, and requiring new skills to compete and win. **Ed dos Santos, Jr.**'s submission ***Veritas, Agilis, Versabilis*** addresses how the revolution in the information landscape brings with it three requirements: the ability to detect truth to build correct reality models (*veritas*), be agile to changes around you (*agilis*), and be versatile to change oneself to new needs and requirements (*versabilis*). The Army must prepare our Soldiers to do all three to competently navigate and succeed in an ever-changing world.

Maximizing the Army Team's Potential

Additional themes associated with prioritizing our Soldiers, Department of the Army Civilians, their dependents, and Soldiers for Life include:

Connecting the Army to the Nation's talent to deliver hard-to-recruit skillsets and counter new and emerging threats:

- **LTC Steve Speece**'s post ***Modernize U.S. Auxiliary Forces for New Era of Great Power Conflict*** argues for expanding volunteer service opportunities to those otherwise disqualified from the Active or Reserve Component.
- **Brandon Allen**'s submission ***Soldier for Life – Strategic Alignment of Generational Experience and Expertise (SAGE2)*** proposes capitalizing on the talent of previous generations of Soldiers to prepare current units for cyber- and space-denied areas of operations.
- **LTC Nathan Colvin** and **Marie Le Scolan**'s submission ***Securing the Information Home Front*** advocates leveraging family members to create self-sustaining teams to help protect the information home front.

Communicating the Army's emphasis on talent generation over talent acquisition or management. The coming personnel shortages due to boomer retirements, the "birth dearth," and rapid technological changes require a strategy to engage younger populations, encourage them to serve, and help them to develop the new talents and skills the Army needs.

Embracing gaming beyond current recruiting opportunities. ***Gamers Building the Future Force*** examines how gaming breaks down barriers in rank, generation, and geography; identifies the digital talent residing in the gaming community; and explores how video games can cultivate future Senior Leaders. ***UK Fight Club – Gaming the Future Army*** addresses how realistic, immersive wargames encourage players to attempt innovative solutions. These games replicate expensive training through virtual settings, and harness younger generations' aptitude for technology and virtual networking. ***A New American Way of Training*** surveys the Synthetic Training Environment and scalability in training systems.

Fostering a culture of innovation. Army personnel harbor a vast untapped wealth of great ideas. The Army's challenge is to develop a culture of innovation where Soldiers and Civilians are encouraged to explore, create, and help implement solutions to **tough problems worth solving** with the **requisite leadership, peer, and resource support**. The Joint Force and Army have organizations leading the way in **tactical innovation**, like **SOFWERX**, **Dragon's Lair**, **EagleWerx**, and **Project Galahad**. The Army should learn from these organizations and scale best practices across the force.

Army Mad Scientist has submitted these insights to assist the Army with its endeavor to Prioritize People First – Enjoy!

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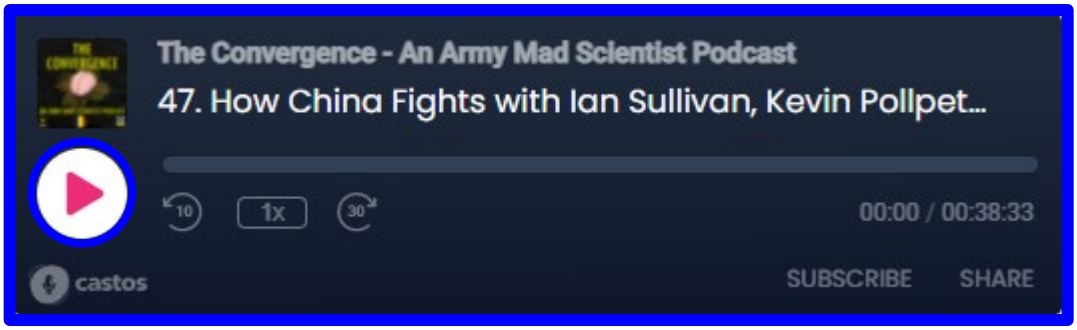
Mad Scientist Laboratory Blog Post 372 (09 Dec 21)

How China Fights

[**Editor's Note:** Army Mad Scientist is pleased to present our latest episode of ***The Convergence*** podcast, with the next installment of our series on ***How They Fight***. This episode features Subject Matter Experts (SMEs) from the TRADOC G-2, Blue Path Labs, Center for New American Security (CNAS), CNA, and VAST-OSINT discussing ***How China Fights***, exploring how our pacing threat conducts intelligentized warfare, maneuver, fires, information operations, cyber, and more! China's global ambitions and increasing assertiveness, combined with its warfighting modernization efforts spanning materiel, organization, training, and personnel capabilities will enable them to contest us across all domains in Competition, Crisis, and Conflict. Read on (and listen!) to learn how our most technologically sophisticated adversary fights!]



[If the podcast dashboard is not rendering correctly for you, please click **here** to listen to the podcast.]

Over the past two decades, China has transformed its People's Liberation Army (PLA) through a holistic approach — modernizing its weaponry, force structure, and approaches to warfare, to include operations in the cyber and space domains, while improving its professional military education. Although Russia remains a near-peer threat, China has ascended to become the United States' lone **pacing threat**. The PLA's momentous progress in warfighting capabilities and concepts, coupled with its whole-of-nation approach to competition, crisis, and conflict, enables it to challenge the United States across all domains and the Diplomatic, Information, Military, and Economic spheres.

Army Mad Scientist interviewed the seven world-class SMEs regarding our near peer threat to learn ***How China Fights***:

Ian Sullivan serves as the Senior Advisor for Analysis and ISR to the Deputy Chief of Staff, G-2, at the U.S. Army Training and Doctrine Command (**TRADOC G2**). He is responsible for the analysis that defines and the narrative that explains the Army's **Operational Environment**, which supports integration across doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy. Mr. Sullivan is a frequent and valued contributor to the ***Mad Scientist Laboratory***, including the previous episode in this series, ***How Russia Fights***.

Peter Wood is a program manager and defense analyst at **Blue Path Labs**, a strategic advisory firm. He previously edited ***China Brief***, a publication of the Jamestown Foundation. He has an M.A. from the Hopkins-Nanjing Center for Chinese and American Studies (HNC) and a B.A. in Political Science from Texas Tech University. He is proficient in Chinese.

Elsa B. Kania is an Adjunct Senior Fellow with the **Technology and National Security Program** at **CNAS**. Her research focuses on Chinese military strategy, **military innovation**, and **emerging technologies**. Her book, ***Fighting to Innovate***, should be forthcoming with the Naval Institute Press in 2022. At CNAS, Ms. Kania has contributed to the Artificial Intelligence and Global Security Initiative and the "*Securing Our 5G Future*" program, while acting as a member of the Digital Freedom Forum and the research team for the Task Force on Artificial Intelligence and National Security. Ms. Kania is a Ph.D. candidate in Harvard University's Department of Government. She is also a graduate of Harvard College and has received a Master of Arts in Government from Harvard University. Ms. Kania was a Boren Scholar in Beijing, China, and she maintains professional

proficiency in Mandarin Chinese. She is a proclaimed Mad Scientist and valued contributor to the ***Mad Scientist Laboratory***.

Kevin Pollpeter is a research scientist in the **CNA China Studies Division**. He is an internationally recognized expert on China's space program and is widely published on Chinese national security issues, focusing on Chinese military modernization, China's defense industry, and Chinese views on information warfare. His publications include ***China Dream, Space Dream: China's Progress in Space Technologies and Implications for the United States***; ***Planning for Innovation: Understanding China's Plans for Technological, Energy, Industrial, and Defense Development***; and "***Chinese Writings on Cyberwarfare and Coercion***," in ***China and Cybersecurity: Espionage, Strategy, and Politics in the Digital Domain***. A Chinese linguist, he holds an M.A. in international policy studies from the Monterey Institute of International Studies and is currently enrolled in a Ph.D. program at King's College London.

Dr. Amanda Kerrigan is a Research Scientist in the **China and Indo-Pacific Security Affairs Division** at **CNA**, where her research has focused on Chinese developments in artificial intelligence (AI) and Chinese media responses to U.S. military operations and activities worldwide. Dr. Kerrigan holds a Ph.D. in China Studies from Johns Hopkins University School of Advanced International Studies, a Master's degree in Chinese Politics and Diplomacy from Fudan University in Shanghai, and a Bachelor's degree in Asian Studies from Georgetown University. She was a Fulbright Fellow in China from 2015-2016, studying protest and violence in China's health care system. Fluent in Chinese, she spent four years living between mainland China and Taiwan. Her previous professional experiences include working in the China Practice at the Albright Stonebridge Group and with Johns Hopkins Medicine International.

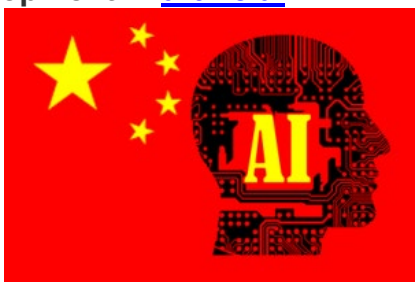
Doowan Lee is CEO and co-founder of **VAST-OSINT**, an AI startup. He builds data analytic tools to expose and analyze the provenance of disinformation and adversarial information operations by enriching and visualizing cyber data for content authentication. He is also a senior advisor to the Institute for Security and Technology (IST) and adjunct professor of politics at the University of San Francisco. He leverages emerging AI technologies to empower open society and support national security. He specializes in disinformation analysis and great power competition in the Information Environment. Before founding VAST-OSINT, he taught at the Naval Postgraduate School for more than eleven years as a faculty member and principal investigator. He was also featured in a previous podcast episode, ***Disinformation, Revisionism, and China***.

Andrea Kendall-Taylor is a Senior Fellow and Director of the **Transatlantic Security Program** at **CNAS**. She works on national security challenges facing the United States and Europe, focusing on Russia, authoritarianism and threats to democracy, and the state of the Transatlantic alliance. Prior to joining CNAS, Ms. Kendall-Taylor served for eight years as a senior intelligence officer. From 2015 to 2018, she was Deputy National Intelligence Officer for Russia and Eurasia at the National Intelligence Council (NIC) in the ODNI. Prior to joining the NIC, Ms. Kendall-Taylor was a senior analyst at the CIA where she worked on Russia and Eurasia, the political dynamics of autocracies, and democratic decline. Ms. Kendall-Taylor is an adjunct professor at Georgetown University's School of Foreign Service. Ms. Kendall-Taylor was also featured in the previous episode, ***How Russia Fights***.

In our interview with the aforementioned SMEs, we explore ***How China Fights***, to include **intelligentized warfare**, **maneuver**, fires, **information operations**, **cyber**, and more! The following bullet points highlight key insights from our interview:

- **Beginning in 2004, China's PLA undertook a major modernization effort to reinvent itself as a rival to the United States.** It invested in extensive technology development, undertook major force restructuring, and created new, specialized units for advanced warfare. Though the PLA lacks combat experience, it has become progressively more assertive in **competition**.

- **China has completed extensive research and development in artificial intelligence (AI) and autonomous systems**. Specifically, China will use this technology to support drones across **all military operations**, including combat and logistical support. China is now the United States' most technologically sophisticated adversary, though its concentration on this "science" of warfare may be at the expense of the "art" of battle, or the focus on training creative, resilient human forces.



- **China will also leverage its AI proficiency in "intelligent warfare," integrating machines in military decision making.** This strategy will shift warfare to the key cyber and space domains and increase its emphasis on obtaining high-quality military data.

- **In its modernization campaign, China created a Strategic Support Force (SSF) for information warfare, space operations, and cyber activities.** The consolidation of **these capabilities** demonstrates China's perception that these will be the decisive domains in future warfare. Further, documentation demonstrates that China sees information operations as a regular, rather than irregular, warfare technique.

PLA SSF shoulder patch

- **China has also sought to fully integrate itself into the global economy and digital infrastructure through programs like the Belt and Road Initiative (BRI)**. This effort increased the strength and resilience of its economy, portrayed China as a willing and capable **development partner**, and provided itself with increased access to operation spaces for future systems confrontations.

China Trifold (obverse) / Source: TRADOC G-2 — check it out here!

- **Though China's relationship with Russia is limited and transactional, the rate of cooperation between the two nations has increased in recent years.** They are increasingly aligned on policy goals such as countering U.S. influence and democracy promotion, and seek to combine Chinese capital with Russian talent to fully advance their respective international standings.

Chinese and Russian marines embrace in Zhanjiang, South China's Guangdong province, during Exercise "Joint Sea 2016" / Source: www.chinadaily.com.cn; Photo by Xinhua

Stay tuned to the ***Mad Scientist Laboratory*** for our next episode of ***The Convergence*** podcast "***Through Soldiers' Eyes: The Future of Ground Combat***," featuring subject matter experts — military analysts, combat veterans, and combat reporters — discussing their experiences in modern warfare at the "bleeding edge" of battle, the future of conflict, and the requirements and challenges facing future ground warfighters.

Learn more about China as our Pacing Threat in the following **TRADOC G-2** content:

> **ATP 7-100.3, Chinese Tactics**; **People's Liberation Army Ground Forces Quick Reference Guide**; **China Trifold**; the **China products** page; and information on PLA weapon systems accessed via the **Worldwide Equipment Guide** (**WEG**) on the **OE Data Integration Network** (**ODIN**).

… explore the following ***Mad Scientist Laboratory*** China content:

> **The Operational Environment (2021-2030): Great Power Competition, Crisis, and Conflict**, along with its source **document**
>
> **China's PLA Modernization through the DOTMLPF-P Lens**, by **Dr. Jacob Barton**
>
> **"Intelligentization" and a Chinese Vision of Future War**
>
> **Competition and Conflict in the Next Decade**
>
> **Disrupting the "Chinese Dream" – Eight Insights on how to win the Competition with China**
>
> **Competition in 2035: Anticipating Chinese Exploitation of Operational Environments**
>
> **Disinformation, Revisionism, and China with Doowan Lee** and associated **podcast**
>
> **China and Russia: Achieving Decision Dominance and Information Advantage**, by **Ian Sullivan**
>
> **The PLA and UAVs – Automating the Battlefield and Enhancing Training**
>
> **A Chinese Perspective on Future Urban Unmanned Operations**
>
> **China: "New Concepts" in Unmanned Combat and Cyber and Electronic Warfare**
>
> **The PLA: Close Combat in the Information Age and the "Blade of Victory"**

… and check out the following additional content on China:

China's Military Civil Fusion Strategy: A View from Chinese Strategists, by **Alex Stone** and **Peter Wood**

People's Liberation Army: Army Campaign Doctrine in Transition by **Kevin McCauley**

THE PLA BEYOND BORDERS Chinese Military Operations in Regional and Global Context, edited by **Joel Wuthnow**, **Arthur S. Ding**, **Phillip C. Saunders**, **Andrew Scobell**, and **Andrew N.D. Yang**

Deciphering the PLA's New Joint Doctrine: A Conversation with Dr. David Finkelstein, a podcast by our colleagues at the ***China Power Project*** at the **Center for Strategic and International Studies (CSIS)**

Disclaimer: *The views expressed in this blog post do not necessarily reflect those of the Department of Defense, Department of the Army, Army Futures Command (AFC), or Training and Doctrine Command (TRADOC).*

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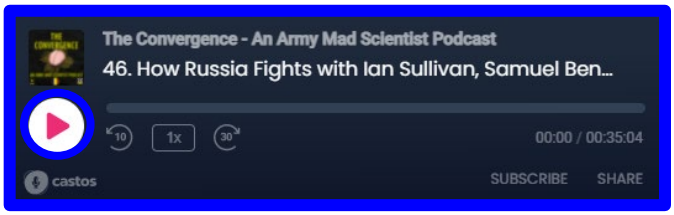
Mad Scientist Laboratory Blog Post 367 (18 Nov 21)

How Russia Fights

[**Editor's Note:** Army Mad Scientist is pleased to feature our latest episode of ***The Convergence*** podcast, introducing our new series — ***How They Fight***. This first episode features Subject Matter Experts (SMEs) from the TRADOC G-2, Georgetown University's Center for Security and Emerging Technology, CNA, and Center for a New American Security discussing ***How Russia Fights***, their use of unmanned and autonomous systems, maneuver warfare, special operations, cyber warfare, information operations, proxy forces, and more! Given Russia's recent military activities in Syria, Libya, Crimea, and the Donbass region of Ukraine; lessons learned from the recently concluded **ZAPAD 21** major military exercise; and witnessing their **current buildup of forces** along their frontier with Ukraine; today's informative post and podcast explores this near-peer threat's military and **Information Confrontation** capabilities and how they could effectively wield them to achieve their political objectives. **Beware — today's Russian military is not the anemic post-Soviet force of the 1990s and early 2000s!** (Please note that this podcast and several of the embedded links below are best accessed via a non-DoD network due to network priorities for teleworking)]



[If the podcast dashboard is not rendering correctly for you, please click **here** to listen to the podcast.]

Russia is a formidable adversary that is currently undergoing transformative modernization. Its combat proficient force has inculcated lessons learned from recent

combat operations in Syria, Crimea, and eastern Ukraine; selectively invested in niche capabilities (e.g., **autonomy, robotics**, and **artificial intelligence**) to add precision strike to its already formidable fires, enhance decision making, augment combined arms formations and logistics support, and safeguard its Soldiers; and professionalized to a more balanced ratio of contract to conscript Soldiers. A master of **information confrontation**, Russia employs **cyber**, **information operations**, and **disinformation** to offset any conventional force asymmetries. **Above all, Russia remains a persistent, vice a declining power!**

Army Mad Scientist interviewed the following four world-class SMEs about our near peer threat to learn ***How Russia Fights***:

Ian Sullivan serves as the Senior Advisor for Analysis and ISR to the Deputy Chief of Staff, G-2, at the U.S. Army Training and Doctrine Command (TRADOC G2). This is a Tier One Defense Intelligence Senior Level (DISL) position. He is responsible for the analysis that defines and the narrative that explains the Army's **Operational Environment**, which supports integration across doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy. Mr. Sullivan is a career civilian intelligence officer, who has served with the Office of Naval Intelligence (ONI); Headquarters, U.S. Army Europe and Seventh Army, Deputy Chief of Staff, G-2 (USAREUR G2); and as an Office of the Director of National Intelligence (ODNI) cadre member at the National Counterterrorism Center (NCTC). Prior to assuming his position at the TRADOC G2, Mr. Sullivan led a joint NCTC Directorate of Intelligence (DI)/Central Intelligence Agency (CIA), Counterterrorism Mission Center (CTMC) unit responsible for WMD terrorism issues, where he provided direct intelligence support to the White House, senior policymakers, Congress, and other senior customers throughout the Government. He was promoted into the Senior Executive ranks in June 2013 as a member of the ODNI's Senior National Intelligence Service, and transferred to the Army as a DISL in January, 2017. Mr. Sullivan is also a frequent and valued contributor to the ***Mad Scientist Laboratory***.

Katerina Sedova is a Research Fellow at Georgetown's Center for Security and Emerging Technology (CSET), where she works on the CyberAI Project. Most recently, she advised **SEN Maggie Hassan** on cybersecurity and technology policy issues and drafted key legislation as a TechCongress fellow with the Senate Homeland Security and Governmental Affairs Committee. Previously, she published research and advised projects on disinformation, state-sponsored information operations and OSINT for the NATO Strategic Communications Center of Excellence, the Department of State, and the Department of Defense. She started her career at Microsoft, where she led engineering teams in the security, networking, and performance components of the internet browsing platform. She was named as an inventor on multiple patents awarded to Microsoft. Ms. Sedova is a **proclaimed Mad Scientist**, having participated in our **AI Speeding up Disinformation** panel discussion during the ***Mad Scientist Weaponized Information Series of Virtual Events*** last year.

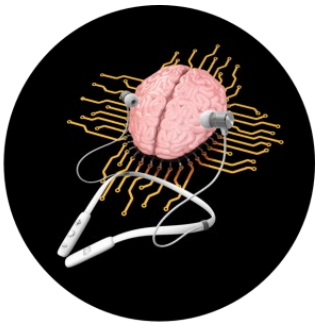
Sam Bendett is an Adviser with CNA's Strategy, Policy, Plans and Programs Center (SP3), where he is a member of the Russia Studies Program. He is also an Adjunct Senior Fellow at the Center for a New American Security (CNAS). His work involves research on the Russian defense and technology developments, unmanned and autonomous military systems and AI, as well as Russian military capabilities and decision-making during crises. He is a Member of CNA's Center for Autonomy and Artificial Intelligence, and a **proclaimed Mad Scientist**, having contributed multiple insightful **blog posts** to the ***Mad Scientist Laboratory***, and presented informative topics during a number of Army Mad Scientist **webinars** and **conferences**. He is also a Russian military autonomy and AI SME for the DoD's Defense Systems Information Analysis Center.

Andrea Kendall-Taylor is a Senior Fellow and Director of the Transatlantic Security Program at the CNAS. She works on national security challenges facing the United States and Europe, focusing on Russia, authoritarianism and threats to democracy, and the state of the Transatlantic alliance. Prior to joining CNAS, Ms. Kendall-Taylor served for eight years as a senior intelligence officer. From 2015 to 2018, she was Deputy National Intelligence Officer for Russia and Eurasia at the National Intelligence Council (NIC) in the ODNI. In this role, Ms. Kendall-Taylor led the U.S. Intelligence Community (IC) strategic analysis on Russia, represented the IC in interagency

policy meetings, provided analysis to the National Security Council, and briefed the DNI and other senior staff for White House and international meetings. Prior to joining the NIC, Ms. Kendall-Taylor was a senior analyst at the CIA where she worked on Russia and Eurasia, the political dynamics of autocracies, and democratic decline. Ms. Kendall-Taylor is an adjunct professor at Georgetown University's School of Foreign Service.

In our interview with the aforementioned SMEs, we explore how Russia fights, addressing unmanned and autonomous systems, maneuver warfare, special operations, cyber warfare, information operations, proxy forces, and more! The following bullet points highlight key insights from our interview:

- **Despite popular discourse casting Russia as a declining power, the Russian military remains a near-peer competitor with significant capabilities in competition, crisis, and conflict.** Russia's military continues to undergo a transformative modernization effort, learning from its extensive combat experience in Chechnya, Dagestan, Georgia, Crimea, Syria, Libya, and eastern Ukraine.
- **The United States cannot simply cast Russia as a declining power and pivot its focus away from the nation entirely.** Instead, the U.S. military should continue to monitor Russian military modernization and strategy.
- **The Russian military continues to develop and implement an advanced force of autonomous and robotic systems supported by AI.** This technology will be tested and adopted to enhance decision-making and safeguard Soldier's lives, ultimately making Russian operations more effective. The deployment of this technology will represent a long-term, transformative change for the Russian military.
- Russia will continue to pursue dominance in information operations. **These comparatively inexpensive "grey zone" tactics will seek to fracture liberal alliances, influence elections, undermine trust in democratic institutions, and weaponize ambiguity and uncertainty.** Even if operations are ultimately discovered, they may still succeed by casting the target as vulnerable and elevating the perceived capabilities of the Russian attackers.
- **Russia will continue seeking to "win without fighting" by implementing rapid military operations immediately followed by offers for a diplomatic resolution.** Such tactics prevent U.S. military mobilization and force the United States to choose between accepting Russian solutions or purposefully escalating conflict.
- **Russia is seeking to develop advanced autonomous systems to increase its intelligence, surveillance, and reconnaissance (ISR) capabilities.** These systems will increase the precision of Russian reconnaissance-fire complexes, enhancing Russia's ability to dominate enemies via firepower.



Stay tuned to the ***Mad Scientist Laboratory*** for our next episode of ***The Convergence*** podcast featuring SMEs from CNA, CNAS, Georgetown University's CSET, and TRADOC G-2 discussing our **pacing threat** and exploring ***How China Fights***, to include **intelligentized warfare**, **maneuver**, fires, **information operations**, **cyber**, and more!

If you enjoyed this post, download and learn more about **Russia** as our near-peer threat on pages 9 and 10 in ***The Operational Environment (2021-2030): Great Power Competition, Crisis, and Conflict*** **here**.

… then explore the following related **Russia** content:

TRADOC G-2's **Russia Products Page** is chockablock with essential open source references on the Russian Threat

The Bear is Still There: Four Insights on Competition with Russia

China and Russia: Achieving Decision Dominance and Information Advantage, **Would You Like to Play a Game? Wargaming as a Learning Experience and Key Assumptions Check**, and **Contagion: COVID-19's impact on the Operational Environment (Part 4)**, by **Ian Sullivan**

Insights from the Mad Scientist Weaponized Information Series of Virtual Events;

Weaponized Information: One Possible Vignette

Three Best Information Warfare Vignettes

Insights from the Robotics and Autonomy Series of Virtual Events, as well as all of the associated webinar **content** (presenter biographies, slide decks, and notes) and associated **videos** [via a non-DoD network]

Major Trends in Russian Military Unmanned Systems Development for the Next Decade, **Russian Ground Battlefield Robots: A Candid Evaluation and Ways Forward**, and **Autonomous Robotic Systems in the Russian Ground Forces**, by proclaimed Mad Scientist **Sam Bendett**

From Singalongs to Spheres of Influence: How Russia Exports Patriotic Military Education to Post-Soviet Youth by proclaimed Mad Scientist **Amelia Larson**, in **Through the Eyes of Gen Z: National Security Challenges and Solutions for the 21st Century**

Russia: Our Current Pacing Threat

Russian Private Military Companies: Their Use and How to Consider Them in Operations, Competition, and Conflict

Disclaimer: *The views expressed in this blog post do not necessarily reflect those of the Department of Defense, Department of the Army, Army Cyber Institute, the U.S. Military Academy, Army Futures Command (AFC), or U.S. Army Training and Doctrine Command (TRADOC).*

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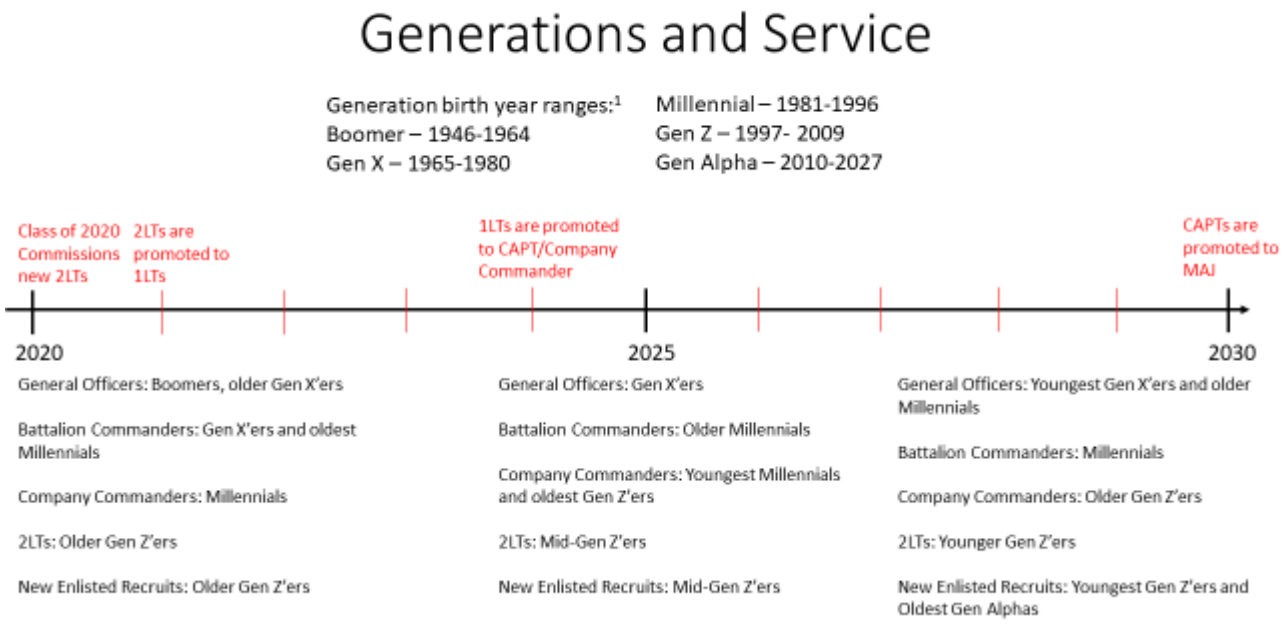
Mad Scientist Laboratory Blog Post 282 (5 Nov 20)

U.S. Demographics, 2020-2028: Serving Generations and Service Propensity

[**Editor's Note:** Today's post, originally written in support of a comprehensive Training and Doctrine Command (TRADOC) planning exercise this past Summer, explores the five generations of Soldiers who will serve in the decade ahead. It describes the characteristics of each, and makes the case that understanding their differences will be essential in successfully recruiting, training, and retaining the Soldiers who will defend this nation in our Multi-Domain Operations (MDO) capable force of 2028. Enjoy!]

The Army is a people-centric service. Considering the generations in military and civilian service is useful for analyzing talent management over the next decade. Generational attributes are not a science but rather a starting point for conceptualizing how events and technologies might shape attitudes towards work, organizations, and relationships. They therefore are a foundational element for recruiting, retention, training, and other components of TRADOC responsibilities. Soldiers entering our Army today will enter mid-level leadership ranks by 2028. The middle years of this decade will see today's recruits stepping into noncommissioned officer ranks; by 2028 some will be entering sergeant first class status, while today's just-commissioned lieutenant will be in company command.

For the first time in history, there will be five generations serving the U.S. Army as of 2028. This could result in significant differences in world views, values, and technological literacy amongst its military and civilian populations. Army culture will be even more important than it is today in serving as a common and unifying standard across all five of these generations (see the graphic below for the birth years that identify the generations addressed here).



Characteristics associated with each of the five generations are described below:

Baby Boomers (born 1946-1964) – General officers and senior civilian leaders today

Strengths:

- More committed to their roles than other generations
- "Workaholics" who value long hours and have the value of experience/expertise accumulated over a career

Weaknesses:

- Prefer structure and discipline and are less welcoming of change
- The least tech-savvy of the five generations; struggle to keep pace with rapid developments

Gen X (b. 1965-1980) – Next Army senior leaders

Strengths:

- 70% of organizations believe they are the best overall workers
- Prefer a work/life balance
- Independent and self-sufficient

Weaknesses:

- Value doing something quickly over doing it perfectly
- Less than 40% are happy with their organizations' senior management
- More cynical than previous generations

Millennials (b. 1981-1996) – Current battalion executive officers (XOs)/ operations officers (S3s); MDO battalion and brigade commanders

Strengths:

- Better at using their own creative processes than taking explicit direction
- Tech-savvy generation (rely on tech for communication)
- Concerned with ethics and social responsibility of their organizations
- Value work/life balance and prefer flexible schedules

Weaknesses:

- Hold a different perception of work ethic as they tend to work fewer hours per week than their generational predecessors
- Nearly three-quarters (71%) will leave a job in two years if they feel they are not developing their desired leadership skills

Gen Z (b. 1997-2009) — Current lieutenants; MDO XOs/S3s

Strengths:

- "Always on" and able to multitask
- Most tech-competent generation currently in the workforce
- Have strong community identities, ties, and values (work to improve their community)
- Value mental health at work and work/life balance

Weaknesses:

- Expect transparent leadership and communication and are unlikely to show strong company loyalty
- Rely on technology to solve problems for them
- Do not remember a time without social media and having easily accessible internet

Gen Alpha (b. 2010-2027) – MDO soldiers

Anticipated Strengths:

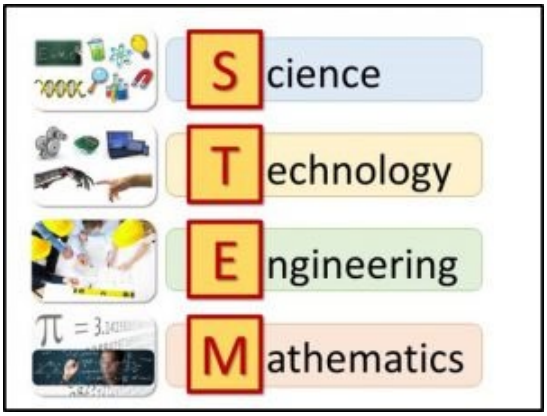
- Able to work anywhere (less inclined towards traditional office jobs)
- High cognitive ability requiring challenges and individualized learning
- Tech natives/tech-literate with expectation to use tech in the workplace
- Experience with AI-guided education focused on video-content learning

Anticipated Weaknesses:

- Will not distinguish lines of personal/professional discourse
- Prefer the company of computers over people
- Tend to be more sedentary and socially isolating than previous generations, making in-person teamwork more difficult
- Less manpower in this generation due to falling birthrate

As the last of the Boomers transition from military service, they will remain a major part of the civilian workforce throughout the next decade. Generation X and Millennials will make up the Army's senior leadership from brigade command to the Chief of Staff of the Army. These leaders might not conform to widely accepted generational attributes because, given their significant time in service, some of these characteristics may be smoothed out or appear less prevalently. A major may not have as much in common with his civilian generational peers because of ingrained military culture and a highly stressful work environment. Some attributes could prove to be more "sticky," like emphasis on spending time with families or comfort with the role of technology in their day-to-day lives.

Generations Z and Alpha are living through several formative shocks—pandemic, recession, and social unrest—that will have major impacts on how they view the Army, national security, and service. TRADOC will need to develop new messages and communication methods to convince them to join the Army. This updated messaging will need to start immediately to reach members of Gen Z before they anchor their perceptions around these societal shocks. Starting in 2023, the oldest members of Gen Alpha will turn 13 and start to form their own opinions about



service; they will be 18 in 2028 and entering the recruiting pool. Both of these populations will respond positively to descriptions of a demographically diverse and technologically enhanced and competent force. Successfully appealing to and recruiting first-generation Americans, specifically those that value science, technology, engineering, and mathematics (STEM) educations, could determine the success of transitioning to a higher-tech MDO force.

If you enjoyed this post, check out:

> **The Convergence: The Future of Talent and Soldiers with MAJ Delaney Brown, CPT Jay Long, and 1LT Richard Kuzma** and listen to the associated podcast **here**.
>
> **Old Human vs. New Human**
>
> **New Skills Required to Compete & Win in the Future Operational Environment**
>
> **Future Jobs and Skillsets**
>
> **TRADOC 2028**
>
> **Setting the Army for the Future (Parts II and III)**
>
> **The Trouble with Talent: Why We're Struggling to Recruit and Retain Our Workforce**, by **Sarah L. Sladek**

Disclaimer: *The views expressed in this post do not necessarily reflect those of the Department of Defense, Department of the Army, Army Futures Command (AFC), or Training and Doctrine Command (TRADOC).*

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Mad Scientist Laboratory Blog Post 378 (13 Jan 22)

Virtual Intervention: People First in 2035

[**Editor's Note:** In conjunction with the ***Army People Synchronization Conference*** later this month, Army Mad Scientist launched a complementary **writing contest** to support this critical endeavor prioritizing the Army Team (Soldiers, Department of the Army Civilians, their dependents, and Soldiers for Life). Crowdsourcing remains one of our most effective tools for gleaning innovative ideas, thoughts, and concepts from a wide variety of interested individuals, helping us to diversify thought and challenge conventional assumptions. We were thrilled with the host of insightful 500-word submissions we received — a hearty Mad Scientist "thank you!" to all who participated.

We are pleased to feature the contest's winning submission by **LTC James Leidenberg** as today's blog post. Observing that the Kindergarten Class of 2020 — having been shaped by the **Global COVID-19 Pandemic** and concurrent social disruption — will be the Soldiers of 2035, LTC Leidenberg makes the compelling case that the Army should reach out and *"engage with this Virtual Generation in their spaces to unify and shape them,"* proactively promoting our shared values. To do otherwise is to neglect our next generation of Citizen Soldiers, at the Nation's future peril — Read on!]

The Army knows much about the Soldiers of 2035 because life events shape a Soldier's identity and values. Assessing the 2020 Kindergarten Class provides insight into broad social experiences, demographics, economic status, and education backgrounds for those entering service in 2035. New Soldiers in 2035 will come from the "Virtual Generation." These future Soldiers will need the Army's support today. Shaped by extreme distrust of government institutions, media, and each other, putting people first for the Soldiers of 2035 begins with tailoring People First Initiatives (PFI) today. Forward-looking PFIs can assess,

identify, and develop novel approaches to support their mental health, values-based leadership skills, and ethical technology practices.

Class of 2035. Imagine May 2035 when thousands tune in to virtual and augmented reality graduation broadcasts. Timelessly, the one-thousand cadets at the United States Military Academy will cross the stage at Michie Stadium at West Point, New York. At that exact moment, graduating classes of Basic and Advanced Individual Training will parade across fields at training bases across the country. The Class of 2035 endured a continuous struggle to reach this point in their lives. They survived multiple Coronavirus pandemics, record-high crime rates, global misinformation campaigns targeting American values, and a decade of economic instability. In response, they adapted a sense of isolationism like the post-World War One generation who faced the Spanish Pandemic and Great Depression.

Scars of Distrust. The social upheaval of 2019-2020 left scars that unmasked social and cultural wounds and divided families and friends. Since kindergarten in the first global pandemic of 2020, these new Soldiers and Officers navigated school and extracurricular experiences through the pandemic that forced a type of isolationism upending modern life. No other generation adapted to social upheaval as well as these young students. In the face of isolation, they connected in virtual spaces in ways that define their entire generation.

Moral and Ethical Disconnect. Enhanced virtual spaces offer an environment that shapes the values and norms of future Soldiers. The richness and realism of the new connected environment introduce them into a world of anonymity and absence of accountability. In such an **environment**, there are significant risks of developing characteristics, traits, and normative behavior incongruent with the profession of arms.

Opportunity. The Army's **advanced technology** to train in virtual and augmented environments offers a competitive advantage. The Army can create virtual

spaces that entice future recruits to join safe virtual environments. The Army could also host **virtual games** or partner with game-makers for industry-setting ethics-based "rules of engagement packages" that promote shared values.

Today's experiences will have lasting impacts on the Soldiers of 2035 that require recognition and active responses. For some, these traumatic experiences coupled with emerging technology shape and influence the psychological health of the Soldiers of 2035.

The Army must adapt. America's greatest adversaries seek to **manipulate and dissuade** our shared values. The Army must engage with the Virtual Generation in their spaces to unify and shape them. If not, others with **less noble intentions** will.

If you enjoyed this post, check out the following related content:

The Operational Environment (2021-2030): Great Power Competition, Crisis, and Conflict, along with its source **document**

U.S. Demographics, 2020-2028: Serving Generations and Service Propensity; and **The Inexorable Role of Demographics** by proclaimed Mad Scientist **Caroline Duckworth**

The Future of Talent and Soldiers with MAJ Delaney Brown, CPT Jay Long, and 1LT Richard Kuzma and associated **podcast** ; and **The Trouble with Talent: Why We're Struggling to Recruit and Retain Our Workforce** by **Sarah L. Sladek**

Virtual Nations: An Emerging Supranational Cyber Trend by proclaimed Mad Scientist **Marie Murphy**; and **The Metaverse: Blurring Reality and Digital Lives with Cathy Hackl** and associated **podcast**

Gamers Building the Future Force and associated **podcast**; **A New American Way of Training** and associated **podcast**; **Fight Club Prepares Lt Col Maddie Novák for Cross-Dimension Manoeuvre**, by **LTC(P) Arnel David**, U.S. Army, and **Major Aaron Moore**, British Army, along with their interview in **UK Fight Club – Gaming the Future Army** and associated **podcast**

China and Russia: Achieving Decision Dominance and Information Advantage by **Ian Sullivan**; **The Exploitation of our Biases through Improved Technology** by proclaimed Mad Scientist **Raechel Melling**; **A House Divided: Microtargeting and the next Great American Threat** by **1LT Carlin Keally**; **The Erosion of National Will – Implications for the Future Strategist** by **Dr. Nick Marsella**; **Weaponized Information: What We've Learned So Far…**; and **Insights from the Mad Scientist Weaponized Information Series of Virtual Events**

About the Author: LTC James Leidenberg *is a Military Intelligence Officer currently completing a Master's in National Security and Resource Strategy with a Data and Disruptive Technologies concentration at the Eisenhower School at National Defense University. Before Senior Service College, he served as the Senior Intelligence Officer (G-2) for the 1st Cavalry Division at Fort Hood, Texas. He holds an MPA in Policy Management from Georgetown University, an MBA concentrating in Non-Profit Organizations from Liberty University, a current Project Management Professional certification, and a BS in World History from the United States Military Academy.*

Disclaimer: *The views expressed in this blog post do not necessarily reflect those of the Department of Defense, Department of the Army, Army Futures Command (AFC), or U.S. Army Training and Doctrine Command (TRADOC).*

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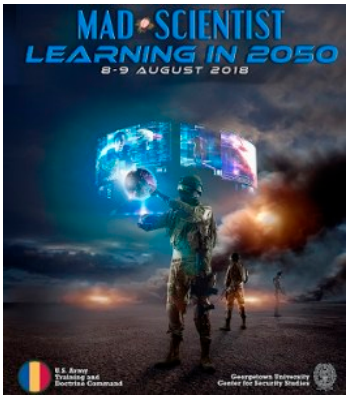
Mad Scientist Laboratory Blog Post 117 (31 Jan 19)

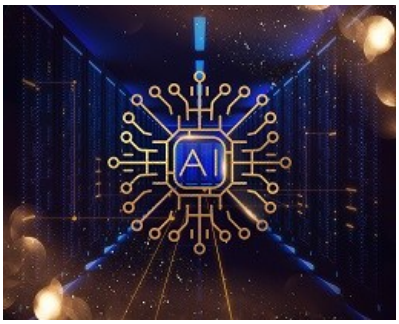
Old Human vs. New Human



[Editor's Note: On 8-9 August 2018, the U.S. Army Training and Doctrine Command (TRADOC) co-hosted the **Mad Scientist Learning in 2050 Conference** with Georgetown University's Center for Security Studies in Washington, DC. Leading scientists, innovators, and scholars from academia, industry, and the government gathered to address future learning techniques and technologies that are critical in preparing for Army operations in the mid-21st century against adversaries in rapidly evolving battlespaces. One finding from this conference is that tomorrow's Soldiers will learn differently from earlier generations, given the technological innovations that will have surrounded them from birth through their high school graduation. To effectively engage these "*New Humans*" and prepare them for combat on future battlefields, the Army must discard old paradigms of learning that no longer resonate (e.g., those desiccated lectures delivered via interminable PowerPoint presentations) and embrace more effective means of instruction.]

The recruit of 2050 will be born in 2032 and will be fundamentally different from the generations born before them. **Marc Prensky**, educational writer and speaker who coined the term digital native, asserts this "*New Human*" will stand in stark contrast to the "*Old Human*" in the ways they assimilate information and approach learning.[1] Where humans today are born into a world with ubiquitous internet, hyper-connectivity, and the Internet of Things, each of these elements are generally external to the human. By 2032, these technologies likely will have converged and will be embedded or integrated into the individual with connectivity literally on the tips of their fingers. The challenge for the Army will be to recognize the implications of this momentous shift and alter its learning methodologies, approach to training, and educational paradigm to account for these digital natives.

These New Humans will be accustomed to the use of artificial intelligence (AI) to augment and supplement decision-making in their everyday lives. AI will be responsible for keeping them on schedule, suggesting options for what and when to eat, delivering relevant news and information, and serving as an on-demand embedded expert. The Old Human *learned* to use these technologies and adapted their learning style to accommodate them, while the New Human will be born into them and their learning style will be a *result* of them. In 2018, 94% of Americans aged 18-29 owned some kind of smartphone.[2] Compare that to 73% ownership for ages 50-64 and 46% for age 65 and above and it becomes clear that there is a strong disconnect between the age groups in terms of employing technology. Both of the leading software developers for smartphones include a built-in artificially intelligent digital assistant, and at the end of 2017, nearly half of all U.S. adults used a digital voice assistant in some way.[3] Based on these trends, there likely will be in the future an even greater technological wedge between New Humans and Old Humans.



% of U.S. adults who own the following devices

	Any cellphone	Smartphone	Cellphone, but not smartphone
Total	95%	77%	17%
Men	95%	80%	16%
Women	94%	75%	19%
Ages 18-29	100%	94%	6%
30-49	98%	89%	9%
50-64	94%	73%	21%
65+	85%	46%	40%

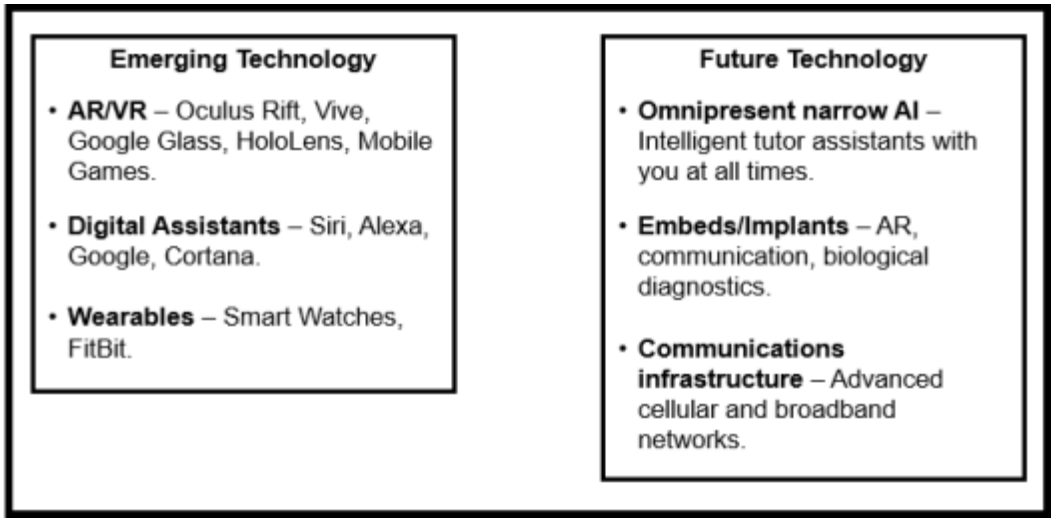
http://www.pewinternet.org/fact-sheet/mobile/

New Humans will be information assimilators, where Old Humans were information gatherers. The techniques to acquire and gather information have evolved swiftly since the advent of the printing press, from user-intensive methods such as manual research, to a reduction in user involvement through Internet search engines. Now, narrow AI using natural language processing is transitioning to AI-enabled predictive learning. Through these AI-enabled virtual entities, New Humans will carry targeted, predictive, and continuous learning assistants with them. These assistants will observe, listen, and process everything of relevance to the learner and then deliver them information as necessary.

There is an abundance of research on the stark contrast between the three generations currently in the workforce: Baby Boomers, Generation X, and Millennials.[4, 5] There will be similar fundamental differences between Old Humans and New Humans and their learning styles. The New Human likely will value experiential learning over traditional classroom learning.[6] The convergence of mixed reality and advanced, high fidelity modeling and simulation will provide New Humans with immersive, experiential learning. For example, Soldiers learning military history and battlefield tactics will be able to experience it ubiquitously, observing how each facet of the battlefield affects the whole in real-time as opposed to reading about it sequentially. Soldiers in training could stand next to an avatar of General Patton and experience him explaining his command decisions firsthand.

There is an opportunity for the Army to adapt its education and training to these growing differences. The Army could—and eventually will need—to recruit, train, and develop New Humans by altering its current structure and recruitment programs. It will become imperative to conduct training with new tools, materials, and technologies that will allow Soldiers to become information assimilators. Additionally, the incorporation of experiential learning techniques will entice Soldiers' learning. There is an opportunity for the Army to pave the way and train its Soldiers with cutting edge technology rather than trying to belatedly catch up to what is publicly available.

Evolution in Learning Technologies



If you enjoyed this post, please also watch **Elliott Masie**'s video presentation on **Dynamic Readiness** and **Mark Prensky**'s presentation on **The Future of Learning** from of the **Mad Scientist Learning in 2050 Conference** …

… see the following related blog posts:

- **Future Jobs and Skillsets**
- **TRADOC 2028**…

… and read **The Mad Scientist Learning in 2050 Final Report**.

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[1] Prensky, Mark, Mad Scientist Conference: Learning in 2050, Georgetown University, 9 August 2018

[2] **http://www.pewinternet.org/fact-sheet/mobile/**

[3] **http://www.pewresearch.org/fact-tank/2017/12/12/nearly-half-of-americans-use-digital-voice-assistants-mostly-on-their-smartphones/**

[4] **https://www.nacada.ksu.edu/Resources/Clearinghouse/View-Articles/Generational-issues-in-the-workplace.aspx**

[5] **https://blogs.uco.edu/customizededucation/2018/01/16/generational-differences-in-the-workplace/**

[6] **https://www.apa.org/monitor/2010/03/undergraduates.aspx**

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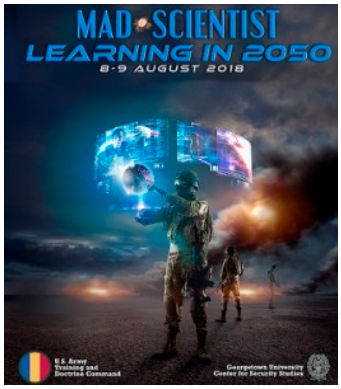
Mad Scientist Laboratory Blog Post 110 (07 Jan 19)

Future Jobs and Skillsets



[**Editor's Note:** On 8-9 August 2018, the U.S. Army Training and Doctrine Command (TRADOC) co-hosted the **Mad Scientist Learning in 2050 Conference** with Georgetown University's Center for Security Studies in Washington, DC. Leading scientists, innovators, and scholars from academia, industry, and the government gathered to address future learning techniques and technologies that are critical in preparing for Army operations in the mid-21st century against adversaries in rapidly evolving battlespaces. Today's post is extracted from this conference's final report (more of which is addressed at the bottom of this post).]

The U.S. Army currently has more than 150 **Military Occupational Specialties (MOSs)**, each requiring a Soldier to learn unique tasks, skills, and knowledges. The emergence of a number of new technologies – drones, **Artificial Intelligence (AI)**, **autonomy**, **immersive mixed reality**, big data storage and analytics, etc. – coupled with the **changing character of future warfare** means that many of these MOSs will need to change, while others will need to be created. This already has been seen in the wider U.S. and global economy, where the growth of internet services, smartphones, social media, and cloud technology over the last ten years has introduced a host of new occupations that previously did not exist. The future will further define and compel the creation of new jobs and skillsets that have not yet been articulated or even imagined. Today's hobbies (e.g., drones) and recreational activities (e.g., Minecraft/Fortnite) that potential recruits engage in every day could become MOSs or Additional Skill Identifiers (ASIs) of the future.

Training eighty thousand new Recruits a year on existing MOSs is a colossal undertaking. A great expansion in the jobs and skillsets needed to field a highly capable future Army, replete with modified or new MOSs, adds a considerable burden to the Army's learning systems and institutions. These new requirements, however, will almost certainly present an opportunity for the Army to capitalize on intelligent tutors, personalized learning, and immersive learning to lessen costs and save time in Soldier and Leader development.

The recruit of 2050 will be born in 2032 and will be fundamentally different from the generations born before them. **Marc Prensky**, educational writer and speaker who coined the term digital native, asserts this "**New Human**" will stand

in stark contrast to the "Old Human" in the ways they learn and approach learning.[1] Where humans today are born into a world with ubiquitous internet, hyper-connectivity, and the Internet of Things, each of these elements are generally external to the human. By 2032, these technologies likely will have **converged** and will be embedded or integrated into the individual with connectivity literally *on* the tips of their fingers.

Some of the newly required skills may be inherent within the next generation(s) of these Recruits. Many of the games, drones, and other everyday technologies that are already or soon to be very common – narrow AI, app development and general programming, and smart devices – will yield a variety of intrinsic skills that Recruits will have prior to entering the Army. Just like we no longer train Soldiers on how to use a computer, games like **Fortnite**, with no formal relationship with the military, will provide players with militarily-useful skills such as communications, resource management, foraging, force structure management, and fortification and structure building, all while attempting to survive against persistent attack. Due to these trends, Recruits may come into the Army with fundamental technical skills and baseline military thinking attributes that flatten the learning curve for Initial Entry Training (IET).[2]

While these new Recruits may have a set of some required skills, there will still be a premium placed on premier skillsets in fields such as AI and machine learning, robotics, big data management, and quantum information sciences. Due to the high demand for these skillsets, the Army will have to compete for talent with private industry, battling them on compensation, benefits, perks, and a less restrictive work environment – limited to no dress code, flexible schedule, and freedom of action. In light of this, the Army may have to consider adjusting or relaxing its current recruitment processes, business practices, and force structuring to ensure it is able to attract and retain expertise. It also may have to reconsider how it adapts and utilizes its civilian workforce to undertake these types of tasks in new and creative ways.

The Recruit of 2050 will need to be engaged much differently than today. Potential Recruits may not want to be contacted by traditional methods[3] – phone calls, in person, job fairs – but instead likely will prefer to "meet" digitally first. Recruiters already are seeing this today. In order to improve recruiting efforts, the Army may need to look for Recruits in non-traditional areas such as competitive online gaming. There is an opportunity for the Army to use AI to identify Recruit commonalities and improve its targeted advertisements in the digital realm to entice specific groups who have otherwise been overlooked. The Army is already exploring this avenue of approach through the formation of an **eSports team** that will engage young potential Recruits and attempt to normalize their view of Soldiers and the Army, making them both more relatable and enticing.[4] This presents a broader opportunity to close the chasm that exists between civilians and the military.

The overall dynamic landscape of the future economy, the evolving labor market, and the changing character of future warfare will create an inflection point for the Army to re-evaluate longstanding recruitment strategies, workplace standards, and learning institutions and programs. This will bring about an opportunity for the Army to expand, refine, and realign its collection of skillsets and MOSs, making Soldiers more adapted for future battles, while at the same time challenging the Army to remain prominent in attracting premier talent in a highly competitive environment.

If you enjoyed this extract, please read the comprehensive **Learning in 2050 Conference Final Report**…

… and see our **TRADOC 2028** blog post.

---

[1] Prensky, Mark, Mad Scientist Conference: Learning in 2050, Georgetown University, 9 August 2018.

[2] Schatz, Sarah, Mad Scientist Conference: Learning in 2050, Georgetown University, 8 August 2018.

[3] Davies, Hans, Mad Scientist Conference: Learning in 2050, Georgetown University, 9 August 2018.

[4] Garland, Chad, ***Uncle Sam wants you — to play video games for the US Army***, **Stars and Stripes,** 9 November 2018, https://www.stripes.com/news/uncle-sam-wants-you-to-play-video-games-for-the-us-army-1.555885.

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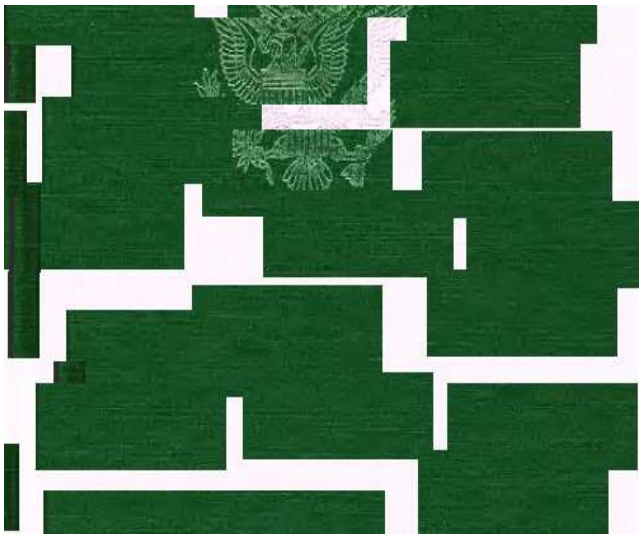
Veritas, Agilis, Versabilis



APSC 2022 – PEOPLE FIRST IN 2035

ABSTRACT

By 2035 all senses can be fooled. All sensors too can befooled. Ever increasing number of jobs are automated.Adversaries are also automated. What you kill, or triesto kill you, no longer is another human. It's hard to know how different military life will be from civilian lifein the future. But by 2035 both will share three needs:detect truth to build correct reality models (veritas), beagile to changes around you (agilis), and be versatile tochange oneself to new needs and requirements (versabilis). People first in 2035 means to teach soldiersthe tools to competently navigate and succeed in an ever-changing world. And strengthening our very society in the process.

Ed dos Santos Jr.
edkenshin@live.com

Landscape, Webscape, and Mindscape

The 2035 battlespace is compound of three realms: landscape (physical realm), webscape (information realm), and mindscape (idea realm). All three appeared already in Homer's Trojan war stories. Still, the interconnection, breath, reach, and speed of those in 2035 would awe even Achilles.

Deepfake, nanomaterials, xenobots, invisibility cloaks, and brain-control weaponry are all realities, and a glimpse of the future. It's hard to predict how new discovery will affect all realms. But a trend is clear. Faster interaction between fields leads to faster changes, and then leads to new day-to-day realities, making what was news yesterday, common today, and obsolete tomorrow.

So how to prepare a soldier for 2035? By giving soldiers skills equally important to accomplish the mission and live purposeful lives after service in an ever-increasing complex world.

Veracity, Agility, and Versatility

The fluid ever-changing needs of 2035 requires people to learn how to be effective agents of change.

Successful people will know how to ID what is real and what is not and create correct mind-patterns (veracity), then know how to quickly ID those patterns among changes, and react to it (agility), and finally analyze how these changes affect previous understanding and change own ideas, perspectives, and expectations accordingly (versatility).

Veritas: needle in the haystack

Truth is not an end state (static) but a pursuit of how things really are (dynamic). Soldiers need tools to eliminate non-truths (opinions, misunderstandings, and lies) to build a clear set of what to take into consideration. Cross-referencing, truth convergence vs. non-truths divergence, and burden of proof (to questioner) vs. weaponization of questions (burden on others) are good tools to teach.

Agilis: Observe, See Pattern, and Act

Complex environments don't fit recipes. They show patterns. Soldiers must understand what affects their perception (cognitive bias) and how to build models (problem solving). Pattern matching relies on memory of previous experiences, so the most important tool is the creation of range experiences (cross- occupation) during their career.

Versabilis: learn and unlearn

Rapid changes mean past assumptions are at best invalid, at worst dangerous. Learn new idea, and unlearn old ones, is essential. Reassessment and repivot of previous knowledge had to become second nature.

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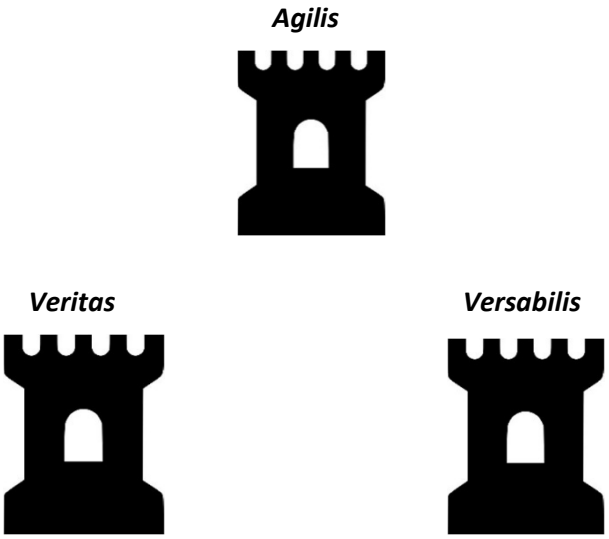

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Mad Scientist Laboratory Blog Post 377 (10 Jan 22)

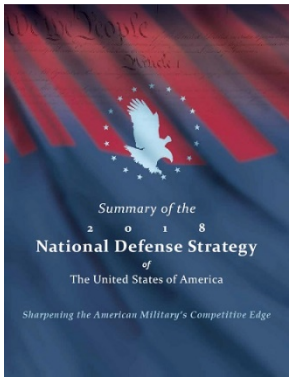
Modernize U.S. Auxiliary Forces for New Era of Great Power Conflict

[**Editor's Note:** ***Mad Scientist Laboratory*** welcomes returning guest blogger **LTC Steve Speece** with another insightful post, this time addressing how Great Power Conflict in the Twenty-first Century requires us to re-think how we mobilize the Nation's talent to successfully compete and win against all adversaries. Army Mad Scientist has **previously acknowledged** that the "*United States' advantage lies in its people's diversity and their ability to innovate."* In today's post, LTC Speece examines U.S. Auxiliary Forces, their role in unconventional warfare, and how our adversaries are developing and employing them. Our national security policy makers should re-examine and tailor legacy U.S. Auxiliary Force roles to support the nation when engaged in Great Power Conflict, and, where necessary, create entirely new Auxiliary Force organizations — expanding volunteer service opportunities to those otherwise disqualified from enlisting in the Active or Reserve Components. Read his compelling case why Auxiliary Force organizations harnessing the breadth of this Nation's talent are essential to winning Great Power Conflict!]

Neglecting a Competitive Advantage

In March 2021, the White House's **Interim National Security Strategic Guidance** (NSS) directed departments and agencies to renew "enduring advantages so that we can meet today's challenges from a position of strength." However, the Department of Defense is failing to envision capitalizing on what is probably the United States' greatest competitive advantage — an enormous service economy with a skilled and adaptable workforce.

The **COVID-19 pandemic** forced many private and public institutions to adopt labor market innovations including Working from Home (WFH) arrangements, reliance on what is now commonly termed the **gig economy**, and introduced many to digital currencies and cashless payment mechanisms. **The current U.S. Auxiliary Force architecture fails to capitalize on these innovations, neglecting to provide volunteer service opportunities to those disqualified for military service, or integrate Auxiliary Forces into Great Power Conflict-relevant missions including Homeland Defense and Unconventional Warfare.** According to **JP 3-27 Homeland Defense**, auxiliary organizations include the USAF Auxiliary [**Civil Air Patrol**], **USCG Auxiliary**, **Military Auxiliary Radio System**, and **State Defense Forces**. Conspicuously absent in any Joint doctrine reference to auxiliary architecture is the **U.S. Selective Service System**.



Few defense policies are so consistently problematic to U.S. civil-military relations as the possibility of forced conscription. In September 2021, Congress passed a **National Defense Authorization Act**, including the first major reform of the Selective Service System since 1980 which expanded registration requirements to all Americans between the ages of 18 and 25, regardless of biological sex. Interestingly, this expansion of the Selective Service System arrives on the heels of unsuccessful attempts to eliminate the agency in 2019 and 2020, and the near irrelevance of the institution to the **2018 National Defense Strategy**.

The Selective Service System defines itself as **the third tier of national defense**, behind the active duty military and reserve components. Its plan to provide this military manpower under current law entails the use of state lottery-style clear **plexiglass tanks filled with percolating ping pong balls** on which birth dates of registrant cohorts are randomly selected. This seemingly archaic protocol blinded to individual human capital is an artifact of the Selective Service System's Cold War origins. It was neglected and avoided during the Global War on Terror, and reflects an urgent need to modernize the legacy U.S. Auxiliary Force architecture to provide relevance in an era of renewed **Great Power Competition and Conflict**.

The Deterrent Value of Auxiliary Force Signals

Apart from the mass mobilization of the U.S. Selective Service System, how can the modernization of existing or the creation of entirely new non-combatant volunteer auxiliary forces deter an attack on the homeland by Russia or China?

These **legacy institutions** were envisioned to develop and maintain a pool of skilled civilians for the military services to draw upon in the event of national mobilization, provide non-combat direct support to the military services, and to provide volunteer consequence management services in the event of an attack on the homeland as part of the broader state and federal Civil Defense architecture.

The National Security Resources Board's report on U.S. Civil Defense policy in 1950 specifically cited the role of consequence management preparations in **strategic nuclear deterrence**. During the early years of the Cold War, the credibility of nuclear retaliation was contingent upon the ability of the homeland to endure a devastating nuclear attack and restore order in its aftermath. While Civil Defense-promoted **student "duck and cover" drills** were later criticized for the questionable protection offered by the tactic and the prospect of nuclear war terrifying children, these measures signaled to the Soviet Union that the United States was preparing to endure the kind of nuclear attack that put non-combatants and even children at risk.

The role of Civil Defense preparations in strategic deterrence remained prominent in U.S. National Security policy until 1963, when President Kennedy de-emphasized its importance relative to massive nuclear force expansion ensuring the survival of retaliatory capability. Auxiliary forces since that time broadened their missions away from specifically nuclear civil defense to general consequence management services, including natural disaster response or search and rescue. Since the creation of the **Federal Emergency Management Agency** (FEMA) in 1979, DoD auxiliaries have provided support to civil authorities in domestic disaster response efforts.

The March 2021 Interim-NSS directed departments and agencies to "*reduce the role of nuclear weapons in our national security strategy,*" despite the rapid nuclear expansion of our adversaries and emerging threats to the homeland. The Department of Defense's answer to this strategic challenge is the concept of '**integrated deterrence**,' which broadens the concept of deterrence across warfighting domains and elements of national power. Emerging threats to the homeland will lack symmetric response options implying a need for Auxiliary Forces to return to strategic deterrent roles in signaling domestic resiliency.

Auxiliary Forces' Role in Unconventional Warfare

Special Operations Command Europe's 2020 **Resistance Operating Concept** (ROC) noted a key challenge in planning for Unconventional Warfare against occupying Great Power adversaries was the need for smaller states to adopt a whole-of-society approach, also known as **Total Defense**. U.S. Special Operations Forces need resilient and survivable irregular partners to enable in occupied areas. According to the ROC, a small state ally needs to plan for and develop such irregular partner forces now, in order for the prospect of prolonged Unconventional Warfare to have any deterrent effect against an adversary with superior conventional military capabilities.

Generating auxiliary forces by conscription to supplement conventional force formations commonly remains the default Total Defense plan for smaller U.S. allies and partners, including **South Korea**, **Israel**, and the **Baltic States**. However, as Switzerland noted in its Cold War Total Defense plan, maintaining a volunteer auxiliary force separate from conventional military and formal government control **protects it from necessary surrender** in the event a military occupation coerces a capitulation agreement. In this example, the greatest limitation of volunteer auxiliary forces in peacetime, their lack of formal bureaucratic control, becomes a key advantage in the post-occupation resistance phase of Total Defense war plans.

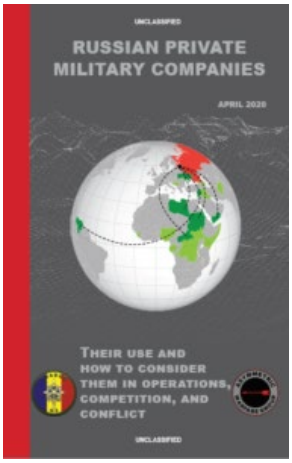
A survivable underground resistance organization requires more than combatants. Auxiliary Forces can develop applicable capabilities in peacetime applicable to both strategic attack resiliency and Unconventional Warfare. An auxiliary force of information technology experts can establish secure **mesh networks** for resilient communication. Aviation enthusiasts and drone hobbyists who practice post-natural disaster **Incident Awareness and Assessment** (IAA) can also provide surveillance and reconnaissance in urban areas. Rural auxiliaries can maintain small electricity generators (e.g., from renewable sources like solar or wind power) to support **continuity of operations** in the event of essential service disruption.

Adversaries' Auxiliary Force Development

How do Russia and China approach the roles of their own Auxiliary Forces and what lessons can be learned? As of 2017, Beijing employed up to 2 million Chinese internet users to post up to **448 million fabricated social media posts per year**. This auxiliary force engaged in information operations is known as the '50c Party' after the standard payment of 0.5 Yuan per post — less than $0.08 USD at

current exchange rates. While the 50c Party is likely not responsible for every pro-Beijing post or comment on the internet, the introduction of micropayment incentives to a receptive volunteer workforce allows China to rapidly scale up capacity to respond to information operations challenges in the cyber domain.

Moscow's **Hybrid Warfare doctrine** expanded the use of separatist auxiliary forces in client states, clandestine enablers, and **Private Military Companies** (PMCs) like **Wagner Group**. According to open sources, Russia's Wagner Group uses short term and low cost **private security contracts** to grow and sustain its mercenary forces deployed globally. A BBC investigation claimed Wagner deliberately seeks prospective recruits otherwise not qualified for conventional military service due to **criminal backgrounds**. This force generation strategy extends service opportunities to otherwise qualified Russians without diverting potential manpower from formal Russian military service.



Russian Private Military Companies */ Source: TRADOC G-2's FMSO via AWG and Johns Hopkins*

Chinese fishing boats head out to sea from Zhoushan in Zhejiang Province, China / Source: China Foto Press via ***China's Maritime Militia and Fishing Fleets: A Primer for Operational Staffs and Tactical Leaders****,* ***Military Review****, Army University Pres*

In the maritime domain, Beijing's expanded use of its **Maritime Militia** further illustrates how auxiliary forces designed to capitalize on competitive advantages like the **world's largest fishing fleet** can serve a role complementary to conventional forces in Great Power Conflict. While compliance with Beijing's civil-military fusion law is not voluntary, it does provide incentives for active participation, including fuel subsidies. The Maritime Militia provides Beijing options to assert sovereignty claims in contested waters that its regional neighbors are challenged to match. In the event of a conflict, the Maritime Militia's role would probably expand to **reconnaissance and minelaying** which they are trained to conduct.

Expanding Opportunities for Volunteer Service

National security policy makers are at times alarmed by the **declining number of young Americans** deemed eligible for military service. In 2009, a group of retired General Officers published a report ***Ready, Willing, and Unable to Serve***, identifying several drivers of declining eligibility for those young people willing to enlist, including poor health, lower education, and past involvement in criminal activities. However, rather than adapting these barriers-to-entry for volunteer service to reflect the changing nation we serve, senior Service Leaders have seemingly doubled-down on a force generation model that cannot quickly scale up in a major war without inefficient and coercive policies which potentially put U.S. civil-military relations at risk.

*Learn more about the PLA's capabilities in TRADOC G-2's **Red Diamond Special Edition: China**, December 2021.*

If publicly available information is accurate, the rapidly modernizing Chinese **People's Liberation Army** maintains **approximately 2 million personnel in regular forces**. In a prolonged Great Power Conflict against an adversary of that capacity, the Joint Force cannot afford to disregard or misallocate any potential human resources. If conscription through the Selective Service System must remain a policy option for such contingencies, the American public must be confident that national security policy makers will only call upon such measures after all voluntary sources of manpower are exhausted.

National security policy makers should consider new roles and incentive structures to make the U.S. Auxiliary Force architecture credibly employable and relevant to Great Power Conflict. It is possible that some legacy Auxiliary Force institutions can be reformed to that end, but cost-benefit analysis might reveal opportunities to create entirely new Auxiliary Force organizations. To the extent possible under current law, Auxiliary Forces should expand volunteer service opportunities to those disqualified from otherwise enlisting in the Active or Reserve Components. The issue of who can serve and how remains of critical importance; civil-military relations with the U.S. Auxiliary Forces should no longer be deprecated as hobbyists, but elevated to recognize their potential role in Great Power Conflict.

If you enjoyed this post, check out **LTC Steve Speece**'s equally insightful **Alternate Futures 2050: A Collection of Fictional Wartime Vignettes**

… as well as the following related content:

The Operational Environment (2021-2030): Great Power Competition, Crisis, and Conflict

The Case for Restructuring the Department of Defense to Fight in the 21st Century, by **LTC Christopher Heatherly**

Global Entanglement and Multi-Reality Warfare and associated **podcast**, with **COL Stefan Banach (USA-Ret.)**

Going on the Offensive in the Fight for the Future and associated **podcast**, with Former Undersecretary of the Navy **James F. "Hondo" Geurts** and **Dr. Zachary S. Davis**

Young Minds on Competition and Conflict

The Convergence: Innovating Innovation with Molly Cain and associated **podcast**

Sub-threshold Maneuver and the Flanking of U.S. National Security, by **Dr. Russell Glenn**

"Once More unto The Breach Dear Friends": From English Longbows to Azerbaijani Drones, Army Modernization STILL Means More than Materiel and **China and Russia: Achieving Decision Dominance and Information Advantage** by **Ian Sullivan**

About the Author: Steve Speece *is an active duty U.S. Army officer currently assigned to the Joint Staff J2 as an Executive Intelligence Briefer to the Chairman's Special Staff. All opinions are his own and do not reflect any official statement of the Joint Staff, the U.S. Army, or the Defense Intelligence Agency.*

Disclaimer: *The views expressed in this blog post do not necessarily reflect those of the Department of Defense, the Joint Staff, Defense Intelligence Agency, Department of the Army, Army Futures Command (AFC), or U.S. Army Training and Doctrine Command (TRADOC).*

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Soldier for Life – Strategic Alignment of Generational Experience and Expertise (SAGE^2)

by Mr. Brandon S. Allen

***Sage*:** Middle English (as an adjective); from Old French, from Latin sapere 'be wise'
noun 1: one (such as a profound philosopher) distinguished for wisdom
2: a mature or venerable person of sound judgment (*Merriam-Webster's Collegiate Dictionary*, 1999)

Leading up to 2035, the Soldier for Life – Strategic Alignment of Generational Experience and Expertise (SFL-SAGE^2) Program will assist in providing solutions to individual, team, and social challenges while maximizing performance. SFL-SAGE^2 aligns with JP 1-0 (United States, 2020) through the experience and expertise of civilian personnel via retirees or former Soldiers to accomplish the mission. Skates (2021) noted the Army will not enjoy domain access and superiority in future multi-domain operations (MDO) as it did during the wars in Afghanistan and Iraq. Additionally, by 2035, advances in technology by both US and adversary forces may render the cyber and space domains untenable to support MDO. As a result, the Army may need to rely on analog or antiquated doctrine to conduct MDO. Through the SFL-SAGE^2 Program, former Soldiers with the necessary pre-Information Age experience and expertise lend their skills to their modern counterparts via a codified teach/coach/mentor training program nested within the existing Soldier for Life framework.

Former Soldiers who self-select or receive invitations to volunteer for the SAGE^2 Program will complete a survey that captures their current location, areas of experience and expertise, and their willingness to participate via in-person, virtual, or hybrid training programs to help prepare Army units to operate in cyber- and space-denied areas of operations. For example, the author is a former 98H Morse Code Interceptor. In a space- or cyber-denied environment, satellite, VHF, and modern digital communications methods may face disruption and HF Morse code may be one of the only ways to communicate. Units needing training on HF Morse code communications can reach out through SFL-SAGE^2 and request training. This type of teach/coach/mentor training capability has applicability across the Army to nearly every MOS that currently relies on technology and has an analog or pre-Information Age MOS.

The SFL-SAGE^2 Program does not limit itself to only helping operational units as they prepare for MDO. Former Soldiers with civilian occupations such accountants, lawyers, HR specialists, social workers, tradespersons, counselors, and health care providers can volunteer to provide advice and support (within the legal limits of their professions) to Soldiers and their families in their areas of expertise. The central repository of volunteers within the SFL-SAGE^2 database provides a ready, willing, and capable

network to respond to Army families' needs during personal, local, or national crises; whether we are at war or not.

Within the SFL-SAGE^2 framework lies a talent management (TM) archive that complements the TM efforts of the active force to capture the "knowledge, skills, behaviors, and even preferences (KSB-Ps) of individuals during their career" (McConville, 2021). In the true spirit of "Soldier for Life", volunteers for the SAGE^2 program can continue to serve and make a difference as they use their experience and expertise to accomplish the mission. In the uncertain and contested operational environment of 2035, every Soldier, no matter what their status, can make a difference and a positive impact on the Army.

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Securing the Information Home Front: Family Member Led *CyberTeams*

by Marie Le Scolan and Nathan Colvin

While examples of hybrid warfare, grey-zone activity, and information warfare proliferate, few programs build Soldier, let alone family member, resilience to these threats. Families are creating troves of unclassified data that can be exploited by adversaries. As Alex Wichowski points out, every time we swipe our credit card, view a webpage, or enroll in a discount program, our digital doppelganger gains fidelity. This is a new vulnerability, putting Army families directly in the cross-hairs of exploitation. This risk can be mitigated if the Army redesigns community services to enable families to protect personally owned devices and guard against disinformation.

The nexus of Soldier daily patterns is not their government computers; it is personally owned smart-phones, voice-activated assistants, and Wi-Fi networks. Recent scandals, such as Cambridge Analytica, raised awareness regarding the ease that individuals, organizations, and governments can extract psychographic data to create predictive models. However, most Soldiers and families are not aware of this. As Artificial Intelligence provides increasing ways of developing meaningful patterns from big data, personal devices pose a vulnerability to Soldiers, families, and Army operations. Beyond collection, the minds of Army families may become the target of psychological manipulation from both broad and narrow avenues of attack.

The Army must enable families to protect their networks, devices, information, and themselves from attack. The first safeguards are VPNs, antivirus, and other software issued to families. Secondly, provide simple courses on how to install these measures and set security features for network routers and connected devices. Identity protection and monitoring should be the new “digital SGLI”. Army provided “Cyber Squads” could make home visits to check on these settings and search for vulnerabilities. To protect the mindset of families, Army resiliency and holistic fitness programs must include tools to identify, report, and guard against disinformation as primary skills. This could have a secondary impact of preventing extremism.

Simultaneously, a competent workforce is needed to do this work. Since it is known that military spouses often suffer from under- or unemployment due to multiple PCSs, they could be recruited to fill the front line of defending their families. Hundreds of state, private, and corporate initiatives seek to train military family members in cyber-security. Building partnerships, the Army could create a corps of family member “interns” to fill “Cyber Squads.” Once a certain level of proficiency is obtained, family members could be hired as “Cyber Squad” supervisors and trainers, or given additional placement preference to information security and resiliency jobs on installation. Hence, family members are trained to circumvent technological risks to and prevent psychological interference, increasing their own transportability and employability.

Capability in the future operational environment increases the surface area of attack to include Army families. The stresses on Soldiers are compared to the impact of witnessing families under digital and psychological attack. To mitigate, a mix of settings, software, and training of family members to create self-sustaining teams that protect the information home-front are essential components of resilience in our fast-changing world.

Marie Le Scolan is a Political Science Student at Sciences Po Strasbourg, France with a desire to study and serve in the information warfare field. **Nathan Colvin** is a PhD student in International Studies who mentors students in allied countries to build stronger transatlantic ties.

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Mad Scientist Laboratory Blog Post 160 (11 July 19)

The Trouble with Talent: Why We're Struggling to Recruit and Retain Our Workforce

[**Editor's Note:** Mad Scientist Laboratory is pleased to publish today's post by guest blogger **Sarah L. Sladek**, addressing how many industries and government organizations remain enmeshed within Twentieth Century hierarchical management constructs, despite the Nation having moved on to become a Talent Economy. Recent challenges in attracting cyber-talent is a weak signal to our Army regarding recruiting, developing, and retaining the right mix of talent necessary to achieve the Multi-Domain Operations (MDO)-Capable Force by 2028 and set the conditions for fielding an MDO-Ready Force in 2035. Read Ms. Sladek's prescription for successfully generating, recruiting, and retaining our next generations of talent — Enjoy!]

The year was 2000. The startup that launched in 1998 had outgrown the garage, relocating to a nondescript building in an office park a couple of miles off the highway.

Outside that building, on an asphalt parking lot, employees played roller hockey. The games were full contact. Employees wore pads and would come back inside drenched in sweat and sometimes bloodied and bruised.

Inside the building, the game was twice as tough. Yes, there was free food for all employees and a massage therapist. The tough part was the company's founder, who would often provoke arguments with the staff over business and product decisions. He pushed his employees to develop their visions of future technologies.

A few years after the idea of ranking web pages by their inbound links came to **Larry Page** in a dream, the founder of **Google** wrote down his five rules for management. He was in his twenties at the time. The list of rules included:

– ***Don't get in the way if you're not adding value***;

– ***Ideas are more important than age***; and

– ***The worst thing you can do is say no. If you say no, you have to help find a better way to get it done***.

Somewhere at the tail end of the 20th century—perhaps right in that asphalt parking lot where the first Google employees played roller hockey—a radical change occurred and the **Talent Economy** emerged. Unlike other eras that have come before, this one is almost entirely powered by innovation and ideas.

Prior to this shift work was just a job, leadership was the equivalent of power, and the prioritization of talent didn't really exist. Consider this timeline:

1910: Natural resources were a company's most valuable assets. America's leading companies grew large by spending increasing amounts of capital to acquire and exploit oil, mineral deposits, forests, water, and land.

1946: Post-World War II, companies took a lesson from the military and applied systems to everything for increased efficiency, predictability, and productivity. This move resulted in a command-and-control leadership style Baby Boomers (1946-1964) were raised knowing.

1955: An insatiable appetite for American-made cars spurred the manufacturing industry. Companies needed labor, but mainly for routine-intensive jobs. When turnover occurred, those jobs were easy to fill, and individual workers had little bargaining power.

1963: A relatively new breed of corporation made the list of largest companies: IBM. This company was wasn't reliant on automation or natural resources. Rather, scientists, engineers, marketers, and salespeople were at the heart of IBM's competitive advantage.

1965: Business growth dominated the economy and more jobs began to require creativity, as well as independent judgment and decision-making skills. The concept of talent (utilizing skills, knowledge, and ideas) began to emerge.

1998: Google was founded by Larry Page and Sergey Brin, ages 25 and 24 respectively, ushering in an era of rule-breaking and innovation among people who would have once been regarded as too young to lead or influence.

2016: Topping the largest companies list were Apple, Microsoft, and Google, all talent-dependent companies. People under the age of 35 were starting more companies, managing bigger staffs, and realizing higher profits than any of their predecessors.

Clearly, change has happened. We've moved into a Talent Economy and the focus is on human capital. The irony is while most organizations are now prioritizing the recruitment and retention of talent, few have actually been successful at it. In fact, employee turnover has become a major concern. Gallup reports that young professional turnover alone costs U.S. companies an estimated $30.5 billion per year.

Why? Because there's a gap in our workforce.

In the past, organizations were built for scalable efficiency. Jobs were well-defined and organized to support processes and forecasts. Workers were trained to protect information and any collaboration with those outside of the organization was highly monitored or even discouraged.

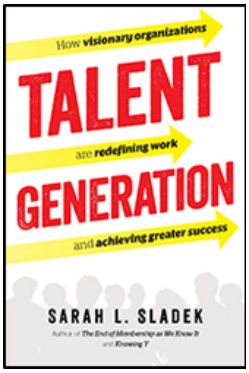
Now we've moved into the 21st century—the Talent Economy—and the generations born into this era have little to no memory of the last century's methodologies. They struggle to comprehend why decisions can't be made on the fly, why they can't have a seat at the decision-making table, and why it's always been done 'that way.' They've been raised in an era fueled by collaboration, globalization, mobility, flexibility, transparency, and creativity. Anything else seems foreign and irrelevant to them.

Hence, we have a problem: an ever-widening gap between the 20th century-managed organizations, and the 21st century-raised workforce. This gap has widespread effects,

including employee turnover, disengagement, and challenges finding talent. This means that every organization – including the military – needs to seriously reconsider how to find and keep talent.

Industrial versus Cyber Age Workspaces: Rigid mid-Twentieth Century office pool contrasted with collaborative Twenty-first Century workspace / Source: Google Dublin's interior

This situation is likely to get worse before it gets better largely because Baby Boomer retirements are escalating. Take the Army for instance. In 2018, the Army started out its fiscal year with an ambitious task: To bring in 80,000 new active duty soldiers. The military branch fell short of its goal partly due to a large number of senior personnel retirements. The Army Times reported that retention had "*stopped the bleeding of missed recruiting goals*," but the balance isn't sustainable in the long-term because the Army "*could end up with more leaders than soldiers to lead*."



Turnover, decline, and uncertainty about the future doesn't have to be the reality for any organization. I've spent several years researching generational behaviors and the employee engagement practices common among the most successful organizations in existence today. In brief, here are six of my key findings, which I also outline in my latest book, ***Talent Generation*** (2018).

If you want to engage the next generation of talent, this is exactly what you must do:

Put Ego Aside

In the 20th century, leadership was often the equivalent of power, fueled by a top down, '*do-it-because-I-said-so*' approach to management. Today, the organizations boasting the highest employee engagement are led by leaders who exhibit a strong sense of passion, humility, and urgency. They are willing to learn from others and take risks. Unlike their 20th-century predecessors, these leaders are visionary, collaborative, and swift, never losing sight of their organization's core purpose or wavering in their desire for change.

Practice Acceptance

The organizations boasting high employee engagement are those that spend a considerable amount of time thinking about change and preparing for it. They also spend a considerable amount of time thinking about how to hire the best and build the best teams. The fact is, employee engagement is an impossible feat in the midst of distrust, stereotypes, and hierarchies. Today's most successful organizations are accepting of new ideas and new people and intentional about building relationships.

Put People First

Being truly talent-focused means prioritizing your people above all else. In a talent-focused organization, the entire team is empowered and encouraged, always part of the discussion, and there's an effort to incorporate young talent into everything.

Stay Future Focused!

It's imperative that all organizations ask: How do we rebuild around what we need to be next, rather than what we used to be? Organizations boasting high employee engagement are focused on creating the future, not responding to it. They pay attention to trends, set aside time to contemplate their futures, and dialogue often with younger generations.

Collaborate

Innovation naturally happens through and exists within collaboration. And the best organizations harness innovation from their employees and outsiders—especially those from younger generations. True collaboration isn't limited to doing one project every once in a while; it's a sustained strategy which maximizes individual contribution while leveraging the collective intelligence of everyone involved.

Build a Better Future

We have moved rapidly into a global, technologically advanced, knowledge-based economy. Presently, our schools are preparing students for a world we can't even imagine, and they're struggling to adapt and make the school-to-work connection. Many of today's leading organizations have aligned with student-focused initiatives, and it's critical that representatives of military, business, and industry find a way to get involved in school programming, outreach, partnering, and education. New research indicates that students hone in on a career path as early as sixth grade, so the connection must start before a student's junior or senior year in high school.

As we move from the computer age into the cyber-age, the workforce crisis will become even more apparent as new industries, jobs, and skills emerge. **The real issue is no longer talent management; it's talent generation.** It's imperative that organizations engage younger generations of talent, and help train and prepare future talent.

Talent is our nation's greatest asset. Talent is the heart and soul of every organization, and developing that talent has become more urgent and important than ever.

We cannot become a nation that relies on others to manufacture, create, and innovate. We cannot sit back and wait for someone else to solve this problem. If we do, we continue to fail.

We cannot be apathetic towards our future, thinking it will be someone else's problem to solve. If we do, we continue to fail.

Without talent, we have much to lose. Without talent, we have no purpose, no future, and no hope. Without talent, society fails. So let's put an end to the workforce crisis and seek to innovate, embrace change, and move our organizations into this next century. Let's make work work again.

If you enjoyed this post, please also see:

– **TRADOC 2028**

– **Old Human vs. New Human**

– **BrAIn Gain > BrAIn Drain: Strategic Competition for Intellect**

– **Setting the Army (Part III)**

Sarah L. Sladek *is the founder and CEO of XYZ University, LLC, a future-focused management consulting firm. In addition, she is the author of five books and several research papers on generations, membership and employee engagement, and the future of work. Her latest book is Talent Generation: How Visionary Organizations Are Redefining Work and Achieving Greater Success. Twitter: @SarahSladek. Web: www.xyzuniversity.com*

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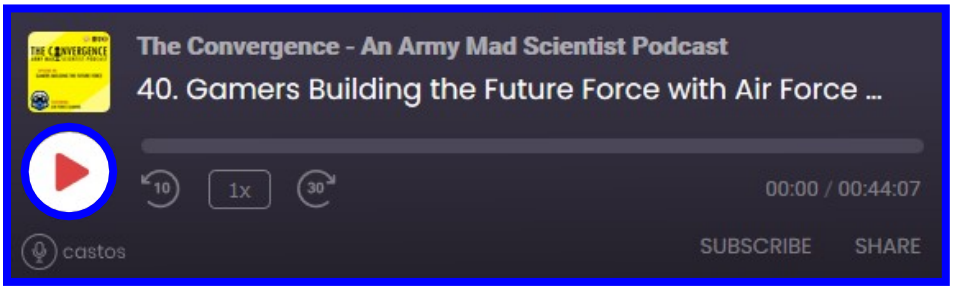
Mad Scientist Laboratory Blog Post 341 (22 July 21)

Gamers Building the Future Force

[**Editor's Note:** Mad Scientist Laboratory is pleased to announce our latest episode of ***The Convergence*** podcast, featuring **Air Force Gaming** leads **Capt Zach Baumann**, **Capt Oliver Parsons**, and **MSgt Michael Sullivan** discussing how gaming breaks down barriers in rank, generation, and geography; identifies the digital talent residing in the gaming community; and how video games can cultivate the future Senior Leaders in the military — Enjoy! (Please note that this podcast and several of the embedded links below are best accessed via a non-DoD network due to network priorities for teleworking)]



[If the podcast dashboard is not rendering correctly for you, please click **here** to listen to the podcast]

Air Force Gaming (AFG) is the official gaming program and competition hub for the United States Air Force and Space Force. Over 86% of Airmen and Guardians between the ages of 18-34 identify as gamers. AFG was started to help Airmen of all ages, ranks, and backgrounds find common ground through video games, while also promoting mental acuity, fine motor coordination, and competitive excellence. Its mission is to create an inclusive gaming community for Airmen of all ages, ranks, and backgrounds.

AIR FORCE GAMING

Capt Zach "ZB" Baumann co-founded AFG, and for the better part of 2020, led the explosion of AFG's digital reach to 575K impressions and 40K profile visits (doubling its digital footprint of followers on social media and verified members on its Discord server) across five platforms, and tirelessly built the connective tissue between the Department of the Air Force, DoD at large, and the gaming industry — ultimately leading to AFG's "acquisition" by the USAF in November of 2020. **AFG is helping to bridge thegap between the DoD's digital natives (tomorrow's leaders) and digital immigrants (today's leaders).**

Capt Oliver "OliPoppinIt" Parsons founded AFG and leads a diverse group of Airmen and Guardians all across the world. AFG strives to be the leading DoD eSports/gaming organization. In 2020, he led the **AFG Space Force Call of Duty** team to victory in the first ever **transatlantic Armed Forces eSports bowl** (**CODE Bowl**).

MSgt Michael Sullivan co-founded AFG, launching the Department of the Air Force's first gaming and eSports organization, with a primary focus in mental health and resiliency for service members. MSgt Sullivan led day to day operations; advised on the organization's direction, event planning, and brand implementation; developed its "Ambassador" volunteer program, on-boarded, and trained50+ personnel; and established the first ever USAF/USSF official eSports teams, achieving the Championship title in an international tournament.

In today's podcast, Capt Baumann, Capt Parsons, and MSgt Sullivan discuss how gamingbreaks down barriers in rank, **generation**, and geography; identities the **digital talent** residing in the gaming community; and how video games can cultivate

the future Senior Leaders in the military. The following bullet points highlight key insights from our interview:

- **AFG seeks to identify and engage gamers already 'within the gate' of theAir and Space Forces, providing an online platform where Airmen and Guardians can network and develop skills in teaming, organization, and strategy.** AFG hopes to expose the benefits of gaming to the DoD, counteracting the outdated stereotype that gaming is a waste of resources.

- AFG engages service members on a massive array of games, ranging from **tabletop games** like chess to interactive streaming games like **Minecraft** and**League of Legends**. **This feature of the community allows for the inclusion of a wide spectrum of gamers with different skills and interest levels.**

- AFG emphasizes that almost all 'techies' are 'tinkerers' who can use games totest new strategies and creative processes. **Thus, games provide service members with opportunities to fail in a safe environment.** Embracing this feature of gaming, in which new strategies can be **developed and tested**, canhelp create a culture of game appreciation in DoD, even up to the level of Senior Leaders.

- **Importantly, gaming communities within the DoD can facilitate better talent management.** Gaming exposes 'hidden talents' among service members, helping the branches identify tomorrow's leaders that are alreadyserving.

- **Gaming can also help promote cooperation and competition across thebranches of the military.** As each branch works to develop new ways to engage gamers, they can learn from each other, advancing the DoD missioncollectively.

Stay tuned to the Mad Scientist Laboratory for our next episode of "***The Convergence***," which, now that the 2021 Baseball Season isin full swing, will feature last year's interview with proclaimed Mad Scientist **Keith Law**, author and Senior Baseball Writer with ***The Athletic***, discussing the parallels between baseball and the Information Environment, how stats skew our thinking, and the implications of anchoring bias.

If you enjoyed today's post and podcast, check out the following related content:

New Skills Required to Compete & Win in the Future Operational Environment

Future Jobs and Skillsets

U.S. Demographics, 2020-2028: Serving Generations and Service Propensity

Old Human vs. New Human

The Convergence: The Future of Talent and Soldiers with MAJ DelaneyBrown, CPT Jay Long, and 1LT Richard Kuzma and associated **podcast**

The Metaverse: Blurring Reality and Digital Lives with Cathy Hackl andassociated **podcast**

Fight Club Prepares Lt Col Maddie Novák for Cross-Dimension Manoeuvre, by **LTC(P) Arnel David**, U.S. Army, and **Major Aaron Moore**, British Army, alongwith their interview in **The Convergence: UK Fight Club – Gaming the Future Army** and associated **podcast**

Ian Sullivan's two posts — **Would You Like to Play a Game? Wargaming as a Learning Experience and Key Assumptions Check** and **"No Option is Excluded" — Using Wargaming to Envision a Chinese Assault on Taiwan** — exploring the relevant lessons wargaming can teach us about Large Scale CombatOperations against Russia and China, respectively

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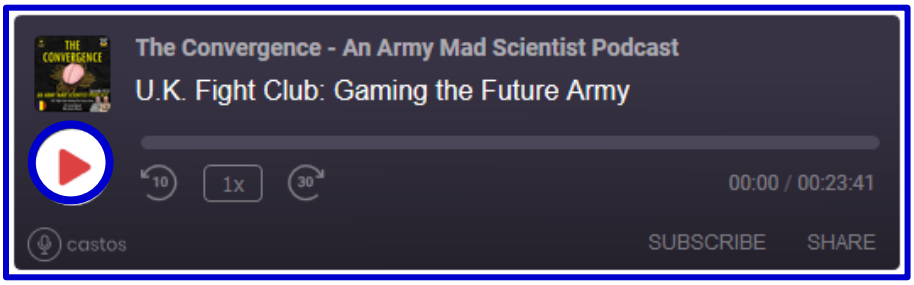
Mad Scientist Laboratory Blog Post 255 (23 July 20)

The Convergence: UK Fight Club – Gaming the Future Army

[**Editor's Note:** Mad Scientist Laboratory is pleased to announce our latest episode of "*The Convergence*" podcast, featuring guest bloggers **LTC Arnel David**, U.S. Army, and **Major Aaron Moore**, British Army, discussing ***Fight Club*** and the nascent revolution in Professional Military Education. Please note that this podcast and several of the embedded links below are best accessed via a non-DoD network due to network priorities for teleworking — Enjoy!]



In this latest episode of "The Convergence," we talk with guest bloggers **LTC Arnel David**, U.S. Army, and **Major Aaron Moore**, British Army, who recently penned **Fight Club Prepares Lt Col Maddie Novák for Cross-Dimension Manoeuvre** — describing the nascent revolution in Professional Military Education (PME) wrought by the convergence of Artificial Intelligence (AI), digital assistants, gaming, and Augmented and Virtual Reality (AR/VR). Using storytelling and backcasting, LTC David and Maj Moore vividly described how Leaders will seek out and leverage these technologies to hone their warfighting skills across all dimensions, enabling them to "think, fight, learn, repeat" and enhance their versatility as innovators on the battlefield.

In today's podcast, LTC David and Major Moore further discuss the convergence of technology and wargaming that resulted in Fight Club and how it is transforming Leader development:

- Fight Club designs realistic wargames to **remove hierarchies and encourage players to attempt innovative solutions**, while also creating a **safe environment to fail repeatedly and learn from mistakes**.

- These games replicate expensive training through a virtual setting, and **harness younger generations' aptitude for technology and virtual networking**. The virtual setting also allows Fight Club to better connect players of different backgrounds, making the gaming more available and accessible.

- **The DoD should implement more gaming in training**. Wargaming can be effective in more frequent, smaller-scale games to increase Service members' exposure to these types of decision making.

- **Wargaming helps the Army and its international partners increase interoperability** without having to run large-scale, time-compressed exercises.

- Gaming will **allow the military to push innovation** and will continue to attract younger generations who thrive in interactive environments. **The competitive nature of gaming can inspire action and push people to develop more creative and effective solutions**.

Group Photo of Fight Club Warrior Council, with Major Aaron Moore (2nd from left) and LTC Arnel David (4th from left)

Stay tuned to the Mad Scientist Laboratory for our next podcast with **Samantha North**, disinformation analyst and doctoral candidate, discussing political tribalism online and susceptibility to disinformation on **6 Aug 2020**!

If you enjoyed this post, check out the following related posts:

"Top Ten" Takeaways from the Learning in 2050 Conference

New Skills Required to Compete & Win in the Future Operational Environment

The Future of Learning: Personalized, Continuous, and Accelerated

TRADOC 2028 (and **TRADOC 2028** video [view via a non-DoD network])

Setting the Army for the Future (**Parts II** and **III**)

Future Jobs and Skillsets

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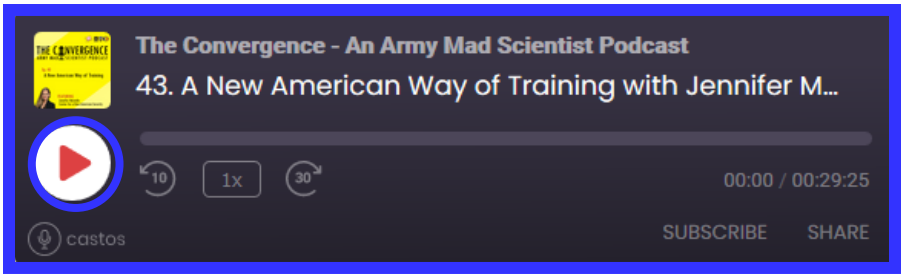
Mad Scientist Laboratory Blog Post 356 (30 Sep 21)

A New American Way of Training with Jennifer McArdle

[**Editor's Note:** Army Mad Scientist is pleased to feature our latest episode of ***The Convergence*** podcast, with **Jennifer McArdle**, Product Strategist at ***Improbable*** and Adjunct Senior Fellow at the ***Center for a New American Security***, discussing the future of the **Synthetic Training Environment**, flexibility and scalability in training systems, and the critical need for a new agile approach to training that can keep pace with the dynamic character of warfare — Enjoy! (Please note that this podcast and several of the embedded links below are best accessed via a non-DoD network due to network priorities for teleworking)]



[If the podcast dashboard is not rendering correctly for you, please click **here** to listen to the podcast.]

Jennifer McArdle is an Adjunct Senior Fellow with the Defense Program at the **Center for a New American Security** (CNAS) and a Product Strategist at **Improbable LLC**, an emerging global leader in distributed simulation technology for military planning, training, and decision support. Her research focuses on military innovation, readiness, and synthetic training. She currently serves as an expert member of a NATO technical working group that is developing cyber effects for the military alliance's mission and campaign simulations. Her work has been

featured in ***Real Clear World***, ***The Cyber Defense Review***, ***National Defense Magazine***, and ***War on the Rocks***, among others. Ms. McArdle previously served as an Assistant Professor of Cyber Defense at Salve Regina University, where she lectured on the relationship between national security and disruptive technologies.

In our interview with Ms. McArdle, we discuss the future of the Synthetic Training Environment, flexibility and scalability in training systems, and the critical need for a new agile approach to training that can keep pace with the dynamic character of warfare. The following bullet points highlight key insights from our interview:

- **Synthetic training will be instrumental in providing the next generation of Soldiers with the tools they need to succeed in a new era of warfare.** The adoption of synthetic training and simulation will empower realistic individual and collective multi-echelon and multi-domain **training and mission rehearsal**, advanced wargaming, and enhanced decision-making.

- The **New American Way of Training Initiative** at CNAS examines how the military will be required to train and fight in the future, using the Cold War as a model. During the Cold War, intense tension and sporadic 'hot' proxy conflicts spurred a series of innovations that required radical changes to military training and organization. **This new CNAS initiative will help ensure that our future individual and collective training programs meet the needs of our warfighters, today and in the future.**

- **The DoD should focus on developing modular synthetic training architectures, enabling it to adapt training and simulations more readily as warfare evolves.** This method differs from current **synthetic simulators**, which are monolithic in nature (i.e., large, complicated, and un-editable platforms). Modular training simulations will give future Soldiers 'degradation dominance,' or the ability to maintain high levels of performance under duress.

*The **Synthetic Training Environment (STE)** is designed to provide a collective, multi-echelon training and mission rehearsal capability for the operational, institutional and self-development training domains / Source: U.S. Army Acquisition Support Center*

- **The DoD should require modular components of training platforms in future acquisition contracts.** Such contracts will also reduce cost for the DoD, as updating platforms will require less overhaul than monolithic platforms.

- **Synthetic training is particularly important for success in multi-domain operations.** Due to safety and security concerns, the military does not incorporate live cyber elements in its training exercises. However, synthetic environments would enable Soldiers to experience the stress of such elements in a risk-free environment, better preparing them for the realities of multi-domain operations.

- **Successfully prioritizing training support will require the DoD to dedicate itself to organizational change.** Breaking down 'knowledge silos' and promoting the cross-pollination of ideas will ensure that the DoD is able to use its **latent talent** and fully exploit the benefits of **breakthrough technologies**.

Stay tuned to the Mad Scientist Laboratory for our next episode of "***The Convergence***," featuring our interview with **Terry Young**, Founder and CEO, ***sparks & honey*** — "*a cultural intelligence consultancy helping organizations understand explosive and immediate cultural shifts, as well as cultural tastes that develop over time.*" We will discuss the future of workplaces, the meaning of true diversity and how to achieve and measure it, and how to leverage AI and machine learning to build cultural intelligence across a wide spectrum of future topics on ***14 October 2021!***

If you enjoyed this post and podcast, check out the following related content:

From Legos to Modular Simulation Architectures: Enabling the Power of Future (War) Play, by **Jennifer McArdle** and **Caitlin Dohrman**

The Synthetic Training Environment [view via a non-DoD network], presented by then **MG Maria Gervais**, Director, STE Cross Functional Team (CFT) / Deputy Commanding General, Combined Arms Center-Training (DCG, CAC-T), from the ***Mad Scientist Installations of the Future Conference***, co-sponsored by the Office of the Assistant Secretary of the Army for Installations, Energy and Environment (OASA (IE&E)) and the Georgia Tech Research Institute (GTRI) on 19-20 June 2018 in Atlanta, Georgia, and see her associated **slide deck**

The STE discussion in the **Top Ten Takeaways from the Installations of the Future Conference**

The Metaverse: Blurring Reality and Digital Lives with Cathy Hackl and associated **podcast**

Gamers Building the Future Force and associated **podcast**

Fight Club Prepares Lt Col Maddie Novák for Cross-Dimension Manoeuvre, by **LTC(P) Arnel David**, U.S. Army, and **Major Aaron Moore**, British Army, along with their interview in **The Convergence: UK Fight Club – Gaming the Future Army** and associated **podcast**

The Convergence: The Future of Software with Major Rob Slaughter, then listen to the associated **podcast**

Disclaimer: *The views expressed in this blog post do not necessarily reflect those of the Department of Defense, Department of the Army, Army Futures Command (AFC), or TRADOC.*

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Mad Scientist Laboratory Blog Post 297 (14 Jan 21)

Dense Urban Hackathon – Virtual Innovation

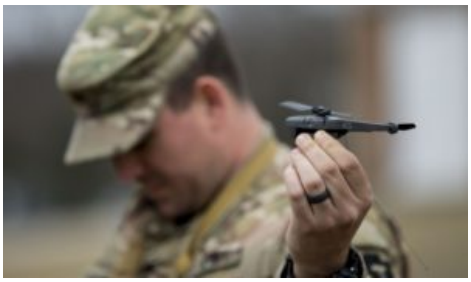
[**Editor's Note:** The Mad Scientist Initiative's mission is to connect the intellect of the Nation to the Army and serve as an on-ramp for academia, industry, other Government agencies, and citizens at large to share their ideas and innovations. We've found crowdsourcing — the gathering of ideas, thoughts, and concepts from a widespread variety of interested individuals — to be an extremely valuable tool in helping us accomplish this mission; diversifying our thoughts and challenging our assumptions. To that end, Mad Scientist was pleased to continue our enduring partnership with the **National Security Innovation Network** in exploring solutions to problems in Dense Urban Environments last year. "***Seeing into the Unknown – A hackathon exploring situational awareness in dense urban environments***" helped the Army identify new and novel ways for Soldiers to see inside buildings, subterranean areas, and other obfuscating structures. Read on to learn about the innovations and unexpected insights we gleaned from this extremely successful collaborative endeavor!]

During the summer of 2020, Mad Scientist partnered with the **National Security Innovation Network** (NSIN) to execute a virtual hackathon centered on solving situational awareness problems in **Dense Urban Environments** (DUE). Hackathons are great ways to connect with innovators, thinkers, and creators to crowdsource cutting edge and outside-the-box solutions. For this hackathon, we asked the teams to generate novel concepts and solutions for sensing (e.g., detecting, measuring, mapping, monitoring) interior spaces, transmitting this data, and providing an understanding of the dense urban environment to first responders and operators.

The teams were asked to focus on several key areas of the problem: detecting physical characteristics and activity, delivering the data in a usable and timely manner, and displaying actionable information to decision-makers.

The event brought together over 300 virtual participants from academia, defense, start-ups, and early stage ventures. In the end, that group was narrowed down to eight finalists, and eventually three winners that earned $15,000 in contract funding to further develop their ideas. While the objectives of the hackathon were fulfilled, and many early technology solutions were identified, the event also brought to light several key insights that will help the Army now and in the future:

Many technology trends that Mad Scientist tracks were featured prominently throughout the event. **Artificial intelligence (AI)**/**Machine Learning (ML)**/**autonomy**, **robotics**, **sensors**, and the civilian **Internet of Things (IoT)** were all at the forefront of the finalists' solutions and most, if not all, of the participants' submissions. What's clear is that operators in DUE will need synthetic assistance and the **convergence** of many technologies to carry out successful missions. To gain situational awareness, a sensor or suite of sensors needs to access an unseen area, and robots or **Unmanned Systems** (UxS) – varying in size, shape, and locomotion – will be the best way to get them there. **Legged robots** will traverse corridors and climb stairs, whether controlled remotely or autonomously, while unmanned aerial systems can fly through windows or bypass stairs to strategically emplace or act as sensors themselves. AI and ML will process the information coming back and highlight the most relevant pieces for visualization to the operator. Reducing cognitive overload and providing a clear and easy to understand picture is imperative and all of the finalists emphasized that importance. In the end, the goal is to provide situational awareness to the operator and augment commanders' decision making.



Public-Private collaboration is not only possible, it can be easy and effective. In order to modernize and keep up with the pace of technological change, the Government will have to look to the private sector and academia. These partnerships will prove vital. As innovation has **shifted to industry** for the past several decades, access to these groups can be difficult as government regulations and red tape can be stifling. This virtual hackathon showed that the Government can attract the best and brightest to extract tangible technology solutions while having a free and open dialogue / exchange of ideas. In addition to the 300 participants that took part in the event, eight

finalists were identified. The Army now has a strong relationship with a group of innovative technology developers that it didn't have before.

A hackathon can answer questions you didn't know you were asking. This event posed a very specific question to the participants and asked them to focus on a very narrow objective. But innovation and ideation don't happen in a rigidly constrained environment. In addition to the solutions that were picked as finalists and winners, there were several other teams that provided technology solutions to problems in DUE that could help warfighters today but didn't strictly align with the hackathon's objectives. The Army never would have been privy to these ideas without the creative catalyst provided by the hackathon. Ideas like ***small, cheap, and quickly deployable but robust ad hoc networks*** or ***improvements to computer vision for self-driving vehicles*** are but two of the innovative ideas that emerged. These have real value and application to other organizations within the Army.

Further, this hackathon really helped us breakdown and understand the DUE situational awareness problem in a more granular fashion. The solutions presented showed us that the larger problem consists of four different subsets: **access**, **sensing**, **transmitting**, and **displaying**, and each finalist addressed one or some of them. The onus is now on the Army to ultimately discern how best to combine them and create a solution that solves the overarching problem.

Hackathons can make a murky future slightly clearer. Among the myriad of ideas presented are weak signals that can help vector us in the right direction for the future. While it's foolish to predict the future, we can narrow it down to a range of potential possibilities, and analyzing the ideas from this event can help us confirm we're on the right track or highlight where we might be going wrong. As previously stated, our interest in AI/ML, autonomy, IoT, UxS, and robotics seems to be grounded in reality. All of these technologies were instrumental in the best solutions. It also confirmed to us that the Radio Frequency (RF) spectrum and connectivity are going to be vital in the future. Most solutions featured a remote sensing technology that transmitted data back to the operator or receiver. In a denied or degraded RF environment, information processing or visualization would be impossible. Knowing what is at stake, we can make decisions now to protect and harden our communications infrastructure for the future. This foresight will also allow us to begin altering our training and education to focus on **man-unmanned teaming**, **trust in AI and autonomy**, and network configuration.

This hackathon demonstrated the effectiveness of inter-governmental cooperation, outreach to academia and industry, and the value and efficiency that can be achieved quickly and cheaply. Innovation is difficult foster, and government access to innovators can be challenging, but virtually connecting the intellect of the Nation to the warfighters, researchers, technology developers, and decision-makers who need their help doesn't have to be.

If you enjoyed this post, learn more about each of the eight hackathon **finalists'** and three **winners'** submissions…

… explore the role technological convergences will play in the Operational Environment:

> **Estimation of Technological Convergence by 2035**, and the associated **final report** and **briefing slides**, by **Lt Col Nicholas Delcour** (USAF), **Lt Col Louis Duncan** (USAF), **Mr. Stephen Frahm** (DOS), **CDR Patrick Lancaster** (USN), and **Lt Col Lance Vann** (USAF), collectively known as the Army War College's Mad Scientist Fellows of 2020, under the direction of **Prof. Kristan Wheaton**, U.S. Army War College
>
> Proclaimed Mad Scientist **Dr. Jamie Canton**'s presentation on **Convergence of Future Technology** [watch via a non-DoD network] from the Mad Scientist **Robotics, Artificial Intelligence, & Autonomy Conference** at Georgia Tech Research Institute, Atlanta, Georgia, 7-8 March 2017
>
> **Speed, Scope, and Convergence Trends**
>
> **Table of Future Technologies: A 360 Degree View Based on Anticipated Availability** and the associated **Table of Future Technologies**, created by **Richard Buchter**

… read about the challenges of military operations in DUE:

Content from the **Current and Future Operations in Megacities Conference**, 16-19 July 2019 in Tokyo, Japan; the **Multi Domain Battle (MDB) In Megacities Conference**, 3-4 April 2018 at Fort Hamilton, New York, and the **Megacities and Dense Urban Areas Conference**, 21-22 April 2016 at Arizona State University, Tempe, Arizona. Videos of the presentations from each of these conferences may be accessed [via a non-DoD network] **here**, **here**, and **here**, respectively.

Dense Urban Environments (DUE): Now through 2050

TRADOC Pamphlet 525-92-1, The Changing Character of Warfare: The Urban Operational Environment

Military Implications of Smart Cities, by **Alexander Braszko, Jr.**

Warfare in the Parallel Cambrian Age, by **Chris O'Connor**

Integrated Sensors: The Critical Element in Future Complex Environment Warfare, by **Dr. Richard Nabors**

… and listen to the following podcasts, hosted by our colleagues at ***Modern War Institute***:

The Battle for Mosul, with **COL Pat Work**

The Future Urban Battlefield, with **Dr. Russell Glenn**

Disclaimer: *The views expressed in this blog post do not necessarily reflect those of the Department of Defense, Department of the Army, Army Futures Command (AFC), or Training and Doctrine Command (TRADOC).*

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Mad Scientist Laboratory Blog Post 334 (21 June 21)

Keeping the Razor's Edge: 4th PSYOP Group's Innovation and Evolution Council

[**Editor's Note:** Regular readers will remember a **post** from last March by **LTC Jim Armstrong**, addressing the Army's current "innovation gap." He deemed that this vulnerability is likely to persist until the Army addresses the cultural obstacles that frustrate its ability to leverage innovation at the tactical level to close the gap in the innovation space. **COL Scott Shaw** observed in a recent episode of our ***The Convergence*** **podcast** that "*U.S. Soldiers and Leaders are the United States' greatest asymmetric advantage.*" Today's guest blog post by members of the **4th Psychological Operations Group** (4th POG) **Innovation and Evolution Council** describes how their Command is successfully fostering tactical innovation and leveraging the asymmetric advantage of the American Soldier to counter our adversaries advances in the competition for global influence dominance — Read on!]

Innovation is increasingly crucial to achieving a competitive and sustained advantage over **peer adversaries**. The shift in foreign policy, declared **competition**, coupled with a shrinking defense budget, has required military leaders to be even more creative with developing solutions to complex problems: a task Special Operations Forces (SOF) organizations are best suited for — their ability to **adapt and innovate** in a timely fashion and in leveraging available **human capital**.

The **Cambridge Analytica** **scandal** in 2018, among other watershed moments, revealed how **influence operations** have become hyper-transnational, technically driven, inexpensive, and democratized in the last decade. Furthermore, **Russia** and **China** have proven their ability to embrace technological platforms and companies, such as Cambridge Analytica, to engage audiences and **undermine democracy** worldwide. By 2020, 4th POG found itself challenged in an increasingly hot global arms race for **influence dominance**. Our adversaries often outnumber and out-invest us by orders of magnitude. While USG government offices are starting to recognize and **sound the alarm**, 4th POG leadership understood that barring massive and sustained innovative changes, the Group would have difficulty competing under the new paradigm.

As the character of competition became increasingly technical and specialized, the 4th POG faced various challenges in terms of how it would develop itself to address the future. **Machine Learning and Artificial Intelligence** (ML/AI), SOF- peculiar cyber and electromagnetic activities (CEMA), **automation**, data science, and analytics are all highly technical and specialized areas that the regiment had not invested in previously, but are key to the revolution in military affairs. The Group needed multiple moonshots in different areas of expertise to catch up rapidly. To achieve this, the 4th POG created the **Innovation and Evolution Council** (IEC), a 15-member group that ranged in rank from Sergeant to Major and drew personnel from across all the regional battalions. **Its purpose is to overcome the traditional barriers to innovation within the organization and make rapid, scalable advances in how 4th POG competes to 1) win back superiority against competitors, and 2) maintain the advantage going forward.** And contrary to Russia's and China's authoritative compulsory service, USSOF and PSYOP forces choose to enlist and serve; the IEC's volunteer nature is a momentous energy source.

The Name of the Game is *Innovation*

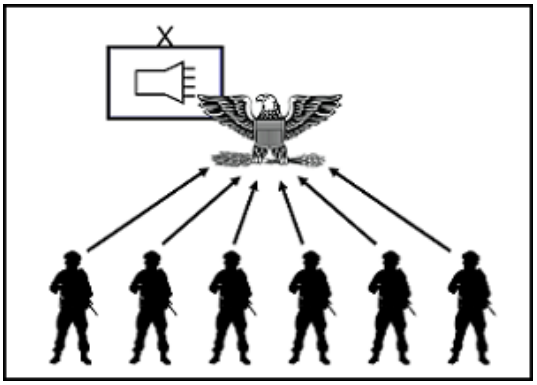
PSYOP Groups recently established S8 positions, signaling that long-term planning and manpower towards solution development is required for future unit success. In the U.S. Army, the S8 sections assist their units with **identifying solutions** for existing capability gaps or problems within the unit. This often requires long-term resources requiring

formal requests for funding to result in Programs of Record for multi-year use, or in other words, the establishment of a **Future Years Defense Program** (FYDP).

In the beginning, the IEC had to overcome several existing barriers to innovation in most Army organizations. These are: 1) finding enough "innovative" people, 2) overcoming bureaucratic complexity, and 3) overcoming organizational inertia. **The key to finding enough "innovative" people is to understand that innovative and passionate minds exist in all organizations at all levels.** One primary obstacle is the likelihood that these individuals will find each other or have the opportunity to collaborate in one location long enough to achieve the critical mass necessary to turn an innovative idea into reality. More often than not, multiple individuals within the SOF community and/or communities of interest are already working towards solutions and revolutionary projects. Often these people are diligently working in an unofficial capacity and on their personal time in which the chain of command is unaware. These individuals would continue to work on these problem sets with or without the IEC; however, without something like the IEC in place, the 4th POG would not have been aware of these efforts and, consequently, would have been unable to invest therein. **Success for the leadership is finding these people, linking them up with one another to achieve critical mass, and investing sufficient resources to turn promising projects into sustainable action.** We already see the results of this — ranging from better ways to collate and share information, shared experiences outside of the standard mission-sets and doctrine, to new perspectives that help others in their research and planning processes.

PSYOP is not alone in the endeavor to address the "next fight." The **Multi-Domain Task Force** in the **3rd Infantry Division** and the **75th Ranger Regiment**'s **Project Galahad** were designed to take on complex problems and are highlighted as models of innovation. Both organizations are designed to address the complexity of the modern and future battlefields, and their creation is fundamental to inspire innovation. The PSYOP Regiment is no stranger to such innovation. **Special Operations Effects Cells** often include PSYOP as a critical component for driving nebulous operations.

Many of the IEC's members have worked (or still work) as freelancers in marketing, graphic design, publishing, coding, film, web development, podcasting, and at a national laboratory. The members' backgrounds are diverse, providing invaluable skills and unique experiences. The IEC accepts a one-page resume and statement of purpose from any military member currently or previously assigned to the 4th POG, with STEM or related innovation experience. The resume and purpose statement allow members to know each other's backgrounds while also enabling the S8 to quickly determine which members may be best to engage on a specific problem set.



The IEC's creation has enabled a direct communication line between these Soldiers and key decision-makers within the 4th POG. This allows ideas to bypass the traditional series of gatekeepers and reach the Group Commander, Command Staff, and higher without fatal distortions. Providing skilled individuals within an organization the latitude for project development and problem-solving is common in civilian organizations. **Google** famously fostered similar projects that led to the creation of **Gmail**, **AdSense**, and the current **Google X Lab** for innovation, and all are examples of the model being successfully implemented. It is natural that adopting this model into a discipline as complex as Psychological Operations would drive a path to success.

From a behavioral psychology perspective, change is difficult and overcoming organizational inertia has been the biggest challenge to innovation projects when the IEC attempts to scale its efforts. To persuade rank and file Soldiers and average leadership populations to adopt changes, adjust existing behaviors, or change certain beliefs is just as challenging as the act of innovating itself. **Innovative ideas and practices will fall short of the desired effect if most organizations do not adopt the changes or do not possess the technical skills required.**

Outside-the-box Operations

Critical mass requires enough individuals working on a project for a sufficient amount of time to turn an idea into reality. To work around the fact that members work across various units and have primary duties and responsibilities that have to come first, the IEC functions as a persistent working group where experience and proficiency determine the group's direction and individuals' focus. Once accepted, members continue to work on projects and contribute even if they change units, duty status, or jobs. While far from ideal, this arrangement allows for the level of persistence necessary to see projects to completion. Members harness the available technology to maintain communication and productivity. The unit's S8, also known as the cyber, innovation,

and modernization officer, serves as the group moderator and knowledge link with Programs of Record, Doctrine, and the Command. IEC members engage and answer on their own time, focusing on their areas of personal skills, knowledge, and talent.

The role of the S8 is crucial to overcoming bureaucratic inertia in the innovation process. Within SOF, existing systems and procedures exist to support and resource innovation that stretch into the interagency networks. The problem is that these were created over years or decades and have likewise grown in complexity. There is a steep learning curve associated with understanding this network, how to navigate it, and then leverage it for change. **Without the S8 position to coordinate these complex interactions full-time, innovations are significantly less likely to occur and the chance of an innovative idea reaching fruition decreases drastically.**

The IEC uses DoD **Commercial Virtual Remote** (CVR) [now superseded by **Army365**], **SOCOM Microsoft Teams**, the various applications hosted within both platforms, and the rest of the Special Operations Forces (SOF) Information Enterprise. Using these platforms, the IEC improves continuity, increases feedback via surveys, communicates globally, and improves task-focused teamwork. **We also endlessly feed creativity and curiosity with discourse among less official platforms, such as Discord and Signal.** The content for this blog post was written, compiled, and edited within the electronic IEC Team on SOCOM Microsoft Teams.

IEC members work with highly experienced individuals from all the SOCOM Regiments and AOs, allowing ideas and skills to cross-pollinate vertically and horizontally within and outside the organization. Valuable input and feedback directly contribute to the modernization, innovation, and evolution within the **Command Subordinate Units** (CSU), **1st Special Forces Command (Airborne)**, **U.S. Army Special Operations Command**, and **U.S. Special Operations Command**. IEC members interact with the innovation, science and technology, and modernization leads throughout these multiple echelons.

In an era of competing tech platforms, the IEC can evaluate and provide written feedback that will directly benefit the broader **USSOCOM** enterprise. And with limited personnel within the ranks with such specialized knowledge, the IEC has been critical in standing up the Group's **Digital Training Facility** by writing objectives, tasks, concepts of training, and equipment requirements. When members can reach back to the IEC, they find a seemingly endless pool of knowledge and experience. IEC discourse has aided real-world missions and solved problems, such as working with policies and procedures that were entirely new for the unit of action. Due to the IEC's collaborative nature, a member from the **IWC** (Information Warfare Center) responded to complications promptly.

The Big Picture

Leadership is supportive of the IEC's positive **change agents**. The Group Commander identified the need to create unique solutions and foster more innovation, leading to the creation of the IEC. The Group Commander plays a direct and vital role in promoting the positive work environment and open discourse of the IEC. In line with that position is the perspective of the **1st Special Forces Command (Airborne) Commanding General** with his recent words: "*People are our most precious resource, and I challenge you to introduce fresh, innovative, norm-shattering ways of recruiting, managing, and optimizing talent*."

The IEC has become an emerging pillar in the professional and individual development of unique minds within the PSYOP Regiment; empowering the Group and Battalion Command teams to identify and foster talent, apply said talent to the betterment of the PSYOP Regiment, and provide a deep sense of purpose and direction.

Strict adherence to rank and position is counter-intuitive for Soldiers who regularly deploy in U.S. Embassy environments alongside senior diplomats and interagency partners. The IEC serves as an oasis within the community for those who have a desire to hone their core competencies and contribute to the success of PSYOP and the Special Operations community.

The age-old mantra of "adapt or die" seems very applicable to this moment in time for any organization interested in influence operations. **Until sweeping organizational**

changes are made that prioritize innovation, the ad hoc model that the IEC is based on is a viable solution for Commanders facing similar challenges.

A Path Forward

The IEC hopes this concept of in-unit crowdsourced collaboration can set an example for other military and SOF units desiring to improve productivity and solutions within their own units. IEC members bring significant value to their units, knowledge, and relationships developed.

IEC members are highly qualified individuals with duties to their units; those duties do not go away when volunteering for the IEC. The unique skillsets and expertise that Council members carry to their subordinate units act as a cornerstone to the SOF model and mission sets. Problems and gaps identified by a council member's subordinate unit are a part of the feedback used to develop solutions. Similarly, issues identified at the Company-level are given credence two levels up because of the Council — expediting multiple processes and facilitating faster solutions.

IEC members are mentors and mentees, all while holistically and diligently working to foster a positive and innovative work culture in the various organizations represented. The goal is to identify solutions for the Force, but the positive effort also naturally provides members a rewarding hope for the future. **The hope is that more military organizations set up similar panels to tackle their most challenging and complex problems.**

Sustained innovation has always been an elusive goal for Commanders, even within the SOF community. Regular internal personnel movement, overall force turnover, and cultural obstacles often combined to stifle innovation. In typical Army fashion, Commanders of the past believed that innovation could be tasked into existence. The belief that throwing enough people and money at a challenge will result in innovation is common.

Looking at the IEC, it is tempting to believe that this was the case, but the truth is more nuanced. **The appearance of innovation and actual innovation are two very different things. Understanding this is key to successfully replicating the effort in other organizations.**

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About the Authors:

MAJ Trisha E. Wyman *is an Army PSYOP officer and graduated with a BA in Global Studies from Methodist University in 2011, a Master of Professional Studies in Security and Safety Leadership from the George Washington University in 2015, and an MS in Information Strategy and Political Warfare from the Naval Postgraduate School in 2019.*

MAJ Ashley Franz Holzmann *is an Army PSYOP officer. He graduated with a BS in Sociology from West Point in 2009 and a Master of Military Art and Science from the Command and General Staff College in 2020.*

CPT Robert Kava *is an Army PSYOP Officer. He graduated with a BS in Law from West Point in 2012.*

SSG John Kozlowski *is a PSYOP Non-commissioned officer with a BA in Psychology (2013) and is a Certified Electronic Technician.*

CPT Vu Tran *is an Army PSYOP Officer. He graduated with a BS in Political Philosophy, Policy, and Law as an Echols scholar from the University of Virginia in 2012.*

Disclaimer: *The views expressed in this blog post do not necessarily reflect those of the Department of Defense, Department of the Army, Army Futures Command (AFC), Training and Doctrine Command (TRADOC), 4th Psychological Operations Group, or any other Special Operations unit.*

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Mad Scientist Laboratory Blog Post 312 (15 Mar 21)

Tactical Innovation: The Missing Piece to Enable Army Futures Command

[**Editor's Note:** Mad Scientist Laboratory welcomes guest blogger **LTC Jim Armstrong**, a student at the Army War College, with his insightful and provocative submission calling on the Army to instill a culture of innovation across the force and putting "Futures" back into Army Futures Command, rather than focusing modernization efforts on our pacing threats. LTC Armstrong proposes three mechanisms — decoupling ideas from experience, pursuing the connection of ideas, and consolidating gains with innovation leadership and management — as a prescription for linking the attributes and value of innovation to the Army's culture and exploiting areas of potential to create a holistic, force-wide approach to innovation. Read on!]

The **current** and **future** operational environment demands not just an Army that can innovate episodically and incrementally, but an Army with an innovative culture that is able to create, identify, and support all types of innovation at all levels of war. Senior Army leaders recognized this demand as demonstrated by the creation of **Army Futures Command** (AFC); however, without the ability to harness all types of innovation at all levels, neither AFC nor the operational force will fulfill their full potential necessary to achieve competitive advantage (see Figure 1).

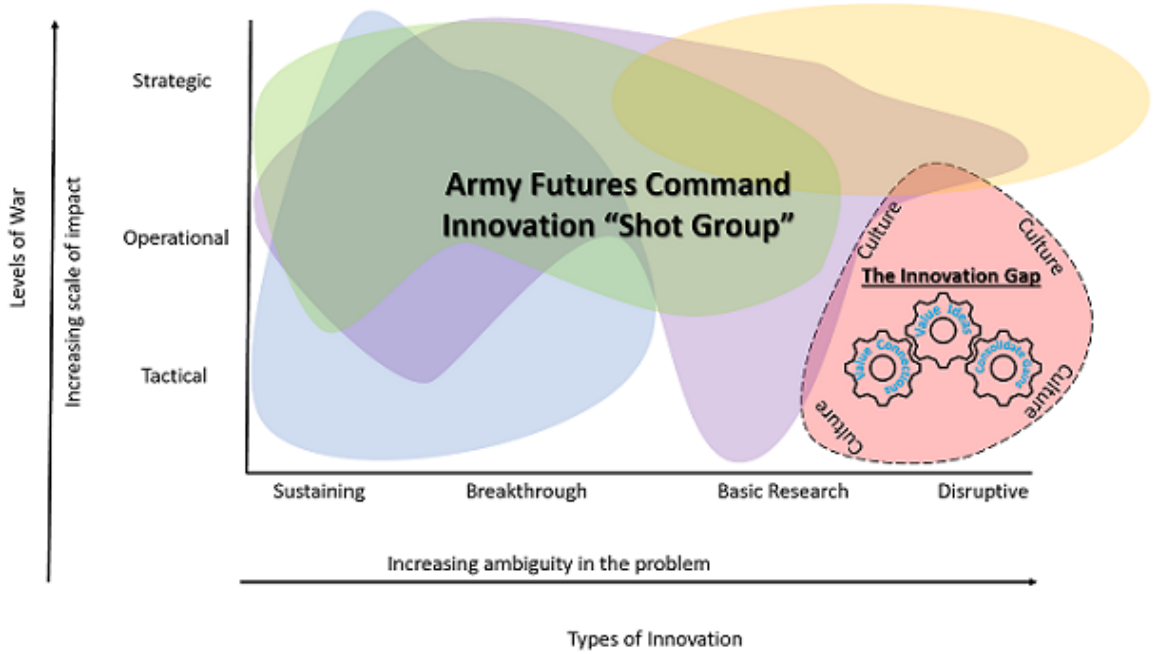

Figure 1: The Innovation Gap (x-axis adapted from Greg Satell's Types of Innovation)

Without a holistic approach, AFC is likely to act as a near-term modernization command. To reach full potential and allow AFC to focus on the strategic level, the Army needs to address the cultural obstacles which frustrate its ability to leverage innovation at the tactical level across the force to fill the gap in the innovation space.

There are nascent Army tactical innovation efforts that are loosely connected to each other and a larger innovation ecosystem, including other Service innovation hubs, that show immense promise. However, if the Army is to better pursue innovation across the spectrum, they must create mechanisms designed to support a culture that embraces innovation at the tactical level. This tactical level innovation can achieve a more lasting impact as a complimentary effort to strategic level innovation at AFC. Three mechanisms which require Army investment to create this culture include decoupling ideas from experience, pursuing the connection of ideas, and consolidating gains with innovation leadership and management. Ultimately, if embraced, these mechanisms could allow the Army to keep the "Futures" in AFC, rather than focusing on keeping pace with our **adversaries**.

Innovation Mechanism	Description
Mechanism 1: Decoupling Ideas and Experience	Invest in bottom-up soldier innovation events at the tactical level supported by the thoughtful use of experimentation and prototyping in the operational force.
Mechanism 2: Connecting Ideas	Provide connections between ideas and the people behind them, despite the uncertainty, to unleash recombination effects, creativity, and diversity.
Mechanism 3: Consolidating Gains with Leadership and Management	Develop leaders with a blend of leadership and management skills to recognize innovation value despite uncertainty, manage innovation efforts, and to institute change in the current system.

Mechanism 1: Decoupling Ideas and Experience

Experience is a necessary element of trusted military expertise. Given limited lateral entry, the Army is especially dependent on its members' experience. Most importantly, the nature of the Army's mission, to fight and win the nation's wars, carries a risk unlike many other vocations. Given the risk of personal and collective survival, the Army necessarily and understandably emphasizes successful experiences. This emphasis exacerbates **the innovator's dilemma**. The Army must provide avenues within its culture to value **ideas based on their merits**. The Army can better leverage their innovative potential by exploring capabilities and concepts from bottom-up and normalizing **prototype** and experimentation opportunities in the operational force.

The Army is involving Soldiers more in innovation efforts, but has yet to realize its full potential. For example, the Secretary of the Army codified the importance of Soldier "touch points" in his November 16, 2020 **directive** on "***Achieving Persistent Modernization***." However, the bulk of current efforts are top-down ideas generated by a small portion of the force and given to Soldiers for feedback. While an important aspect of innovation, this approach does not harness the true power of those closest to problems at the tactical level. As a result of being closest to the problem, Soldiers understand the value proposition involved in potential solutions and failures, are more likely to see second and third order opportunities, and are more likely to develop novel approaches given their simple focus on solving the problem with less bureaucratic distractors or institutional bias. In addition to the likelihood of novel solutions, **supporting Soldier innovation shows the Army values people, creates ownership, and propagates creative and critical thinking.**

Supporting Soldier innovation requires operational units to make a habit of experimentation and prototyping. The Army has codified the idea of experimentation and prototyping to **fail fast, fail early, fail cheap**. However, these opportunities are too

infrequent in the operational force at the tactical level. Operational units' ability to conduct fruitful experiments and prototyping is an important part of problem solving, is critical to using valuable time wisely, and mitigates cost risk. Experimentation with prototypes allows Soldiers and the organization to learn by doing in a less expensive manner. **Prototype efforts** show dynamics of the problem not yet considered and highlight assumptions not yet recognized. Most importantly, working with prototypes is a critical facet of bottom-up idea development with disruptive results. Experimentation with prototype opportunities makes space for "**creative serendipity**," where those immersed in the problem are likely to achieve breakthroughs because of their constant engagement; no one is more engaged with Army problems than Soldiers. The desire to learn inexpensively and use time wisely is a recognized advantage of experimentation and prototyping; however, the benefits of identifying solutions with new value propositions and learning about the problem more fully are not as recognized within the Army and must become a matter of course within the operational force.

Venues for crowdsourcing Soldier solutions provide an opportunity for leaders to hear from soldiers and drive competition amongst ideas. Shark Tank like events such as XVIII Airborne Corps' **Dragon Lair** and other **similar events** are start points. These venues are a small piece of the soldier, bottom-up innovation process. These events and ideas must be nested as part of a guided innovation methodology. **EAGLEWERX**, **Team Rainer** at 2nd Battalion 75th Ranger Regiment, and **AFWERX Spark Cells** provide examples of forming an educated team capable of guiding a cycle of innovation. The team needs to understand agile product development and be able to guide soldiers with ideas through an iterative effort to reach a minimum viable solution. The right innovators mindset is critical for this team more so than degree specification, branch, or time served. Finally, if ideas are to become applied, they will need resources. While this article does not focus on resourcing challenges, further research on resourcing options need explored to provide the support necessary to complete the innovation cycle.

Mechanism 2: The Connection of Ideas

Combining people and organizations with diverse viewpoints creates opportunities for merging resources, generating new ideas, and enabling unexpected results. The value of connecting ideas is overlooked because there is often not an immediate or direct relationship to tangible returns on investment before the pursuit begins. **Keith Sawyer's** study of innovation using an approach he called "**interaction analysis**" concluded that no single person has the big idea, the complete meaning may not become clear until

much later, and surprises emerge from the bottom-up. **Williamson Murray** and **Allan Millett**'s comprehensive study of innovation in military history reinforces this same premise; there is often a complex confluence of people, timing, and organizations that produce new ideas whose paths were not apparent as the new idea was coming to fruition and are difficult to understand even with hindsight.

In addition to simply combining efforts, **recombination of ideas** can reconfigure old ideas in new ways and create momentum. Beyond the stitching together of the ideas, there is also power and momentum gained in the gathering of these networks themselves. Passionate problem solvers create a climate of their own akin to an insurgency where the network organizes itself and is governed by the problem solver ideology. These recombination effects and momentum are neither predictable nor tangible. Results are often unexpected. The energy and sense of community from these connections is not quantifiable; however, the unexpected is worth connecting.

Soldiers from the 101st ABN DIV and Matthew Yandell, chief innovation officer of HeroWear and recent Vanderbilt engineering PhD graduate, carry howitzer rounds to simulate the physical demands of field artillery missions. / Photo by Professor Karl Zelik,

Making connections of ideas and the people behind them based on common problems instead of common experience injects diversity into problem framing, cognitive approaches, and solution space. Connecting ideas in a manner that increases **diversity** of problem solvers is a way to expand discovery beyond natural institutional bias and prevent groupthink. Creating enough diversity of viewpoints within the Army is not possible. The problems the Army must tackle are too complex and disparate for solutions to come from within the current system. External connections, like those happening at **Army Applications Lab**, must be a matter of course and linked to the soldiers closest to the problem in units at the tactical level. Partnerships like those at the **101st Airborne with Vanderbilt**, **Ranger Regiment with Georgia Tech**, and **82nd Airborne with NC State** are good examples, but the opportunities for these partnerships are underleveraged. Increasing operational unit involvement with programs like **National Security Innovation Network**'s **X-Force** can increase diversity. Diversity of connections beyond the military increases the possibility of discovering something new and, especially in the Army, requires purposeful effort to achieve different viewpoints.

The most concrete benefit of connecting ideas is the exponential increase in problem solvers. The Army has more than one million potential problem solvers and is underrating what the Army knows to be its most critical asset — people. However, the Army's natural inclination to impose order through centralization and formal structure to gain efficiency and achieve unity of command in connecting these problem solvers will naturally crowd out tactical innovation. An informal ecosystem model for realizing innovation potential, though counter-cultural, is characterized by tailored idea hubs and platforms that assist innovators in connecting rather than a single structure providing direction to all. The Army must enable connection without providing a structure that counteracts the power of diversity or stifles the conditions for innovation.

Current idea connection platforms in the Army innovation ecosystem are immature. While nascent, this is the area with most potential because of the pockets of excellence already happening in the force. The 75th Ranger Regiment has articulated this same problem and, as of early 2021, is pursuing an innovation marketplace and collaboration tool, "Go Innovate," with promise. This tool not only connects innovators, but also uses software platforms to help with problem formulation and solution design. With the right leader involvement and resourcing, this tool could provide connections across an informal ecosystem within months.

Mechanism 3 Consolidating Gains with Leadership and Management

Consolidating gains is the most critical task leaders must accomplish over the next three to five years if the Army is to move beyond structural innovative solutions to a culture that supports continuous tactical innovation. In the Army's **leadership doctrine**, there are two short paragraphs about innovation as a component within the Army leader attribute of intellect. Although under addressed, the espoused leader attributes and competencies in Army documents puts the Army in a better position to support tactical innovation than these two paragraphs suggest. The Army's mission command ideals are especially relevant if applied within the spirit of its creation. However, an overlooked aspect of tactical innovation that only leaders can address is the ability to consolidate gains.

Rather than focusing on the immeasurable personal qualities for leaders to innovate, the Army needs leaders able to recognize innovative efforts, support the efforts, and translate efforts into real gains. Seeing these gains and experiencing this support demonstrates to the organization that there is real value in innovation at the tactical level. Innovation without consolidating gains does not lead to enduring change. Successful experiments and demonstrations, especially those with disruptive qualities, are celebrated amongst the small group driving the effort, but are not scaled

appropriately or shared to create meaningful change unless leaders make specific and thoughtful efforts to consolidate gains and translate the disruption back into the system.

In **Army doctrine**, consolidating gains means transforming temporary success into enduring outcomes. **Civilian industry** recognizes the need for the same ability to move beyond short term wins in times of change, continue to overcome resistance, and produce change in interdependent systems. The requirements for consolidating gains of an unforeseen innovation are not predictable. Therefore, tactical innovation requires a leader with a blend of leadership and management skills; this is a person with the agility of mind to recognize innovation value despite uncertainty, understanding to manage innovation efforts without stomping them out, and the knowledge of the current system to understand how to institute change. **The Army needs both skills, leadership and management, to translate successful innovation efforts into lasting change.**

Leaders must look at supporting tactical innovation as part of their professional stewardship. Understanding the value of innovation and their role in stewarding these efforts is foundational to leader support. Without buy-in to the benefits of tactical innovation and an understanding of the long-term effects, there is no organizational incentive that will overcome the short-term focus. A logical connection of innovation study, education, principles, and history creates more probability for change than any short-term incentive. **Leaders will need to guide, help, ask, resource, and encourage more than control, organize, direct, and standardize.**

Without the balance between understanding of the current system and ability to manage the incubation and acceleration of new ideas, even successful experiments will not reach their potential. This requires more leaders to understand not only the current system, but also the conditions and characteristics for innovation with different problem-solving approaches. Not all leaders can take advantage of a civilian program like Stanford's **Ignite** or **Innovation Fellows**, but organizations like **NavalX** and **Joint Special Operations University** offer opportunities for courses in design thinking and agile product development. The Army can encourage these by creating additional skill identifiers or adding knowledge and skills on the Assignment Interactive Module resume. Investing in the skills necessary for managing innovation and blending them with knowledge of the current system is imperative to realizing gains. Leaders with this ability have long term outlooks and reduce obstacles for soldier solutions.

Conclusion

The three suggested mechanisms for change offered in this article are logically linked from innovation characteristics to current Army culture with consideration of past and current Army efforts. These methods require the Army, through its leaders across the force, to decouple ideas from experience, connect ideas to mature the ecosystem, and be equipped to consolidate innovation gains with leadership and management. It is important to highlight that these methods offer examples, not standards. The most important facet of these suggestions is the culture they reflect.

This article does not suggest structural or policy changes. It does not advocate for a particular organization standard within every unit. To do so would merely reinforce efforts with temporary impact. No number of new organizations or policies will create the ability for the Army to recognize and take advantage of change without the foundational culture conducive to innovation. This article attempts to link the attributes and value of innovation to the Army's cultural shortfalls and exploit areas of potential to suggest mechanisms for an innovative culture that are tailored to fill a specific innovation gap. With this gap filled, AFC can better focus on strategic level innovation while enabling tactical innovation for a more holistic approach.

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Jim Armstrong *is an active-duty Army officer. He is currently a student at the Army War College. His service includes assignment as a concept lead for the Joint Staff Innovation Group from 2016 to 2018.*

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