

MAD SCIENTIST LABORATORY

... Exploring the Operational Environment



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FEBRUARY 22, 2018 BY USER

31. Top Ten Bio Convergence Trends Impacting the Future Operational Environment

As Mad Scientist Laboratory has noted in previous blog posts, **War is an intrinsically human endeavor**. Rapid innovations in the biological sciences are changing how we work, live, and fight. Drawing on the past two years of Mad Scientist events, we have identified a change in the character of war driven by the **exponential convergence of bio, nano, quantum, and information**. This convergence is leading to revolutionary achievements in sensing, data acquisition and retrieval, and computer processing hardware; creating a new environment in which humans must co-evolve with these technologies. Mad Scientist has identified the following top ten bio convergence trends associated with this co-evolution that will directly impact the Future Operational Environment (OE).



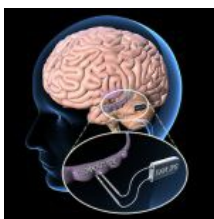
1) **Bio convergence** with advanced computing is happening at the edge. Humans will become part of the network connected through their embedded and worn devices. From transhumanism to theorizing about uploading the brain, the Future OE will not be an internet of things but the **Internet of everything**

(Including humans).

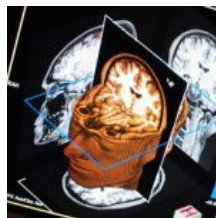
2) The next 50 years will see an evolution in human society; we will be augmented by Artificial Intelligence (AI), partner with AI in centaur chess fashion, and **eventually be eclipsed by AI**



3) This augmentation and enhanced AI partnering will require **hyper-connected humans** with wearables and eventually embeddables to provide continuous diagnostics and **human-machine interface**.



4) The Army will need to measure **cognitive potential** and **baseline neural activity** of its **recruits and Soldiers**.



HOT!!!



Click [here](#) to review the TRADOC G-2's draft information paper **The Operational Environment (2021-2030): Great Power Competition, Crisis, and Conflict**, then drop us an email at madsctradoc@gmail.com and give us your feedback!

Click [here](#) to read the Army Future Command's new **AFC Pamphlet 525-2, Future Operational Environment: Forging the Future In an Uncertain World 2035-2050** addressing the mid- to far term OE and watch the associated [video](#)!

Watch the TRADOC G-2's new [The 2 + 3 Threat](#) video addressing the near-term OE (i.e., 2020 to 2028)!

Watch the new [TRADOC 2028](#) video [via a non-DoD network]!

PRIMERS ON THE OPERATIONAL ENVIRONMENT

[The Changing Character of Future Warfare](#) video

[TRADOC Pamphlet 525-92, The Operational Environment and the Changing Character of Warfare](#)

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[TP 525-92-1, The Changing Character of Warfare: The Urban Operational Environment](#)

[The Arctic Through 2035: An Overview of the Operational Environment and Competitor Strategies for U.S. Army Training, Doctrine, and Capabilities Development](#)

[The Information Environment: Competition & Conflict](#) anthology

MORE OPERATIONAL ENVIRONMENT RESOURCES...

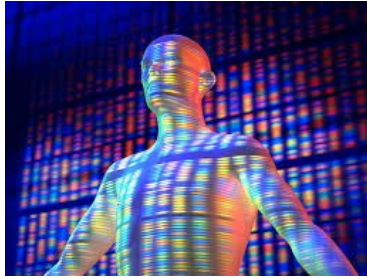
Foreign Military Studies Office [OE Watch](#)

Watch [The Future of Unmanned Maritime](#)



5) The Army needs new training tools to take advantage of **neuralplasticity** and realize the full cognitive potential of Soldiers. **Brain gyms** and the promise of Augmented and Virtual Reality (AR/VR) training sets could accelerate learning and, in some cases, challenge the tyranny of “the 10,000 hour rule.”

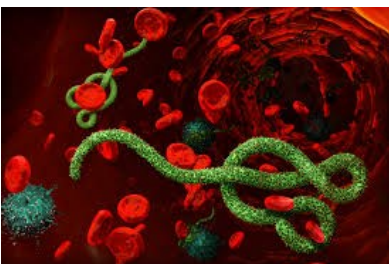
6) **Human enhancement**, the **unlocking of the genome**, and **improving AI** will stress the **Army’s policies and ethics**. In any case, potential adversaries are exploring using all three of these capabilities as a way to **gain advantage over U.S. Forces**. This is not a 2050 problem but more than likely a **2030 reality**.



7) **Asymmetric Ethics**, where adversaries make choices we will not (e.g., manipulating the DNA of pathogens to **target specific genome populations** or to breed “super” soldiers) will play a bigger part in the future. This is not new, but will be **amplified** by future technologies.

Bio enhancements will be one of the areas and experimentation is required to determine our vulnerabilities.

8) Cognitive enhancement and **attacking the human brain** (neurological system) is not science fiction. The U.S. Army should establish a Program Executive Office (PEO) for **Soldier Enhancement** to bring unity of purpose to a **range of possibilities** from physical/mental enhancement with **wearables, embeddables, stimulants, brain gyms, and exoskeletons**.



9) **Chemical and bio defense** will need to be much more sophisticated on the next battlefield. The twin challenges of **democratization** and **proliferation** have resulted in a world where the capability

of engineering **potentially grave bio-weapons**, once only the purview of nation states and advance research institutes and universities, is now available to **Super-Empowered Individuals**, Violent Non-State Actors (VNSA), and criminal organizations.

10) We are missing the full impact of bio on all emerging trends. We must **focus beyond human enhancement** and address how **bio is impacting materials, computing, and garage level, down scaled innovation**.



Headquarters, U.S. Army Training and Doctrine Command (TRADOC) is co-sponsoring the **Bio**

[Systems Webinar \[via a non-DoD network\]](#)

“THE CONVERGENCE” — ARMY MAD SCIENTIST PODCASTS

Undersecretary of the Navy **James F. “Hondo” Geurts** and **Dr. Zachary S. Davis**, Senior Fellow, Center for Global Security Research, Lawrence Livermore National Laboratory, [discuss Strategic Latency Unleashed: The Role of Technology in a Revisionist Global Order and the Implications for Special Operations Force](#) and how to think radically about the future, capitalize on talent, and unleash technological convergences to out-compete our adversaries, and when necessary, defeat them decisively in conflict.

COL John Antal (USA-Ret.), author and innovator in the interactive gaming and learning industry, [discusses](#) the implications of the Second Nagorno-Karabakh Conflict, the psychological effects of drone warfare, and the future of maneuver.

COL Scott Shaw, Commander, U.S. Army Asymmetric Warfare Group, [discusses](#) the future of ground warfare, including lessons learned from the Nagorno-Karabakh Conflict in 2020 and the realities of combat for tomorrow’s Soldiers.

Dr. David Kilcullen, bestselling author and expert on unconventional warfare, [discusses](#) how the U.S. Army must prepare to engage “Dragons” and “Snakes” as they employ Liminal Warfare and blended cyber-kinetic operations to avoid our conventional warfare dominance.

Mr. Doowan Lee, Senior Director, Signal Labs, [discusses](#) disinformation, changes over time in approaches to information warfare, and collaboration between Russia and the Chinese Communist Party on information operations.

Click [here](#) to listen to other episodes of “The Convergence”

MAD SCIENTIST PARTNER SITES

Modern War Institute Podcasts

[Former Deputy Defense Secretary Robert Work Assesses the Future Battlefield](#)

[Dr. Moriba Jah on What Does the Future Hold for the US Military in Space?](#)

[Elsa Kanla on China and Its Pursuit of Enhanced Military Technology](#)

Small Wars Journal [Mad Scientist Page](#)

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SEARCH



Convergence and Soldier 2050 Conference with **SRI International** at Menlo Park, California, on 08-09 March 2018. Click [here](#) to learn more about the conference and then watch the live-streamed proceedings, starting at 0840 PST / 1140 EST on 08 March 2018.

Also note that our friends at **Small Wars Journal** have published the **first paper** from our series of **Soldier 2050 Call for Ideas** finalists — enjoy!

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