

# MAD SCIENTIST LABORATORY

... Exploring the Operational Environment

U.S. ARMY



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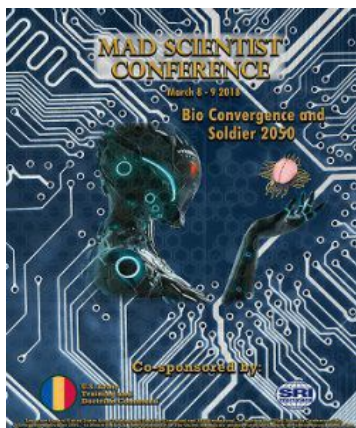
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MARCH 15, 2018 BY USER

## 36. Lessons Learned from the Bio Convergence and Soldier 2050 Conference



**(Editor's Note:** Mad Scientist successfully facilitated the **Bio Convergence and Soldier 2050 Conference** on 8-9 March 2018 with our co-sponsor, **SRI International**, at their Silicon Valley campus in Menlo Park, California. With over **400 live and virtual participants**, our first West Coast conference brought together **World class expertise in biology and the tech convergences** that will have a

significant impact on the **changing character of future conflict**.)

**Bioengineering is becoming easier and cheaper** as a suite of developments are reducing biotechnology transaction costs in **gene reading, writing, and editing**. The **Internet of Living Things (IoLT)**, operating across space and time, and the integration of **bioengineering tools** (e.g., Genome editing tools such as CRISPR, Talon, ZFN; molecular printers; and robotic strain engineering platforms), **big data, high-powered computing**, and **artificial intelligence** are facilitating this revolution. The resultant explosion in knowledge regarding the **human body** and the **brain** offers phenomenal opportunities to **improve soldier lethality and survivability**. This will be accomplished through **improved cognitive and physical skills**, as well as maintaining the critical role of **human judgement** with the **ever increasing machine speed** we will find on the future battlefield.



**1) Prototyping:** Innovation has shifted from government demand signals and funding to the incredibly fast paced innovation in **the private sector**. Emerging products that **enhance physical** (e.g., Exoskeletons) and **cognitive abilities** (e.g., Pharmaceuticals) are almost entirely in the commercial sector. **The military must determine what is applicable to**

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](mailto: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](#)

[Potential Game Changers](#) handout

[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](#)

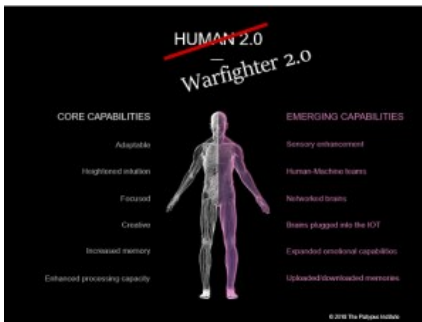


warfighting and integrate from the commercial space to the defense sector. **Prototyping** and **experimentation** will be critical.

**2) Personalized Warfare:** The mapping of the **human genome** and the ongoing **Human Brain Project** offer **unprecedented advances** in medicine and the neurosciences, but also **major vulnerabilities** to Soldiers and the homeland. With advanced biological technology evolution comes a host of **moral challenges, security vulnerabilities, and new threat vectors**. In the future, protecting one's **genomic information** will require safeguards similar to how we **currently protect our digital identities**. We will be **more vulnerable** to **advanced blow weapons** and **information warfare** available to **states** and **non-state organizations**.



## Human Brain Project



### 3) Customization:

Advances in biology offer much greater customization in medicine which could improve how quickly our **Soldiers learn** and how they **handle stress and anxiety** associated with **combat zones**. **Human 2.0** will

have **direct Warfighter applications**, providing Soldiers with sensory enhancements, human-machine teaming, brains plugged into the **Internet of Battle Things (IoBT)**, and uploadable / downloadable memories. Customization of battlefield medical care will be enabled by **advanced diagnostics** worn by Soldiers (uniforms and equipment) and eventually **embedded**. In other countries, we can expect to see the **customization of humans** with **genome editing children** to increase height, improve intelligence, and expand creativity.



**4) Competition:** The **democratization** of this technology cannot be understated. We will compete with states, non-state groups, and **super-empowered individuals** who will have access to a full range of human enhancement capabilities and genetic editing tools. **China** is at **parity with the US** in this space, but **more willing** to take technologies to **clinical trials**.



**5) Ethics:** The full range of **bio tools** will be available in the US. They will initially be approved because of their **disease curing properties** and the ability to **improve quality of life** for an aging population. They will then be **normed** into our **population**. We can expect to see a **Soldier** enter a **recruiting station** after some kind of **physical enhancement** in the next decade, if not sooner. In the Deep Future, the concept of **personhood** will be challenged.



[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

**Mad Scientist** is producing a range of products to transfer what we learned from the Bio Convergence and Soldier 2050 Conference out to the Army. We will have **videos** of the conference presentations posted online [here](#) within 10 days, as well as several **podcasts** posted at [Modern War Institute](#), starting on 28 March 2018. The **Blo Convergence and Soldier 2050 Conference Final Report** will be posted [here](#) within 45 days.

Note that the associated **SciTech Futures Bio Convergence Game** remains open until 16 March 2018 — share your ideas on-line about the future, collaborate with (and challenge) other players, and bid on the most compelling concepts in this online marketplace.

Read our Mad Scientist **Soldier 2050 Call for Ideas** finalists' submissions [here](#), graciously hosted by our colleagues at **Small Wars Journal**.

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