

# BIG IDEAS

EXCHANGE

The Big Ideas Exchange (BIX) brings forward new thinking to address grand challenges in American national security.



NAVAL POSTGRADUATE SCHOOL



## Cooperative, Mobile Mines

**LT Christopher Hevey**

*Systems Engineering*

With rising blue-water navies now challenging our long-enjoyed maritime superiority, the need for a revolutionary weapon system, capable of bringing about a renaissance of naval warfare, has returned. The “systems that wait” are no longer enough. Through the deliberate integration of legacy mine functions and bleeding edge technology, developed by our partners in industry, sea control and sea denial tactics, techniques, and procedures may be forever changed. Mine warfare is an effect threat, one that is still relevant and very real.



## Weaponizing Information in Support of Maneuver Warfare

**Capt Allison Reitmeyer**

*Information Warfare Systems Engineering*

Information has always been a part of warfare, but as the Marine Corps pivots to conflicts with near-peer adversaries information’s role is increasingly important. The Marine Corps needs to assess its foundational doctrine and ensure information is seamlessly integrated with the tenets of maneuver warfare. By adding two considerations for decisive action, the Marine Corps can change its understanding of the operational environment and information’s role in it.



## Virtual Tactical Decision Game

**Maj Shane Robinette**

*Information Warfare Systems Engineering*

The historical methods for teaching tactics—walking the ground, tactical decision games, and actual field exercises—are important and must be done by all leaders. To augment this practical training; however, leaders need to experience the chaotic challenges of combat hundreds of times. The technology currently exists for infantry battalions to be fielded with commercial-off-the-shelf virtual reality headsets; allowing infantry small unit leaders to become more lethal by honing their combat decision-making through numerous repetitions of force-on-force battles and tactical decision games conducted in virtual reality.



## **Cleared Hot for Next Gen AI Targeting** **Maj Eric Kim**

*Computer Science*

We live in a data saturated world, causing decision paralysis at all levels of war. The future operating environment will impose power, signature, and bandwidth constraints which will further compound the need for accurate and distilled targeting analysis. I aim to show that biologically inspired AI can offload target detection, classification, and tracking to assist decision makers and reduce kill chain lag while being optimized for the future operating environment.



## **AI & Machine Learning: Our Data Is An Enterprise Asset**

**Maj Julia Weber**

*Operations Research*

The foundation needed to support the use of modern data analytics tools such as Artificial Intelligence and Machine Learning does not currently exist within the Marine Corps. We haven't collected the right kind of data, haven't stored it in a consistent manner, don't have the expertise needed to manage it, and don't have the computing infrastructure available to process it in order to generate timely, useful information. In order to be prepared to fight on the battlefields of the future, we have to change the way that we, as a Marine Corps, think about data. Our relevance as a fighting force is already at stake, if we don't start treating data with the same reverence as we treat our weapons, we will fail in every future conflict.



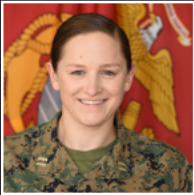
## **25 Million Bloodless Battles**

**Capt Jonathan Boron**

*Computer Science*

Modern artificial intelligence is improving the quality and adaptability of virtual opponents. At a time when senior defense leaders are calling to increase investments in wargames and simulations, we must ensure that we are maximizing the effectiveness of these analytical and training tools. In keeping with this spirit, my big idea seeks to provide Marines the opportunity to fight 25 bloodless battles, or more, against a cunning and intelligent enemy trained through deep reinforcement learning.

*Continued*



## **LED-based Underwater Communication in support of Littoral Operations**

**Capt Haley Nowak**

*Joint C4I Systems*

The underwater environment poses significant challenges for communication in contested, littoral operations. In order to improve and better integrate underwater communication, the Navy and Marine Corps will require underwater wireless communication technology that can achieve higher data rates with a lower probability of detection than current equipment can provide. This big idea offers a short-range, directional, and cost-effective underwater communication system for combat divers and unmanned underwater vehicles using the visible and infrared light spectrum.



## **Solving the Rubik's Cube: Fire Support Coordination in Future Conflict**

**Capt Benjamin Herbold**

*Information Warfare Systems Engineering*

For fire support coordination in future operating environments, one thing is clear: machine assistance will be required. The solution requires us to move away from manual "charts and darts" methods of fire support coordination towards a Cognitive Assistant that magnifies human decision-making capabilities. Oddly enough, we can learn a lot from Rubik's Cubes.



## **Military Internships: Closing the Cognitive Gap**

**Maj Matthew Bowman**

*Information Warfare Systems Engineering*

A student's connection to their community and the larger Fleet Marine Force (FMF) atrophies during the 18 to 24 months that they are assigned to the Naval Postgraduate School (NPS). A funded internship program with documented and repeatable processes will nest students with units long enough to provide an information exchange that is beneficial to each organization.



# MARINE CORPS UNIVERSITY

“Marine Corps University and the Krulak Center are excited to partner with both the Naval Postgraduate School and the Naval War College in the inaugural joint release of the Big Ideas Exchange and the Innovation Summit. Seeking to further explore national security concerns, the Naval Education Enterprise is collectively addressing maritime challenges and modernizing naval education through collaboration in the spirit of the combined Navy and Marine Corps team.”



## Multi-Domain Intelligence: Driver of Concept Innovation

**COL Christopher L. Tomlinson**

*Joint Force Development*

Successful Multi-Domain operations is dependent upon the convergence of capability across the operating environment. Individual service doctrine is not interoperable to the speed of operations to achieve dominance of Joint functions. A Multi-Domain Intelligence architecture identifies and informs emerging capability that innovate Joint concepts and capability beyond the pace of our adversary.



## Developing the First Ender for the Next Ellis

**Maj Travis Hord**

The Mosaic Warfare concept offers commanders composable force design and decision frameworks enabled by AI support tools in the near future. Harnessing autonomous systems and machine-enabled control systems will require enhanced training for commanders and staffs. By making upfront manpower investments in specialized ‘Mosaic Cadres’ during development, the DoD can fully harness the potential of enhanced decision-making and autonomous systems once operational.

*Continued*



## **Retweet Hell: Social Media and the Future of Enlisted PME**

**Maj Timothy Riemann**

Social Media has had a transformative effect on many aspects of contemporary society. This concept describes a new approach to Marine Corps junior enlisted Professional Military Education by recognizing, utilizing, and maximizing the latent educational potential in various social media platforms. Is there a way to communicate ideas and knowledge to the Corps' youngest members on social media platforms and mediums that they are already familiar with?



## **Attrition Interception: A New Maritime Operating Concept**

**Maj Samuel Colclough**

The ongoing strategic rivalry between the United States and China has led to US military planners focusing on the South China Sea. Little attention is paid to the Indian Ocean Region and the potential benefits of a US-India security partnership to balance against China's growing power and influence. The inter-war concept of maritime attrition-interception might give US and Indian policy makers more options for competing with China in the future.



## **Wargaming Fleet Problems with Off-the-Shelf Games**

**Capt Steven Lee Stansbury**

Exploring the possibility to assist in answering fleet problems with commercial games like Command: Modern Air and Naval Operations. By using the six-step scientific method, any Marine can test and validate modern and future fleet concerns with digital gaming systems—with the potential to produce effective solutions and further questions for research.



## NAVAL WAR COLLEGE



### **Talent Management in the Marine Corps** **Major Douglas Toulotte**

Within the Marine Corps, the discussion surrounding Talent Management has been dominated by a focus on developing skill and increasing retention. Little to no discussion addresses the identification and cultivation of talent. A shift in approach, prioritizing talent, will enable skill development and encourage the most talented to remain within the service.



# NAVAL POSTGRADUATE SCHOOL