‘A Night of Honor’ Awards Banquet & Keynote

The Banquet Keynote speaker was Mr. Michael Fabey, US Editor for Jane’s Fighting Ships and Americas Reporter for Jane’s. He discussed his book Crashback: The Power Clash Between the US and China in the Pacific.

Fifteen years ago, China was not seen as a threat to US interests in the Pacific. Then, US satellite operators began to be concerned. An increasingly aggressive Chinese posture followed, as the Chinese Navy grew in operational experience. Mr. Fabey now considers China to be a major peer competitor.

Mr. Fabey related the incident of the cruiser USS Cowpens. Cowpens was an aging cruiser projected to be retired. In 2013, after minor upgrades, the ship was sent into Asian waters to show the flag as part of a US strategy pivot toward the Pacific. The crew was not fully trained on the new systems at the time. Cowpens was ordered to obtain intel on the then newly acquired ex-Ukraine Chinese aircraft carrier. Cowpens orders were to avoid confrontation and not get too close to the aircraft carrier and its escorts.

The small and midsize escort vessels became aggressive and attempted to hem in the Cowpens, which was forced to do a “crashback” (emergency reverse) to avoid a collision. Officially, neither side made a big deal of it; but the confrontation caused alarm within the US Surface Navy. The USN decided to get tougher with China.

The strategic picture in the Pacific had changed. The Chinese trade surplus with the US had helped fund a major buildup in ships and aircraft. The US had left a void in the Pacific by extended commitment of military assets for Iraq and Afghanistan. The US pivot put the Navy back into a sea now filled with Chinese warships.

Mr. Fabey believes that Chinese objectives are twofold: to establish and defend its maritime Silk Road logistics train; and to get US forces out of the Western Pacific. He feels that US actions should include the following to “stay in the game”: insert a Carrier Strike Group into the Strait of Taiwan, conduct allied exercises in contested areas like the Philippines, and act in the best interests of the US and its partners. He believes there will continue to be conflict, like the recent near collision of US and Chinese destroyers during Freedom of Navigation operations around the manmade island bases.

Following the talk, Lisa Fruge-Cirilli gave thanks for the support given during her two year term as AOC President. Her charge to the membership was to be a vocal advocate for EW, to seek new opportunities to collaborate, and to mentor the younger crows. She swore in Muddy Waters as the new AOC President, who recognized the incoming Board of Directors, the AOC staff, and the military members present.

- Arnold Feineman
Keynote Addresses

Lieutenant General (Ret) Chris Bogdan is a Senior VP at Booz Allen Hamilton. He led the charge in today’s theme, “Building the Future” by asking us to think ahead into the future and imagine what warfare might be like decades from now, given what we know today.

Mr. Bogdan used his personal experience with the 5th Generation F-35 Joint Strike Fighter program to give a personal perspective of the things we got right and where we may have missed the mark.

What we got right:

1. Survivability (disrupting the kill chain). In order to disrupt the kill chain, you have to find, fix, track, target and shoot something at it.
2. The collection and fusion of multi-source data both onboard the airplane and off-board the airplane to create a very accurate and digestible integrated battlespace picture for the pilot. This gives the pilot and his wingmen unprecedented situational awareness.
3. The alliance between the US services, the 8 partner nations, and the 3 foreign military sales customers is really a geopolitical win between the United States and our allies. Having strong allies, we then become stronger than the sum of our parts.

What we got wrong:

1. We started the program with a flawed acquisition construct called TSPR which stands for Total System Performance Responsibility. TSPR was a poor strategy in which DOD would write vague, top level requirements and then ‘get out of the way’ because detailed specs, oversight, and reporting requirements were overburdening industry and resulting in programs coming in late, over-budget, and not delivering performance that DoD expected.
2. The concurrency of two acquisition programs, testing and production proved to be devastating to the F-35 because the DOD began producing F-35’s before flight testing was ever begun. This cost the DoD and the program dearly when future testing revealed design deficiencies and poor performance, requiring significant time-consuming and costly redesigns and retrofits on already produced aircraft.
3. Finally, the program made decisions early on that created significant challenges in the long term.

Let’s jump ahead to see what the art of the possible could be if we were to build an 8th generation years from now. First, any future weapon system must be designed from the start to grow and change as the technology and the threat evolves. Second, one of the biggest problems with joint programs is that there’s a belief that one size fits all. However, the participants in the joint program come to the table with their unique requirements which they’re very reluctant to compromise on. We should recognize this reality and set up joint programs that allow for development of things, and tailor unique capabilities. Lastly, we should forget 5000.02 as it is today. Mr. Bogdan showed a chart of the current structure of acquisition and noted there’s one idea we should recognize in the future - DOD is going to acquire weapons systems and capabilities in a number of different market environments and each may require a different strategy. The system needs to allow for different rules of engagements for these different kinds of acquisitions. It needs to be reimagined.
In closing Mr. Bogdan stated that we need to dominate the EM spectrum with cognitive EW, with smart real time response to new threats in machine to machine fashion. The coupling of AI and ML with traditional military capabilities on the edge of the battlespace in real time will be a huge game changer in the future. Creating smart, real time adaptive EW systems that can respond near instantaneously to new threats should be the norm in the future. We need to rethink what INTEL provides to EW and weapons. Technology insertion, manned and unmanned teaming, control of swarms, kinetic and non-kinetic effects will be important. We need to avoid being platform centric, it is all about networking and interoperability. Future warfare will be a multi domain battlespace, land, sea, air space, cyber and we can’t afford un-adaptable single point solutions.

The Honorable Don Bacon, U.S. House of Representatives wrapped up this morning’s keynote session. He thanked the AOC for inviting him back to speak for a second year in row and expressed appreciation to the attendees. “I have been in this community for 30 years and I think we have the world champion EW team comprised of those doing tactical EW, SIGINT, MASINT, COMINT, ELINT.” He acknowledged and recognized the AOC as being the ‘conscience’ of EW for decades and today, and has stepped in to fill the gap to advocate for EW. “Congress is along-side you now.” We were dominant in the 1980s and 1990s and we crushed Iraq but as is usually the case... if you don’t have to fight, you don’t have to fund EW and we didn’t.” He explained that at the time of 9/11, we had more challenges and some significant EW successes. We increased funding for the counter terrorism fight but didn’t worry about the near peer threat. We currently have 2 near peers that have fielded an effective array of EW systems. While we have dozens of systems, they have a wide array. “They have a quantity of quality and we have pockets of quality.” Our EW leaders have said Syria was the most aggressive EW environment they have been in and European commanders have said in the Ukraine, Russian Tactical EW outclasses us. We have turned the page and have fixed the EC-37 the new Compass Call and have funded RC-135 intelligence collection upgrades, EA-18G and sensor OSA. AOC was critical in helping with 10-53 NDAA where we now have an organization and senior in charge of EW and a cross functional team for EW to address Russia and China gaps and build programs. We are going to do joint EW modeling and war-gaming and have joint ESMO cells at each COCOM and we need a strategy to gain superiority in this domain. Defense procurement can’t take 10 years. We have to partner with industry as the roles are reversed now with commercial technology feeding defense. Allied partnerships and training are also key. The audience responded with applause when Congressman Bacon spoke about the doctrine of the EMS domain. “It’s time to get the doctrine right on what our domains are. EM enables success in all our other domains. The EMS is a physical and scientific domain in which we want to ensure that we have superiority over and that we deny it to our enemy.”

- Karen Arthur, Aspen Consulting Group
Preparing EMS Superiority

As the director of Joint Electromagnetic Preparedness for Advanced Combat (JEPAC), Col. David “Chimi” Perez was well-suited to lead a panel on Preparing EMS Superiority. He assembled a diverse squad of professionals and students to outline suitable measures for EMS Superiority: Mr. PJ Wallace, Retired British O-6 Fast Jet WSO, now at Leonardo DRS; Mr. Matthew Rogers & Mr. James Braun, Rhodes Scholars, Univ of Oxford and Air Force Academy, respectively; and Mr. David “Streaker” Lowe, Senior Program Analyst 2, Circle, Inc.

Col. Perez suggested we need “long-term thinking” to enable EMS Superiority. He cited the example of going to a 5-digit year date (e.g. 02018), and “The Clock of the Long Now,” (http://longnow.org/clock/) a 10,000-year clock being assembled in Western Texas. He believes our joint force is not yet ready for the next engagement, and his mission is to see that the joint force is optimally postured to dominate the EMS for decades to come. He believes as part of long-term thinking, we should spend more time contemplating Concepts and Requirements, and less time on Design & Build.

Mr. PJ Wallace believes people are the key to preparing EMS Superiority. The spectrum is much more complicated today, and there is a skill set mismatch: how do you teach people about spectrum? And, who do you teach? Everyone operating in the EMS needs to understand the environment. We need our EW, Cyber, Math and IT people to think differently from those trained in the last 20 years. So, processes and technology to train them needs to evolve. We need to draw upon Academia to cultivate the right talent, developing new degree fields and certifications. Young people have incredible intellectual energy, and need to be motivated to use that intellect, make mistakes, and learn from them. We can learn a lot from Estonia, the bordering nation of Russia that is being attacked daily, and has recovered from a nation-wide hack in 2007 by fortifying their use of the Internet for many common tasks.

Mr. Braun and Mr. Rogers spoke at the AOC’s 50th Annual Symposium and Convention in 2013, when they were just 16 years old. They are now pursuing advanced degrees in EW and Cyber, giving credit to the AOC/Raytheon scholarship process for cultivating young talent. Col. Perez brought these Young Crows to the panel to share an altruistic message of long-term thinking: teach people to think like hackers. They believe part of the solution for EMS Superiority is to get everyone thinking about security not as a rule set (like current DoD annual security training; e.g. don’t open phishing emails, swipe your badge, don’t write down passwords), but as a systems of systems. Start by asking questions about it: how does it work? How can I make it work? How can I develop ways to misuse this system? They cited an example of transferring money at a bank: if the system “works” today by depositing $50, what would happen if someone deposited -$50? The ingenuity and non-linear thinking to devise such a plan, and then see it through the system to achieve an unexpected outcome is the kind of thinking they are proposing everyone needs to do. Despite the abundant damage that hackers have been able to wield thus far, we need a mentality of hope that these perpetrators are still capable of being defeated. Similar to Mr. Wallace’s comments, they feel their generation needs to be made comfortable making mistakes, and failing forward. They remark creating this new culture of professionals will take time, effort and creativity. We are already behind, so we best get moving.
Mr. David “Streaker” Lowe exuded his passion for proper training for our warfighters. Streaker works on SLATE (Secure LVC Advanced Training Environment), and JSILS (Joint Secure Interoperable LVC Solution). The problem right now is there is an alarming inability to train/test/experiment in real environments (we don’t train like we fight), and the sell-off/auction of key frequency bands in the spectrum has rendered current training waveforms unable to operate. It is important to note that both solutions carry the “Secure” mantle. As we develop real-world capabilities, these systems will be fortified with precious technology, waveforms, agility and countermeasures. We will need to protect these learning platforms as though they were real weapon systems. It is also prudent to note that the ultimate solution rests on joint collaboration. We will need to train with all the Services and our Joint Allies and Partners to truly prepare warfighters for the next engagement.

The conclusions of this panel are that we do need a culture change and mind-shift in how we prepare for EMS Superiority. People will always be part of the solution, so their methods of thinking need to be shaped and honed – e.g. new professional careers/advanced degrees, hackers, and 5-digit dates. We need to start thinking very differently from how we ever have before. Developing training solutions to reflect how we fight is critical. The theme for this 55th Annual Symposium and Convention is right on: culture and mindset take a seat right next to technological development to ensure our dominance in the electromagnetic spectrum.

- Melinda Tourangeau, Warrior Support Solutions, LLC

**Advancing Automation for EMS Warfighting**

The session was chaired by Marv Potts, Technical Director, Systems Technology Office, Air Force Research Laboratory. DOD has turned a corner on Cognitive EW, evidenced by the 2018 National Defense Strategy and the completion of a JROC. The two key technical issues are trust and timeliness. Mr. Potts discussed the diverse backgrounds of the presenters in the session. He acknowledged Mr. Steven Govea, Senior Staff Engineer at Motorola Solutions, Applied Technology, whose paper could not be presented due to the session time constraints.

The first presenter was Mr. Bryan Clark, Senior Fellow, Center for Strategic and Budgetary Assessments (CSBA); speaking on the topic “Winning the Decision Battle: Using Autonomy and Recomposable Forces to Fully Exploit Electromagnetic Warfare”. He discussed the DARPA concept of Mosaic Warfare, where current monolithic systems are decomposed into a collective of diverse, adaptive, and dispersed elements that can be recombined into multiple kill chains. This architecture can provide for both manned and unmanned elements to be integrated. Advantages are adaptability, more kill chain options, imposition of complexity to disorient an adversary. This can allow smaller, less escalatory attacks direct to target without rolling back an IADS. Managing these decomposed forces will require machine learning to construct kill chains from available options, similar to approaches used by ride sharing services like Uber and Lyft.
Next up was Mr. Colin Lee, Computer Scientist, NAWCWD, Machine Intelligence and Learning Initiative, speaking on “Learning Features for Radar Emitter Identification using Time-Dependent Convolutional Networks”. Emitter ID is a two step process of feature extraction and pattern recognition. Current system issues are ID of agile pulse parameters and performance in dense environments. A new approach being evaluated is Automated Feature Selection based on convolutional layers that develops the most robust features through Machine Learning. The approach consisted of training the network with a subset of data, then using the results to ID a second subset of the data. The results showed that agile pulse emitters are identified with high accuracy, in both pure and dense environments. Low false positives are achieved with emitters in the library but not with emitters out of the library. The latter is a trust issue that requires further work.

The third presenter was Mr. Marty Moser, General Manager of CRFS, Inc; speaking on “Agile, collaborative, automated and actionable- The future of military spectrum management”. The objective in automated spectrum awareness is to create timely, actionable intel. Raw spectrum is not actionable intelligence; machines can take over from limited human resources to automate spectrum awareness, identify signals of interest, and determine intent. Available technology can perform functions such as detection and geolocation of jammers, highlight abnormal signals of interest, and aid in drone detection and intent.

The final speaker was Col William “Dollar” Young, Ph.D., Commander, 53rd Electronic Warfare Group, Eglin AFB, FL; discussing “Real-time Reprogramming: Operationalizing Cognitive EW and other Technologies to Deliver EMS Capability. The 53rd EWG mission is Mission Data (MD) programming and reprogramming. MD controls EMS software functionality and confers orientation superiority for USAF aircraft. The process has as inputs intelligence data and MD Software Tasking and outputs MD Software and MD Reports. The USAF reprogramming tool called SPECTRE automates this process and maximizes machine to machine connections to speed the reprogramming process. Further improvements in response time may result from automating the process of validating the intel data used by SPECTRE. Future enhancements may enhance the use of the integrated data recording capability present in fielded EW systems.

- Arnold Feinemane
Senior Service Panel

After hearing this week from the Department of Defense and Joint Staff, attendees heard service perspectives on the need for superiority in the EMS. In a panel moderated by Lieutenant General (Ret.) Bob Elder, Major General Michael S. Groen, Director of Intelligence, J2, Brigadier General Jennifer G. Buckner, Director of Cyber G-3/5/7, Rear Admiral Michael Brookes, Deputy Commander, US Fleet Cyber Command/U.S. 10th Fleet, and Brigadier General David Gaedecke, Director, Cyberspace Operations and Warfighting Integration Office of Information Dominance, all discussed how their services are building the force for the future fight. The EMS is central to the conversation in the Department of Defense, but it is now the Services responsibility to align implementation across organizations. The panelists each highlighted the need to assure access to and maneuver within the EMS, yet recognized the organizational challenges that stem from declaring spectrum a domain. The Services are making progress in restructuring organizationally to strengthen core warfighting functions and to adapt to an increasingly dynamic and complex threat environment. However, all panelists agreed changes are occurring, whether or not EMS is a domain. While the Services have been using the EMS at a tactical level, they are now starting to see commanders and senior leaders talk about how to integrate spectrum operations into their overall strategy. The Marines Corps has even created a new Deputy Commandant for Information in order to help steer the Corps of the future.

These changes are also taking place at the program management and resourcing levels. Military leadership is now looking to EMS specialists for recommendations on where to invest so they can maintain superiority in such a congested, contested environment. They are also encouraged by new approaches to acquisition as highlighted earlier in the week by Ms. Ellen Lord at the Department of Defense. These changes are reinforced by the National Defense Strategy (NDS). The services agreed that the NDS is incredibly helpful for the work they are trying to do in the spectrum. At the same time though, it reinforces what they already knew and were already in the process of reinvigorating. Competition in the EMS has never been as fierce as it currently is. The U.S. no longer is the only country using the space and we need to figure out how to win the battle for it. Rear Admiral Brookes discussed the need to integrate across stovepipes. We need to find a different way of doing business when it comes to the EMS. Even though the services are using different language to describe how to work together in this realm, as Brigadier General Buckner pointed out, they do seem to agree on the importance of the EMS to the future force and the future fight. It’s becoming an everyday discussion at the service level which will impact our warfighters for the better.

- Amanda Crowe