Sea Dragon 2025

Small unit leaders' thoughts

by NCOs, SNCOs, and Officers, 3d Bn, 5th Marines

Based on experiences from the 2016 MIX (MAGTF Integrated Experiment), six months of different battalion training events, and the execution of ITZ 1-17 (Integrated Training Exercise 1-17) as part of our Corps' Sea Dragon campaign, 3d Bn, 5th Marines' small unit leaders have identified trends in using new technology and different tables of organization through repetitive, hands-on employment. Cast against a variety of enemy threat scenarios forecasted in the *MOC (Marine Corps Operating Concept)*,[1] we experienced firsthand the friction of previous training meeting new ideas, gaps in conceptual understanding causing missteps in execution, and had the opportunity to create new techniques and procedures to solve emerging problems—all while dealing with the day-to-day infantry battalion life and training requirements. We are grateful to have had all of these opportunities to date. The goal of this article is to provide feedback on the "best of" or "most critical" concepts and capabilities that we feel must be pursued to ensure "*superior infantry is a Marine Corps asymmetric advantage,*" as per the *MOC*'s explicit guidance.[2]

C[2]: Digital, Interoperable, Flat, Federated, and Shared

Our C[2] (command and control) networks must be brought into the future—now. First and foremost, we must re-invent the acquisitions wheel, specifically figuring out ways to enable our small units to leverage the revolution in commercial information technological advances that our enemies are readily using. There is no reason that it takes us almost a decade to field a new communications device while our adversaries just pre-order the latest Samsung or iPhone, create an ad hoc network over whatever waveform is available, and out communicate us at the tactical level. The C[2] acquisitions system must be streamlined to allow our small units to rapidly test and field current and emerging technologies.

With so many emerging technologies, what kind of system, or *system of systems*, should be developed? For understandable reasons, each element of the MAGTF has unique requirements that input into their respective C[2] system to help enable and drive decision making. Thus, the baseline network should enable operating on different waveforms, depending on the best suited or least interfered with (much the way we have historically chosen between VHF or HF, for example). Components of the MAGTF, to include smaller tactical formations down to the rifle squad level, should be able to access this backbone—or WAN (wider area network) to use a civilian model—through a radio such as the soon-to-be fielded NGHH (next generation handheld) or STC (SOF tactical communications).[3] This WAN is our tactical Internet, allowing us to share information seamlessly and fluidly whenever, and however, we are able to connect to it. To this end, we need a digital battalion Tac 3 and 4 (and platoon, company, and even regiment) that are on available waveforms to serve as our LAN (local area network). Americans have secure, modifiable, and adaptable LANs in every house in neighborhoods across the Nation—the same should be true for tactical, small unit formations. The tactical LANs will allow digital sharing of information, key to decentralized decision making in the future, and multiple LANs should be available at any time to allow us to use the best available waveform. For example, a complete list of company tactical nets to be used for voice and data, both internal as LANs or to the higher headquarters in the WAN would read:

Co Tac 1 – VHF SINCGARS voice

Co Tac 2 – VHF SINCGARS voice

Co Tac 3 – ANW2, simultaneous data and voice, including sensor information

Co Tac 4 – Trellisware-TSM-X, simultaneous data and voice, including sensor information

(This framework for useable communications nets could be replicated at every level.)

Utilizing a common radio and common handheld or wearable device that can plug into this network would allow specific elements of the MAGTF to have their own applications to provide information management while also allowing seamless consolidation and sharing of information on the network. Radios at the headquarters elements at all levels would be responsible for bridging information across the LANs and to higher headquarters as well. The end-state should be a federated—no longer hierarchal—network that allows individual combat formations to operate independently if required while also, depending on the conditions in a given combat environment, enabling the unit to connect and share information across all networks in order to provide a common operational picture. A small, multi-terabyte hard drive attached to a computer power unit, which is connected to each network, could mean a server to cache information and store it to share with adjacent, higher, and subordinate units whenever connectivity is achieved from even the most dispersed units. This would create the following:

1st Squad, 1st Platoon, Company X, is part of a company clearing operation and has a sUAS airborne that has identified an enemy position. 3d Squad, 3d Platoon, Company X, is on the opposite side of the company

formation, but the enemy is to his front. The squad leader, after being informed and shown by his ISO (infantry systems operator) or his ASL (assistant to the squad leader) and JFO (joint fires observer), is able to "see" what the sUAS is able to see, multiple kilometers away, and orient on the enemy. All the while, depending on the situation, he, his ISO, or ASL is text chatting and talking VOIP (voice over Internet Protocol) over Co Tac 4 to their very adjacent squad leader. Simultaneously, the company sees what the squads and small unit leaders are all seeing. Within seconds the battalion is tracking all the digital traffic as well, to include locations of all friendly units and any possible geometry of fire issues resolved. No traffic was passed over VHF communications, which are often degraded in urban environments, rather than optimized for them such as the NGHH/STC's TSM-X illustrated in Figure 1. This scenario has been trained to and the operations order accounted for this—with no direction from higher, the 3d Squad Leader in 3d Platoon understands his intent, knows he is able to defeat this enemy positon organically, and he acts—immediately and with knowledge!

Additionally, we have learned so far there is no such thing as too much information. There can certainly be poor information management, but increased information, if we have proper

The MAGTF Integrated Experiment was the iniital event in the SEA DRAGON initiative. (Photo by Cpl Thor Larson.)

information management processes in place, becomes increased knowledge. Today's Marine grew up in the Information Age and was nurtured by the Internet. Today's Marine had Google instead of a hard-spine encyclopedia. He is comfortable in an information-rich environment. Just as Google organizes our search results, with simple information management techniques, we can trust today's Marine to sort and identify what information is critical to him at that time and place. Applications,

common interfaces, and consolidation and sharing of information across all networks is critical. The Marine Corps would be wise to devise a flat network that maximizes information organization and sharing (simply!) and that will update as distant units come on and off the net.

Rifle Squad Size: 15 Marines

If our Service truly desires to achieve all that the MOC describes for our infantry small units, the 15 Marine rifle squad, as illustrated in Figure 2 is, at a minimum, the way to go. This organization accounts for the integration of advanced technologies to enhance the squad's situational awareness and battlefield understanding per the unanimously approved Marine Requirements Oversight Council August 2015 MERS (Marine Expeditionary Rifle Squad) ICD (Initial Capabilities Document).[5] This organization also provides the rifle squad the flexibility and lethality required to win the direct fire fight in a complex, most likely urban environment.

The 13 Marine rifle squad is a proven construct to fight and win in complicated direct fires engagements. The employment of assault, support, and security is easily accomplished, squad leaders are able to effectively lead subordinate elements of "3," and each fire
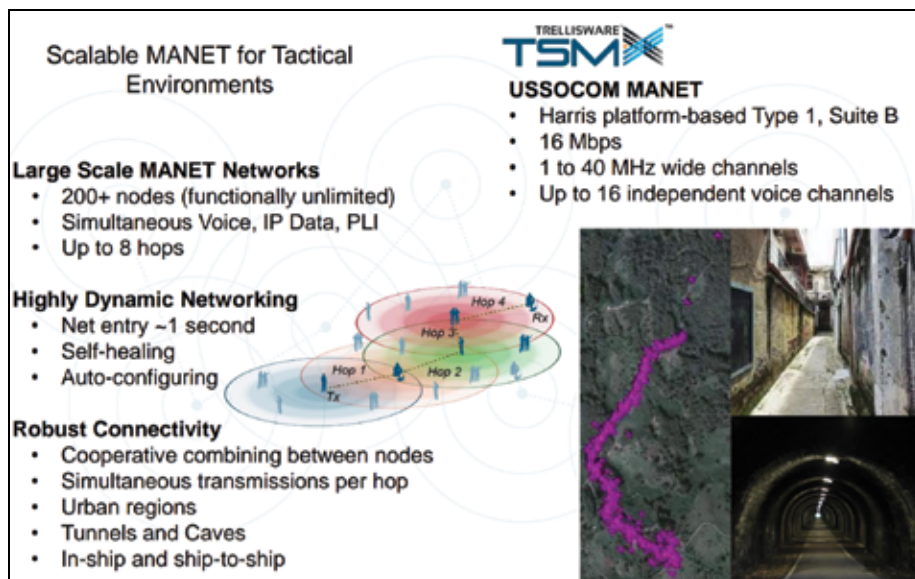

Figure 1.[4]

team is capable of independent combined arms. This model has proven effective—on islands in the Pacific, mountains in Korea, jungles in Vietnam, dense urban sprawl in Iraq, and villages and intersecting farmlands in Afghanistan—in everything from daily patrols to deliberate attacks to straight up clearing in zone. We cannot afford to sacrifice the killing efficiency and combat power that three combined arms fire teams possess, but we do need to enhance their capabilities to provide the currently absent asymmetric advantages that the *MOC* mandates.

The "new" fire team should be fundamentally constructed in the same manner as today. However, the fire team's Marines' weapons should all be M27 IARs (infantry automatic rifles), with one Marine still designated as the true "automatic rifleman." This frees up the old "assistant" automatic rifleman to become a combat multiplier. Each fire team within the squad would have a different specialty training requirement for their new "combat multiplier" capability, creating enhanced fire teams with unique abilities that together enhance overall squad combat power. 1st Fire Team will have an infantry Marine with specialized demolitions and rocket proficiency, 2nd Fire Team an unmanned air/ground/water system (UxS) operator that will be operated as needed, and the 3rd Fire Team a counter-UxS. The strength of this model is that it builds a table of organization that allows the infantry to adapt to the future—the combat multiplier is an infantry Marine with additional, specialized, and formal training which can be modified to fit future requirements.

The rifle squad also needs a "fighting headquarters," which will bring the unit size to 15 Marines. This headquarters will consist of the three Marines: the rifle squad leader (0365), the assistant to the squad leader (0311 that has graduated the Advanced Infantry Course and JFO course[6]), and an infantry systems operator (0311 that is the squad's UxS and digital communications subject matter expert). The ISO's primary mission is to operate and employ assigned unmanned systems in support of the rifle squad, be it UAS or UGV, and if and when necessary,

he integrates the 2d Fire Team's UxS operator to assist in carrying equipment or to operate a second system. The ASL is knowledgeable on the employment of the rifle squad and will act as an "in the know" radio operator and serve as the squad's certified fires coordinator and observer. On one end, this Marine will manage information and provide the squad leader knowledge that is critical to his decision making and reporting with higher headquarters. He will also assist the squad leader in the employment of technologies such as KILSWITCH and its connection to PCAS (persistent close air support) airborne systems (more on this below), as well as other fires capabilities.[7] On the other end, the ASL will also conduct pre-

combat check/pre-combat inspection of the squad's new equipment. Ultimately, the ASL and ISO allow the actual rifle squad leader to control his teams, fight his squad, and supervise the employment of new capabilities to support his Marines in the "last 600 meters."

Infantry Weapons Systems

To achieve the MOC vision, our infantry small units need different weapons and equipment:

1. M27 should be the Marine Infantry Service Rifle. Infantry Marines serving in the rifle squad should carry the M27 for its increased accuracy, cleaner operating system, and higher rate of fire. Some worry that equipping Marines with the M27 will lead to wasting
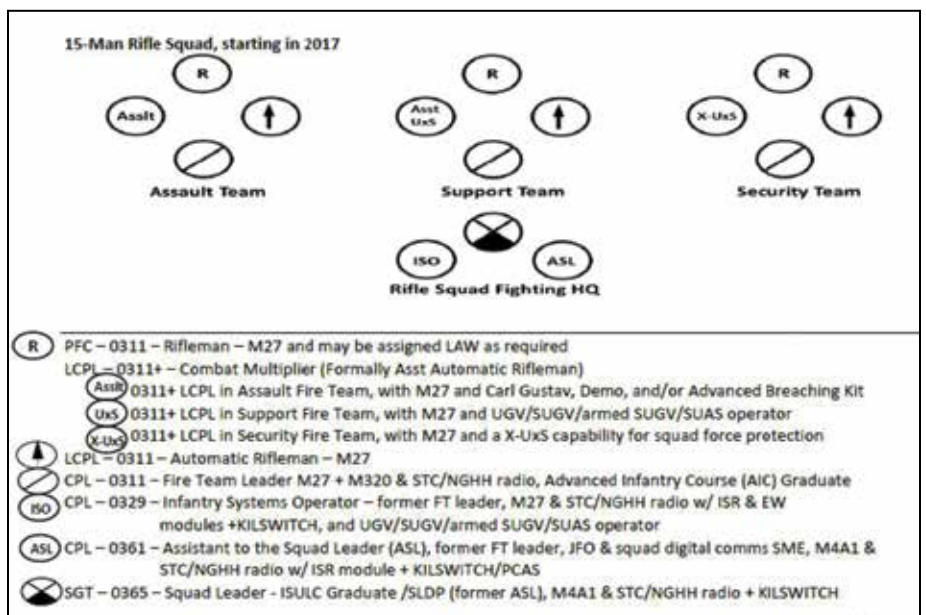

Figure 2.

ammunition, but we have found that through proper training, which would be enhanced through introduction at Infantry Training Battalion, proper fire discipline is able to be taught and understood by Marines. Within the fire team, one Marine is still designated as the true automatic rifleman. The other Marines in the fire team carrying the M27 will allow the squad leader the ability to order his entire squad to fire on automatic as required. As a general rule, any automatic fire should be employed on the bipods (which should be improved and made more durable like the old M249 bipods) and at ranges up to 50m unless ordered by exception from the unit leader. The abundance of automatic fire enhances the close in, urban fight as well; for example, making entry into rooms. Additionally, one M27 per platoon should be given an improved scope to use in the designated marksman role.

2. The M4A1, which provides automatic fire but is lighter weight, should be the Marine Infantry Support Service Rifle and should be carried by the squad's fighting headquarters as well as all unit leaders and those carrying crew-served systems.

3. Our rifles should be suppressed. This will cost money up front (but much will be saved in Veteran's Affairs disability claims for tinnitus and hear-ing loss in the long term), but allows for a greater level of concealment/force protection and communication when in contact with the enemy.

4. The Carl Gustav should exist at the squad and platoon level. Its increased range and use by the U.S. Army, Special Operations Command, and key U.S. allies provides us increased, sustainable combat power when we have to fight ashore and integrate into the joint logistics infrastructure. The multiple munitions to choose from also grant new capabilities in the direct fire fight. An example for Range 400, the popular "standard" company attack of ITX: bunkers could be destroyed from Machine Gun Hill before closure occurs, greatly increasing the company and platoon's ability to shape the enemy appropriately and increase tempo. The image below, taken by 3/5's Kilo Company, highlights the battalion's experiences with the Carl Gustav.

5. PGM (precision guided munitions) must be brought to the company level as a way to reduce the amount of ammunition to be carried, increase probability of hit, and reduce collateral damage in the forecasted urban fight. This may be done in two ways. First, develop a PGM for the Carl Gustav (see China Lake's Spike Missile as an example for innovation or possible adaptation). Second, increase the capability and use of light miniature attack munition (LMAM) systems. Currently, LMAMs provide the company commander the ability to support platoons and squads with a hip pocket PGM. Again, at Range 400 at ITX, we used LMAMs effectively, especially when teamed with other intelligence, surveillance, and reconnaissance (ISR) assets, to rapidly destroy the enemy 82mm mortar position. The LMAMs should be capable of using GPS or terminally controlled by each squad's ASL and certified JFO.

6. The M320 Grenade Launcher. This weapons system is a reliable, proven grenade launcher used by the U.S. Army. Attachment becomes an issue: The M27 becomes very front heavy and unstable and is only mounted via drilling holes in the M27 handrail or using a different handrail. Our recommendation is that M320s be assigned to grenadiers as secondary weapons much like the old M79; M203s are still employed on M4A1s, and in the future, a lighter weight, under-barrel mounted grenade launcher may be developed for the M27. Additionally, development of a medium-velocity round that can increase the range and transition from an HEDP (high explosive, dual purpose) to an HE round would be advantageous for general purpose and more realistic for use against strong points often protecting enemy crew-served weapons.

UAS: Restart and Reorganize

Due to the unacceptable deficiencies in the current platforms assigned to Marine unmanned aerial vehicle squadrons (VMUs), over the past six months, 3/5 Marines have not received support from a single VMU UAS sortie. These deficiencies have been highlighted repeatedly and consistently in the *Gazette's* pages, as well as in numerous UUNS/DUNS (urgent and deliberate universal needs statements) from Operating Force units dating back 13 years.[8] It's long past time that our Corps commits to fixing UAS on behalf of our young infantry Marines. Based on our experiences throughout the experiments, solutions exist and are readily available today to fundamentally transform how UAS support the Marine on the ground.[9]

May 2009, Soldiers firing the Carl Gustave in Basra, Iraq. (Photo by Spc William Hatton, USA.)

To start, in regard to our concept of employment for smaller or Group I and II UAS systems, the airspace above the GCE should belong to the GCE up to around 1,000 feet AGL (above ground level). This allows multiple advantages and will actually protect, vice restrict, our brothers and sisters in the ACE. First and foremost, snapping this airspace to the GCE and its organic controllers (JFOs and JTACs [joint tactical air controllers]) will protect friendly aircraft by keeping them out of the vertical hazard of most direct fire munitions as well as keep them away from enemy UAS, which are employed daily, often with lethal effects, overseas.[10] In the future, smaller, harder to detect enemy UAS will mostly likely be massed at low altitude in vicinity of the GCE,[11] so we should only bring aircraft into the zone as required. Rotary-wing pilots may scoff at this initially as they like to fly low to protect their aircraft and to maximize support to the GCE, but in the urban fight of the future with denser enemy UAS and more proliferated MANPADS (man-portable air defense systems), rotary-wing aircraft will not have freedom of maneuver over contested ground combat areas. Our Service has already experienced this reality in Iraq,[12] 3/5 experienced this during the MIX in July 2016, the Israelis have experienced the same in combat,[13] and the Turkish Air Force has been forced to realize the same.[14] Second to this, by keeping friendly aircraft out of the GCE airspace, Marines on the ground will then be granted decentralized employment of UAS down to the fire team level. Based on our lessons learned at ITX, brevity codes enabled automatically bringing UAS down to a restricted altitude or cancelling their flights altogether if rotary-wing aircraft were needed for low-level CAS; likewise, we developed a UAS five-line to submit to the battalion air officer for approval if any company-level UAS needed to fly above the standing 1,000 ft AGL ceiling.

When it comes to the types of UAS to be used or desired, the answer is simple: robust and layered, Group I, II, and V, or small UAS (sUAS) and medium altitude long endurance tactical (MALET) UAS. Figure 3 provides an illustration of what this architecture,
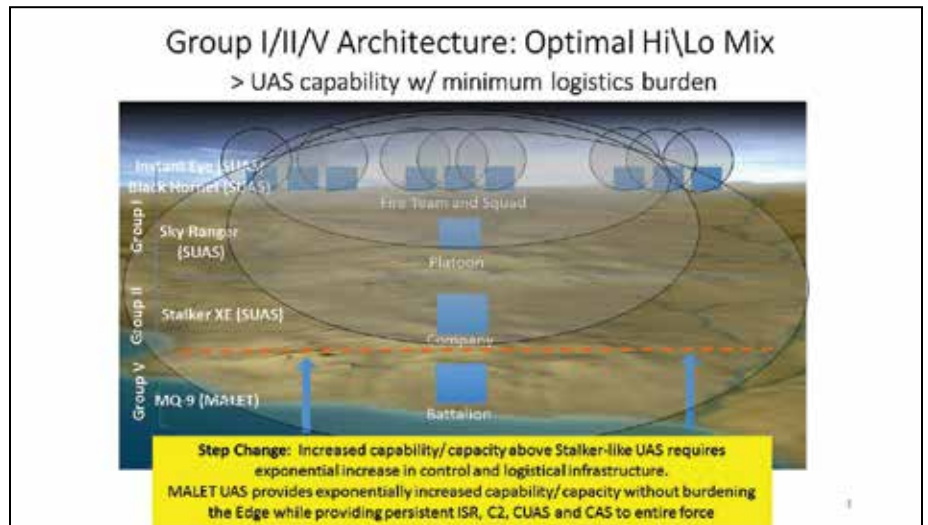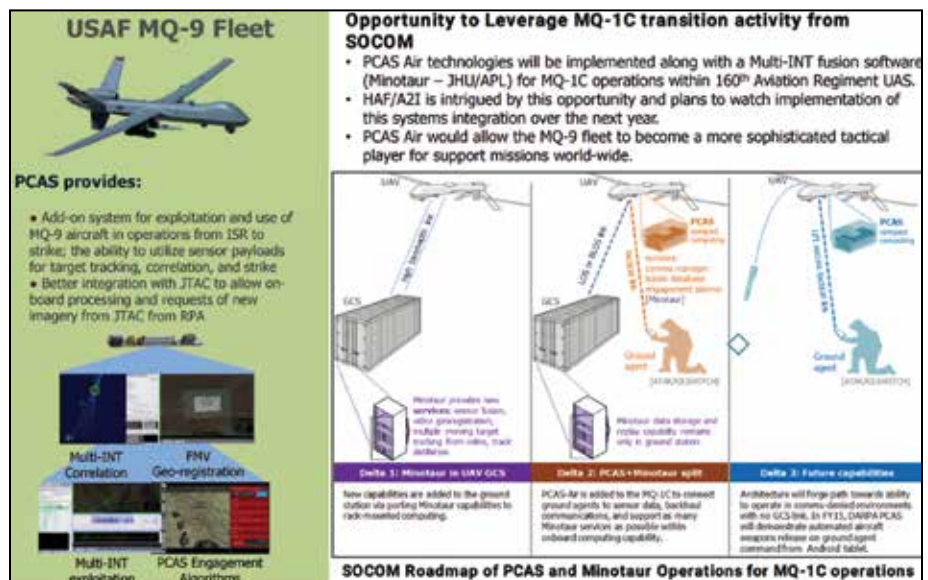

Figure 3.

Figure 4.[22]

coverage, and capability should look like.

At the forefront, an off-the-shelf solution exists in the MQ-9 Reaper as a robust and game-changing combat multiplier for all warfighting functions in support of the Marine on the ground. It can keep up with Ospreys in range and speed; relay communications; act as a long duration, 24 to 40 hour "Guardian Angel;" provide multi-spectral ISR; operate from the same airfields as our KC-130s and F/A-18Ds; and even mark or prosecute targets itself with PGMs—all at a fraction of the operating costs of conventional aircraft.[15] The MQ-9 also conveniently answers numerous oper-

ating force UUNS/DUNSs from the past decade or more of fighting.[16] The MQ-9 alone provides enhanced, layered C[2], fires, and intelligence for supported units in a way that no manned aircraft can sustain. If our Service equipped MQ-9s with existing PCAS-air technologies (see Figure 4[17]), added forthcoming precision-guided 81 millimeter mortar rounds[18] to the aircraft's existing AGM-114 Hellfire and GBU-38/49 weapons load-out, and connected these aircraft to our ASLs/JFOs and platoon-level JTACs, this would revolutionize how CAS is conducted in support of the Marine on the ground. Also, if for some reason, our Service cannot afford the game-changing,
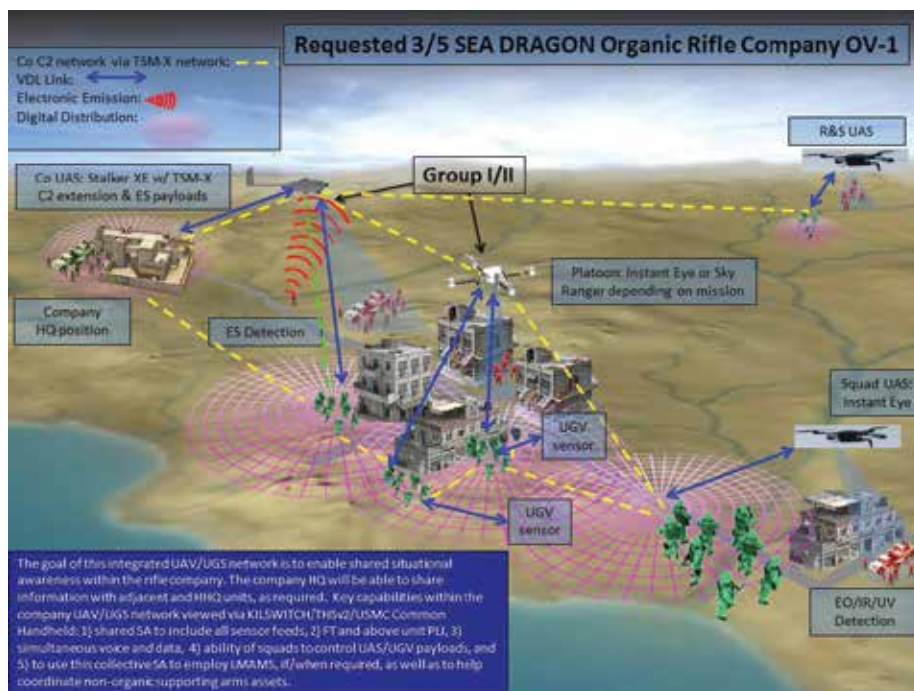
Figure 5.

cost-effective, and efficient investment in the MQ-9 when all indications are that the defense budget will significantly increase,[19] combined with our Commandant's recent directive to develop a comprehensive plan to modernize the GCE "to produce next generation Marine ground combat forces that are better networked and more resilient, capable, and lethal,"[20] why can't our Service at least obtain for our infantrymen the 100-plus Air Force MQ-1 Predators that are being retired in the next year?[21]

We would further increase this layered UAS approach by using a platform such as the Stalker-XE as the company level UAS, with Instant Eyes, Sky Rangers, and even the small Black Hornet able to be used from the platoon to the fire team level.[23] Ultimately, the company-level UAS architecture should look something close to what is illustrated in Figure 5. Still, it's important to keep in mind that these smaller UAS are often less capable, specifically in high definition optics and human tracking, when compared to current commercially available sUAS such as the DJI Phantom 2, 3, 4, Mavic Pro, etc.,[24] which are used frequently by enemies such as ISIS/ISIL. In the end, a sUAS that can be easily carried and employed by one operator like the Instant Eye, with a digitally encrypted feed and high definition optic, would greatly enhance small unit situational awareness, which would be multiplied if the feed can be placed on the network for a seamless, shared common operating picture such as what the capabilities in Figure 5 enable.

Unmanned Ground Vehicles

UGV (unmanned ground vehicle) integration is a sound concept for now and the future, proven in our experiments thus far and is already in use today by the Russians.[25] They are fielding UGV with multiple RPG-26 launchers and a PKM, obstacle breaching capabilities,[26] and in Syria, a small UGV with RPGs assisted in the reduction of a Syrian rebel strong point.[27] The pursuit of UGVs of all sizes and capabilities (broken into classifications in the same manner that UAVs are divided into groups) is the future.

Different types of UGVs are required. At the infantry company level they should be light and modular—"light infantry UGV"—that can be tailored to fit a mission and assigned in support roles similar to current weapons platoon assets. With minimal armor around key components, our UGV for the infantry should be internally transportable and lightweight. It needs universal adaptors and universal power systems—a quick modification to transform it from a logistics carrier, stretcher bearer, armed with machine guns and/or rockets/missiles, equipped with an APOBs (anti-personnel obstacle breaching system) and/or mine roller, or fitted with chargers and amplified radios. The "Humvee of UGV" is the goal. Additionally, sUGV (small UGV) that are able to employ at the squad level would be a huge combat multiplier. A remote control car with an iPhone's camera and explosive charge would fundamentally change the way we close on a strongpoint: at the individual to squad level we could reduce IEDs (improvised explosive devices)/booby traps/mines, breach doors, or even frag a room/bunker with positive identification *before* exposing Marines to the threat. We should also explore UGVs that are specifically designed for dynamic, casualty producing tasks such as a MCLIC (mine clearing line change)/breaching UGV to engineers or even UGVs that can fight alongside our heavy and light armor.

Conclusion

Our unit has been extremely fortunate over the past six months to think about and experiment with concepts described in the *MOC* against a variety of free-thinking adversaries. Throughout this process, we've learned a great deal, our Marines have grown stronger, we've identified key capability gaps standing in the way of achieving the *MOC*'s intent, and we've spent many hours discussing potential solutions to eliminate these capability gaps. With the *MOC*'s endstate constantly in mind—"*superior infantry is a Marine Corps asymmetric advantage*"—we look forward to doing everything we can to ensure that our Corps is prepared to fight between now and 2025.

P. Bowen; SSgts Jose A. Murillo, Juan J. Morales, Michael R. Laskowski, and Jerry L. Pershin; GySgts Jason S. Hubbard and Mark J. Miller; 2ndLts James G. Heisler, Kyle A. Thompson, Liam R. Moffett, and Kyle B. Connell; 1stLts Jared R. Griffith, Constantine N. Filipos, Eric R. Cybulski, and Brent W. Ramos; Capts Charles E. Broun, Johnathon J. Lorraine, Randy K. Brazile, Josef E. Patterson and Tyler J. Anthony.

Notes

1. Headquarters Marine Corps, *Marine Corps Operating Concept (MOC): How an Expeditionary Force Fights and Wins in the 21st Century,* (Washington, DC: 2016).

2. *MOC*, 13.

3. For more on the NGHH/STC, please see "Harris Unveils FALCON III RF-335M-STC SOF Radio," (Online: 27 May 2016), available at http://www.miltechmag.com.

4. For more on Trellisware waveform's capabilities, see Capt Daniel Rettedal, "Digital Interoperability in the Objective Area," *Marine Corps Gazette*, (Quantico, VA: April 2016), 50–55. Image from a Harris RF-335 STC Product Overview.

5. Headquarters U.S. Marine Corps, "Marine Expeditionary Rifle Squad Initial Capabilities Document," Combat Development and Integration, (Quantico, VA: 13 August 2015).

6. The MERS ICD mandates a JFO capability organic to the rifle squad.

7. For more on KILSWITCH and PCAS, see Capt Travis Barksdale, "CAS: KILSWITCH and the Way Ahead," *Marine Corps Gazette*, (Quantico, VA: July 2014), 34–37; CWO4 Shelby Lasater, et al., "Scales on War Book Review Essay," *Marine Corps Gazette*, (Quantico, VA: November 2016), 92–93; and a Defense Advanced Research Projects Agency explanation video available at https://youtu.be/weR-z7bbIdfo.

8. For more on our Service's UAS deficiencies, see CWO4 Shelby Lasater, et al., "Scales on War Book Review Essay," Capt Guy R. Nelson II, "Unmanned Aviation," *Marine Corps Gazette*, (Quantico, VA: November 2016), 69–71; Che Bolden, Scott Cuomo, James Foley, and Kevin Murray, "Manned/Unmanned Teaming to Transform the MAGTF," *Marine Corps Gazette,* (Quantico, VA: June 2016), 70–75; Kevin F. Murray, "Marine Aviation Readiness:

Solving the Problem," *Marine Corps Gazette*, (Quantico, VA: December 2016), 51–57; Cory D. Radcliffe, "Embrace UAS 'Guardian Angels' Immediately: Our Corps is 15 Years Behind," *Marine Corps Gazette*, (Quantico, VA: December 2016), 43–50.

9. See Justin Doubleday, "Marines Experiment with New Tech during Force-on-Force Experiment," *Inside the Navy*, (Online: 8 August 2016), available at http://insidedefense.com and "Marines use Reaper Drone for First Time during Tech Experiment," *Inside the Navy*, (Online: 12 August 2016), located at http://insidedefense.com.

10. For more on the threat from enemy UAS, see John Beck, "ISIL Ramps Up Fight with Weaponised Drones," *Al Jazeera*, (Online: 3 January 2017), available at http://www.aljazeera.com and Kelsey D. Atherton, "IED Drone Kills Kurdish Soldiers, French Commandos," *Popular Science*, (Online: 11 October 2016), available at http://www.popsci.com.

11. See http://rudaw.net and https://www.reddit.com for current, real-world threats facing ground forces against a thinking and rapidly adapting opponent using sUAS to its maximum potential.

12. See Michael D. Grice, "Fear of Flying," *Marine Corps Gazette*, (Quantico, VA: June 2007), 15–18.

13. Given the threat to rotary wing aircraft, combined with the exponential advanced on MALE (medium altitude long endurance) UAS, the Israeli Defense Force has phased out all of their AH-1 "Cobra" aircraft and now fly MALE UAS for approximately 70 percent of their daily sorties, including in urban combat. For more on this subject, see Oded Yaron, "Autonomous Drones May Be the Future, but Israeli Army Still Stresses Human Factor," *Haaretz*, (Online: 9 September 2016), available at http://www.haaretz.com and Dan Williams, "Drones Gain Ground in Israel after Cobra Helicopter Cut," *Reuters*, (Online: 28 May 2014), available at http://mobile.reuters.com.

14. For a story about and a video of a Turkish Air Force AH-1 Cobra being shot down, see David Cenciotti, *Aviationist*, (Online: 14 May 2016), available at https://theaviationist.com.

15. For more information on how and why this is the case, see the articles referenced in Endotes' 10 and 11.

16. For more information about this subject, see the articles referenced in Endnote 8.

17. Figure 4 was taken from a Defense Advanced Research Projects Agency (DARPA) PowerPoint brief on PCAS given to a U.S. Air Force CAS conference on 2 March 2015.

18. Information provided in a UTC Aerospace System PowerPoint brief titled "Extended Range Air-dropped Munitions Capability Briefing" for the U.S. Air Force Association from 19–21 September 2016.

19. For more on the likelihood of significant increases in the defense budget, see Charles Tiefer, "President Trump is Likely to Boost U.S. Military Spending By $500 Billion to $1 Trillion," *Forbes Magazine*, (Online: 9 November 2016), available at https://www.forbes.com.

20. Headquarters Marine Corps, *2017 CMC Institutional-Level Task List for Deputy Commandants (DCs) and Commanders*, (Washington, DC: 2017), 11.

21. The U.S. Air Force is retiring its Predator drones in 2018, see http://www.c4isrnet.com. If our Service can't afford the MQ-9, despite the massive capability increase and reduction in costs operating less able systems, what is stopping us from picking up proven equipment no longer in use by the USAF if that may bridge the capability so desperately needed by our infantry?

22. Image taken from the Persistent Close Air Support (PCAS) brief by Dr. Daniel Patt from 2 March 2015.

23. The Stalker XE UAS is identified in Headquarters Marine Corps, "UUNS for ORGANIC Group 2 UAS for MARSOC," Combat Development Command, (Camp Lejeune, NC: Marine Special Operations Command, 4 November 2016), and the other sUAS are addressed in the articles addressed in Endnotes' 8 and 9.

24. Learn more about DJI Phantom 4 capabilities at https://www.dji.com.

25. David Hambling, "Russia Wants Autonomous Fighting Robots, and Lots of Them," *Popular Mechanics*, (New York, NY: 12 May 2014), available at http://www.popularmechanics.com.

26. See https://sputniknews.com.

27. Julian Robinson, "Russian Forces Use Machine Gun Robot to 'Take Out' ISIS," *The Sun*, (Online: 8 December 2016), available at https://www.thesun.co.uk.