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14. ABSTRACT
During RIMPAC 2014, SPMAGTF-3 was unabled to conduct distrubuted operations of its three CLTs because of its reliance on " push" logistics, lack of available manned aviation assets, and company-level distribution once supplies reached ashore. The Marine Corps must modernize the infantry battalion logistics structure by integrating an organic logistics platoon into infantry company structure. This logistics platoon must utilize the tenets of hybrid logistics (blending of new and proven technologies, being naval in character, remaining flexible and expeditionary), train logistics Marines across multiple specialties, and develop new equipment (such as unmanned aerial logistics platforms and leader-follower logistics vehicles). This paper explores the DOTMPFL impacts of this new logistics model on Marine Corps operations and force generation.

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FUTURE WAR PAPER

Flattened Logistics: The Future of Marine Corps Logistics and the Company Landing Team

**SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF OPERATIONAL STUDIES**

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Lance Corporal Snippert, a distribution combat logistics integrator (CLI), is ready to hit the beach during Operation LITTORAL RESOLVE. The battalion is conducting four widely-separated attacks on islands spanning 500 miles apart. The 1st Platoon grunts of Snippert's company landing team already hit the beach in assault amphibian vehicles 10 minutes prior and Snippert's landing craft, loaded with his leader-follower logistics vehicles (LFLV) and 1st Platoons' light off-road vehicles, lands against the sand. Immediately after the bow drops, Snippert moves his vehicles onto the beach and to the pre-arranged casualty collection point. He sees the corpsman working on two Marines who were wounded during the assault. Picking up his unmanned aerial logistics platform (UALP) remote control, he directs two of four light UALPs that he launched from the landing craft before the assault began and assists the corpsman. Within 10 minutes, he has both Marines slung under the UALPs and on their way to the operating room on the USS America 60 miles off-shore. Without having to wait for a manned aircraft to arrive, the two Marines receive treatment within the critical golden hour and survive.

Moving to the Logistics Platoon rally point, LCpl Snippert is met by the rest of the platoon. He leaves his LFLVs with the platoon commander and platoon sergeant, launches two light UALPs with speed balls of blood plasma, ammo, and water bottles and two with medical evacuation setups, and moves to meet 1st Platoon for their next attack over the ridge. The grunts have already attacked and seized the objective without casualties so Snippert brings down the UALPs and distributes supplies to refill their magazines and hydration systems. One infantryman's M240 machine gun is broken, so LCpl Snippert takes it and returns to the Logistics Platoon on the beach.

On the beach, Sergeant Mooney, the senior maintenance CLI, was setting up his 3D printer while Corporal Baker was troubleshooting a Weapons Platoon light off-road vehicle that kept overheating. Sergeant Mooney took a quick look at the broken M240 and saw the broken feed tray. Unfortunately, there were no replacement feed tray parts within the repair block on-hand so he began to fabricate one on the 3D printer. A few hours later, the M240 was delivered back to 1st Platoon via a UALP from the beach. The vehicle couldn't be fixed on-site, so a replacement was forwarded and the broken vehicle sent back to the intermediate maintenance detachment aboard ship via the same heavy UALP.

Meanwhile, the sustainment CLIs were operating their water purification systems, refilling empty 5-gallon water jugs, and pushing them to the platoons via LCpl Snippert and the other distribution Marines on their off-road vehicles. After delivering water and picking up dead batteries, the sustainment CLIs unrolled the flexible solar panels and began recharging radio, LFLVs, and UALP batteries. Since the distribution CLIs resupplied the grunts with chow and ammo, the sustainment section counted their stocks and ordered resupply from the embarked MEU CLB. Two hours later, a heavy UALP drops three pallets with rations, mortar rounds, and various small arms ammo and the supplies are loaded onto their LFLVs.

Since the company seized its objectives, the Logistics Platoon displaces to the company HQ at a half-finished airfield to prepare for tomorrow's next attack. The logistics platoon commander coordinates with the company landing team commander and the battalion logistics officer to reorganize logistics assets to support upcoming operations. Just 10 years before, an operation of LITTORAL RESOLVE's audacity would not have been logistically supportable from the old organization of the battalion's logistics assets.

During the RIM OF THE PACIFIC exercise (RIMPAC) 2014, Special Purpose Marine Air-Ground Task Force 3 (SPMAGTF-3) was task-organized as part of a Marine Corps Warfighting Lab (MCWL) advanced warfighting experiment. Its purpose was to test whether or not "a sea-based SPMAGTF–organized, trained, and equipped to conduct distributed operations–can sustain…multiple widely disbursed Company Landing Teams (CLT)."[1] While published two years before the current *Marine Corps Operating Concept* (MOC), this experiment tested three key aspects of the Marine Corps future warfighting concept: the ability to integrate the Naval Force to fight at and from the sea; evolving the MAGTF; and enhancing Marines' ability to maneuver.[2] SPMAGTF-3 uncovered a critical gap in sustaining our forces from the seabase, which will handcuff our ability to defeat the enemy.[3] *To unleash the combat power and potential of the CLT, the Marine Corps must fully embrace hybrid logistics, flatten the logistical concept of support, devolve the lowest echelon of logistical support to the company-level, and combine tactical logistics-related military occupational specialties.*

During RIMPAC 2014, SPMAGTF-3 employed three CLTs for a period of 96 hours and sustained those units from amphibious shipping with Combat Logistics Battalion 3 and a composite aviation squadron. The unit identified three main failures in the effort to sustain these widely dispersed units: 1. reliance on "push" logistics; 2. the lack of available manned aviation assets; and 3. company-level distribution once supplies reached ashore.[4] These gaps were a direct result of the Marine Corps not leveraging unmanned aviation platforms to sustain forces within the area of operations and the structural unsuitability of the battalion logistics organization.

With regard to the first and second issues, the aviation combat element (ACE) of the MAGTF–specifically the assault support components (medium and heavy rotary-wing and KC-

130 transport airframes)–does not possess the capacity to deliver logistical sustainment across a widely disbursed area. During amphibious distributed combat operations, the ACE's probable prioritized assault support missions, in order, will be troop insertion, casualty evacuation, and sustainment. Additionally, the requirement for armed escort for these sorties and slower deck cycles associated with shipboard aviation operations further restrains manned aviation capacity. Accordingly, SPMAGTF-3 resorted to "push" logistics when manned aircraft sorties were available to ensure that vital supplies were sent forward when possible instead of when needed. As a result, the receiving unit was inundated with supplies when it did not possess the distribution mechanism to service platoon-level organizations. While the lack of manned aviation assets contributed to this bottleneck of supplies, it was not the only factor.

With respect to the third issue, the current organization of the battalion logistics formation is inadequate. As the lowest echelon of sustainment, the battalion logistics section provide subordinate companies with supply, maintenance, and transportation. Infantry companies only possess the ability to transport one to two days of ammunition, food, and water; have limited ability for maneuver and medical triage; and no ability to generate power or produce potable water. Without a permanent logistics capability at the company-level, battalion efforts to embed logistics providers into their CLTs will remain ad-hoc, haphazard, and insufficient to enable the full potential for operational maneuver.

A Logistics Platoon, organic to the company landing team and empowered by hybrid logistics, would overcome these two structural challenges inherent in CLT operations. The incorporation of hybrid logistics concepts–in particular leader-follower logistics vehicles (LFLV) and unmanned aerial logistics platforms (UALP)–will resolve current aviation sustainment capacity shortfalls and flatten the concept of logistics support between the CLT and the logistics

combat element (LCE). Moreover, the CLT Logistics Platoon provides a standardized capability which will enable an effective entry-level training pipeline and realistic training for combat operations.

Before demonstrating the ability of a hybrid logistics-enabled CLT Logistics Platoon, key assumptions must be outlined and terms defined. Fundamentally, this paper assumes that the organization, manning, and equipping of the CLT defined below is the organization that will be accepted as the standard subordinate unit of the future infantry battalion, equivalent to the current infantry company. This paper also assumes that current manpower for logistics personnel within the infantry battalion will not expand. Finally, the infantry battalion will retain appropriate ability to conduct supply functions which must be supervised by the battalion commander and executive officer.

With the above in mind, the CLT will consist of three rifle platoons, a weapons platoon, a logistics platoon, and a headquarters section for a total of (198) Marines and Sailors as depicted in Figure 1 below.[5]

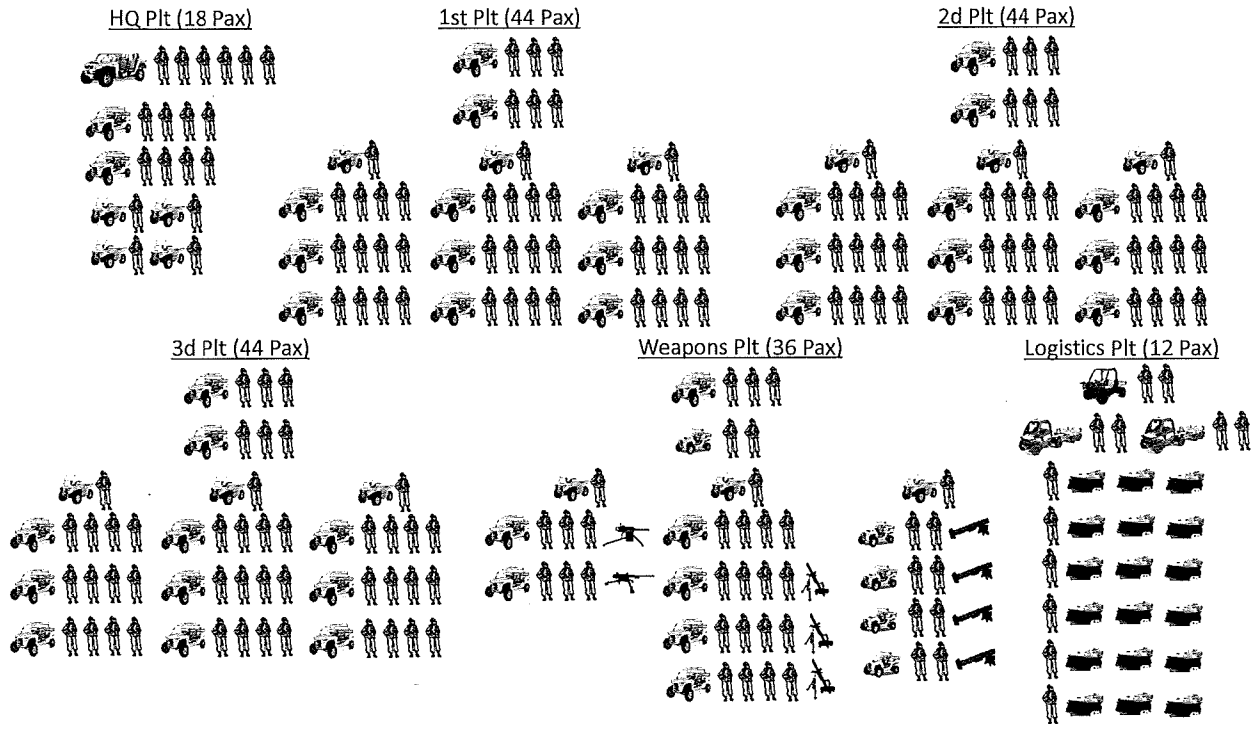

Figure 1 – Company Landing Team Task Organization w. Communications and Medical Attachments

The CLT will be mounted aboard light, off-road vehicles, which are internally transportable by MV-22, in order to provide enhanced ground mobility and survivability through speed and dispersion. The rifle platoons will maintain the current organization of three rifle squads with organic light automatic weapons. The weapons platoon will field the current light mortar, medium machine gun, and light anti-armor weapon capabilities and reinforced with medium/heavy mortars, heavy machine guns, and medium/heavy anti-armor weapons.

The CLT will use an "armory locker" construct, where it is various weapons and the appropriate weapons mix is selected based on mission analysis. The headquarters section will retain the current command team augmented by a fires support team, a company-level intelligence cell, and a reconnaissance team. Each infantry battalion will have four company landing teams and a headquarters and service company.

In addition to the above, the concept of hybrid logistics will power the CLT Logistics Platoon and has been best outlined by the Deputy Commandant for Installations and Logistics, Lieutenant General Michael Dana. Its key tenets include: the blending of new and proven technologies, such as additive manufacturing, unmanned air and ground platforms, and expeditionary medicine; being naval in character; remaining flexible and expeditionary; and implementing extensive cross-training and certification in multiple MOSs.[6]

The current table of organization for an infantry battalion contains 51 Marines to provide combat service support, exclusive of the battalion supply section, as depicted in table 1.[7]

Occupational Field	Marine Officers	Enlisted Marines	Total
Logistics (04)	4	7	11
Ground Ordnance Maintenance (21)	0	5	5
Ground Ammunition (23)	0	2	2
Food Service (33)	0	9	9
Motor Transport (35)	0	24	24
Total	**4**	**47**	**51**

Table 1 – Current Infantry Battalion CSS Personnel

The vast majority exist within Headquarters and Service Company under the battalion S-4 with each infantry company possessing one Landing Support Specialist (MOS: 0481) and Weapons Company having one Motor Transport Operator (MOS: 3531) and Ground Ammunition Technician (MOS: 2311). The current supply chain uses a hub-and-spoke distribution model: the S-4 collects all logistics reports from the companies, coordinates resupply with the combat logistics battalion (CLB), the CLB delivers supplies to the battalion position, and the battalion combat trains to deliver supplies to the companies per S-4 direction. Maintenance is consolidated at the battalion, so all inoperative equipment is sent to the battalion, repaired, and returned to its owner. Any equipment requiring maintenance beyond the battalion's organic capabilities is evacuated to the appropriate Marine Logistics Group unit and returned to the owner via a CLB convoy and the battalion logistics train. This combat service support model is

1. stove-piped with eleven military operational specialties operating within their small slice of logistics and 2. unresponsive with multiple layers between the infantry companies and the CLB's supply depots as depicted in figure 2.

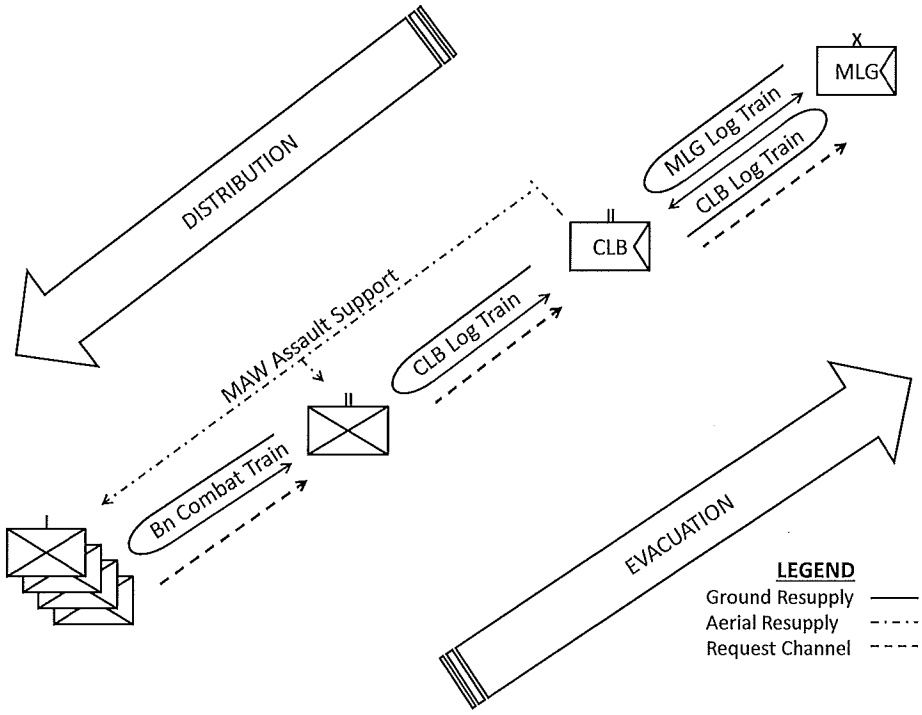

Figure 2 – Current Logistics Distribution Model

The CLT Logistics Platoon concept will affect all aspects of battalion logistics. First, it will reduce the battalion S-4 to a logistics coordination role and integrate logistics directly into line companies. The S-4 will consist of the personnel listed in table 2 below. This organization will combine the stove-piped MOS subject matter experts with CLIs who understand the unique nature of flattened logistics. Additionally, the S-4 will provide logistics to Headquarters & Service Company.

Billet	Rank	MOS	Existing or New Billet
Battalion Logistics Officer	O3	0402	Existing
Combat Logistics Integrator–Chief	E7	TBD	New
Motor Transport Maintenance Chief	E6	3529	Existing
Motor Transport Operations Chief	E6	3537	Existing
Food Service Chief	E6	3381	Existing
Maintenance Management Chief	E5	0411	Existing
Ground Ammunition Chief	E5	2311	Existing
Combat Logistics Integrator–Sustainment	E4	TBD	New
Combat Logistics Integrator–Maintenance	E4	TBD	New
Combat Logistics Integrator–Distribution	E3	TBD	New
Combat Logistics Integrator–Distribution	E3	TBD	New

Table 2 – Proposed Infantry Battalion Logistics Section

The preponderance of combat service support personnel will be relocated to the four CLTs within the infantry battalion. These self-contained platoons will provide not only the existing combat service support functions (motor transportation, vehicle and ordnance maintenance, maintenance management, food service, and ground ammunition) but also additional capabilities, including: landing support, water support, expeditionary power, and unmanned aerial logistics operations. The personnel listed below in table 3 will possess skills spanning across several MOSs to provide a distributable capability beyond the current structure of the infantry battalion's logistics.

Billet	Rank	MOS
Company Logistics Officer	O2	0402
Combat Logistics Integrator–Chief	E6	TBD
Combat Logistics Integrator–Sustainment	E5	TBD
Combat Logistics Integrator–Sustainment	E4	TBD
Combat Logistics Integrator–Distribution	E5	TBD
Combat Logistics Integrator–Distribution	E4	TBD
Combat Logistics Integrator–Distribution	E3	TBD
Combat Logistics Integrator–Maintenance	E5	TBD
Combat Logistics Integrator–Maintenance	E4	TBD
Combat Logistics Integrator–Maintenance	E3	TBD

Table 3 – Proposed Company Landing Team Logistics Platoon

These CLTs will coordinate resupply and intermediate-level maintenance directly with the CLB via air and surface (ground and sea) means without coordination with the battalion S-4. The battalion S-4 will coordinate with the CLTs to ensure proper support from the assigned CLB or

reallocate logistics forces per mission requirements. This integrated and flattened logistics construct will enable operations across a widely distributed area of operations.

As previously mentioned, the Combat Logistics Integrators (CLI) will retain and expand the infantry battalion's combat service support capabilities to respond to new requirements and avoid the previous "iron mountain" approach to logistics. Each will require a specific training pipeline that will endure throughout their careers. Unique to this new logistics MOS, these Marines will only serve within the Marine Division of the MAGTF.

The Combat Logistics Integrator–Distribution (CLI-D) will harness the capabilities of ground vehicles and UALPs. These Marines will operate the light off-road vehicles, LFLVs, and UALPs as well as provide landing support to distribute supplies to the CLT. Additionally, they will repair the CLT's UALPs. As trained Landing Support Specialists (MOS: 0481), they can assist the loading of the CLTs on and off of amphibious shipping and aircraft. Further, they will be the subject matter expert to train and lead Marines (CLIs and non-CLIs alike) in helicopter support team external load operations. CLI-Ds will receive supplies from the CLB and disseminate them to the platoons via ground assets or organic UALPs. Any injured personnel or inoperative equipment will be evacuated to the rear by CLI-Ds. The CLI-D formal entry-level training pipeline will include the Basic Landing Support Specialist Course, a to-be-developed LFLV Operator Course, a to-be-developed UALP Basic Operator Course, and a to-be-developed UALP Repair Course. Upon completion of the pipeline, CLI-Ds will be licensed to operate the light off-road vehicles via a locally executed course.

The Combat Logistics Integrator–Maintenance (CLI-M) Marine will primarily service and repair the CLT's vehicles, small arms, and UALPs. While their primary focus will be the maintenance of the light off-road fleet and LFLVs, the CLI-Ms will be trained to repair the

entire Marine Corps' wheeled tactical vehicle fleet (HMMWVs, JLTVs, MTVRs, and LVSRs) as all Automotive Organizational Mechanics (MOS: 3521) are capable. Additionally, they will possess the same skills as the Small Arms Repairer/Technician (MOS: 2111) and Electro-Optical Ordnance Repairer (MOS: 2171) as well as aspects of the Towed Artillery Systems Technician (MOS: 2131). Through these skills, CLI-Ms will maintain all weapons organic to the CLT. The training pipeline will include: the Automotive Maintenance Technician Basic Course, a to-be-developed UALP Repair Course, a to-be-developed LFLV Repairer Course, the Small Arms Repair Course, the Electro-Optical Ordnance Repairer Course, and aspects of the Towed Artillery Repair Course (focused primarily on the Expeditionary Fire Support System 120mm mortar). Similar to the CLI-Ds, these Marines will also be licensed to operate the light off-road vehicles at their first duty station.

Next, the Combat Logistics Integrator–Sustainment (CLI-S) Marine will provide key classes of supply–specifically classes I (subsistence), III (fuel), V (ammunition), and IX (repair parts)–expeditionary power, and water generation. CLI-S Marines will fabricate limited repair parts via a portable, low-power 3D printer and provide maintenance management oversight to support the CLI-M's maintenance operations. Primarily using solar power and small fossil fuel generators, these Marines will provide expeditionary energy to support the CLT's communications equipment and battery-powered devices. Further, these Marines will train to maintain and repair all Marine Corps electrical equipment for missions requiring enduring distributed operations, similar to the extended forward operating base model of Iraq and Afghanistan. Overall, these Marines will have similar capabilities to Ammunition Technicians (MOS: 2311), Electrical Equipment Repair Specialists (MOS: 1142), and Water Support Technician (MOS: 1171). The CLI-S formal training pipeline will include: the Enlisted

Ammunition Specialist Course, the Basic Engineer Equipment Electrical Systems Technician Course, and the Basic Water Support Technician Course. After this pipeline and assignment to their units, these Marines will also be trained to operate the light off-road vehicles, the 3D printers, and solar power charging systems via home station training courses.

Distribution	
Unmanned Logistics Aerial Platform Operators Course*	77
Unmanned Logistics Aerial Platform Repair Course*	66
Basic Landing Support Specialist Course†	35
Leader-Follower Logistics Vehicle Operator Course‡	15
Total (Est.)	**193**

Maintenance	
Automotive Maintenance Technician Basic Course†	73
Small Arms Repairer/Technician Course†	38
Electro-Optical Ordnance Repairer Course†	111
Towed Artillery Repairer Course (Partial)†	25
Leader-Follower Logistics Vehicle Repairer Course	28
Unmanned Logistics Aerial Platform Repair Course*	66
Total (Est.)	**341**

Sustainment	
Ammunition Technician Course†	27
Basic Engineer Equipment Electrical Systems Technician Course†	101
Basic Water Support Technician Course†	77
Food Service Specialist Course	56
Total (Est.)	**261**

*Estimated from established equivalent course
†Established course length
‡No established equivalent course

Table 4 – Combat Logistics Integrator Formal Training Pipelines[8]

Upon promotion to staff sergeant (E6), these CLI Marines will become a Combat Logistics Integrator–Chief (CLI-C). Principally trained as a Maintenance, Distribution, or Sustainment Integrator, the CLI-C will receive cross-leveling training from the other CLI pipelines to create a well-rounded logistics supervisor. The CLI-C Marine will provide oversight to the CLT Logistics Platoon's CLIs as well as counsel to the Logistics Platoon Commander on the unit's employment and operations. Requiring an understanding of the entire Marine Corps logistics enterprise in order to harness its capabilities, the CLI-Cs will attend the same school as current Logistics Mobility Chiefs (MOS: 0491), the Advanced Logistics/Mobility Course. As the CLI construct includes more knowledge and skills from outside the 04 occupational field and therefore outside of the 0491 curriculum, an additional, specific CLI-C course must be established to provide tailored supervisor training from the 11, 21, 23, and 35 occupational fields listed above.

Finally, the CLT Logistics Platoon Commander must be addressed. While not a new MOS, the proposed use of the Logistics Officer (MOS: 0402) is more intensive than before. Trained as generalists at the Logistics Officer Course, 0402s are currently employed within a specific aspect of logistics upon assignment to the infantry battalion, such as the Maintenance Management Officer, Motor Transport Officer, Food Service Officer, etc. and only approach logistics from a holistic approach as the Assistant Battalion Logistics Officer or Battalion Logistics Officer. However, there is no career-level training to bridge this specific to holistic transition. Therefore, the 0402s will continue to attend the established formal training pipeline. However, once assigned to the CLT Logistics Platoon, they will attend the same local home station training courses as their CLIs previously outlined.

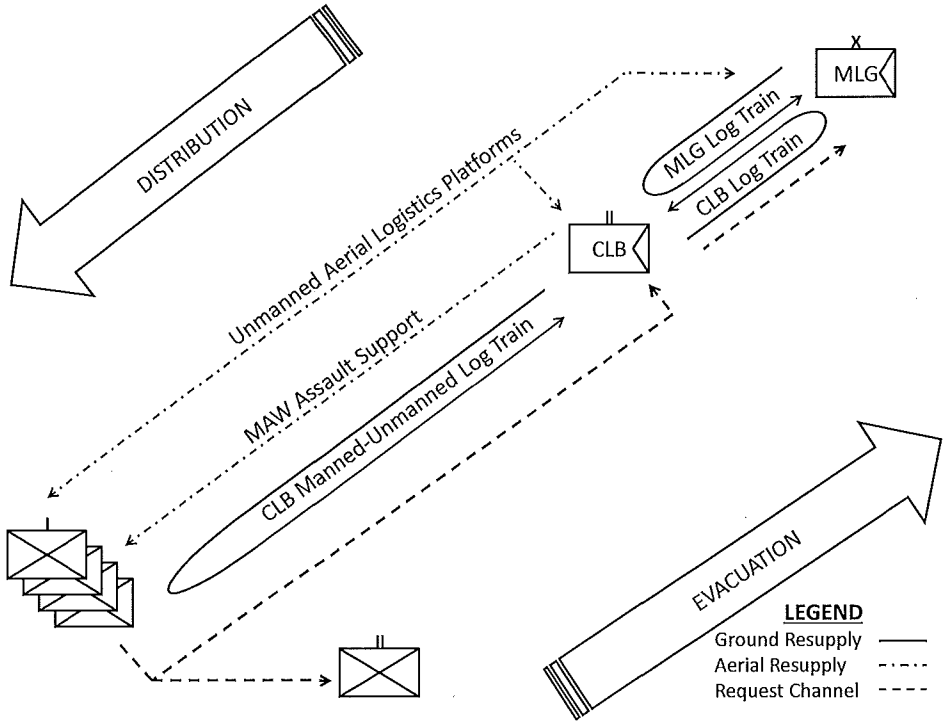

Figure 3 – Proposed Logistics Distribution Model

As the reorganization of infantry battalion logistics will have far reaching consequences, we must analyze them thoroughly utilizing the Joint Capabilities Integration and Development

System's DOTMLPF analysis[9]. Specifically, we will focus on doctrine, organization, materiel, leadership and education, and personnel.

Doctrine. In regards to doctrine, the CLT Logistics Platoon concept flattens the supply chain by converting the battalion S-4 to a logistics monitor instead a logistics provider. This fundamental change alters the relationship with the CLT and the CLB, empowering the CLT to directly request support from the CLB as depicted in Figure 3 above. The infantry battalion and regiment will retain their existing authority to provide priorities of effort for their subordinate battalions/companies to the CLB. Similarly, the CLB would continue the practice of seeking infantry battalion/regiment guidance if requests exceed capacity and/or source external support from the Marine Logistics Group (MLG). Additionally, the CLT would gain the ability to evacuate inoperable equipment to the MLG Maintenance Battalion in cases where the direct support CLB does not have the capability or capacity to conduct required maintenance action, saving another time-consuming stop at an intermediate base.

A considerable doctrinal hurdle is the operation of UALPs by the CLT Logistics Platoons and LCE units and the required reconciliation with the ACE. The Marine Air Command and Control System, in accordance with Marine Corps doctrine, is founded upon the central tenet of centralized command and decentralized control. Centralized command allows the ACE to plan aviation operations; plan the use of the battlespace; coordinate ordnance, fuel, and facilities; coordinate with joint and multinational aviation partners; and, most importantly, apportion and allocate aircraft and crews. Considered altogether, the above allows the ACE commander to create an executable air tasking order (ATO), which will be executed via decentralized control.[10] The specific categorization of Unmanned Aerial *Logistics* Platforms requires LCE commander ownership and precludes centralized ACE command outlined in MCWP 3-2. While seemingly at

odds, deconfliction of UALP operations with the ACE and integration into the MACCS makes this exception practicable. As previously mentioned, the most important aspect of centralized command is the ability of the ACE commander to apportion and allocate aircraft; as UALPs are solely dedicated to logistical support, centralized command is not required for the ACE commander to accomplish the mission. Pre-planned airspace coordinating measures, such as transit corridors, combined with existing air control agencies, such as battalion air officers, will allow for safe execution of this proposal.

Organization. Next, organizational implications will be addressed. As the essay assumed the CLT structure and described the CLT Logistics Platoon in depth, the analysis will focus on organizational modifications to the MLG. Currently, there is no MLG organization that possesses or operates UALPs and the CLT Logistics Platoon concept will require considerable throughput via UALP. The Marine Corps has three options to incorporate the UALP capability into the MLG and maintain current force levels. First, a UALP platoon could be organized within the CLB by replacing one motor transport platoon to provide direct support to the Marine Division. Second, the Marine Corps could create a UALP company within the Transportation Battalion by replacing one of its motor transport platoon.[11] Lastly, the soon-to-be reestablished Landing Support Battalion could replace a landing support company with a UALP company.[12] If this capability is created through the second or third options, these functional battalions will send detachments to the CLB during combat operations and retain the remainder for general support to the MEF. Within the Marine Division, the Truck Company could also trade a motor transport platoon for a UALP platoon in order to reinforce the infantry regiments' and battalions' maneuver capabilities.

Materiel. The CLT Logistics Platoon concept will require considerable materiel acquisition and fielding, some of which already exists and others which must be developed. The most critical technology to be developed regards the UALP. The Marine Corps must develop and field three UALP models: light, medium, and heavy. The CLT Logistics Platoon would have primarily the light model with a few medium UALPs. The LCE should operate all three models with more emphasis on medium and heavy capacities. The light model should be capable of transporting a payload between 300 and 400 pounds. This allows the movement of a casualty, ammunition, rations, fuel, repair parts, and other critical sustainment. The medium model's payload capacity should be approximately 1,250 pounds in order to move larger, heavier echelons of logistics. This would include major repair parts (replacement JLTV engine weight: ≈900 pounds), larger fuel drums (155-gallon drum: ≈1239 pounds), larger packaged rations (MRE pallet: ≈1010 pounds), and small ground vehicles (LFLV: ≈500 pounds). The heavy UALP should be capable of transporting 5,000 pounds, which would include all vehicles organic to the CLT. Marine aircraft currently fielded, such as the CH-53 (30,000 pound external load) and MV-22 (15,000 pound external load), would fulfill the super-heavy movement requirements.

Next, the Marine Corps must develop and procure sufficient ground logistics vehicles that are capable of leader-follower operations. Leader-follower capability is a must-have for the CLT Logistics Platoon concept as it enables a greater, tailorable payload-to-operator ratio. With five CLIs trained in LFLV operations and a two vehicle setup per operator (one leader and one follower vehicles), the CLT will be capable of transporting 16,500 pounds of supply based on current technology. Adding an additional follower vehicle per operator increases unit payload capacity by 8,250 pounds.[13] In addition to payload, the leader-follower concept will allow flexible employment of personnel as one leader vehicle can handle as many followers as the

mission and operational environment allows. The LFLV should primarily be wheeled, but should have the capability to replace wheels for tracks to operate in snow environments.

To conduct expeditionary maintenance, a 3D printer should be included that is capable of creating military-grade replacement parts within the CLT table of equipment. The 3D printer should operate from the power provided by solar-charged battery packs; however, a fossil-fuel generator can be paired or incorporated into the expeditionary 3D printer if this is not achievable. Additionally, customized tool kits and repair part blocks must be developed to support the CLT's table of equipment and LFLV beds.

In regards to sustainment, the CLT Logistics Platoon must be outfitted with sufficient solar chargers, battery packs, and small fossil-fuel generators. As the CLT is mounted on light, off-road vehicles, each vehicle should be outfitted with light and medium solar chargers to fulfill individual power requirements. The Logistics Platoon's heavy solar chargers should recharge battery packs similar to the current Ground Renewable Expeditionary Energy Network System and additional batteries for man-portable radios. Ideally, these solar chargers and battery packs should be capable of powering the small 3D printer discussed above. Water purification systems, currently capable of 3,600 gallons per day at only 150 pounds weight, would provide a surplus of water to support the company under the harshest arid conditions.[14] Development of polymer ammunition would increase the Logistics Platoon's transportation capacity by reducing weight on individual Marines and unit vehicles.

Leadership and Education. As the training and education pipeline for the Logistics Platoon has been addressed in detail, we will focus outside of the platoon, specifically the CLT Commander and the Battalion S-4. The main concern regarding the CLT Commander is an overload of responsibility. Under this construct, this Marine would be fighting his three rifle

platoons and employing fires from his weapons platoon. Adding the responsibility to provide his own logistics would increase the level of complexity. However, the inclusion of a Logistics Officer as the CLT Platoon Commander minimizes this concern and provides the CLT Commander more freedom of action than before. Without this organic capability, the CLT Commander would still coordinate logistics through his Company Gunnery Sergeant and Logistics NCO, but remain dependent on an external organization that is not under his command and is rarely co-located. The Logistics Platoon concept provides this commander with more flexibility and control over his operations.

Both the CLT Commander and the Battalion S-4 will require education on the capabilities, limitations, and methods of employment of the Logistics Platoon. While the CLT Commander will interact with the Logistics Platoon as an infantry rifle platoon commander, he will need to receive a standardized education to understand how to best employ the asset. Most likely, the Battalion S-4 will have had no previous interaction with the Logistics Platoon construct due to the assignment of 0402s across other elements of the MAGTF. A specialized course on CLT Logistics Platoon operations must be created for these battalion S-4s and the concept should be integrated into both career- and intermediate-level logistics education.

Personnel. As depicted in Table 4 above, the training pipelines for CLI Marines are time-intensive. Considering initial recruit training and Marine combat training span approximately 5 months, the proposed training pipeline implies training cycles of 12-months for CLI-Ds, 15-months for CLI-S, and 18-months for CLI-Ms.[15] A standard 48-month contract does not allow for sufficient return-on-investment for the Marine Corps. The first-term enlistment should be extended from 48-months to 72-months for CLI Marines. Additionally, the CLI skills, especially of the maintenance track, will probably make retention difficult without financial

incentives. In addition to talent loss to the civilian logistics market, the exclusive employment of CLIs within the Marine Division may lead to additional attrition. As CLIs will possess multiple primary MOSs, the option to lateral move into an MOS or billet assignment can retain core talent if this issue arises. The multi-disciplinary nature of the CLI provides for flexible personnel solutions.

In conclusion, the requirement for the infantry battalion to operate across wide expanses, especially in Pacific Command's area of responsibility, necessitates the use of the company landing team and the creation of a new concept of logistics support. This new concept of support must fully embrace hybrid logistics, flatten the supply chain, devolve the lowest echelon of logistical support to the company-level, and combine tactical logistics-related military occupational specialties into multi-disciplinary personnel. The embedded CLT Logistics Platoon and revised battalion logistics section fulfills all of these requirements and enables distributed operations across wide expanses. The Marine Corps should designate an infantry battalion as a test unit, cross-train existing logistics personnel per the proposed training pipeline, acquire equipment with existing technology, develop technology to meet currently unmet requirements, and begin field testing to validate the concept's viability. Once proven, the Marine Corps should adopt the CLT construct within all infantry battalions as its standard structure.

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[1] SPMAGTF-3, "Company Landing Team: Employment from the Seabase," *Marine Corps Gazette* 99, no. 1 (January 2015): 6-12.
[2] Headquarters US Marine Corps, *Marine Corps Operating Concept: How an Expeditionary Force Operates in the 21st Century* (Washington, DC: Headquarters US Marine Corps, September 2016), 13-23.
[3] SPMAGTF-3, 7-11.
[4] Ibid.
[5] This (198) personnel figure assumes no growth in combat arms personnel end strength. This includes three 181-Marine rifle companies, which excludes the Landing Support Specialist (MOS: 0481), and one 144-Marine weapons company, which excludes the Motor Transport Operator (MOS: 3531) and Ammunition Technician (MOS: 2311), evenly divided across four CLTs. The new organization consists of 171 combat arms Marines, 10 organic logistics Marines, and 17 Headquarters and Service Company Marines (communications and medical).
[6] Michael Dana, "21st Century Logistics." *Marine Corps Gazette* 101, no. 10 (October 2017): 12-15.

[7]Headquarters US Marine Corps, "*FY2019 Infantry Battalion H&S CO, RFL CO, WPNS Co Tables of Organization and Equipment*," Total Force Structure Management System, https://tfsms.mceits.usmc.mil [accessed November 14, 2017].

[8] Training and Education Command, "*Course & Class Information*," Marine Corps Training Information Management System, https://mctims.usmc.mil/Registrar/ [accessed December 11, 2017]. The estimated course durations for the Unmanned Aerial Logistics Platform Operators and Repairer Courses listed are based on the current Unmanned Aircraft System Common Core (course code: A12VAH1) and Unmanned Aircraft System Repairer (course code: A12VAR1) courses. The Leader-Follower Logistics Vehicle course duration is based on the author's anecdotal experience for incidental motor vehicle operator courses, which consist of five days of classroom instruction and five to ten days of practical application.

[9] Joint Chiefs of Staff, *CJCSI 3170.01G: Joint Capabilities Integration and Development System* (Washington, DC: Joint Chiefs of Staff, March 2009). The full acronym stands for Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, and Facilities.

[10] Headquarters US Marine Corps, *MCWP 3-2: Aviation Operations* (Washington, DC: Headquarters US Marine Corps, May 2000), Chapter 4.

[11] Headquarters US Marine Corps, "*Publication of FY 2017 through 2037 Tables of Organization and Equipment*," MARADMIN 127/17, http://www.marines.mil/News/Messages/Messages-Display/Article/1113948/publication-of-fiscal-years-2017-through-2037-tables-of-organization-and-equipm/ [accessed December 11, 2017]. Currently, Transportation Battalion is designated as Transportation Support Battalion. However, it will be re-designated as Transportation Battalion on 1 Oct 2018 under the approved FY19 table of organization.

[12]*Ibid.* Landing Support Company will be reestablished on 1 Oct 2018 under the approved FY19 table of organization.

[13] The General Dynamic Multi-Utility Tactical Transport 8x8 Wheeled/Tracked vehicle is capable of a 1,200 pound payload.

[14] W. S. Darley and Company, "*5S3P Water Purification System Specifications Sheet*," W. S. Darley and Company, https://www.darley.com/documents/product_detail_sheets/5S3P_Literature.pdf [accessed December 11, 2017].

[15] Training and Education Command, "*Course & Class Information*," Marine Corps Training Information Management System, https://mctims.usmc.mil/Registrar/ [accessed December 11, 2017].

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