

TRIDENT JUNCTURE

Adaptive information and knowledge management

by LtCol Fred Hopewell, USMC(Ret)

The II MEF Information Management Officer's (IMO) mission for TRIDENT JUNCTURE 2018 (TRJE18) was to create an adaptive information and knowledge management (IM/KM) system capable of concurrent support to II MEF, 2D MEB, and 24th MEU command elements, exchanging information and knowledge with multiple commands (Strike Force North Atlantic Treaty Organization [NATO] [SFN], Joint Forces Naples, Norwegians, Canadians) who were afloat, ashore, or back in the continental United States (CONUS) while simultaneously enabling the same at the major subordinate commands and elements (MSC/E) within the task organization.

This article will present how the TRJE18 IM/KM mission was accomplished from the perspective of the IMO. It will reveal the IM/KM design theory applied to this NATO exercise, disclose the deliverables aligned to IMO mission essential tasks, summarize what was learned, and provide a recommendation for incorporating this information related capability throughout the Marine Corps.

Design Thinking

Delivering an IM/KM architecture requires trained and certified IMO's applying IM/KM theory to those large organizations; it requires an understanding of the exercise objectives and concept of operations and how users might adapt the digital environment to respond to unfolding events or changes. TRJE18 presented a degree of complexity because of the phasing of MEF and NATO elements, providing knowledge transactions based on existing and widely applied warfighting processes, adapting to changing circumstances, and emergent *ad-hoc* processes while

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still arranging solutions for knowledge generating, integrating, transferring, and protecting. Additionally, the IMO provides the command more than just sets of tools and technological solutions; the IMO must accomplish the following doctrinal IM/KM mission essential tasks: resolving information processes; establishing and managing the commander's decision-making cycle; engineering systems or applications for both command and functional area

use; disseminating shared situational awareness through a common tactical picture; incorporating MEF and MSC staffs' information exchange requirements; and generating the ability for all staffs, internally and externally, to collaborate in a widely distributed and highly mobile environment, amongst a variety of bandwidth sizes. It is quite clear this range of responsibility expands beyond the scope of delivering a single SharePoint site, which is a widely held, Service-wide misunderstanding.

Equipped with an IM/KM concept of support, the IMO applies a deliberate planning process to develop the IM/KM system. The seven-step planning process works through the solicitation, evaluation, and compilation of collaborative ideas and projects presented by members of the IM/KM Working

| Information Management Lifecycle | | | | | |
|---|---|---|--|---|--|
| Phase 1 | | | | Redeployment | Reconstitute |
| Stage A | Stage B | Stage C | Stage D | | |
| Info Exchange for On Load | IE to synchronize amphibious action with ESG-2 | ICW ESG-2, NLT 29 Oct, establish AoA IVO Alvund Fjord via what IERs? | Validate IERs for JISR and joint targeting ISO TF Northern Screen. | Coordinated backup of MPE CS and conduct shutdown | Recovery and accountability of all IM/C2 materials and items |
| Connectivity and Info Exchange (IE) with deploying elements | IE established to manage the II MEF Deep Area IVO Setermoen | I & W of MUR aggression and/or incursion reported via what CS service? | P.A.C.E to coordinate the ESG-2 and 2D MAW DATF IOT | Plan Data Environ. Transfer | Reestablish the MPE CWS in CONUS |
| Establish IM/C2 links with ESG-2, AAOG | IE established to coordinate ISR and support to targeting | IE/CS to coordinate ISR and support to targeting within the II MEF Deep Area IVO Setermoen? | Coordinate a plan for orderly shutdown of IM/C2 servers/services | Execute File and Record transfer to home station | Coordinate staff recovery of key files |
| Cmd Journal fully operational | IE established prior to 26 Oct 18, to form a combined arms capable screen | | Review IMO draft AAR; route or post template location; 3up/3down hotwash | Prepare info for AAR | Prepare and coordinate x-fer of records to HQMC ARDB |
| Verify In Transit Visibility | | | | Verify In Transit Visibility | |
| | | | Coordination with G-6 | | 1 |

Figure 1. TRJE18 information management lifecycle table.

Group (IM/KMWG) and arrives with an executable IM/KM annex.

Deliverables

The result of the IM planning process completes the way in which a MAGTF will collect, manage, filter, fuse, disseminate, protect, and store its information. Based on the challenges of an information architecture spanning from Norway to Iceland to Camp Lejeune, NC, several of the IMO generated deliverables for TRJE18 required innovative approaches and solutions. The first being the way in which information would be managed from deployment to reconstitution, referred to as the information management lifecycle (IML). (See Figure 1 on previous page.)

A lifecycle approach to information and knowledge management during TRJE18 held several advantages:

- It permitted staffs to recognize and effectively focus IM resources in each phase of the exercise lifecycle.
- It anticipated the key information needs of the next phase and prompted staffs to ensure proper coordination occurred in advance.
- It allowed IMOs to manage and monitor information flow through the approved process, using the proper document formats located in the IM matrix, ensuring knowledge sharing takes place by routing products through the appropriate collaborative service or functional area system.

A second TRJE18 output was the “exercise image,” which provided the software load for over 30+ systems and applications hosted on the mission partner environment. Its use eliminated confusion over specific C2 systems on the client image and aided in troubleshooting through a common sight picture, as referenced in the Annex U. The MEF Chief of Staff, by locking the C2 systems’ baseline, contributed to regulating system training requirements, network vulnerabilities and system sprawl, normally produced by connecting unapproved systems or programs.

The third output, the battle rhythm (BR), underwent several iterations to create a balance between decision making and time allocated for leaders and staffs to work, think, and circulate.

Properly connecting the MEF BR with SFN BR required eleven modifications before it stabilized. The associated seven-minute drills served as cornerstones to constructing the commander’s decision-making cycle, consisting of critical boards, bureaus, cells, and working groups.

The fourth output, collaborative services (CS), a rather new term, provides three methods for the MAGTF to unite across distance through a common workspace, chat, and web conferencing. SharePoint, the collaborative workspace (CWS), leveraged existing MEF policy to establish a simple taxonomy and layout to rapidly access information. *Through the wide use of hyperlinking, adherence to a 2-click rule, and hosting pages vice site collections*, users were able to access BR event spaces and navigate effortlessly through command and staff pages. Relevant text from the CWS could be cut, pasted, and shared with remote units using the chat service, another IMO provided output. JChat was the mission partner environment solution and provided nearly one hundred chatrooms for each MSC, the MEU, MEB, and MEF to conduct warfighting business. Effectively aligning chatrooms to the radio guard chart reduced inquiries and requests for new chatrooms, as chat traffic correlated to radio net functions.

Web conferencing, on the other hand, was not as easily determined as CWS and JChat. Web conferencing was previously accomplished using Adobe Connect Professional. In spring 2017, it was determined by Joint Task Force, Global Network Operations, to possess security vulnerabilities, resulting in the Command, Control, Communications and Computers (C4) Department to rescind its authority to be placed on Marine Corps networks. Secure video teleconferencing (SVTC) offered an alternative solution but is associated with a high bandwidth usage cost, which is not truly conducive to afloat commands but possible through reconfiguration. During TRJE18, SVTC would be limited and restricted to a few terminals. Another consideration, Defense Collaboration Services, hosted by Defense Information Service Agency had proven

mission capable stateside, but connectivity to and from Norway was recognized to be ineffective. Fortunately, the MEF IMO, with a long lead time, was able to present this operational gap to MEF and C4 leadership. Left without an enterprise solution for the next twelve to eighteen months, an extensive search arrived at the Marine Corps Enterprise License Management System. Through a series of conversations, it was uncovered Microsoft Skype for Business (SfB) licenses were on the shelf, prompting the IMO to develop the business case and obtain approvals to both acquire SfB and place it on tactical networks.

The basic features of SfB contain instant messaging, voice over IP, and video conferencing inside the client software. Advanced features related to SfB’s integration with other Microsoft products include: availability of contacts based on Microsoft Outlook accounts and their retrieval from the Exchange Server, Microsoft Office revealing personnel working on the same document, and communication between clients occurring through a SfB server. This web conferencing solution came together at the start of CPX-2 but was not widely adopted until the execution phase with tremendous success.

The fifth TRJE18 output were performance support systems to address MEF staff issues important to senior leadership. The Executive Decision Support Tool provided executive leadership with a visual display of warfighting function information components, leveraging existing authoritative data sources and reuse of staff products. The Defensive Cyber Event Tracker provided a central location for cyber incident data collection, consolidation, analysis, and reporting. The Data Migration Plan, part of the IML, collected and stored pertinent files and documents, provided for transition of C2 capabilities during the redeployment phase, and directed an orderly deactivation of the MEF’s knowledge management architecture.

The sixth TRJE18 output was assembling an experienced IMO team to properly manage and maintain the IM/KM system delivered to the MEF. As TRJE18 confirmed, there is a significant workload to keep the IM/KM system

functional and responsive to change as the operation unfolds. For some commanders, it is a paradigm shift to form a team to undertake IM's three mission areas: continuous process improvement, shared situational awareness, and MAGTF collaborative services. These high demand, low density skills are not currently present as part of formal Marine Corps training and are likened to and often assigned as "smart comm guy" tasks; however, this is an overly simplistic view. These are acquired skills best suited for "MAGTF operation types" and take investment in time, money, and experience to acquire. Accordingly, the IMO deployed a twelve-man team, augmented by a remain behind element. While the remain behind element responded to the first mission area, the forward IM team focused on delivering user support to mission areas two and three for the afloat and ashore command elements, with IM leadership present to participate in the BR—simultaneously monitoring and responding to developing events. The deployed team was comprised of three C2 system analyst contractors (CTR), two CS server administrators (CTR), two Command Post Systems Advisors (CTR) for common tactical picture, and C2 systems maintenance. Leadership included the IMO (LtCol), the IM supervisor (GS-14), IM watch officer (USMCR Capt), and MEF IM/C2 liaison officer to SFN (USMCR LtCol). An IM service desk (IMSD) manager (CTR) provided customer interaction and managed 100 TRJE18 service requests (SR) in the first 96 hours, and over two hundred SRs from CPX-1B through the end of the exercise. The IMSD fills a significant role for the IMO due to its continuous process improvement mission and recurring response to changing information needs; therefore, the analysis of IMSD's SRs serve as direct feedback regarding CTR performance, user trends, and system challenges, as well as concurrently aiding the IMO to define, measure, analyze, improve, and control activities within the information environment.

What We Learned

Overall, more was learned about the capabilities and value of IM/KM by

the training audience. IM/KM is not entirely focused on technology and sets of tools; instead, it is a 7:2:1 ratio of people to process to technology, which enables the MAGTF to accomplish its mission.

IM/KM activities and initiatives, instead of being additional functions, must be viewed as enabling the commander's decision cycle, ensuring the command is relevant to the speed of the problem.

Equally exceptional takeaways included the following: CS are a critical MAGTF capability; professional and operationalized IMOs are game changers; recognize IM/C2 systems and services can become victims of cyber fratricide.

CS were identified early in the TRJE18 planning process as the IM/C2 center of gravity, which contributed to rapid coordination, decision dissemination, and solution building, spanning from Camp Lejeune to Iceland to Norway. Central to CS for TRJE18 was the value of SfB. During the exercise, SfB use increased considerably

Practitioners' Course, Afloat Knowledge Management Course, Lean Six Sigma Green Belt certification, Information Technology Infrastructure Library Version 3, Project Management Professional, and Information Assurance certifications. Because of the complexity of TRJE18, fourteen IMOs, staff KMOs, and information management analyst contractors completed e-learning and a blended workshop resulting in the industry recognized Certified Knowledge Manager certificate. This experience and professional training enabled them to fully understand how knowledge is formed as well as how their staffs and commands can leverage it. Additionally, the IMOs applied an understanding of how their MSC's performance capabilities and knowledge competencies combine and recombine in new patterns, enabling flexible responses to changing tactical conditions.

A final learning point came following 120-man hours of rebuilding IM/C2 servers and clients over the course of two command post exercises and an MRX. The resolution, coordinated be-

Software corruption in servers and clients required them to be completely rebuilt, which can take up to eight hours per machine.

with over 620 SfB sessions in the first 96 hours. It delivered exceptional call quality without dropping a single session and an average bandwidth usage of 39Kbps per session—a bandwidth friendly alternative to SVTC. (Note: similar CS software and websites are accessible on Marine Corps NIPRNET and SIPRNET desktops at most duty stations today.)

Another observation was the experience level of the MEF/MSO IMOs: five of the seven had over twelve months in an IM/ KM intensive billet/position. They received extensive formal and on-the-job training through the II MEF Information Management Orientation Course and in various combinations of the Joint Knowledge Management

tween the IMO and technical control facility located at the communication battalion, was to establish an IMO organizational unit. An organizational unit protects and excludes program of record (POR) systems and applications from receiving cyber updates, which corrupt the POR software. Software corruption in servers and clients required them to be completely rebuilt, which can take up to eight hours per machine. Project and program offices remain solely responsible for coordinating cyber patches and software updates for their PORs. The TRJE18 organizational unit ended service interruptions and equipped the IMO with the correct permissions, to maintain IM/C2 services in an optimal state.

The Road Ahead

With TRJE18 completed and the after-action report finalized, what can the II MEF IMO suggest institutionally? First is to sustain a continuous IM/KM connection with NATO, U.S. European Command, and United States Naval Forces Europe–Naval Forces Africa. Much can be shared in building a comprehensive approach to this information related capability, honing collective skills through continued participation in exercises such as STEADFAST COBALT, and exchanging tactics, techniques, and procedures through joint/combined IM/KM workshops. Secondly, and more conspicuously, is establishing a Marine Corps IM/KM program. Senior leaders could “focus first on the particular areas experiencing the most unpredictable change”¹ and asking their seasoned IMOs and KMOs how the areas can be stabilized. Restarting a HQMC KM community of interest connecting Deputy Commandants is another promising move; moreover, connecting the Defense Collaboration Services and HQMC departments to Marine Force-level staffs will go a long way in harmonizing and operationalizing command centers at HQMC with persistent combat operation centers at the Marine Forces, MEFs, and their MSCs.

There are many opportunities for cost reductions and cost avoidances by an IM/KM program which will steadily improve overall service performance. The IMO’s continuous process improvement capability has already resulted in a business reform initiative and holds further promise in arriving at data-driven programmatic evaluations and informed business decisions. It also can assist in reallocating total obligation authority by eliminating waste and overspending on IM/KM/C2 contractors and redundant capabilities.

A 2017 data call on IM/KM expenditures discovered over \$20 million being spent by those organizations whose responses were captured. It is evident an omnibus contract for these services would control and substantiate the required technical skills while spending the appropriate amount for these skills, which is not always achieved by those unfamiliar with the cost of IM/KM/

C2 technical service deliverables. Anecdotally, in 2013, \$900K was spent on a Microsoft access database worth about \$10K.² Tactical Radios over Internet Protocol and Wide Area Voice Environment Services also unveiled potential reductions in hardware, maintenance costs, and consumables for providing tactical voice services. There is additional fiscal and organizational value by consolidating the Corps’ knowledge in a federated CWS as part of a single information and knowledge enterprise—provided it is properly resourced.

During a 2010 II MEF CPX, the late LtGen Martin R. Berndt, USMC, serving as the senior mentor, questioned the benefit of maintaining two C2 equipment suites: one garrison and one deployed. TRJE18 visibly demonstrated this gap is closing and equipment suites used in garrison are progressing toward a single suite when deployed. Delivering solutions stated in Deliberate Universal Needs Statement (DUNS) 17114DB, Replication and DUNS 17114DA, Marine Corps Enterprise Information Technology Services Support to Tactical Collaboration could close the gap even further—improving access to stateside applications like Automated Performance Evaluation System. In fact, DUNS 17114DB and 17114DA, combined with the POR organizational units, could become part of amphibious ships’ architecture, reducing the time it takes Marine commands to install their IM and communications services to less than the current four weeks while facilitating the amphibious readiness group’s ability to continue operations, locally, in a communications contested environment. It is important to highlight these DUNS are recommending applying existing technology, which will reduce research, development, testing, and evaluation fiscal outlays. Replication, previously used by 24th MEU during ODYSSEY DAWN and 2d MEB at AGILE LION, is the subject of a December 2019 *Gazette* article, explaining its Service-wide advantage. Regardless, these relatively low-cost DUNS, only ranked 210 and 211 during their fiscal year 2020 review.

Lastly, other no-cost solutions can be incorporated, like having KM programs

established in all functional areas and adding IM/KM concepts of support information to all pre- and post-deployment briefs. Notably, another option would be to establish a programmatic requirement across current and future PORs based on the threat. It could require future system budget exhibits to certify interoperability across networks, functions, and applications, and require authenticated application programming interfaces as a deliverable for all PORs and a basis for program funding decisions.

Conclusion

The II MEF IMO delivered the envisioned adaptive IM/KM system for TRJE18 through realization and delivery succeeding mission analysis, collaborative ideas, and projects presented over fourteen months of IM/KMWGs. IM/KM can be focused on the Marine Corps’ overall performance and aid high optempo, MAGTF operations, and cross-functionally by optimizing the decision-making cycle and the outputs of functional area processes, rapidly exchanging data, information, and knowledge flagpole to fighting hole. IM/KM performs best when the command IMO is formally trained, remains in the billet two-plus years, and works for the Chief of Staff or XO fulltime. IM/KM is “expensive to do and—if in a highly competitive environment—expensive not to do.”³ Much can be done to make IM/KM prevalent in the Marine Corps, but this will only occur after the Corps decides what it requires from a Service-wide IM/KM program, substantiated by TRJE18.

Notes

1. Charles Despres and Daniele Chauvel, *Knowledge Horizons: The Present and the Promise of Knowledge Management*, 1st Edition, (Oxford, UK: Butterworth-Heinemann, 2000).
2. The information is available at <https://www.costowl.com>.
3. *Knowledge Horizons*.

