



Marine Air Ground Task Force
Information Environment Operations
Concept of Employment

6 JUL 2017

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UNITED STATES MARINE CORPS

Deputy Commandant for Combat Development and Integration

6 July 2017

FOREWORD

As the nation's premier warfighting organization, the Marine Corps continually adapts and applies new ways to leverage our time-tested *maneuver warfare* philosophy to fight and win in any environment. Since 1775, Marines have combined tools and tactics to dictate tempo, influence perceptions, impose fear and anxiety, and find innumerable other ways to defeat the adversary or achieve mission objectives. We will continue this success in the future as we adapt to meet the new challenges of a perpetually expanding and increasingly complex *information environment*.

The *Marine Air Ground Task Force (MAGTF) Information Environment Operations Concept of Employment* introduces a comprehensive approach to fighting and winning in and through the information environment. This approach should be viewed from the maneuver warfare perspective, such that we extend this warfighting philosophy into the information space. This concept introduces ideas intended to improve the MAGTF's ability to coherently plan and execute integrated actions in and through the information environment. These ideas include operationalizing the information environment as a maneuver space, commanding and controlling information capabilities integrally to achieve objectives, and providing MEF commanders with dedicated organization, tools, and experts to ensure rapidly advancing information capabilities can be planned and executed effectively. Combining these ideas under a whole-of-MAGTF functional approach, this COE describes a bold new direction for the Marine Corps to achieve advantage in and through the information environment.

While the notion of operating in and through the information environment may not be new or unfamiliar, what is new is our approach to achieving decision in battle by incorporating a large number of rapidly advancing multifunctional information capabilities into MAGTF operations. This requires the MAGTF to plan and employ a wide range of new capabilities cohesively and in a way that emphasizes both the physical and cognitive aspects of any mission. To achieve this, the MAGTF must be appropriately organized, manned, trained, and equipped to ensure operations in this evolving environment become seamless and intuitive across the whole-of-MAGTF. This also requires the MAGTF's ability to extensively leverage information capabilities available across the Department of Defense (DoD), Combatant Commands, and Joint/Coalition mission partners.



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INTRODUCTION

With the pervasiveness of the internet and wireless communications, the far-reaching impact of social media, and the increasing use of these and other information capabilities by adversaries, today's information environment (IE) poses new and complex challenges and opportunities for the Marine Air Ground Task Force (MAGTF). The *Department of Defense Strategy for Operations in the Information Environment* asserts that:

This networked environment has enabled both state and non-state actors to employ activities in or through the IE to effectively achieve their objectives. They use various capabilities to exploit, disrupt, and disable command and control systems and other critical infrastructure; to disseminate propaganda and disinformation; to foster internal dissent; to recruit and solicit financing; and to promote legitimacy for their actions while discrediting the legitimacy of others. Although we can expect potential state adversaries to offer sophisticated challenges through aggressive operations in the IE, new forms of technology and communication have lowered the barriers of entry for non-state actors. These actors, and their supporters and surrogates, can now access the IE with ease and at relatively low cost, using it to advance their objectives and influence audiences around the globe.

The IE's increased significance poses challenges and presents opportunities for the Marine Corps. Fundamentally, it is now necessary to organize, operate, and fight integrally in and through the IE, just as we do in the physical maneuver domains, to ensure unity of action, and achieve military advantage. Otherwise, the MAGTF is at serious risk of losing its competitive edge across the range of military operations.

MILITARY CHALLENGE

The *Marine Corps Operating Concept* summarizes the military challenge:

The Marine Corps is currently not organized, trained, and equipped to meet the demands of a future operating environment characterized by complex terrain, technology proliferation, information warfare, the need to shield and exploit signatures, and an increasingly non-permissive maritime domain.

Deducing the military challenge above, this concept of employment (COE) identifies the crux of the problem facing the MAGTF: ***there is an inadequate mechanism in place for the MAGTF commander to comprehensively understand, plan, and execute Information Environment Operations (IE Ops) as an integral component of MAGTF operations.*** Today, the MAGTF commander has limited ability to maintain a coherent understanding of relevant threats, vulnerabilities, and opportunities across the IE; and has limited C2 mechanisms in place to integrate disparate IE Ops capabilities holistically and dynamically across the MAGTF. Additionally, intelligence and other information about many aspects of the IE are at best scattered across the MAGTF and external organizations, and at worst are non-existent. Moreover, there is no organization or C2 mechanism focused on holistically planning and conducting IE Ops. Given the increasing complexity and consequence of the IE, the MAGTF must develop a new approach to maneuvering in the IE and conducting *Information Environment Operations* at the tactical level.

DEFINITION

Instituting a new approach to MAGTF IE Ops begins by establishing its definition:

The integrated planning and employment of MAGTF, Naval, Joint, and Interagency information capabilities, resources, and activities that enhance the Marine Corps single-battle concept and provide defensive, offensive, exploitative effects and support in order to operate, fight and win in and through a contested information environment.

VISION

Information Environment Operations represent our time-tested *maneuver warfare philosophy* in the information environment. Marines understand well that warfare is a violent contest of irreconcilable, independent, human wills, each trying to impose itself on the other. Military strategists, tacticians, and commanders throughout the ages have sought both *physical and cognitive* advantages to prevent battle, or to achieve disproportionate results in battle. IE Ops are conducted in and through the IE to achieve or enable these same advantages. This leads us to establishing the following vision for MAGTF IE Ops in the 2025 timeframe:

The MAGTF operates with freedom of action in and through the information environment to preserve, generate, and apply informational power in concert with fires and maneuver to accelerate tempo and achieve physical and cognitive advantage.

In 2025 the MAGTF will be organized, trained, and equipped to sense, understand, and coherently operate within the information environment. Achieving the vision requires developing and integrating four central ideas: (1) planning and executing IE Ops along *functional lines of effort* to enable cohesive and comprehensive planning and employment of IE Ops capabilities, (2) establishing a dedicated MAGTF IE Ops *organization* – the MEF information Group (MIG) with an associated Combat Operations Center (MIG COC) focused on integrating IE Ops along the functional lines of effort, (3) building *agile distributed C2 capabilities* to enable collaborative distributed planning and dynamic, decentralized execution, and (4) fusing, analyzing, and using disparate intelligence and other information about the IE through a near-real time *running estimate* that feeds the common operational picture/common tactical picture (COP/CTP), provides planning support, mission coordination, and supports mission assessment.

FUNCTIONS OF MAGTF INFORMATION ENVIRONMENT OPERATIONS

MAGTF IE Ops begin with establishing functional lines of effort. The key characteristic of a *function* is that varying mission contexts do not change the nature of the function, while at the same time; the function is potentially applicable in any mission context. This immutable and often-applicable benefit establishes the use of functions as a stable organizing framework that drives efficiency in planning and operations. Seven IE Ops *functions* are introduced in this COE as illustrated and defined in figure 1.

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|----------|--|--|
| 1 | Assure Enterprise C2 & Critical Systems | Actions to operate and defend networks, systems and information in order to enable command and control and the assured operation of critical systems. |
| 2 | Provide IE Battlespace Awareness | Actions to characterize the physical, informational and cognitive dimensions of the Information Environment in order to identify challenges, opportunities and comparative advantages for the MAGTF. |
| 3 | Attack & Exploit Networks, Systems, & Information | Actions in accordance with approved authorities to exploit or attack adversary networks, systems, signatures and information in order to create advantages for the MAGTF. |
| 4 | Inform Domestic & International Audiences | Actions taken to inform domestic and international audiences IOT build understanding and support for operational and institutional objectives. |
| 5 | Influence Foreign Target Audiences | Actions taken in accordance with approved authorities to influence select foreign audiences and affect their decision-making and behaviors IOT create conditions favorable to operational objectives. |
| 6 | Deceive Foreign Target Audiences | Actions to induce ambiguity, misunderstanding, resource misallocation and delayed actions IOT mislead adversary decision makers, reveal their strengths, dispositions, and future intent while protecting MAGTF's capability, readiness, posture and intent. |
| 7 | Control IW Capabilities, Resources, & Activities | Actions taken to provide the commander with the ability to exercise command and control and integrate assigned Marine, Naval and Joint information assets and enhance the MAGTF's ability to operate in the Information Environment. |

Figure 1. Seven Functions of IE Ops

CONCEPT OF EMPLOYMENT (COE) PURPOSE AND SCOPE

Developing and implementing MAGTF IE Ops requires identifying essential capabilities across the *doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) framework*. This COE provides a vision and conceptual framework focused on the 2025 timeframe, and while the ideas presented herein are scalable to any MAGTF size or type, the primary focus of this COE is the Marine Expeditionary Force (MEF). This focus is required to assist MIGs in achieving initial operational capability (IOC) in 2017. This concept should drive discussion and experimentation to help develop and refine detailed information exchange requirements, staff roles and responsibilities, and technical command and control requirements.

CONCEPT DEVELOPMENT AND FUTURE EVOLUTION

As a concept of employment, this document provides enough detail to inform the stand up and operation of a MIG and MIG COC; however, as a concept this document is not prescriptive and is meant to provide a starting point for experimentation, wargaming, and training exercises to discover and refine this capability in the coming years. During the course of this document's development and through extensive collaboration with leaders and subject matter experts from across the Marine Corps, it has been widely recognized that establishing a MIG as an MSC-like command within the MEF command element is not reflected in current doctrine. Moreover, the MIG commander is not a member of the MEF's general or special staff. This represents a new concept with C2 implications that have yet to be fully understood. Uncertainties with implementing a MIG have been registered within this COE and with force developers. This COE asserts continued study, wargaming, experimentation, and real world experiences are needed to fully understand and develop this capability across the DOTMLPF-P. *This document is the first of many information products that will be developed in collaboration with the operating forces to drive this concept and capability to maturity and effectiveness.*

MEF INFORMATION GROUP

The MIG is established as a MEF command element (CE) subordinate command dedicated to planning, conducting, coordinating, and/or supporting IE Ops missions across the MEF's area of interest (AOI). Given specified IE Ops tasks from an OPLAN, CONPLAN, OPORD, FRAGO, or other authoritative directive, the MIG develops an integrated IE Ops plan and coordinates IE Ops missions and tasks within the larger MEF concept of operations (CONOPS) and scheme of maneuver (SoM). The MIG is formed by growing and repurposing the MEF Headquarters Group (MHG), is commanded by a Marine colonel, and has a permanent staff focused on planning, executing, and/or coordinating IE Ops missions across the MEF's AOI. Additionally, the MIG HQ is manned with new force structure provided under *Future Force 2025*, and is comprised of subordinate commands which plan, perform, or support IE Ops and other IE related activities. MIG subordinate commands with a primary role in IE Ops include the Radio Battalion, Communications battalion, Intelligence Battalion, and the Communication Strategy and Operations Company. Other MIG units which provide support to IE Ops include the Air Naval Gunfire Liaison Company (ANGLICO), the Law Enforcement Battalion, MEF Support Battalion, as well as the Expeditionary Operations Training Group (EOTG). Figure 2 provides a high level organizational chart of the MIG.

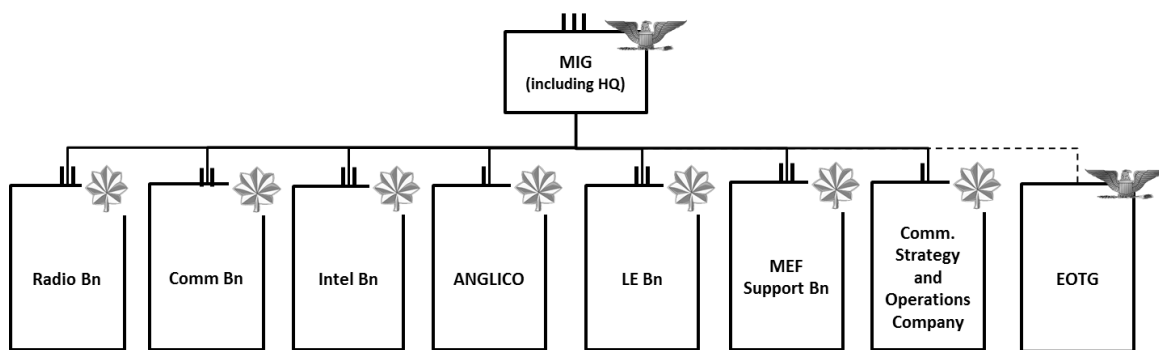


Figure 2. MIG Command Structure

The responsibility and authority for IE Ops ultimately rests with the commander. However, just as all commanders rely on subordinate commanders and staff to carry out the mission, so too will the MEF commander rely on subordinate commanders and staff to plan and conduct integrated IE Ops. The MIG commander is the MEF commanding general's primary subordinate commander delegated the authority to plan, execute, and/or coordinate integrated IE Ops across the MEF's AOI. This leads to the following MIG mission statement:

MEF Information Group Mission

Coordinate, integrate and employ IE Ops capabilities in order to ensure the MAGTF Commander's ability to facilitate friendly forces maneuver and deny the enemy freedom of action in the information environment. Provide communications, intelligence, supporting arms liaison, and law enforcement capabilities in support of MAGTF operations.

MIG COMMAND RELATIONSHIPS

The MIG is a departure from MHG's current role. The MIG commander reports directly to the MEF commanding general and is the MEF's lead for planning, integrating, coordinating and supporting IE Ops across the MAGTF. Because the majority of future IE Ops capabilities will be employed by major subordinate commands (MSCs), the MIG's success will depend on facilitating a ***whole-of-MAGTF approach*** to ensure coordinated planning and decentralized execution across the MSCs and the MEF's AOI. While not a 5th MAGTF element, the MIG does perform a role similar to an MSC, but is retained within the MEF command element, and is not a staff section. Positioning the MIG within the command element is necessary to ensure strategic, joint, and organic capabilities are seamlessly integrated and coordinated across the MEF's deep, close, and rear areas; and to mitigate inherent

complexities associated with IE Ops missions such as: cross-boundary effects and coordination requirements, a requirement for special authorities, and a need for near-real time deconfliction and asset re-programming. These inherent IE Ops challenges combined with an urgent need to operate more effectively in and through the IE, require a MIG to leverage an agile distributed C2 mechanism which spans MSCs (down to company or lower levels) and integrates with the joint headquarters and/or national level agencies in support of MEF-level operations.

IE Ops C2 Example using MACCS Model

The Marine Air Command and Control System (MACCS) provides an agile distributed C2 model which may be an appropriate example for IE Ops. The MACCS is a distributed C2 capability that connects and integrates information, people, technology, and procedures from the Joint/theater headquarters all the way down to the individual forward air controller (FAC) assigned to an infantry battalion. In this distributed model, the aviation combat element (ACE) commander and his/her battlestaff plan, supervise, coordinate, and execute all current and future air operations in support of the MAGTF through various C2 agencies, information systems, and communications. These capabilities are used by planners and mission coordinators to integrate the six functions of Marine Aviation in support of all MAGTF operations.

MIG, MEF STAFF, AND MSC RELATIONSHIPS

Based on the MEF CONOPS, task organization, specified and implied tasks, and the commanding general's direction, guidance, and priorities, the MIG commander directs and coordinates subordinate command relationships. In coordinating these relationships, the MIG commander may direct MIG subordinate units to support MEF command element, support MSC operational requirements and/or provide IE Ops forces and capabilities to MSCs. In these arrangements, the commanding general uses his/her general staff to task the MIG commander, who then directs subordinate commands to fulfill the tasking requirements. ***To streamline C2, the MIG commander may direct a subordinate unit to respond directly to MEF staff tasking requirements, just as the MHG commander does today with the Intel Battalion, Communications Battalion, and Radio Battalion.*** However, in the future there may be operational phases where the MIG becomes the MEF's main effort, or where the MIG commander retains authority and must execute or coordinate a mission within an MSC's assigned boundary to achieve priority objectives. In these situations, the MIG commander becomes the supported commander, and the commanding general may require his/her staff and/or MSCs to support the MIG commander. ***The development of agile distributed C2 mechanisms and the introduction of the MIG commander as a "MSE-like" commander within the command element should be a focus of future experimentation to determine appropriate command relationships, procedures, and technologies to employ this organizational capability.***

MIG HEADQUARTERS (HQ)

The MIG HQ is organized with personnel to provide IE Ops planning and execution support as directed by the MIG commander. During planning, the MIG HQ provides future and current operations personnel to support MEF operational planning teams (OPTs) and any other B2C2WGs. During mission execution, the MIG HQ provides current operations personnel to support MEF G-3 current operations planning or mission coordination. Additionally, the MIG HQ establishes and operates the MIG COC as the MIG commander's centerpiece for planning, executing, and coordinating IE Ops. Figure 3 is the organizational chart of the MIG HQ.

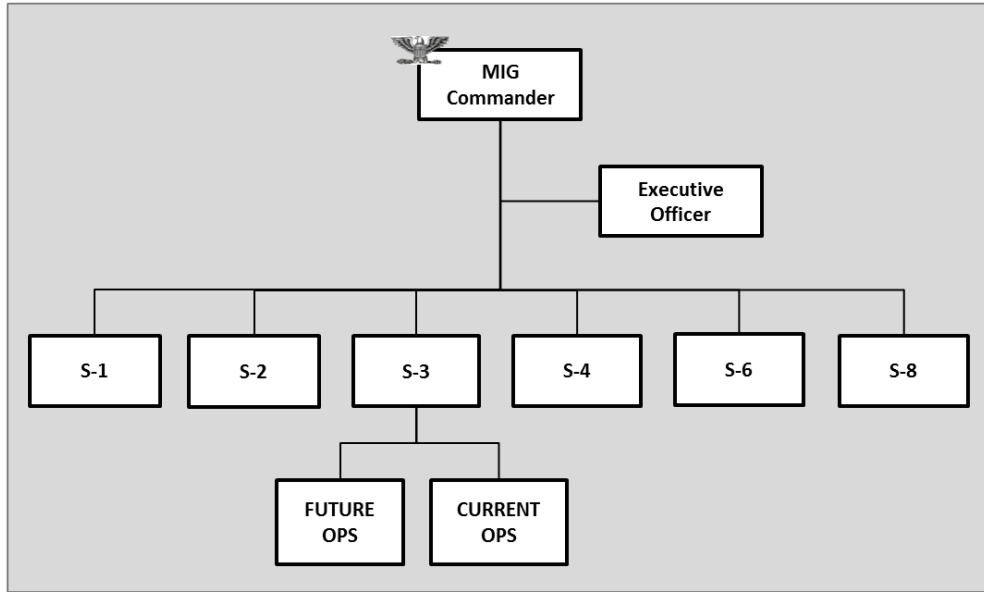


Figure 3. MIG Headquarters Diagram

MIG HQ Future and Current Operations Primary Tasks

MIG HQ future and current operations sections will support MEF IE Ops by performing at a minimum the following tasks:

- In support of future (beyond 96 hours) or current (less than 96 hours) planning time horizons, provide IE Ops objectives based on the interrelationships of threats, vulnerabilities, and opportunities in the IE as they relate to overall MEF objectives
- Provide deliberate planning support and course of action (COA) generation and/or decision recommendations to meet requirements mission priorities and objectives
- Develop the IE Ops concept of operations as part of the broader MAGTF CONOPS and scheme of maneuver
- Provide IE Ops asset capability and availability information in support of detailed planning and the development of the Air Tasking Order, IE Ops Coordination Order (ICO) and execution checklist
- Support the FECC in the development of appropriate cyberspace operations CONOPS, plans, and annexes
- Develop appropriate planning documentation including FRAGOS and coordination orders
- Discover, request, and maintain cyberspace operations and electronic warfare (EW) tasking authorities
- Participate in the MEF OPSEC program and help protect MEF critical elements in accordance with their established procedures
- Execute a MIG OPSEC program to identify and then safeguard critical information
- Ensure subordinate battalions have an OPSEC program and are protecting critical information
- Conduct authority acquisition and coordination in support of detailed planning
- Develop tactics, techniques, and procedures and combined arms options to achieve targeting objectives
- Identify mission priorities for planned capabilities and assets to facilitate decision support tools
- Support the G-2's intelligence gain/loss risk assessment metrics for the planned operation
- Provide the G-6 with IE Ops mission and data service priorities for the planned operation
- Establish and maintain planning and coordination relationships with MARFOR, JTF, and Combatant Command staff representatives in support of planning and operations
- Organize and provide trained IE Ops forces and capabilities to MEF MSC, MEB, MEU, and SPMAGTF CEs for operational employment

- Support MEB, MEU, and SPMAGTF training and pre-deployment requirements
- Support the development of appropriate space operations CONOPS, plans, and annexes
- Support the development of appropriate Special Technical Operations CONOPS, plans, and annexes
- Assist in the integration of space-based capabilities in operations, training, and exercises
- Assist in the integration of National Technical Means (NTM) into operations, contingency operations, training, and exercises
- Integrate OPSEC and signature management (SIGMAN) initiatives into operations, training, and exercises
- Provide the ability to detect, identify, and counter effects in a denied, degraded, or disrupted IE
- Assist in the integration of Special Technical Operations into operations, training, and exercises
- In coordination with joint and national level agencies provides space-based threat intelligence to enhance force protection, enable lethal and non-lethal fires, and characterize threat SATCOM networks

MIG COC

The MIG COC is the MEF C2 agency that forms the centerpiece for the integrated employment of the seven functions of IE Ops. The MIG COC also provides the functional interface to the Joint Force for the employment of MAFTF IE Ops capabilities as part of a joint/combined operation. The MIG COC plays a central role in integrating IE Ops with the MAGTF CONOPS through connectivity with the MEF COC and FECC and any other C2 agency within the command element or the MSCs. The role of the MIG COC is established according to the operational employment of the MAGTF and associated joint, coalition, or national assets operating in the MAGTF's assigned area of operations. Borrowing directly from the TACC model, the MIG COC is the operational command post for the MIG from which the MIG commander and his/her staff plan, supervise, coordinate, and execute all current and future IE Ops in support of the MAGTF. Additionally, just like the TACC and MACCS, the MIG COC facilitates the command and control of IE Ops through an agile distributed C2 system, generically entitled an *Information Battle Management and Control System (IBMCS)*, which may include subordinate C2 nodes integrated within MAGTF C2 centers including the MEF COC, Fires and Effects Coordination Center (FECC), TACC, Direct Air Support Center (DASC), Intelligence Operations Center (IOC), etc. Figure 4 illustrates the MIG COC as a C2 center for the MIG integrated across the MAGTF.

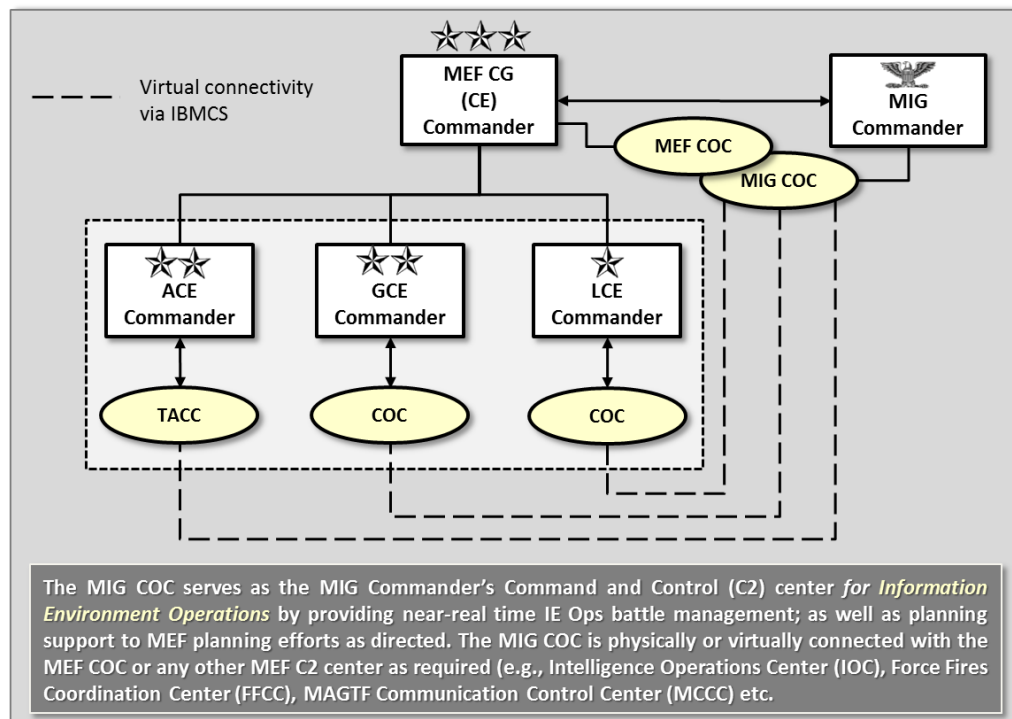


Figure 4. Information Environment Operations Command Center

MIG COC Tasks

As the MIG's C2 center, the MIG COC must be highly reconfigurable to ensure it can support a variety of MEF deployment configurations. MIG COC configurability depends on leveraging distributed IBMCS technologies designed to enable the MIG and MIG COC to achieve tasks through the capabilities and actions of subordinate MIG commands which have existing support relationships with elements of the MEF staff or MSCs. In this regard, the MIG COC may accomplish assigned tasks through subordinate organizations. In this model, the MIG COC maintains supervision of mission execution. With respect to deployment configurations, the MIG COC may be physically established in one location or virtually established in a distributed manner across the COC and other MAGTF C2 centers (e.g., IOC) as the situation requires. The MIG COC is primarily responsible for the following tasks:

- Maintain and disseminate a comprehensive running estimate of threats, vulnerabilities, and opportunities in and through the IE affecting MAGTF operations
- Monitor the status of MAGTF IE Ops assets including organic and externally available capabilities
- Conduct near-real time IE Ops battle management (direction, coordination, and deconfliction) in support of MEF operations
- Serve as the operational point of contact between the MEF and external IE Ops control agencies
- Establish IE Ops control measures in the MAGTF area of operations
- Promulgate changes to the rules of engagement for IE Ops capabilities and actions
- Promulgate signature management (SIGMAN) control conditions/actions in the MAGTF area of operations
- Manage the execution of applicable IE Ops FRAGOS and coordination orders
- Direct and/or coordinate the execution of MAGTF IE Ops
- Evaluate the results of MAGTF IE Ops
- Provide COA change recommendations to the G-3 to meet emergent requirements in the IE battle
- Provide visualization overlays that illustrate the interrelationship of threat information, friendly force information, and environmental information as it relates to current and future IE Ops courses of action
- Provide near-real time IE Ops asset and spectrum-dependent system (SDS) coordination, deconfliction, and dynamic reprogramming to support emergent requirements in the IE battle
- Provide support to the G-2 and G-6 by providing near-real time visualization and decision support recommendations which enable EMS maneuver, competing priority resolution, and EMS fratricide prevention
- Provide support to the G-6 by providing near-real time visualization and decision support recommendations to enable near-real time configuration, and content and bandwidth management actions to ensure MAGTF C2 network flexibility and resiliency
- Support the FECC in coordinating the timing and tempo of integrated non-lethal fires solutions

MIG COC Dynamic Re-tasking and Re-programming of Multifunctional Capabilities

While conducting MAGTF IE Ops, supporting / supported relationships and associated tasking authorities can rapidly change – even during the course of a single mission. This is a unique consequence of introducing many new multi-functional sensors and emitters across the MEF's area of operations and MSCs (e.g., Intrepid Tiger II (IT-II), RadioMap, Communications Emitter Sensing and Attack System (CESAS) II, etc.). As threats, vulnerabilities, and opportunities in or through the IE are identified in near-real time, multi-functional capabilities will need to be dynamically re-tasked and re-programmed to meet emergent requirements. This means that a single asset capable of performing a variety of sense, attack, or communications missions may need to be tasked to perform any or all of these during a mission. This poses a challenge of managing multiple tasking authorities as well as coordinating the timing and deconfliction of multiple payload transmissions. In this notional example, the G-2, G-3, and G-6 would all need the ability to re-task or re-program the asset, perhaps nearly simultaneously. The MIG COC will possess the tools and services to enable this near-real time C2 requirement through a distributed IBMCS capability which is used across the MAGTF.

MIG SUBORDINATE COMMANDS

Figure 2 briefly introduced MIG subordinate commands which are described in more detail below. These commands provide the personnel, equipment, and knowledge needed to perform IE Ops in support of the MAGTF. As this concept is developed in the coming years, the integrated and coordinated employment of these commands and their respective capabilities will become increasingly important.

INTELLIGENCE BATTALION

During operations the intelligence battalion supports the commanding general's priorities and is responsible for planning, directing, collecting, processing, producing, and disseminating intelligence; as well as providing counterintelligence (CI) support to the MEF, MSCs, subordinate MAGTFs, and other commands as directed. During combat and crisis response operations, the intelligence battalion commander assumes the role of the intelligence support coordinator. In support of IE Ops, the Intelligence Battalion conducts media analysis to determine enemy actions, identifies changes in population behaviors, supports operational assessments, provides indications and warnings (I&W), and identifies threats the MEF rear area. ***The MEF G-2, on behalf of the MEF commanding general, tasks the MIG commander for intelligence support. The MIG commander directs the intelligence battalion commander to support the G-2. The MIG COC plays a critical role in coordinating and deconflicting the intelligence battalion's operations and collections activities with other IE Ops actions across the MAGTF's battlespace.***

RADIO BATTALION

The radio battalion plans and conducts signals intelligence (SIGINT), EW, and cyberspace operations support to the MAGTF and Joint force commander. During operations, and by direction of the MIG commander, the radio battalion supports the commanding general's priorities for planning and conducting all SIGINT operations throughout the MAGTF area of operations. The radio battalion plans and performs these missions in close coordination with higher headquarters (HHQ)/ National and Joint level agencies, the MEF G-2, MEF G-3, and the MIG Future Ops and/or Current Ops sections. The radio battalion and its detachments remain in *general support* of the MAGTF, except for electronic warfare support teams (EWSTs), which provide *direct support* to the supported air, ground, or logistics unit. The MEF G-2, on behalf of the MEF commanding general, tasks the MIG commander for SIGINT operational support; likewise, the G-3 tasks the MIG commander for electronic warfare and cyberspace operations support. The MIG COC maintains awareness of and may be required to coordinate and/or deconflict radio battalion actions with the G-3 and G-6. The Radio Battalion provides the MAGTF with SIGINT support teams (SSTs) and is planned to provide EWSTs as new force structure is implemented. SSTs include tech-SIGINT, digital network, and cryptologic language operators. EWSTs include electronic warfare, digital network, and cryptologic language operators, as well as, a data-flow manager to conduct electromagnetic spectrum operation systems integration and data management. EWSTs provide indications and warnings (I&W) support to ground, airborne, and advance force operations and support electronic battle damage assessments. Employment variations for SSTs and EWSTs consist of static, vehicle mobile, man packable, and airborne.

COMMUNICATIONS BATTALION

During operations the communications battalion supports the commanding general's priorities and is responsible for installing, operating, securing, and maintaining communications networks in support of MAGTF command elements (CEs), Marine component headquarters, or combined/JTF headquarters in order to enable effective C2 of assigned forces. It provides communication detachments and teams to install, operate, and maintain beyond line of sight (BLOS) wideband transmission systems, tactical network services, and telephone services in support of MEU/SPMAGTF CEs. The battalion as a whole conducts and supports MAGTF DODIN Ops. With future force 2025, additional capabilities and manpower are planned to become organic to the communications battalion – this includes the *DCO-Internal Defense Measures (IDM) Company*, which is envisioned to provide a robust organic DCO and Cybersecurity capability for the MAGTF. ***The MEF G-6, on behalf of the MEF commanding general, tasks the MIG commander for communications support. The MIG commander directs the communications battalion commander to support the G-6. The MIG COC plays a critical role in coordinating and deconflicting the communications battalion's operations and activities with other IE Ops actions across the MAGTF's battlespace.***

COMMUNICATION STRATEGY AND OPERATIONS COMPANY

The Communication Strategy and Operations (CommStrat) Company (formerly the Public Affairs / Combat Camera Company) plans and conducts *Inform Operations* in support of the MAGTF and Joint Force commander. During operations, and by direction of the MIG commander, the CommStrat Company supports the commanding general's priorities, and is responsible for the planning and execution of inform operations, to include public engagement and the acquisition, production, and dissemination of communication and other information products. The CommStrat Company plans and performs these tasks in close coordination with higher headquarters, the MEF CE (particularly the MEF G2, G3, and CommStrat Officer), and the MIG COC and subordinate battalions. The CommStrat Company provides production support to the MIG subordinate battalions and the MEF, MEB, and MEU CEs; specifically, it employs Operational Support Teams to: (1) acquire imagery and content needed to develop communication products and meet other requirements; (2) augment the MEB with personnel when needed; (3) augment MEUs with personnel upon change of operational control (CHOP); and (4) fill other deployment requirements, to include individual augment requirements, as needed. The company also supports training requirements, such as MEU and SPMAGTF certifications, escorting media during MEF or MEB training exercises, and providing media and communication training to units prior to deployment. ***The MEF CommStrat Officer (formerly known as the Public Affairs Officer (PAO)) and the G-3, on behalf of the MEF commanding general, tasks the MIG commander for CommStrat support. The MIG commander directs the CommStrat company commander to support the CommStrat Officer. The MIG COC plays a critical role in coordinating and deconflicting the CommStrat operations and activities with other IE Ops actions across the MAGTF's battlespace.***

LAW ENFORCEMENT BATTALION

Law Enforcement (LE) Battalion provides specialized capabilities to the MIG and MIG COC supporting two of the seven IE Ops Functions—*Provide IE Battlespace Awareness, and Attack and Exploit Networks, Systems and Information*. Military Police support IE Battlespace Awareness and the IE Ops running estimate as they interact with host nation (HN) military and law enforcement partners, the civilian population, and enemy prisoners of war in the course of conducting policing operations (including police intelligence operations), security and mobility operations, and detention operations. Employing an expeditionary forensic lab (the Expeditionary Forensic Exploitation Capability (EFEC)), the battalion supports IE Ops function Attack and Exploit Networks, Systems and Information, with its Expeditionary Analysis Cell (EAC) by conducting forensics exploitation and analysis of captured enemy material providing the commander with near-real time results supporting all-source intelligence analysis and decision making. ***The MIG Commander, on behalf of the MEF commanding general, the MEF G-2, G-3, and G-6 tasks LE BN for forensic support. The MIG COC plays a critical role in coordinating and de-conflicting EFEC activities with IE Ops and other IE related actions across the MAGTF battlespace.***

AIR NAVAL GUNFIRE LIAISON COMPANY (ANGLICO)

ANGLICO provides Marine Air Ground Task Force (MAGTF) Commanders a liaison capability and ability to plan, coordinate, and conduct terminal control of fires in support of joint, allied, and coalition forces. In the information environment ANGLICO, with the assistance of joint, allied, or coalition forces, supports the MAGTF Commander's information effects through direct liaison capability. ANGLICO accomplishes this liaison function by co-locating with supported commands and by facilitating IE Ops fire support requests (e.g., electronic attack (EA)) to the MAGTF on behalf of the supported commander.

FUNCTIONAL APPROACH TO MAGTF IE OPERATIONS

The seven MAGTF IE Ops functions were briefly introduced in figure 1. The MIG commander has overall authority for ensuring the seven IE Ops functions are integrated in support of the MAGTF CONOPS and scheme of maneuver. The following sections describe the seven functions in more detail and include descriptions of the functions, as well as associated roles, responsibilities and tasks.

FUNCTION #1: ASSURE ENTERPRISE COMMAND AND CONTROL SYSTEMS AND CRITICAL SYSTEMS

The G-6 enables the MEF commander to command and control assigned forces through planning that both informs and supports the concept of operations. Close coordination with the G-2, G-3, G-4, and MIG COC is necessary to ensure actions performed by the G-6 in the information environment support MAGTF IE Ops, and ultimately preserve the commanding general's ability to retain freedom of action in all warfighting domains. The MIG commander's communications battalion provides the personnel and equipment for conducting this function. The G-6 directs communications and cyberspace operations through the MCCC. ***While this function is primarily thought of as a G-6/MCCC/Communications Battalion responsibility, this function should be viewed in a broader context than actions occurring exclusively in or through the MAGTF C2 system. Included within this function are actions performed by other functions which may be used to destroy, degrade, deny, or deceive enemy capabilities and actions targeting or affecting MAGTF C2 systems and critical systems. Thus, the MIG has a significant role in coordinating actions across the MAGTF to enable this function.*** The following tasks are associated with this function.

- The G-2 identifies enemy capabilities and actions which are planned or are in the process of denying, degrading, or destroying MAGTF C2 systems and critical systems
- The G-3 and/or FECC coordinates fires to destroy or degrade enemy capabilities and actions aimed against MAGTF C2 systems and critical systems
- The MIG COC plans and coordinates offensive cyberspace operations and/or electronic attack (EA) to prevent, deny, or destroy enemy capabilities targeting MAGTF C2 systems and critical systems
- The MIG and/or MIG COC provides planning support to G-6 hosted B2C2WGs to inform them of planned IE Ops capabilities and priorities which will affect or will be affected by the health and status of command and control and critical systems
- The MIG provides the G-6 with running estimate information necessary to support both planning and real time network management and defense actions – the running estimate provides the G-6 with a comprehensive understanding of the disposition, health, status, and priority of IE Ops assets using or affecting the C2 network and/or critical systems
- The MIG COC supports the G-6 by coordinating and deconflicting electromagnetic spectrum operations to minimize and/or mitigate blue-on-blue electromagnetic interference (EMI), which may affect the MAGTF C2 network and critical systems
- The MIG COC supports the G-6 by coordinating and deconflicting cyberspace operations and any other special capability which may affect the MAGTF command and control network and critical systems
- The MIG COC, in coordination with the G-6 identifies, requests, and coordinates reachback support to obtain and use special capabilities which may directly enhance the resiliency, reliability, integrity, and robustness of the MAGTF command and control network and critical systems
- The G-6 provides the MIG COC with the health and status of the command and control network and critical systems (NETCOP), which is used as input to the IE Ops running estimate
- The MIG HQ and/or MIG COC supports the G-6 and G-2 in the identification of key terrain in the cyber domain as they relate to future plans and current operations
- The MIG COC provides feedback information to the G-6 from organic IE Ops sensors deployed across the battlespace which inform on the health and status of the C2 network and critical systems
- The MIG COC supports the G-6 by coordinating dynamic spectrum management and/or maneuver – including the re-tasking and reprogramming of spectrum dependent systems within or affecting the MAGTF C2 network

- The MIG COC supports the G-6 in the identification of critical network vulnerabilities
- The MIG COC provides input to the information management (IM) / knowledge management (KM) plans
- The MIG and/or MIG COC consumes Red Cell teams penetration testing results against facilities and MAGTF networks
- The MIG COC coordinates with the G-6 to update the Joint Restricted Frequency List (JRFL) based on G-2, G-3, and G-6 spectrum access requirements
- The MIG and/or MIG COC provides IE Ops asset spectrum use and access requirements to the G-6

FUNCTION #2: PROVIDE INFORMATION ENVIRONMENT BATTLESPACE AWARENESS

This IE Ops function is centered on providing information flows that comprise the IE Ops *running estimate*. This function integrates intelligence and other information which characterizes the physical, informational, and cognitive dimensions of the information environment in order to identify threats, vulnerabilities, and opportunities. Through the IBMCS, the MIG COC consumes threat and environmental information from MEF intelligence sources, and friendly force and environmental information from non-intelligence sources. The running estimate is the fourth central idea introduced on page 2 and is described in more detail on page 18. The following is a breakdown of specific MIG and/or MIG COC tasks required to enable this function:

- The MIG and/or MIG COC provides intelligence requirements to the G-2
- The G-2 and/or IOC provides the MIG COC with **threat intelligence** and indications and warnings (I&W) regarding technical, organizational, or human targets, target system parametrics, target command and control networks and nodal dependencies, threat cyberspace operations capabilities and actions, threat space capabilities and actions, threat EMSO capabilities and actions, battle damage assessments (BDA), and re-attack recommendations
- The G-2 provides the MIG COC with **environmental information** from formal intelligence products and data sources. Environmental information includes: foundational geospatial intelligence, meteorological (METOC), electromagnetic environment, cyberspace physical layer, cyberspace logical layer, cyberspace social layer information, and civil information, etc. The MIG COC also consumes environmental information from non-intelligence sources (e.g., Intrepid Tiger II pods, RadioMap, Civil Information from Civil Affairs forces, etc.)
- The MIG COC consumes **friendly force information** from across the MAGTF through the command and control system, and from plans, orders, and coordination instructions. Through the IBMCS the MIG COC pulls data about the health and status of the C2 network (NETCOP), overall MAGTF signature picture, and the position, location, payload, and mission of IE Ops assets across the battlespace
- The MIG COC provides **running estimate** overlays which are the resultant visualization and decision support aids from fusing and analyzing threat, environmental, and friendly force information relevant to IE Ops and shares this information across the MAGTF

FUNCTION #3: ATTACK AND EXPLOIT NETWORKS, SYSTEMS AND INFORMATION

This function represents those actions conducted to exploit or attack enemy networks, systems, signatures, and information in order to create advantages for the MAGTF. This includes planning, integrating, and synchronizing IE Ops activities across all domains in a mutually reinforcing manner. The MIG COC, using the running estimate and IBMCS, enables the overall success of this function by assisting the FECC, COC, and IOC in coordinating and deconflicting attack and exploit capabilities in near-real time across the deep, close, and rear areas. ***This function involves non-lethal actions occurring in and through the IE as well as fires and maneuver, and thus requires integration into existing targeting and fires planning processes. The MIG provides the MEF additional personnel and subject matter experts who will be available to participate in existing targeting and fires planning processes.*** Additionally, the MIG and/or MIG COC use IBMCS tools and services to support the planning of capabilities used in this function, over multiple time horizons, including near-real time. The following is a list of specific MIG and/or MIG COC tasks required to enable this function:

- The MIG and/MIG COC conducts planning in support of the G-3/FECC's MAGTF concept of fires

- The MIG and/or MIG COC deconflicts the electronic warfare plan, offensive cyberspace operations plan, collection plan, and communications plan to identify potential EMS fratricide; recommends possible alternative COAs or combined arms solutions
- The MIG and/or MIG COC coordinates with theater and/or national level agencies to ensure a shared situational awareness with a focus on human dynamics, social network links and nodes, atmospheric, environmental characteristics, and personal intent
- The MIG and/or MIG COC coordinates with the G-2, G-3, and G-6 to plan and execute IE Ops missions which target specific enemy networks, systems, and information in support of the operational scheme of maneuver
- The MIG and/or MIG COC coordinates with the G-2, G-3, and G-6 to identify systems that support the attack and exploit mission, and template the logical topology that supports these systems
- The MIG COC supports the G-3 and G-2 with running estimate information that visualizes the topological structure, including key terrain in the cyber domain, and potential named areas of interested (NAIs)
- The MIG COC ensures Cyberspace Effects Requests Forms (CERFs) are submitted and deconflicted throughout the targeting process as appropriate
- The MIG COC ensures Electronic Attack Requests Forms (EARFs) are submitted and deconflicted with the C2 communications architecture, intelligence collection plan, planned cyberspace fires, airspace control order (ACO) and the JRFL as appropriate
- The MIG submits the IE Ops plan to the MEF Staff Judge Advocate (SJA) for legal review

FUNCTION #4: INFORM DOMESTIC & INTERNATIONAL AUDIENCES

This function involves actions taken to truthfully communicate with domestic and foreign audiences in order to build understanding and support for operational and institutional objectives. It also seeks to reassure friends and allies, and deter and dissuade adversaries. It is conducted both in garrison and while deployed. While inform operations are largely led and planned by the CommStrat and Civil Affairs Occupational Fields, they are executed and supported by MAGTF commanders, staffs, and Marines in addition to the CommStrat and Civil Affairs capabilities. The MIG COC enables the overall success of this function by coordinating and de-conflicting inform capabilities in real-time or near-real time across the deep, close and rear areas in close collaboration with the MEF CommStrat Section, FECC, COC and IOC. Additionally, the MIG and/or MIG COC supports the planning of capabilities used in this function, over multiple time horizons, and plans. The following is a list of specific tasks required to enable this function:

- The MIG, in coordination with the G-2 and MEF CommStrat Section, conducts continuous research and analysis to understand the information environment and key publics to inform planning and operations
- The MIG supports the MEF CommStrat Section in the development of the Annex F (Public Affairs), Annex C Appendix 9 (Combat Camera), and Annex Y (Communication Strategy), and public affairs guidance (PAG)
- The MIG, in coordination with the CommStrat Section and FECC, conducts inform operations planning, integration and synchronization with the MEF, MSCs, MARFORs, interagency organizations, and regional partners
- The MIG, in coordination with the CommStrat Section and FECC, provides inform operations planning support to MEF B2C2WGs
- In coordination with and support from the MIG, the CommStrat Section facilitates the MEF's communication with internal, domestic, host-nation, coalition, other international, and adversary audiences through a variety of mediums, to include the traditional news media, social media, community engagement, and key leader engagement
- The MIG coordinates with the MEF CE and CommStrat Section during issue management and crisis communication
- The MIG acquires imagery and content, and provides production support to the CommStrat Section, other MEF sections, and MIG subordinate commands. Production includes written and visual information products for public release or internal use
- The MIG, in coordination with the CommStrat Section, disseminates communication products (written and imagery) in electronic and print formats through traditional and digital means

- The MIG, in coordination with the CommStrat Section, assesses inform operations measures of performance (MOPs) and measures of effectiveness (MOEs), and modifies plans as necessary based on feedback and changes in the information and/or operating environment
- The MIG attaches Operational Support Teams from the CommStrat Company to the MEB, MEUs, and other units, as required
- The MIG provides inform operations training support to the MEF, MEB and MEU CEs
- Civil Affairs forces establish relationships and build rapport with key leaders in civilian networks to inform the populace of CMO activities, correct misinformation and hostile propaganda, and help legitimize a host nation government during MAGTF operations

FUNCTION #5: INFLUENCE FOREIGN TARGET AUDIENCES

This function embodies the *Influence Operations* operational capability area. These operations are associated with *information operations* as they are commonly understood and practiced in the Marine Corps today. ***However, it is important to note that while this function includes MISO and other technical capabilities, a broader notion of influence is required which incorporates any MAGTF capability or physical action (e.g., fires and maneuver) which must be integrated into a broader influence plan.*** The MIG COC, using the running estimate and IBMCS, enables the overall success of this function by assisting the FECC, COC, and IOC in coordinating and deconflicting attack and exploit capabilities in near-real time across the deep, close, and rear areas. This function involves non-lethal actions occurring in and through the IE as well as fires and maneuver, and thus requires integration into existing targeting and fires planning processes. Additionally, the MIG and/or MIG COC supports the planning of capabilities used in this function, over multiple time horizons, and plans. The following is a list of specific MIG and/or MIG COC tasks required to enable this function:

- The MIG, in coordination with the G-2, identifies non-adversary relevant actors and other target audiences affecting or affected by MAGTF operations and the scheme of maneuver
- The MIG will work with the MEF G3 in the development of Appendix 3 (Information Operations) to Annex C (Operations) and the corresponding appropriate Tabs
- The MIG and/or MIG COC coordinates with the military information support operations (MISO) Company, the G-2, and appropriate B2C2WGs to de-conflict message and theme dissemination, and provide leadership with multiple methods – including fires and maneuver – to achieve influence effects, and to jointly assess the effect of ongoing and previous influence efforts
- In coordination with the G-2 and G-3, the MIG COC coordinates the ongoing assessments of MOPs and MOEs for all Influence Operations
- The MIG and/or MIG COC provides planning support to the MISO Company and MAGTF G-2 to develop messaging for KLE and other G-3 planned engagements with relevant actors
- The MIG and/or COC nominates effects against approved target audiences for review in the targeting process and maintains awareness of the target list
- The MIG and/or MIG COC ensures MOP and MOE of selected information capabilities are analyzed in combination with intelligence derived feedback
- The MIG COC consumes responses to MAGTF messaging throughout the IE IOT create conditions favorable to operational objectives
- The MIG COC coordinates operations with Expeditionary MISO teams (EMT) and organic capabilities for the dissemination of audio, visual, and audio-visual messages, including by loudspeaker, leaflet and other print products, dissemination, face-to-face engagements, and radio broadcast operations
- The MIG COC monitors civil affairs forces

FUNCTION #6: DECEIVE FOREIGN TARGET AUDIENCES

This function involves MAGTF actions executed to deliberately mislead adversary decision makers, thereby causing the adversary or target to take specific actions or inactions that if successfully executed will contribute to the accomplishment of MAGTF objectives. ***The MIG and MIG COC supports and enables the overall success of this function by coordinating and deconflicting various technical and non-technical capabilities during planning, and operations across the deep, close, and rear areas—in close collaboration with the FECC, COC, and IOC.***

Additionally, the MIG and/or MIG COC supports the broader MAGTF plan for deception which involves a wide variety of capabilities, actions, inactions, and signatures implemented over multiple time horizons. The following is a breakdown of specific MIG and/or MIG COC tasks required to enable this function:

- The MIG coordinates and ensures MAGTF deception actions are nested under higher level joint plans
- The MIG and/or MIG COC coordinates the planning and employment of deception in support of OPSEC (DISO) and, in particular, *Tactical Deception*
- The MIG COC coordinates the timing and tempo of deception actions in support of tactical-level commanders, and ensures deception actions are deconflicted and/or synchronized with other MAGTF operations which may affect or be affected by deception actions (e.g., EMSO, CO, fires and maneuver)
- The MIG and/or MIG COC maintains awareness of counterintelligence (CI) personnel in their efforts to protect against threats from outside the unit
- The MIG COC provides running estimate information needed to support the development of deception plans
- The MIG supports the MEF staff during the development of CONPLANS and OPLANS to ensure deception is included
- The MIG and/or MIG COC provides running estimate information needed to support the development of MILDEC plans and the writing of Annex C, Appendix 3, Tab A Military Deception
- The MIG COC coordinates with the G-2, G-3, G-4, and G-6 to manage signatures using administrative, physical, and technical means
- The MIG COC coordinates with the DCO team's efforts to monitor networks in garrison based on identified key systems that are likely targets for exploitation
- The MIG and/or MIG COC coordinates across the staff to assess friendly force signatures and advise the commander on ways to modify these signatures
- The MIG and/or MIG COC coordinates across the staff to develop the required Signature Management Plan
- The MIG and/or MIG COC supports the G-3s operational risk evaluation of the Signature Management Plan

FUNCTION #7: CONTROL OF INFORMATION ENVIRONMENT OPERATIONS CAPABILITIES, RESOURCES AND ACTIVITIES

The IE Ops control function is the MIG commander's primary task and responsibility to the commanding general. This distributed function uses IBMCS tools and services which provide operational feedback and control mechanisms to conduct and coordinate IE Ops across the MAGTF's AOI. In performing this function, the MIG COC uses the IE Ops *running estimate* to support planning, mission execution, and assessment activities. In addition to MIG COC tasks listed on page 8, the following is a breakdown of MIG and/or MIG COC tasks required to enable this function:

- Through the running estimate, the MIG COC provides near-real time re-tasking and re-programming recommendations based on knowledge of the mission, emergent conditions in the battlespace, and knowledge of the capabilities and disposition of friendly force assets
- The MIG COC coordinates the timing and tempo of CO and EMSO actions in support of MAGTF maneuver elements and supporting agencies
- The MIG and/or MIG COC requests and obtains required authorizations through documentation (i.e. OPORD, EXORD, WARNORD, FRAGO, PLANORD)
- The MIG and/or MIG COC maintains awareness of relevant ongoing DoD operations in the information environment
- The MIG and/or MIG COC maintains an updated list of IE Ops related authorities available to the commander
- The MIG and/or MIG COC assists in the development of the EMS Coordination Order (ECO)

- With the assistance of the SJA, the MIG COC coordinates OCO execution timing support of the plan and operational scheme of maneuver
- The MIG COC coordinates DCO response actions (DCO-RA) execution timing in support of G-3 requirements as appropriate
- The MIG COC coordinates across staff sections to deconflict CO and EMSO capabilities with fire support, intelligence collection plans, spectrum management, and maneuver elements
- The MIG and/or MIG COC support the G-6 in the compilation/coordination of the Joint Restricted Frequency List (JRFL) and supports the resolution of any conflicts during planning and execution
- The MIG and/or MIG COC supports the G-6's EMS deconfliction efforts and responsibilities (e.g., EARF deconfliction with G-2 collections, Annex K execution, etc.)
- The MIG COC coordinates requests for IE Ops capabilities from across the MAGTF, including major subordinate commands (MSCs)
- The MIG COC in coordination with the FECC delegates electronic warfare coordination authority (EWCA) - (conduct on station coordination, employment, targeting, and deconfliction of EA and ES assets) - to the commander's fires and effects coordinator that adequately manages battlespace appropriate to the effects produced by the EW asset
- The MIG and/or MIG COC responds to emergent requirements and identifies, requests, and coordinates reachback support as required
- The MIG and/or MIG COC requests space based resources
- The MIG promulgates the SIGMAN plan and procedures
- The MIG and/or MIG COC monitors Civil Affairs forces in coordination with the G-9

AGILE DISTRIBUTED C2 – TACTICAL SERVICES ORIENTED ARCHITECTURE (TSOA)

Agile distributed C2 is one of four central ideas introduced on page 2 and has been discussed throughout this document using the TACC and MACCS model analogy. Similar to Marine aviation, IE Ops will employ a wide range of capabilities that are distributed and controlled across the MEF's MSCs. In the case of IE Ops disparate capabilities such as sensor pods on aircraft, electronic warfare support teams with infantry battalions, electronic protection assets with resupply convoys, and activities like key leader engagements (KLE) will all need to be planned and integrated coherently to achieve MAGTF objectives. While the MIG commander is responsible to the commanding general for ensuring IE Ops actions are effectively planned, integrated, and executed across the MEF, the sheer number and dispersion of IE Ops related ground and air capabilities across the battlespace will require a whole-of-MAGTF approach to effectively command and control IE Ops. ***The whole-of-MAGTF approach is enhanced through an agile distributed command and control (C2) family of services, built upon a services oriented architecture (SOA) that enables at a minimum: (1) real-time data sharing across MSCs and the CE, (2) customizable situational awareness views (all aspects of the IE), (3) collaborative planning and decision making, (4) near-real time course of action (COA) generation, (5) near-real time mission execution coordination and deconfliction, (6) dynamic network and bandwidth management, (7) agile spectrum management, (8) IE visualization, and (9) dynamic re-tasking and re-programming of multi-functional assets.***

IBMCS - TACTICAL SERVICES ORIENTED ARCHITECTURE (TSOA)

To comply with Marine Corps policy and to ensure maximum flexibility and interoperability, the *Information Battle Management and Control System* must involve software services and applications developed within and/or integrated through the Tactical Services Oriented Architecture (TSOA). TSOA compliant IBMCS services will provide Marines the ability to discover, subscribe to, shape, filter, modify, and visualize data that aids their assessment of a situation, enabling timely and informed decisions within the information environment. Additionally, TSOA provides a modular suite of government owned software components that enable the sharing of tactical data across disparate data systems within the MAGTF's command and control centers across all levels. TSOA will be used throughout the full spectrum of operations and environments in which Marines are expected to deploy and operate. The family of IBMCS services will be distributed and available for use by the whole-of-MAGTF to enable integrated distributed IE Ops across the MEF's area of interest. TSOA software developers will be present within each MEF to provide MEF commanders and MSCs with direct input on C2 requirements. Figure 5 illustrates the TSOA concept from disparate authoritative data sources (ADSs) on the left of the diagram to fused, meaningful, and actionable information on the right.

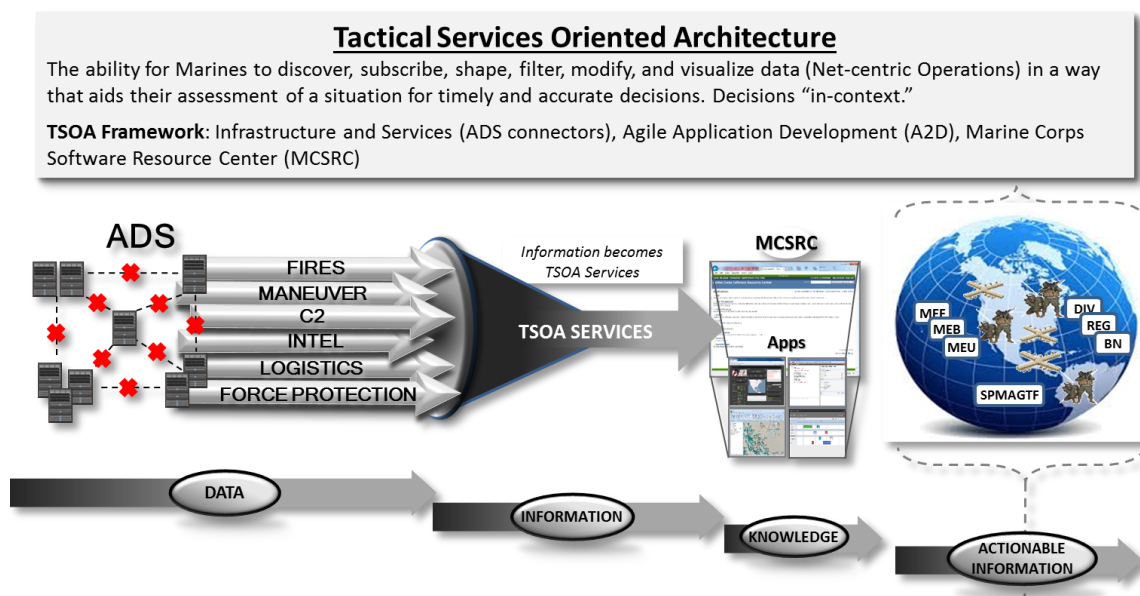


Figure 5. TSOA Framework for MAGTF Command and Control

INFORMATION ENVIRONMENT OPERATIONS RUNNING ESTIMATE

The IE Ops running estimate is one of four central ideas introduced on page 2 and has been discussed throughout this document. The IE Ops running estimate is envisioned as future advanced analytical and decision support capability that uses innovative algorithms, high end computing power, and artificial intelligence (AI) to identify and predict threats, vulnerabilities, and opportunities in the IE. The IE Ops running estimate produces information and decision support products used and displayed by the COP/CTP, integrated mission planning tools, C2 systems, and mission assessment and feedback mechanisms. The IE Ops running estimate is envisioned as a required capability for the MAGTF to sense, understand, and act effectively in and through the information environment. It is not synonymous with or a replacement for the COP/CTP, and is better thought of as the analytical “engine” within an IBMCS which enables the MAGTF to coherently plan, conduct, and assess operations in and through a contested information environment. Additionally, the IE Ops running estimate is a distributed capability used by the whole-of-MAGTF such that services and applications are used by major subordinate commands (MSCs), the MEF staff (e.g., G-2, G-3, G-4, G-5, G-6), and MAGTF’s C2 centers (e.g., MEF COC, MIG COC, IOC, FECC, TACC, DASC, and the MAGTF Communications Control Center (MCCC)), etc. This capability is intended to specifically address the crux of the problem identified on page 1 – *the need for a commander to have a single “place” to go and gain or maintain a comprehensive understanding of the information environment, and to rapidly determine options for changing course, or engaging in new actions to achieve objectives in and through the IE.*

IE OPS RUNNING ESTIMATE INFORMATION FLOW

The IE Ops running estimate is a component of the IBMCS and encompasses a family of software services. These services enable IE relevant information to flow to whichever staff section or functional process requires it. Thus, it represents a distributed MAGTF capability, integral to command and control. The IE Ops running estimate pulls/pushes information from/to National, Combatant Command, and Joint Force authoritative sources, as well as any MAGTF C2 center involved in planning or executing IE Ops. As an illustrative example, the MAGTF *spectrum running estimate* (which is an IE Ops running estimate sub-component provided by the spectrum services framework (SSF) in FY-19), will allow the MAGTF to create tailorable views from the global *spectrum running estimate* (SRE). This global estimate will be provided by Strategic Command (STRATCOM) through the Joint Electromagnetic Spectrum Operations Cell (JEMSOC). Other global or theater level running estimates (e.g., cyberspace) may be provided in the future which will be available for use by the MAGTF through the IBMCS. Figure 6 provides a simple information flow diagram for the IE Ops running estimate.

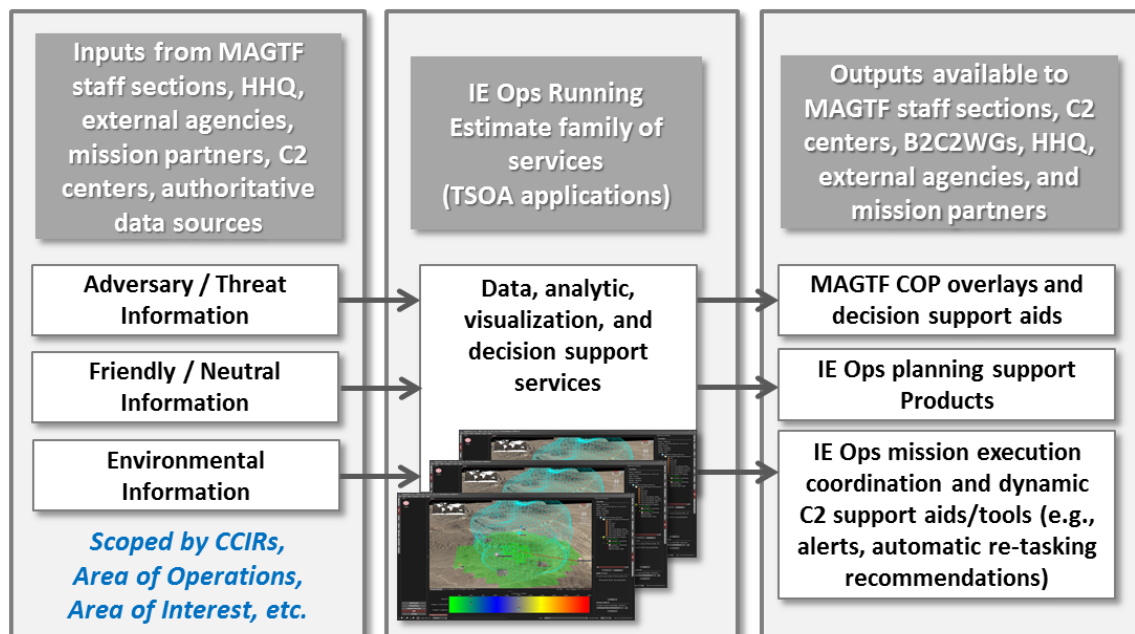


Figure 6. IE Ops Running Estimate

INFORMATION ENVIRONMENT OPERATIONS RUNNING ESTIMATE KEY CHARACTERISTICS

While the MAGTF currently takes advantage of numerous capabilities that use the EMS and cyberspace domain to affect IE Ops across all warfighting functions, integrating the rapidly increasing numbers of these capabilities in the future creates an inherent technical complexity that poses a growing challenge to the MAGTF. ***The IE Ops running estimate enables an agile distributed command and control mechanism by leveraging automation, advanced algorithms, and artificial intelligence to foster near-real time collaborative planning and execution coordination environments that span the MAGTF.*** This will enhance collective awareness, operational tempo, agile command and control, and will increase options for combined arms solutions. To achieve this, the IE Ops running estimate is envisioned as a capability upon which commanders and their staffs at all echelons may rely upon to help plan, execute, monitor, and assess integrated IE Ops actions.

Common Example of a Running Estimate – Smartphone Navigation Application

A simple example of a running estimate understood by almost everyone is a navigation application on a smartphone. In near-real time, and with no training required, this intuitive and simple application produces possible routes (COAs), highlights the predicted optimal route based on the current traffic situation, and provides continuous monitoring of the traffic situation during the course of travel. As conditions in the traffic situation change, the application automatically presents alternate routes to the driver based on rules which favor time, road type, or other priorities. It also predicts and presents an assessment of changing or staying on course (e.g., time saved, additional distance to be traveled, updated ETA, etc.) At this point, the driver makes a decision based on the analysis and visual presentation.

While the smartphone example is overly-simplistic, it illustrates some of the key characteristics and utility of using advanced technologies to gain and maintain a continuous understanding of threats, vulnerabilities, and opportunities in a situation or environment. By gathering and fusing disparate data sources and analyzing them against mission objectives and priorities, the easy to use application provides a running estimate of route progress and the traffic situation using near-real time analytics. It gives the decision maker alerts and options to change course based on mission priorities, obstacles, and available alternatives. Extending this idea to support IE Ops in the future will require incorporating existing and forthcoming advanced technologies which are designed to enable a continuous and comprehensive understanding of all relevant facets of the IE, and to improve IE Ops decision making across the MAGTF's AOI. *The IE Ops running estimate is envisioned with the following characteristics:*

Continuous

The information environment is an increasingly consequential, ever present space that requires constant monitoring, understanding, planning, and maneuvering. The MEF produces and consumes large amounts of information and leverages communications which are continuously subject to threat activity or interference. This occurs regardless of whether the MEF is in garrison, training, or conducting military operations. Under all circumstances, the MEF must maintain a continuous IE Ops running estimate, including in areas relevant to deployed subordinate MAGTFs (i.e., Marine Expeditionary Units (MEUs), Marine Expeditionary Brigades (MEBs), and Special Purpose MAGTFs (SPMAGTFs). This estimate provides real-time and/or near-real time threat, vulnerability, and opportunity assessments as well as near-real time effectiveness assessments of current MAGTF operations in the IE. Moreover, because significant portions of the IE are used by everyone (i.e., the EMS and Cyberspace Domain), the MEF can use the IE Ops running estimate to maintain a current understanding of not only relevant enemy actions, but also of friendly and neutral/host nation actions which may cause interference or otherwise affect the mission.

Predictive

The running estimate provides real-time predictive analysis to enable *decision superiority* by leveraging “big data” analytics and artificial intelligence which process large amounts of disparate, structured and unstructured IE Ops related data; and by identifying hidden patterns, unknown correlations, trends, and other useful information. Decision superiority is defined by this concept as the comparative advantage gained by executing better and faster

decision cycles at the lowest levels of the MAGTF, relative to an adversary's decision cycles and levels. Predictive analysis is based on using advanced algorithms and pattern analysis to reveal the probability of a future occurrence, or to predict likely risks to the force or to operational tempo. This information is crucial to enhancing decision speed and adjusting planned actions to meet emergent conditions in the battlespace. To develop predictive analytics the IE Ops running estimate's analytic core services ingest data derived from relevant sources, including machine to machine communications, and then analyzes these data within the context of planning and/or executing MEF and Joint Force operations to reveal imminent threats, vulnerabilities, and opportunities. This analytical capability is designed to scale from MEF to MEU and will continue to operate in austere bandwidth constrained environments by using cached data.

Holistic

The IE Ops running estimate is holistic by providing analytical and decision support services to the MIG COC and all other MAGTF C2 centers. ***In other words, the IE Ops running estimate enables the whole-of-MAGTF approach by being available to the entire MAGTF at all echelons.*** The MEF IE Ops running estimate also provides a source of reachback for deployed MAGTFs. The running estimate serves as the MEF's primary means for visualizing, understanding, and deciding on IE Ops actions in a dynamic, integrated, and intuitive way. ***These displays and decision support aids are integral with the COP/CTP*** and are displayed in any of the MEF's command centers. Additionally, the running estimate provides tactical level information to theater and national level organizations to enhance the fidelity of higher level operations and understanding. A critical feature envisioned for the IE Ops running estimate is its ability to show how friendly, enemy, and neutral/host nation actions within the IE interact within one another and how they affect MEF capabilities and actions in the traditional domains. ***This capability is required to ensure IE Ops actions are not planned and conducted for achieving objectives in the IE only, but are integrated to enhance or enable non-IE objectives in the physical domains.***

Multi-functional

The IE Ops running estimate must be multi-functional and tailorable as it provides numerous software applications which analyze each component of the IE, and produce derivative products to support MEF planning, execution, and assessment processes. The IE Ops running estimate directly feeds the MEF's COP/CTP, modeling and simulation capabilities, and collaborative planning tools. As a collection of services within an IBMCS, it produces a wide variety of useful information products such as:

- Graphical overlays and decision support aids for the common operational picture (COP/CTP)
- Alerts of changing conditions in the information environment
- Automated textual narrative generation for written operational plans and/or reports
- Displays of analytics and planning results such as recommended IE Ops courses of action (COA), asset configurations, routes, and payloads as a result of ingesting and analyzing finished formal intelligence products and analysis, mission objectives, friendly force information, environmental information
- Displays correlation of spectrum and emitter data to support target development, intelligence surveillance and reconnaissance (ISR) planning, electronic and/or cyber battle damage assessment (BDA)
- Assessment support products resulting from automated comparison of advanced IE models with sensor and human reported feedback
- Message sets for tasking spectrum and cyber assets and/or reprogramming assignments
- Display analytical results of relevant actors, population trends, perceptions, and responses to MEF operations and messaging, and support the development and reporting of measures of effectiveness (MOEs)

KEY TERMS AND SUPPORTING IDEAS

The information environment spans the operational environment, and as such, affects operations in the physical domains, the electromagnetic spectrum, and the cyberspace domain. Thus, operationalizing the IE as a maneuver space requires a conceptual framework that considers all aspects of the operational environment. Figure 7 provides context for establishing the overall conceptual hierarchy of IE Ops actions using the commonly understood “levels of war” model.

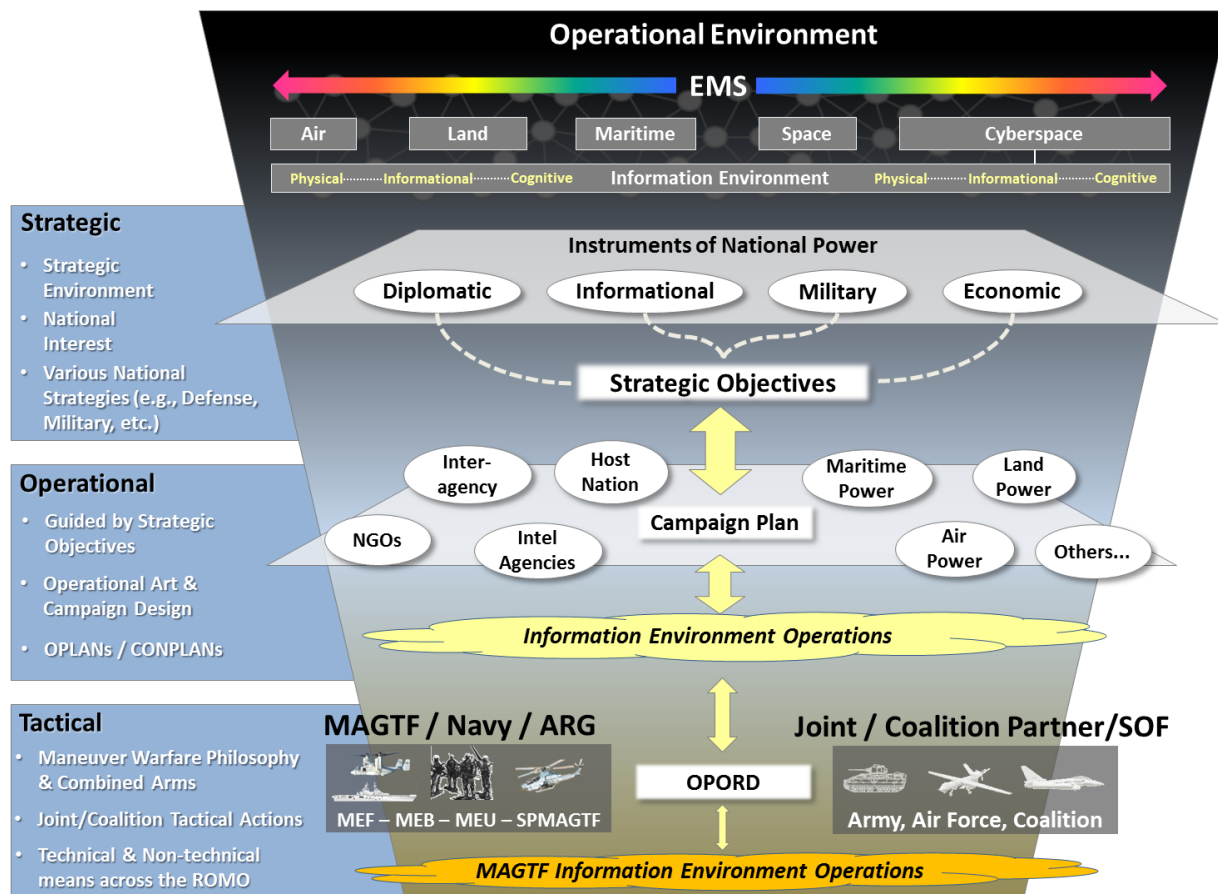


Figure 7. Conceptual Model for Information and Related Activities

The operational environment (OE) is defined in Joint Publication 3-0 *Joint Operations* as the “composite of the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of commanders.” It encompasses physical areas and factors of the air, land, maritime, and space domains, as well as the information environment (which includes the cyberspace domain). Additionally, the OE encompasses portions of electromagnetic spectrum (EMS) – a critical OE component which many IE Ops capabilities depend upon to perform their functions. The **Informational** instrument of power is one of four primary instruments of national power – and thus it sits atop a strategic-to-tactical hierarchy which highlights information as a strategic resource vital to the national interest. Previously considered in the context of traditional nation-states, the concept of information as an instrument of national power extends to non-state actors—such as terrorists and transnational criminal groups—who are using information to further their causes and undermine those of the United States and our allies.

INFORMATION ENVIRONMENT OPERATIONS

The information environment is defined as the aggregate of individuals, organizations, and systems that collect, process, disseminate, or act on information. With its function as a conduit for influence on decision-making, and command and control, the IE is a key component of the commander's assigned operational environment and battlespace. Our ability to rapidly obtain, share, and apply information or knowledge about the environment is core to operating effectively in this space. The IE spans from the strategic to tactical levels and provides a medium for affecting actions across the physical domains. Additionally, the electromagnetic spectrum (EMS) defines a pervasive physical medium spanning the IE through which vast quantities of information flow. The IE is composed of three interrelated dimensions: the *physical*, which includes command and control systems, the supporting infrastructure, as well as human terrain; the *informational*, which includes the manner and flow by which information is collected, processed, stored, disseminated, and protected; and the *cognitive*, which includes the knowledge, attitudes, beliefs, and perceptions of people. **Information Environment Operations** represents a broad set of activities occurring in or through the IE which are conducted at the operational or strategic level to achieve operational or strategic objectives. The MAGTF may support theater or national/strategic objectives by conducting tactical level IE Ops.

INFORMATION ENVIRONMENT OPERATIONS VS. INFORMATION OPERATIONS

MAGTF IE Ops, defined on page 1, represents a broad set of activities occurring in or through the information environment *at the tactical level* to enable MAGTF operations and to achieve mission objectives. While recognizing current Joint terms and definitions for Information Operations (IO) and related activities, IE Ops involves a broader set of activities framed by seven functions identified in figure 1, and implemented through the six IE Ops operational capability areas (see figure 8 on page 23). The Marine Corps will continue to align to, recognize, and work with joint and partner organizations conducting IO, but will evolve the way the MAGTF traditionally applies IO. This evolution is based on the notion of normalizing IE Ops as an integral part of combined arms maneuver by holistically commanding and controlling actions within the information environment to achieve unity of effort.

From "Information Operations" to "Influence Operations"

Traditionally, Marine Corps IO has focused on integrating *information related capabilities* to affect adversary decision making – hence to achieve *cognitive* effects yielding operational advantage. Seeking cognitive effects correspond to seeking *psychological advantage* – which is one of the four types of advantages defined in MCDP 1 *Warfighting*. IE Ops includes the notion of seeking cognitive effects and psychological advantage by integrating information capabilities, but it also seeks to integrate information capabilities to achieve the other three types of military advantages identified in MCDP 1: **temporal, spatial, and technological**. These advantages differentiate IE Ops from IO justifying its broader description. IE Ops are conducted to achieve all four types of advantages defined in our maneuver warfare doctrine. ***This concept of employment asserts that IO in the traditional sense should continue as an integrating function, but should be referred to as Influence Operations. These operations are conducted for the primary purpose of achieving psychological advantage as a "1st order cognitive effect" – using all available means - including fires and maneuver. This COE defines a first order effect as the intended primary, immediate effect imposed on a target through the application of a capability. A second order effect is defined by this COE as the derivative, subsequent, unintended, or cumulative effect, of one or more first order effects (e.g., mission endstate)***

INFORMATION ENVIRONMENT OPERATIONAL CAPABILITY AREAS

IE Ops are planned and executed in accordance with the seven functions, and grouped by operational capability areas: ***Electromagnetic Spectrum Operations (EMSO), Cyberspace Operations, Space Operations, Influence Operations, Deception Operations, and Inform operations***. While the MIG is responsible for ensuring the seven functions are integrated across the MAGTF using all available capabilities, it also has a primary responsibility for ensuring the six operational capability areas are aligned to functional objectives. These areas must be integrated and applied with other MAGTF capabilities and physical actions (e.g., fires and maneuver) to most effectively achieve mission objectives. The MIG staff will participate in MAGTF planning to present integration and coordination requirements to achieve functional objectives. This COE highlights operational capability areas not as an exhaustive list, but to identify well understood existing capability portfolios which are immediately available for use to conduct IE Ops. ***The following sections summarize the operational capability areas illustrated in Figure 8.***

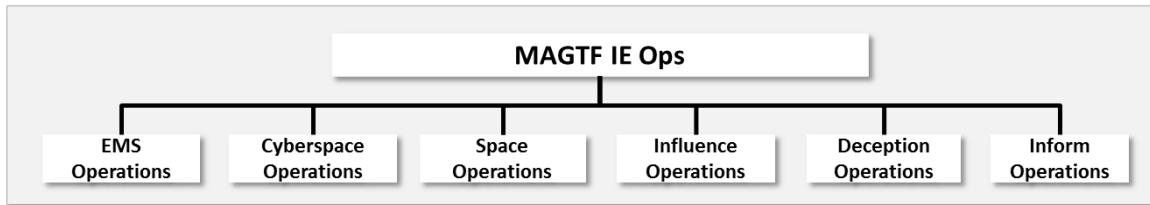


Figure 8. IE Operational Capability Areas

ELECTROMAGNETIC SPECTRUM OPERATIONS

The electromagnetic spectrum (EMS) is a natural phenomenon governed by physics, influenced by technology, and is a common medium making up a significant portion of the information environment. All activity within the EMS can be distilled into two functions: *transmission* and *reception*. With physical properties that can be measured spatially, temporally, and parametrically, the EMS represents *maneuver space* within the physical dimension of the IE, in which military forces compete against adversaries and neutral audiences for access. *Electromagnetic spectrum operations* represent the total of military activities conducted within the EMS. In practical terms, EMSO encompasses **electronic warfare (EW)** and **spectrum management**, and involves activities to closely plan and coordinate these with other EMS-dependent disciplines such as Signals Intelligence (SIGINT), certain cyberspace operations, space operations, and any other EMS-dependent capabilities. **The MIG will conduct EMSO C2 through the MIG COC's EMSO Center (EMSOC) – which is a team of EMSO SMEs, equipped tools and applications, dedicated to processing, analyzing, and sharing EMS data with across the MAGTF. The EMSOC provides a critical capability for enabling EMSO planning and near-real time EMSO coordination, deconfliction, and platform reprogramming. The EMSOC also enables radio frequency-enabled cyberspace operations planning and coordination.** EMSO provides essential capabilities to functions 1-3, and 5-7 (see figure 1).

CYBERSPACE OPERATIONS

Cyberspace is a global domain within the information environment consisting of the interdependent networks of information technology (IT) infrastructures and resident data, including the Internet, telecommunications networks, computer systems, and embedded processors and controllers. MAGTF cyberspace operations are the employment of capabilities where the primary purpose is to support MAGTF objectives in or through cyberspace. Cyberspace operations include three types of operations: (1) Department of Defense information network (DODIN) operations, (2) defensive cyberspace operations (DCO), and (3) offensive cyberspace operations (OCO). DODIN Ops and DCO are the most common types of cyberspace operations conducted by the MAGTF and are used to assure C2 – hence they are critical to functions 1, 2, and 7 (see figure 2). DODIN Ops provide the *network common operational picture* (NETCOP) and the foundational technical and procedural means to enable DCO. OCO authorities are now evolving and will likely be extended to the MAGTF commander in the near future. **As this occurs, there must be a command and control mechanism in place for the MIG and MIG COC to plan and execute OCO as a type of MAGTF fires.** This capability will be conducted under MIG commander delegated authority and is essential or related to functions 3, 5, and 6 (see figure 1).

SPACE OPERATIONS

Space operations are those operations impacting or directly utilizing space-based assets to enhance the potential of the MAGTF and mission partners. Space systems are comprised of three related segments: ground, user, and space. To maintain freedom of action in the space domain, the Marine Corps needs to leverage the five missions of space operations: (1) space situational awareness (SSA); (2) battle management command and control (BMC2); (3) space control; (4) space support to operations; and (5) space services support. Of the five missions, the MAGTF relies primarily on *space support to operations* which provides services and capabilities such as position navigation and timing (PNT)/navigation warfare, missile warning, satellite communications (SATCOM), intelligence surveillance and reconnaissance (ISR), and environmental monitoring. In all cases space-based assets utilize the EMS as the medium for transmitting and receiving signals. The electromagnetic frequency bands that space-based systems use, however, have finite capacity. Therefore, it is vital that the MAGTF achieve the required level of EMS control to ensure freedom of action for space assets. Like the air, land, and maritime domains, space is a physical domain within which military, civil, and commercial activities are conducted. The relationship between the space

domain and the cyberspace domain is unique as space operations depend on cyberspace, and a critical portion of cyberspace can only be provided via space operations. The space IE Ops capability area is unique in that the Marine Corps does not have organic space capabilities and must in all cases request capabilities from external agencies or departments which own and operate space assets. This operational capability area provides essential capabilities to functions 1-3, and 5-7 (see figure 1).

INFLUENCE OPERATIONS

Influence Operations represent specific MAGTF actions taken to affect adversarial or relevant actor decision making to create operational advantage. This IE Ops capability area is heavily focused on the cognitive dimension of the information environment and ensures MAGTF operations incorporate elements of this dimension such as the decisionmaker's culture, life experiences, relationships, outside events, ideology, and the influences of those inside and outside the decisionmaker's group. Influence Operations are ultimately designed to shape perceptions in the IE of both the adversary and/or other relevant actors. Added to these variables are the perceptions built on information collected on current events and the plans and beliefs of others. IE Ops and/or IE capabilities most often associated with influence operations include but are not limited to Operational Security (OPSEC), military information support operations (MISO), signature management (SIGMAN), Civil Affairs (CA), and other special technical capabilities. Influence Operations also incorporate physical MAGTF actions such as fires and maneuver. This operational capability area provides capabilities that specifically align to function 5 (see figure 1).

DECEPTION OPERATIONS

Deception Operations are MAGTF actions executed to deliberately mislead adversary decision makers, thereby causing the adversary or target to take specific actions or inactions that if successfully executed will contribute to the accomplishment of MAGTF objectives (JP 3-13.4). Deception Operations involve all MAGTF elements and capabilities, and require significant planning and integration efforts across the entire MAGTF. IE Ops capabilities most often associated with Deception Operations include but are not limited to OPSEC, space operations, MISO, SIGMAN, and other special technical capabilities. Deception Operations also incorporate physical MAGTF actions such as fires and maneuver. This operational capability area provides capabilities that specifically align to function 6 (see figure 1).

INFORM OPERATIONS

Inform Operations use accurate and timely information and imagery to communicate with a variety of audiences in order to build understanding and support for MAGTF operations and activities while deployed and in garrison. Through the official release of information via traditional media, social media, and face-to-face engagements, Inform Operations facilitate informed perceptions by establishing first facts and putting MAGTF actions in context; correcting inaccuracies and misinformation; and discrediting adversary propaganda with counter narratives. Inform operations involve communication with internal, domestic, host-nation, coalition, other international, and adversary audiences. In all cases, Inform operations are crucial to enhancing situational awareness and command and control, and must be incorporated within the MAGTF planning process to ensure its seamless integration in support of MAGTF objectives and a whole-of-MAGTF approach. While all commanders, staffs, and Marines contribute to Inform operations, primary responsibility for planning and execution resides with the "Communication Strategy and Operations" (CommStrat) Occupational Field (OccFld), Information and Knowledge Management OccFlds, as well as the Civil Affairs OccFld. This operational capability area provides capabilities that specifically align to function 4 (see figure 1).

IE OPERATIONS IN SUPPORT OF COMBINED ARMS MANEUVER

Under the MAGTF IE Ops construct, the IE is viewed in a way similar to the physical maneuver domains – such that it represents a "maneuver" space where military advantage can be gained or lost. However, the IE adds complexity not typical of the physical maneuver domains – ***a dichotomy of continuously evolving threats, vulnerabilities, and opportunities versus a requirement to plan and execute long-lead time deliberate actions (applicable whether in garrison or deployed)***. These contrasting IE characteristics correspond to managing the daily battle rhythm for operating and defending an effective command and control system, and planning and executing deliberate shaping actions to support the scheme of maneuver during operations. Figure 9 illustrates continuous activities and episodic shaping actions within the IE which enable decisive combined arms action.

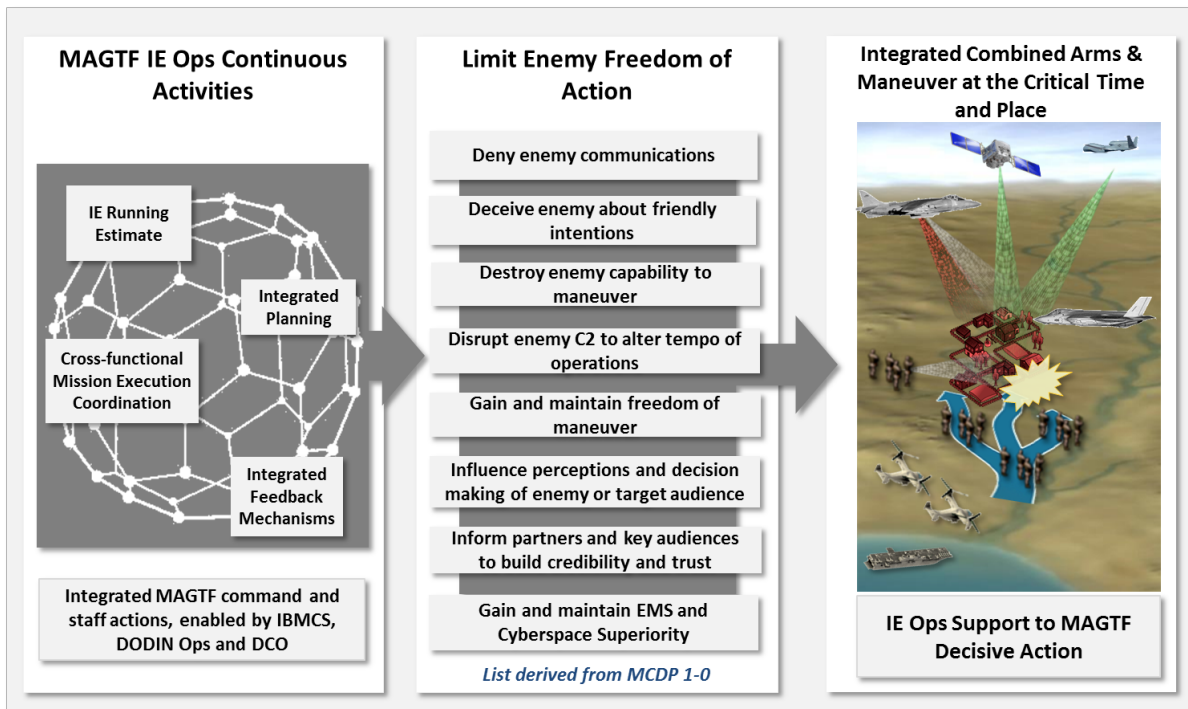


Figure 9. IE Ops within MAGTF Operations

CONTINUOUS MAGTF IE OPS ACTIONS

The MEF will plan and conduct IE Ops continuously, whether in garrison or deployed because the IE is always contested and is crucial for shaping the operational environment. Recognizing the IE encompasses both technical and non-technical means for communication (e.g., cyberspace, EMS, visual, face-to-face, etc.) and is always contested and potentially consequential; the MEF conducts continuous IE Ops to sense, understand, and act in the information environment to assure command and control and to set conditions for future discrete IE Ops activities. Continuous actions occur during steady state operations and through all phases of a named operation. ***The purpose of continuous IE Ops actions, as depicted in Figure 9, is to illustrate the MAGTF’s need to sense and understand relevant threats, vulnerabilities, and opportunities within the IE to ensure the MAGTF can act decisively when needed.***

MAGTF SHAPING ACTIONS

This COE asserts that continuous IE Ops actions are necessary for creating the conditions and opportunities for planning and executing specific shaping actions. While IE Ops shaping actions (see figure 9, 2nd column) are specific to the IE, a whole-of-MAGTF approach to IE Ops requires IE related plans, capabilities, and actions are integrated with fires, maneuver, and other non-IE Ops MAGTF activities to shape the battlespace and set the conditions for mission accomplishment. IE Ops support to MAGTF shaping actions are planned and employed using technical and non-technical means to achieve shaping objectives over multiple time horizons, and in accordance with available authorities. Many shaping actions will involve the use of non-organic assets and will thus require the MIG to conduct planning and coordination through their respective Marine Corps Forces (MARFOR), JTF, Component Commands, or National Technical Means (NTM) to access and coordinate the use of higher level capabilities.

PHASE 0 – STEADY STATE ACTIVITIES AND CONSIDERATIONS

Deployed MAGTFs are supported from garrison in accordance with existing authorities during any phase of operations. However, opportunities available during phase 0 – steady state operations – must be leveraged to ensure long-lead time planning activities and conditions are set to enable phase III operations. Joint doctrine is currently being drafted which describes the importance of operationalizing phase 0, as a matter of necessity, to facilitate mission success across the range of military operations and achieve objectives in later phases. The MIG,

as a standing organization, operationalizes phase 0 for the MEF in two primary ways: (1) conducts planning to regularly update the MEF's IE Ops CONOPS within the broader theater CONPLANS and OPLANS, and (2) conducts or coordinates IE Ops in support of forward deployed MAGTFs. Within these two broad categories the MIG may conduct at a minimum the following activities during Phase 0:

- Develop staff relationships with appropriate MARFORs, Combatant Commands, and associated Joint Headquarters
- Coordinate identification of both physical and cyber key terrain
- Develop the electromagnetic operational environment (EMOE)
- Maintain the IE Ops running estimate
- Inform Joint Task Force (JTF) level military deception plans (MILDEC)
- Run or support operational planning teams (OPTs)
- Task site surveys
- Establish, disseminate, and refine KM/IM requirements and procedures
- Develop and integrate Key Leader Engagement (KLE) operations
- Develop standard operating procedures (SOPs)
- Maintain awareness of externally provided capabilities, associated authorities, and policies and procedures for requesting capabilities
- Observe and participate in exercises
- Support pre-deployment training of subordinate MAGTFs
- Support force protection planning and operations

MAGTF – MARFOR RELATIONSHIP

STRATCOM's global spectrum running estimate (see page 18) exemplifies the MEF and subordinate deployed MAGTFs need to be engaged with Combatant Commands (CCMDs). This is accomplished through the MAGTF's respective MARFOR. The MARFOR plays a critical role in facilitating strategic-to-tactical IE Ops capabilities and activities with adjacent and supporting organizations. Because the IE is becoming increasingly complex, and due to the Joint nature by which we fight, makes this complexity even more challenging. The MARFOR's role of working with adjacent Service partners (as well as Coalition/Combined partners) is crucial. The MARFOR's ability to support the MAGTF during planning, and to assist in coordinating, deconflicting, and synchronizing effects in the IE will be paramount to the overall MAGTF's success. Additionally, MARFOR planners must ensure that our MAGTFs are aligned with our Service headquarters and with our adjacent component commands. To organize for the future operating environment and to holistically support the single-battle concept, MARFOR headquarters should identify a primary staff lead for IE Ops, and ensure staff leads (e.g., G-2, G-3, G-6, CommStrat, etc.) are aligned with the seven IE Ops functions.

CURRENT MARFOR CHALLENGES AND LIMITATIONS

Current design/structure and component roles must be reviewed if the MARFORs are to adequately support the MAGTFs in this role. In active theaters, the MAGTF will normally fight as part of the Joint Forces Maritime Component Command (JFMCC) under a Naval Forces Component (NAVFOR), or Joint Forces Land Component Command (JFLCC) under an Army Forces Component (ARFOR). MAGTFs may require regular, direct links with those Joint Component Commands during phase 0/day-to-day operations to adequately present IE capabilities during crisis and contingency (a MEU is typically OPCON to the JFMCC and should coordinate all IE Ops actions through the JFMCC, not the MARFOR). If the MARFORs are to execute an expanded role, that will change the nature of the MARFOR and necessarily draw it deeper into the immediate current ops of the CCMD J2, J3 and J6. At present, the MARFOR cannot adequately execute the proposed IE tasks without severe risk to already assigned roles and responsibilities. Additionally, if IE Ops/IE coordination is not conducted through the assigned Joint Component, the risk of uncoordinated effects within that component's conventional (air/sea/land) domain is high.

INTELLIGENCE SUPPORT TO INFORMATION ENVIRONMENT OPERATIONS

Intelligence supports IE Ops the same as it does other MAGTF operations and missions. Over time, as the IE grows in scope and consequence, new intelligence requirements will drive an increasing demand for intelligence support to all aspects of the IE. The Marine Corps Intelligence Surveillance and Reconnaissance Enterprise (MCISR-E) is the Marine Corps' intelligence mechanism designed to support the distributed and complex nature of IE Ops. MCISR-E projects the *intelligence* warfighting function forward, seamlessly linking distributed intelligence nodes at the tactical edge with decision makers at all levels through a robust network and knowledge base. Moreover, the MCISR-E is an enterprise that supports MAGTFs through every phase of operations by leveraging modern methodologies and systems in a deliberate architecture. This architecture defines a family of services which include advanced analytics and processing, exploitation, and dissemination (PED) capabilities needed as input to the IE Ops running estimate. Within the context of this COE, function #2 - *Provide Battlespace Awareness* - is identified as an IE Ops function specifically to assert a broad notion of "awareness", which is the fusion of formal intelligence estimates, products, and information provided through the MCISR-E with friendly force information, and other IE related environmental information provided by non-intelligence sources and organizations. Combining both formal intelligence and non-intelligence sourced information creates a comprehensive and continuous operational picture of the information environment to the commander and staff. ***Additionally, fusing formal intelligence with non-intelligence sourced information to form IE layers of the MAGTF common operational picture (COP) asserts that IE Ops command and control services (e.g., IBMCS etc.) and organizations (e.g., MIG, MIG COC, etc.) are consumers of intelligence, not producers of intelligence.***

CIVIL AFFAIRS SUPPORT TO MAGTF INFORMATION ENVIRONMENT OPERATIONS

Civil Affairs (CA) forces drawn from the Reserve Component (RC) that are specially trained to conduct Civil Affairs Operations (CAO); and plan, coordinate, and enable Civil-Military Operations (CMO) conducted by the MAGTF to support accomplishment of its overall objectives. Properly executed CMO and CAO enable MAGTF commanders to create effects in their battlespace maximizing the support of indigenous populace for their objectives and minimizing the negative effects that indigenous populace can have on MAGTF operations. ***CMO and CAO are critical components of MAGTF IE Ops as they provide a conduit for shaping the environment, as well as a capability that greatly enhances the MAGTF's understanding the IE's human/cognitive aspects.***

CIVIL MILITARY OPERATIONS (CMO)

CMO are activities performed by designated CA or other military forces to establish, maintain, influence, or exploit relationships between military forces and indigenous populations and institutions. This is accomplished by directly supporting the attainment of objectives relating to the reestablishment or maintenance of stability within a region or host nation. The G-9, as a primary MEF staff officer, is responsible for the planning, integration and assessment of CMO considerations into the Marine Corps Planning Process (MCP). As there is no standing G-9, this role is typically assigned to the reserve Civil Affairs Group Commanding Officer when mobilized.

CIVIL AFFAIRS OPERATIONS (CAO)

CAO are planned, executed, and assessed by civil affairs forces to enhance the awareness and management of civil component interactions within the operational environment. These operations are intended to identify and mitigate underlying causes of instability within civil society and to facilitate the application and integration of functional specialty skills within civil government.

KNOWLEDGE AND INFORMATION MANAGEMENT (KM/IM)

Information provides context for decision and action; knowledge enables decision and action directly. There are two primary types of knowledge – explicit and tacit – where the prior is an expression (e.g., written order, verbal command, etc.) that can be easily shared or transmitted, and the latter is an accumulation of experiences and patterns that cannot be easily shared or transmitted (e.g., "gut instinct", commander's judgment of risk, etc.). When relevant timely information or *explicit* knowledge is provided to an experienced commander and staff with a large amount of *tacit* knowledge, the potential for fast high fidelity decision making increases. The art and science of knowledge management is determining the most effective ways to ensure relevant information or explicit knowledge is discovered and mobilized to reach the right decision maker at the right time.

THE COMMANDER AND STAFF

The commander prioritizes his/her commander's critical information requirements (CCIRs). Knowledge and information management (KM/IM) facilitates knowledge and information flow (internally, externally, vertically, and horizontally) to optimize and support the commander's decision cycle. A SOA approach to IE Ops C2 drives a need for an KM/IM capability which effectively mobilizes and integrates distributed MAGTF workflows and processes (i.e., boards, bureaus, centers, cells, and working groups (B2C2WGs)) by providing people and systems with access to required information. A comprehensive approach to KM/IM within the MAGTF includes the integration of knowledge and information resources and processes associated with each of the warfighting functions, including intelligence. With respect to *intelligence* KM/IM, the MCISRE-E today provides a mature and robust KM/IM capability that must be integrated with the overall MAGTF KM/IM effort. Effective KM/IM ensures timely, relevant, and prioritized information is organized, accessible, and useable to the commander, staff, and MAGTF elements. Effective management of mission-critical knowledge and information requires clear processes that are understood and practiced by staff members and leadership who will enforce KM/IM policies.

INFORMATION MANAGEMENT OFFICER

The Information Management Officer (IMO) plays a significant role in organizing, managing, and sustaining the B2C2WGs that consume and produce information in support of continuous mission planning and execution. The IMO's primary responsibility is to manage this cycle from an information flow perspective. The IMO is therefore tasked with developing and implementing effective tools and procedures to optimize the flow of information from external and MAGTF sources to those who need it.

KNOWLEDGE MANAGEMENT OFFICER

Knowledge management supports the commander's decision cycle and efficient day-to-day operations by aligning command processes, information requirements, and available technology to facilitate staff synchronization, information exchange, and collaboration. Knowledge management enhances decision-making by supporting shared situational awareness, enabling a common understanding of the commander's intent, and enhancing the speed and quality of decision-making. The KMO has responsibility for knowledge and information management operations across the staff. The Knowledge Management Officer (KMO), working in close coordination with the IMO, plays a critical role in creating a holistic integrated approach to improving the MAGTF's ability to quickly learn and adapt to evolving operational circumstances. This is accomplished by establishing KM policies and procedures that integrate people (i.e., from MAGTF commander to individual Marine and mission partner personnel), processes (e.g., planning process, B2C2WGs, Battle Rhythm Management, etc.), and technology (e.g., IBMCS, running estimate), to enhance overall performance and improve decision making. The KMO is responsible for: (1) ensuring all staff members and battle rhythm participants are aware of which battle rhythm is in effect, (2) recommending organizational structures that facilitate KM/IM within the command, (3) identifying role-based responsibilities for KM/IM tasks and product production, (4) delineating business rules for information flow to and from organizations external to the MEF, and (5) coordinating the information flow strategy to track, control, and fuse the vast amount of information used by the MEF, while optimizing the KM/IM infrastructure. The KMO oversees the development of the KM/IM plan, represented by Annex U of an operations order.

FOREIGN DISCLOSURE OFFICER

The foreign disclosure officer (FDO) serves in an advisory role to the KM/IM working group to ensure classified and controlled unclassified information that is appropriately disclosed to coalition partners. Therefore, the FDO serves in an advisory role to the KM/IM working group to ensure that foreign disclosure processes are understood and integrated into the knowledge management plan (KMP).

PLANNING, EXECUTION, ASSESSMENT

Commanders and their staffs plan, execute, and assess operations. Planning envisions a desired endstate and effective methods to achieve that endstate. Execution is the implementation of the plan that causes changes in the battlespace. Assessment tracks the changes and determines impacts to plan as a basis for subsequent decisions. Information Environment Operations is integral to all three of these recurring, integrated, and often parallel staff processes.

PLANNING

Planning is an essential and significant part of the broader field of command and control. Planning supports decision-making by helping the commander and staff appreciate the larger environment and understand the true nature of the problem. It supports execution by identifying and detailing the specifics of implementation. For a planning process to be effective and enable the command's ability to understand and adapt to changing situations, the commander must ensure **feedback pathways** are in place that connect ongoing planning with execution results and other sources of information. While IE Ops activities may often include specific actions taken to achieve attack, exploit, influence, or deceive objectives in and through the information environment, many IE Ops capabilities are dual-use and should be employed as feedback mechanisms to inform the overall situation and planning. Additionally, these capabilities should always be planned in accordance with IE Ops tasks that specifically support MAGTF objectives and the scheme of maneuver.

EXECUTION

Mission execution is the concerted action of the commander and his forces to conduct operations based on the OPLAN or OPORD, modified as the current tactical situation dictates, to achieve the commander's intent and to accomplish the mission. Planning is largely a centralized effort, and execution is decentralized to allow commanders on the scene the latitude to deal with the unfolding situation in accordance with commander's intent. Planning and executing IE Ops adheres to this centralized planning and decentralized control paradigm. The MIG COC enables a decentralized approach to IE Ops execution by sharing information through various collaborative environments and *running estimate* information products (e.g., visualization, dynamic re-tasking alternatives, and decision support tools) across the MEF staff, MSCs, and joint or coalition mission partners.

ASSESSMENT

Assessment is the continuous monitoring and evaluation of the current situation and the progress of an operation. Monitoring is the continuous observation of the current situation to identify opportunities for the force, threats to the force, gaps in information, and progress according to the plan or order. Evaluation compares relevant information about the situation or operations against criteria to judge success or progress. Planning and executing IE Ops capabilities must consider two aspects – the first is determining how to measure and ascertain the effectiveness of IE Ops actions, using all available resources from the MAGTF or externally. The second is determining how to use IE Ops capabilities for the purpose of measuring and ascertaining the effectiveness of non-IE Ops actions which are part of the overall MAGTF operation. The IE Ops running estimate supports assessment.

STAFF INTEGRATION

Effective staff integration results from the collaboration of functional expertise from across the staff and from external stakeholders in direct support of the commander's decision-making process. The KMO plays a central role in staff integration by working across functional area boundaries to optimize applications and data structures, eliminate redundancies, facilitate collaboration, and generally serve as the command's information referee, to ensure the integration of relevant and meaningful content into the command's knowledge repositories. The key aspect of staff integration involves the creation, management, and use of an effective staff battle rhythm. Boards, bureaus, centers, cells, and working groups can be facilitated with virtual collaboration tools; enhance staff coordination and support planning, monitoring, and assessment activities. With the introduction of the MIG and MIG COC organizations, the MEF staff must consider how these and the other MEF staff sections with IE Ops responsibilities are incorporated into the battle rhythm and B2C2WGs to support IE Ops planning, execution, and assessment.

MEF COMMAND AND CONTROL CENTERS

Command and control centers are established to support the commanders of all units of battalion size or larger. Each battlestaff function may also be supported by one or more C2 centers. From these centers, watch officers and cells from the various staff sections plan, monitor, coordinate, control, and support the day-to-day activities of the unit. These centers include the personnel, software, hardware, shelters, and ancillary equipment needed to support command and control. With respect to IE Ops, as a distributed concept requiring a whole-of-MAGTF approach, various command and control centers may use IBMCS services and the IE Ops running estimate help coordinate to synchronize IE Ops.

Maneuver

The ***MEF Combat Operations Center (COC)*** is the command's "nerve center" where information is fused to provide situational awareness for the commander and his staff. For the wide ranging and complex battle in the information environment, the MIG COC provides the COC with critical information and tailored services to ensure the COC remains the "nerve center" after envisioned IE Ops capabilities and resources are fully implemented. Current operations are directed from the command's COC, which is typically manned by representatives from each battlestaff section. The COC is the location for watch officers, and this COE asserts an IE Ops watch officer should be provided as additional battlestaff to the COC as well. This watch officer would bear the same responsibilities as other watch officers, but would focus on IE Ops, the timely satisfaction of the IE Ops related friendly force information requirements (FFIRs), and the dissemination of IE *running estimate* products and information.

Intelligence

The ***MEF Intelligence Operations Center (IOC)*** is established to provide centralized cognizance for the overall intelligence effort. The IOC is a MCISR-E node and is organized to respond to the tasking and priorities of the MEF G-2. The IOC serves the MEF by consolidating, validating, and prioritizing intelligence requirements from all elements of the command. The MIG and/or MIG COC engages in a close continuous communication with the IOC and its subordinate elements in person or virtually via IBMCS to share information on matters related to IE Ops. The IOC links the command to theater, national, and coalition intelligence resources. The IOC also operates the MEF Operations Control and Analysis Center (OCAC) -- which provides centralized direction, management, and control of signals intelligence (SIGINT) and electronic warfare (EW) activities within the command. It also links to external theater and national assets. Concentration of specialized intelligence capabilities in the radio battalion, the intelligence battalion, and the force reconnaissance company under this centralized direction facilitates unity of effort, effective employment of limited assets, and the collection and production of all-source intelligence. ***The MIG COC supports the OCAC by ensuring all SIGINT and EW activities are coordinated across air and ground platforms, and are deconflicted with the MAGTF's use of other spectrum-dependent systems.*** The IOC also coordinates and integrates all-source intelligence operations with other Service components, JTF joint intelligence support element (JISE), theater joint intelligence center (JIC) or joint analysis center, and national intelligence agencies and operations to include all aspects of intelligence reach back support. The MIG COC supports the OCAC by ensuring all SIGINT and EW activities are coordinated across air and ground platforms, and are deconflicted with the MAGTF's use of other spectrum-dependent systems. The MEF Surveillance and Reconnaissance Center (SARC) is also established by the intelligence battalion at the direction of the MIG commander to supervise the execution of the integrated organic, attached, and direct support intelligence collection and reconnaissance operations. The MIG COC supports the SARC by ensuring surveillance and reconnaissance planning and execution across all domains are closely and continuously coordinated to enhance situational awareness and responsive support for IE Ops and the IE Ops running estimate.

Communications

The ***MAGTF Communication Control Center (MCCC)*** is established by the G-6 as the primary systems control capability to plan, monitor, and direct action in the MAGTF Information environment – to include cyber and space domains. The MCCC has a directive relationship, referred to as communications control, with the subordinate commands of the MAGTF as well as the communications battalion. The MCCC also serves as the central control center to monitor activity on information networks supporting MAGTF operations. This includes providing the NETCOP and the ability to sense and assess anomalous actions on the network that may inform the range

Defensive Cyberspace Operations. Coordination with the MIG COC will be necessary to fuse cyberspace intelligence collected by the G2, and cyberspace threats observed and registered on the MAGTF network by the G-6. Manage and coordinate the use of DCO as it affects DODIN Ops.

Fires

The **Fires and Effects Coordination Center (FECC)** plans, coordinates, integrates, directs, and monitors organic and supporting lethal and nonlethal fires. The MIG COC supports the FECC by providing planners to participate in the targeting process, contribute to the development of the fire support plan, and to support non-lethal fire support coordination. The introduction of the MIG and MIG COC within the MEF does not change the process by which the MEF plans, conducts, and integrates lethal and non-lethal fires during combat operations. In this process the FECC will provide tasks to the MIG for detailed planning and to provide the desired action and effect. As the MEF's capacity to support and/or coordinate with the MARFOR (and by extension combatant commander) increases, actions taken from garrison or deployed could include creating or coordinating effects in support of theater objectives during phase 0. This may require a MIG/MIG COC to coordinate with external agencies and deployed MAGTF's chopped to a theater and to create or coordinate effects across one or more assigned boundaries. Additionally, the MIG may establish a MIG COC capability physically or virtually within the FECC, depending upon the situation, to ensure close coordination, support, and integration of IE Ops capabilities within the targeting and fires planning processes. However, because of the MIG COC's wide ranging responsibilities associated with IE Ops, many MIG COC activities are external to the targeting process; therefore, this COE asserts the situation and commander's priorities and direction should dictate how the MIG COC physically or virtually supports the FECC.

Aviation

The Aviation Combat Element (ACE) provides many capabilities and C2 systems to the MAGTF that are critical to enabling IE Ops in support of the overall MAGTF operation. The ACE is uniquely positioned to deliver a wide variety of distributed assets to achieve IE Ops mission objectives because of the types of platforms and coverage they provide to the MAGTF. The ACE commander uses the Marine Air Command and Control System (MACCS) and its family of C2 capabilities to plan, direct, and control aviation operations in a distributed integrated manner. Aviation C2 is distributed across MACCS agencies including TACC, DASC, and the tactical air operations center (TAOC), as well as air traffic control (ATC) facilities. The ACE provides the MAGTF with robust IE Ops capabilities in areas of electronic warfare, intelligence, MISO, OCO, communications relay, spectrum management, as well many other MAGTF digital interoperability (DI) capabilities needed to enhance situational awareness, establish mesh networks, and enable the dynamic agile C2. IE Ops C2 functionality will be incorporated into the MACCS due to the fact that many IE capabilities will be delivered by aircraft.

The Common Aviation Command and Control System (CAC2S)

The common aviation command and control system (CAC2S) provides C2 capabilities for the ACE commander and the MACCS C2 agencies. It provides services to fuse weapons and sensor data into a single integrated display, and will serve as a waveform gateway between the ACE and GCE. The **Marine TACC is the senior MAGTF air C2 agency, and is the primary agency with direct coordination requirements with the MIG and/or MIG COC.** The MIG and/or MIG COC must have a close and continuous relationship with ACE planners and ACE operators controlling IE Ops payloads, communications equipment, and intelligence collection assets since many IE Ops capabilities will reside on air platforms under the direct control of the ACE. The DASC will play a crucial role in facilitating IE Ops actions, while maintaining a close relationship with the senior fires center in support of the ground scheme of maneuver. The TAOC's fusion capability of multiple radar feeds and sources of data link information will contribute to the IE Ops running estimate, with systems such as the TPS-80 G/ATOR and its ability to parse F-35B sensed data via datalink. Under Future Force 2025, new structure for IE Ops is provided to the Marine Aircraft Wings (MAWs) for planning and mission coordination support of aviation based IE Ops. This includes intelligence related aviation IE Ops command and control found within a Marine Air Information Environment Operations Squadron, which includes an IE Ops planning cell to coordinate planning and execution with the TACC, TAOC, DASC, and MIG COC.

Digital Interoperability

DI is the seamless integration of Marines, systems, and data, across all domains and networks throughout the MAGTF, naval, joint, and coalition forces. This includes communications in degraded or denied environments. MAGTF IE Ops, as a collaborative, agile, and distributed activity depends heavily on the existence of a reliable and robust communications network provided in large part through DI. In the future MAGTF IE Ops tasks, capabilities, and other actions will be collaboratively planned and dynamically executed through the interconnection of software defined radios, dynamically re-programmable assets, advanced waveforms, mesh networks, and airborne and ground gateways provided through DI. The MIG and MIG COC require the ability to consume, analyze, or affect IE Ops information provided by the ACE through the MACCS, CAC2S, and DI.

Logistics

The Logistics Combat Element (LCE) COC serves as the hub for future and current operations planning within the LCE. There are many ways to organize the LCE COC dependent on situation and mission. At a minimum, each function of logistics (supply, maintenance, transportation, engineering, health services, and services) is represented in the LCE COC along with warfighting function representatives, liaisons (LNOs), and enablers. Under the supervision of a watch officer, these personnel monitor current operations and maintain status displays of friendly and enemy situations. Additionally, LCE COC personnel process requests from subordinate units and keep the MAGTF command element informed of the combat service support situation and its general support logistic posture. The LCE commanders may choose either a centralized or decentralized configuration for their COCs. The MIG COC maintains communication and connectivity with the LCE COC, just as it would with any other COC. Logistics activities must be monitored and supported by IE Ops forces because logistics operations involve the movement of equipment and supplies across the battlefield. In many instances, combined arms solutions involving IE Ops and traditional fires are required to provide force protection and counter attack capabilities in support of logistics operations. Additionally, the movement of logistics forces across the battlespace employs vehicles and people equipped with sensors and self-protection capabilities that must be integrated into IBMCS.

IE OPS WITHIN MSCs AND SUBORDINATE MAGTFs

While this concept is focused primarily on the MEF, the ideas captured herein are applicable to the MSCs and/or any MAGTF. As this concept is developed and implemented in the coming years, future force development initiatives may provide additional manpower to other Marine Corps units as required. Applying this concept at the MSC or MEB and MEU level is achievable in the near term by leveraging existing agile distributed C2 mechanisms that integrate people, information, and processes across down to the lowest level possible. Just as the MACCS is integrated and employed within the ground combat element (GCE) to enable procedural command and control of Marine aviation at the lowest level possible, so too must IE Ops be distributed and coordinated at the lowest level possible. This COE recommends MSCs and/or MAGTFs consider the following actions at a minimum to begin implementing this concept:

- Identify within the staff and/or request assignment of an appropriately trained lead planner responsible for ensuring the holistic integration of IE Ops capabilities into planning and operations
- Identify within the staff and/or request assignment of appropriately trained personnel capable of conducting detailed functional planning of available IE Ops capabilities
- Establish an IE Ops Support Cell and develop standard operating procedures (SOPs) based on knowledge of existing practices associated with the Marine Corps Planning Process, targeting and fires planning, cyberspace operations support requests, electronic warfare support requests, intelligence operations, communications, and the development of battlespace coordination measures
- Integrate the IE Ops Support Cell into the existing B2C2WGs and participate in continuous communication and information sharing among G-2/S-2, G-3/S-3, and G-6/S-6 staffs
- Leverage existing C2 mechanisms and communications to facilitate IE Ops C2
- Establish liaison with higher headquarters IE Ops Support Cell and/or the MIG COC
- Exercise IE Ops during training

FUTURE EXPERIMENTATION AND CONCEPT REFINEMENT

This COE establishes a starting point for experimentation and for the Marine Corps to determine in detail what capabilities and practices are required to achieve the overall vision for IE Ops. Senior Marine Corps leadership, including the Commandant of the Marine Corps, has given clear direction to implement change and drive the institution toward the overall framework discussed in this document. However, details matter and future experimentation and discovery for this concept must reveal detailed capability requirements and gaps across the *doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P)* framework. Because of the unique organizational and technological dynamics presented herein, it may be several years before the capabilities needed to implement this concept are sufficiently mature. This COE is at risk of not being sufficiently understood and implemented if time and resources are not given to develop and integrate key organizational, functional, and technological enablers. Areas requiring future experimentation, development, and discovery include:

COMMAND RELATIONSHIPS AND ROLES AND RESPONSIBILITIES

By introducing the role of a MIG as an MSC-like command *within* the MEF command element, familiar MEF staff roles and responsibilities may need to become more dynamic and flexible depending upon the situation. This creates a potentially significant variation in the way the MAGTF traditionally approaches planning and mission execution. *The gaps and unknowns associated with the new command organization and the implications for staff relationships will not likely to be understood fully in the near term (i.e., 1-5 years). Moreover, the discovery process associated with this facet of the concept must be conducted as a function of the critical enabling technologies discussed throughout (i.e., IBMCS and running estimate).*

KEY ENABLING TECHNOLOGIES

This ideas contained within this COE are significantly enhanced by using an agile distributed command and control family of services (i.e., IBMCS) powered by a scalable framework of *visualization, analysis, and decision support* software applications (i.e., running estimate). As the Marine Corps experiments with this concept in the coming years, capability developers should become aware of, and begin to integrate through TSOA the many available technologies that already exist within specialized communities. The unique benefits of TSOA include the acceleration of cybersecurity accreditation, the instantaneous distribution of new applications via a storefront known as the Marine Corps Software Resource Center (MCSCRC), and the de-coupling of tightly bound hardware / software solutions. This last benefit is noteworthy because de-coupling software from hardware allows for C2 systems to be frequently updated with the latest applications (apps) without having to re-certify the entire system. This will save the Marine Corps money and will increase the “speed to market” of new services and applications.

BOARDS, BUREAUS, CENTERS, CELLS, AND WORKING GROUPS (B2C2WGs)

The process for planning, deconflicting, synchronizing, and coordinating starts with the Marine Corps Planning Process and extends into the MAGTF’s B2C2WGs which are responsible for cross-functional collaboration to enhance decision-making. The MAGTF’s B2C2WGs and Operational Planning Teams (OPTs) are together responsible for achieving cross-functional synergy to achieve the MAGTF mission. From an IE Ops perspective, the MIG commander is the senior subordinate commander with overall responsibility for ensuring the effective coordination, integration, and employment of IE Ops capabilities in support of MAGTF operations. To enable effective IE Ops, future experimentation and exercises should examine in detail how the MIG and MIG COC support, host, or integrate into the following:

- IE Ops Working Groups that support the MAGTF Battle Rhythm
- Commander’s Update Brief
- Commander’s Decision Board
- Communication Synchronization Working Group
- ISR Working Group
- Collections Working Group
- IOC’s planning and execution of intelligence operations

- Current Ops Cell and Combat Operations Center
- Knowledge and Information Management (KIM) Working Group
- Future Ops/Plans Working Group(s)
- IO Working Group (IOWG)
- Targeting Working Group and/or Board
- Fires & Effects Collections Board
- FECC with liaisons who coordinate non-lethal fires
- Sustainment Working Group
- MCCC's planning, execution, and defense of MAGTF communications with liaisons or virtually
- TACC's planning and execution of aviation assets employed IE Ops capabilities
- Movement Control Center (MCC) planning and execution of movement
- Effects Working Group
- Effects Assessment Board

KM/IM

The MAGTF will typically generate a large amount of unstructured data associated with its interactions across all security domains. This includes a variety of network data (authentication events, bandwidth utilization, packet flow to nodes within the network, etc.), social network data, and other indicators of the state of the IE and the conduct of all IE Ops functions. As this information is gathered and processed within the context of enemy, friendly, and neutral actions in the IE, a more comprehensive understanding of the IE is possible. Therefore, IM/KM functions or technologies are essential for providing an understanding of threats, vulnerabilities, and opportunities within the IE. Moreover, given the envisioned increased role the IMO/KMO will play in supporting the MAGTF's battle rhythm and B2C2WGs; future experimentation should focus on discovering and integrating state-of-the-art IM/KM tools, techniques, and procedures to give the IMO/KMO the ability to better affect the MAGTF's operational tempo and advantage. Another area in need of development is finding ways to help IE Ops planners discover external agency data sources and subject matter experts. In many instances, MAGTF planners are unaware of available data and other resources or capabilities that might be available if they were requested. Solving this problem requires an advanced searchable catalog or database that planners can use across security domains to discover relevant data or people who can help the planner fulfill a requirement.

CONCLUSION

The notion of conducting Information Environment Operations is not new or unfamiliar to Marines. Commanders in battle since 1775 have well understood the physical, psychological, and moral factors of war, and have sought innumerable and creative ways to win. *IE Ops* therefore does not represent something new or unusual; instead it represents the natural extension of *Maneuver Warfare*, as our highest calling and organizing principle, into the information environment. What has changed since 1775, and perhaps since the 20th Century, is the character of the information environment. This environment is now dominated by the internet, the expansion of information technology, the widespread availability of wireless communications, and the far-reaching impact of social media. This presents complex challenges for MAGTF operations.

This highly networked information environment has enabled both state and non-state actors to employ activities in the IE to achieve their objectives effectively. They use various capabilities to exploit, disrupt, and disable command and control systems and other critical infrastructure; to disseminate propaganda and disinformation; to foster internal dissent; to recruit and solicit financing; and to promote legitimacy for their actions while discrediting the legitimacy of others. The IE's increasing significance poses significant challenges and presents great opportunities for the Marine Corps. Fundamentally, it is now necessary to organize, operate, and fight integrally within the IE, just as we do in the physical domains, to enhance the Marine Corps single-battle and provide the defensive, offensive, and exploitative effects needed to gain and maintain military advantage across the operational environment. Otherwise, the MAGTF is at serious risk of losing competitive advantage across the range of military operations.

The key to operating effectively in the information environment is to operationalize it like a maneuver space, not unlike the physical domains. This requires a few key ideas such as mobilizing a whole-of-MAGTF approach to IE Ops, establishing primary organizing functions, and building a distributed agile and secure command and control system. This COE describes these key ideas as a starting point for a Service level discussion.

LIST OF ACRONYMS

A2D – Agile Application Development
ACE – Aviation Combat Element
ACO – Airspace Control Order
ADS – Authoritative Data Source
ANGLICO – Air Naval Gunfire Liaison Company
AOI – Area of Interest
AOR – Area of Responsibility
ARFOR – Army Forces Component Command
ATC – Air Traffic Control
ATO – Air Tasking Order
B2C2WG – Boards, Bureaus, Centers, Cells, Working Groups
BDA – Battle Damage Assessment
BLOS – Beyond Line of Sight
BMC2 – Battle Management and Control
BN – Battalion
C2 – Command and Control
CA – Civil Affairs
CAC2S – Common Aviation Command and Control System
CAO – Civil Affairs Operations
CCIR – Commanders Critical Information Requirement
CCMD – Combatant Command
CE – Command Element
CERF – Cyberspace Effects Request Form
CESAS – Communications Sensing and Attack System
CEWCC – Cyberspace and Electronic Warfare Coordination Cell
CHOP – Change in Operational Control
CI – Counterintelligence
CMO – Civil Military Operations
COA – Course of Action
COC – Combat Operations Center
COE – Concept of Employment
CommStrat – Communication Strategy and Operations
CONOPS – Concept of Operations
CONPLAN – Concept Plan
COP – Common Operational Picture
CTP – Common Tactical Picture
DASC – Direct Air Support Center
DCO – Defensive Cyberspace Operations
DCO-IDM – Defensive Cyberspace Operations Internal Defense Measures
DCO-RA – Defensive Cyberspace Operations Response Actions
DI – Digital Interoperability
DISO – Deception in support of OPSEC
DNA – Deoxyribonucleic Acid
DODIN – Department of Defense Information Network
DOTMLPF-P – Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, Policy
EA – Electronic Attack
EAC – Expeditionary Analysis Cell
EARF – Electronic Attack Request Form
EFEC – Expeditionary Forensic Exploitation Capability
EMI – Electromagnetic Interference
EMS – Electromagnetic Spectrum

EMSO – Electromagnetic Spectrum Operations
EMSOC – Electromagnetic Spectrum Operations Center
EMT – Expeditionary MISO Team
EOTG – Expeditionary Operations Training Group
EW – Electronic Warfare
EWCA – Electronic Warfare Control Authority
EWST – Electronic Warfare Support Team
EXORD – Execution Order
FDO – Foreign Disclosure Officer
FECC – Fires and Effects Coordination Center
FECC – Force Fires Coordination Center
FRAGO – Fragmentary Order
GAP-CIE – Global Adaptive Planning Collaborative Information Environment
GCE – Ground Combat Element
HN – Host Nation
HQ – Headquarters
HHQ – Higher Headquarters
IBMCS – Information Battle Management and Control Service
ICO – IE Operations Coordination Order
IE – Information Environment
IM – Information Management
IMO – Information Management Officer
I&W – Indications and Warnings
IO – Information Operations and/or Influence Operations
IOC – Initial Operational Capability
IOC – Intelligence Operations Center
ISO – In support of
ISR – Intelligence Surveillance and Reconnaissance
IT II – Intrepid Tiger II
IE Ops – Information Environment Operations
JEMSOC – Joint Electromagnetic Spectrum Operations Center
JFLCC – Joint Force Land Component Command
JFMCC – Joint Force Maritime Component Command
JRFL – Joint Restricted Frequency List
JTF – Joint Task Force
JTFHQ – Joint Task Force Headquarters
KLE – Key Leader Engagement
KIM – Knowledge and Information Management
KM – Knowledge Management
KMP – Knowledge Management Plan
LCE – Logistics Combat Element
LE – Law Enforcement
LNO – Liaison
MACCS – Marine Air Command and Control System
MAGTF – Marine Air Ground Task Force
MARFOR – Marine Forces Component Command
MAW – Marine Aircraft Wing
MCCC – MAGTF Communications Control Center
MCDP – Marine Corps Doctrinal Publication
MCISR-E – Marine Corps ISR Enterprise
MCP – Marine Corps Planning Process
MCSRC – Marine Corps Software Resource Center
MEB – Marine Expeditionary Brigade
MEF – Marine Expeditionary Force

METOC – Meteorological
MEU – Marine Expeditionary Unit
MHG – MEF Headquarters Group
MIC – MEF Intelligence Center
MIG – MEF information Group
MIG COC – MEF Information Group Combat Operations Center
MILDEC – Military Deception
MISO – Military Information Support Operations
MOE – Measure of Effectiveness
MOP – Measure of Performance
MSC – Major Subordinate Command
NAI – Named Area of Interest
NAVFOR – Naval Forces Component Command
NETCOP – Network Common Operational Picture
NTM – National Technical Means
OCAC – Operations Control and Analysis Center
OccFld – Occupational Field
OCO – Offensive Cyberspace Operations
OE – Operational Environment
OPT – Operational Planning Team
OPSEC – Operations Security
OPCON – Operational Control
OPLAN – Operations Plan
OPORD – Operations Order
OPT – Operational Planning Team
PAG – Public Affairs Guidance
PAO – Public Affairs Officer
PED – Processing, Exploitation, and Dissemination
PLANORD – Planning Order
PNT – Position Navigation and Timing
RF – Radio Frequency
ROMO – Range of Military Operations
SARC – Surveillance and Reconnaissance Center
SATCOM – Satellite Communications
SDS – Spectrum Dependent System
SI – Special Intelligence
SIGINT – Signals Intelligence
SIGMAN – Signature Management
SME – Subject Matter Expert
SOA – Services Oriented Architecture
SOM – Scheme of Maneuver
SOP – Standard Operating Procedure
SPMAGTF – Special Purpose MAGTF
SRE – Spectrum Running Estimate
SSA – Space Situational Awareness
SSE – Sensitive Site Exploitation
SSF – Spectrum Services Framework
SST – SIGINT Support Team
STRATCOM – Strategic Command
TACC – Tactical Air Command Center
TAOC – Tactical Air Operations Center
TSOA – Tactical Services Oriented Architecture
TTP – Tactics Techniques and Procedures
WARNORD – Warning Order

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