On IEBA and an IE COP

How an information environment's common operating picture became an uncommon virtue

by Maj John Hoffner (Ret)

In the May 2022 issue of the *Marine Corps Gazette*, LtGen Glavy, Deputy Commandant for Information, wrote two articles on the information warfighting function. In them, he provided both a *why* and a *how* Marines focus on the information environment (IE). First, he stated that we do it, "Because our Marines are good at it."[1] This is a truism the author still sees this working alongside Marines post-retirement and could not agree more. The general's article detailed how individual Marines, Service planning efforts, and commitment of the right resources to the right engagements will create conditions of success for both *A Concept for Stand-In Forces* and *Force Design 2030* by creating and maintaining information advantage. Information, as the seventh warfighting function, aims to integrate and maximize IE capabilities, resources, and activities across the Marine Corps to increase success in campaigning. Our new doctrine, *MCDP 8,* directs Marines to leverage the inherent informational aspects of military operations, from tactical to strategic efforts, to support the Nation's defense, increase competitive advantage, and achieve mission objectives.[2] Ensuring information advantage in campaigning requires a Marine Corps capable of understanding the competition continuum, applying lethal force when needed, and conducting operations in the IE to achieve military advantage.

LtGen Glavy went on to write that people and processes are "needed to understand the physical and non-tangible aspects of the information environment and visualize combinations of capabilities that result in operating effectively in the information environment."[3] To provide these Marines and capabilities, the Marine Corps Information Command (MCIC) activated in January

Existing command logos alongside MCIC command logo. (Compiled by author.)

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2023 onboard Fort Meade, MD. The commanding general of the MCIC is also the commander of MARFORCYBER, MARFORSPACE , Joint Force Headquarters–Cyber (Marine Corps), Joint Task Force ARES, and serves as the Service cryptologic commander (SCC). As the CG's sixth command, the MCIC activated to integrate, synchronize, and enable operations in the IE in the conduct of naval, joint, and combined campaigning to deter adver-

MCIC Activation, January 2023. (Image from dvidshub.net.)

saries and set conditions for the FMF across the range of military operations.

In its initial operating capacity, the MCIC's mission essential tasks are concise. One of them is the conduct of information environment battlespace awareness. In its initial operating capacity, the MCIC established an information environment current operations (IECO) cell that works to catalog and integrate available capabilities and concurrently executes the conduct of information environment battlespace awareness (IEBA) in support of the commander and staff. This article outlines the concepts and practical IEBA efforts established that first year along with some of the evidence-based research used to support them.

The State of Situational Awareness

In 2022 a DC Information-led working group defined IEBA as

> "... the ability to understand dispositions and intentions as well as the characteristics and conditions of the global competitive space across all warfighting domains, including information itself and all social, cultural, psychological, technical, and physical factors that affect the employment of forces and bear on the decisions of commanders to create or exploit information advantages."[4]

When the MCIC formed everyone from the commander to the newest contractors was left trying to determine exactly what that meant. By presenting what has not worked and what has worked across the MCIC's adjacent commands (those other five hats) and subordinate elements within the MCIC, we aim to present a value proposition for the MCIC across the Marine Corps and to the Joint Service for examination in this community of interest.

Marine commanders need to make sense of adversary, friendly, and other activities that generate, deny, project, or protect information. The conduct of information as a warfighting function enables commanders to apply maximum combat power through the understanding of and actions related to prevailing narratives, force resiliency, and systems overmatch. According to *MCDP 8*, this is the point of information advantage,

and we argue information advantage requires near realtime IEBA. Through diligent review of existing Service and academic literature, comparison of the resources and efforts across the Marine Corps, and daily trial and error, the MCIC came to appreciate that there is a large delta between accepted practice and the need apparent to move forward in providing IEBA. As we establish the MCIC to leverage information forces, we establish that IEBA must display the right information to the right level of command, in context, to achieve this information advantage in support of mission objectives.

Historically, IEBA came from "finished IE products" such as analysis of ASCOPE (area, structures, capabilities, organizations, people, and events [characteristics of civil considerations during a military campaign]) or PMESII-PT (political, military, economic, social, information, infrastructure, physical environment, and time [a structured way to manage information during complex operations]), and open source intelligence (OSINT) based on publicly available information. This concept of IEBA produces reports of various formats, depth, and periodicity to enhance understanding, but it does not display near realtime situational awareness of the IE—they are delivered on a production cycle intending to inform the mind of the individual receiver.

Accepting this status quo does not allow the Marine Corps to fully achieve the current requirement to conduct IEBA. To maximize the value of information, Marines need to provide IEBA in a timely manner so the commander and staff look at the IE through a *sight alignment and sight picture* of the area of responsibility/area of interest, fully facilitated by technological advancements harnessed in service of our warfighting principles. Within the MCIC, we recognize now that the improved delivery of IEBA requires visualization of the IE in the proper context for the command and its mission and focused on timely data feeds. Visualization of the IE in near realtime is an essential first step.

The work began as a design-based approach, using stakeholder analysis

to conduct a full examination of the requirement. The MCIC activation cell did a roadshow in the summer and fall of 2022 to gather this data prior to an operational planning team which led to the MCIC activation MCBUL. The roadshow team discovered that units accumulated dozens of programs of record and commercial off the shelf solutions across the Corps, all purchased or licensed capabilities to capture, translate, and/or analyze data from multiple sources. However, despite the wide range of tools and pockets of excellence the roadshow saw, no one agreed on how to define and provide IEBA, even across the MCIC and MARFORCYBER HQ.[5]

After six months of data gathering, the MCIC activation cell observed that the content of most IEBA products focused on the contest of prevailing narratives. Further, products created in support of prevailing narratives use the lenses of legacy information-related capabilities and limited that focus to effects in the cognitive domain. We also maintain that IEBA products delivered through these historic lenses frequently do fail to include a full depiction of operations, activities, and investments (OAIs), including but not limited to friendly, adversary, and third-party key operational deployments, exercises, key engagements, cyberspace, electromagnetic spectrum, and space events. With that limited stakeholder analysis in hand, we began defining the requirement in the simplest terms.

Moving from Simple SA to Distributed Shared Awareness to Coup D'oeil at Scale

Situational awareness as studied in the field of ergonomics is "knowing what is going on around you" or "having the big picture."[6] This simple definition quickly gets complicated. It implies that there is a ground truth that is constant against which an individual or organizational awareness can be measured. That ground truth relies on a "mapping of the relevant information in the situation onto a mental representation of that information with the [individual or organization]."[7] To facilitate command and control, we want to

develop understanding from situational awareness , so the MCIC determined it needed an "individual-to-ground-truth-to-mental model" grounded in evidence-based research. Models, at a greater level of abstraction, provide a greater ability for individuals to develop and improve their understanding of complex environments. Choosing the right model depends on the intended purpose and end state.

Outside of enhancing our commander's individual understanding through SA, the MCIC had to approach the problem of sharing this mental model across a distributed, global staff. Stanton, et al., proposed a model that fits our needs called *distributed shared awareness* composed of "activated knowledge for a specific task within a system ... [and] the use of appropriate knowledge (held by individuals, captured by devices, etc.) which relates to the state of the environment and the changes as the situation develops."[8] Stanton's distributed shared awareness model is a *socio-technical system* explaining the linear, non-linear, and complex relationships between the social and technological factors in organizational performance focused on optimizing performance as a whole.[9]

Following the model of distributed shared awareness enhances situational awareness and facilitates understanding across the unit. It does this *as an emergent property of complex systems*.[10] This happens where elements needed to create and improve awareness are

In academic and industry research, information is defined in terms of data; knowledge in terms of information; and wisdom in terms of knowledge. Knowledge is actionable information. Wisdom is knowledge in action.[11] Commercially businesses use large amounts of data, at speed and scale, to put information in the hands of consumers at a rate and utility never before seen. At the MCIC, we want to acquire and scale similar successful capabilities to put information at the tactical edge at a speed and scale to enhance individual awareness and understanding by mirroring how successful businesses harness data.

> *"Leaders with a strong situational awareness and broad experience can act quickly because they have an intuitive understanding of the situation, know what needs to be done, and know what can be done. This insight has been called coup d'oeil."*
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> **—MCDP 1-03, Tactics**

Information, in the form capitalized on by that business model, provides insight and enables actions that previously required the accumulation of *knowledge* and *wisdom*—the Marine Corps doctrinally refers to that ability

will.[14] In Napoleon's army, this innate ability was complemented by experience through command, taking years to acquire the best military tacticians. Today the use of machine learning and the technology for global communications across all facets of life—social media, sales, logistics, in everything not just the military domain—enables so much of this to be fast-tracked for those willing to put in the work and facilitate organizational change. At the MCIC, we see this as a case when new doctrine complements existing doctrine adding modern speed and scale.

> *"Information is valuable when it contributes to situational understanding, timely and effective decision making, the attraction and retention of partners, or the exploitation of some advantage. Information's value is a function of many factors, including timing, accuracy, situational relevance, cultural context, and trust"*
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> **—MCDP 8, Information**

> *"Knowledge that cannot be acted upon or that commanders choose to ignore is of little value. Consequently, the Marine Corps recognizes that because intelligence is directly connected to action, it is therefore inseparable from command and operations."*
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> **—MCDP 2, Intelligence**

Following the model of distributed shared awareness enhances situational awareness and facilitates understanding across the unit.

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both held within the overall system and continually build up over time through the interactions of the people and technology of the system. Integration, synchronization, and coordination of information forces cry out for this type of continuous and virtuous cycle—that is a model that can help maximize the conduct of information for information advantage.

of commanders as *coup d'oeil*.[12] This term comes from France during the Napoleonic Era and is recognized today as shorthand for "adaptive tactical expertise—the ability to apply warfighting knowledge flexibly and creatively to solve novel tactical problems."[13] *MCDP 8, Information*, compels Marines to generate information advantage to accomplish objectives and impose our

The MCIC seeks to increase its collective intelligence to generate *coup d'oeil*. Existing research pioneered by Dr. Tom Malone at MIT's Center for Collective Intelligence describes a means to provide organization and focus to complex work, framed as "the

work of individuals [using computers] acting together" by asking "can people and computers be connected so that collectively they act more intelligently than any individual, group, or computer has ever done before?" We propose to increase collective intelligence within the boundary of Stanton's distributed shared awareness model using timely visual displays of OAIs. Visualization facilitates understanding in support of joint and Service mission success. From

The staff of a unit at any level exists to plan and execute operations, requiring a lot of work and interdependent interactions to make it succeed. Staff work is just that—work ...

that shared understanding commanders and staff gain the current status of elements in the competition continuum across an AOR and AOI, informing the application of kinetic and non-kinetic operations and effects in the IE to maximize information advantage.

Sensemaking

So, what is the end state desired of IEBA? Its *sensemaking:* a term from systems theory describing how organizations interpret information for which *no frame of reference* exists and for which *there is not enough information* for action.[15] Another application of systems theory, Network Centric Warfare, defined sensemaking as that activity which "encompasses the range of cognitive activities undertaken by individuals, teams, [and] organizations ... to develop awareness and understanding and relate this understanding to a feasible action space."[16] It also discussed the phenomenon of sensemaking as raising understanding and awareness through the ability to synthesize various and disparate pieces of information using the expertise and experience of many.[17] These pursuits tie directly to the model described in distributed shared awareness where we seek "knowledge for a specific task within a system ... which relates to the state of the environ-

ment and the changes as the situation develops."[18]

The conduct of sensemaking means capturing the volume, velocity, and value of information as described in *MCDP 8*. Volume refers to quantity, which must be controlled to prevent overload but in a manner that does not put blinders on. Velocity is speed and direction, subject to a person or unit's capacity and resistance from adversaries of environments. Value is a function of timing, accuracy, relevance, context culture, and trust. Visualization, management, and updating of OAIs, PAI, and enclave-based enrichment data is the difficult work of IEBA. OAIs are where it starts; force disposition, exercises and operations (United States, allies, and others), incidents of interest, crisis, and other events elections riots, summits) all need to be tailored to the AOI and AOR of the commander and their mission. Your OAIs will determine your relevant PAI needs, including but limited to social media, press releases (ours and others), law enforcement sharing, foreign media broadcasts, key engagement outcomes, and network operations data sets. Displays allow orientation and allow questions and concerns about support to operations, force laydown, PAI, and IE effects to friendly plans to arise. This visualization in turn makes greater individual SA, understanding, and greater unit distributed shared awareness.

The staff of a unit at any level exists to plan and execute operations, requiring a lot of work and interdependent interactions to make it succeed. Staff work is just that—work: a set of processes and interactions all related to or representing operations. Staff work always creates and increases complex-

ity over time and as the organization grows. The complexity of the work is what makes it important to add *sensemaking* as the goal when we attempt to understand IEBA. Sensemaking differs from SA, which is "about the knowledge state achieved"[19] including data, inferences, and predictions to be made, while "[s]ensemaking is about the process of achieving these kinds of outcomes, the strategies, and the barriers encountered."[20]

Sensemaking sharpens the focus on the continuous work of IEBA. When focused explicitly on actions that can be taken within a system, defined by boundaries and with goals, it gives the staff a means to determine the view and perspective needed for visualization of the IE. The actions taken through sensemaking also prescribe a specific context to the visualization and show the potential resources a commander can apply or reallocate regarding a set of OAIs—resources that include the allocation of their own time and attention, and that of their staff. Bounding and framing the what, how, and why we spend staff hours conducting IEBA in terms of why—sensemaking—led the MCIC to define and prototype its own minimum viable product for the daily provision of IEBA to the commander.

The IE COP

The MCIC spent over a year conducting a trial-by-fire event daily right back where activation started—at Lasswell Hall—using what we learned and current events of interest to present a series of observations of the IE at the morning commander's update brief. At this point we ideated, created, and improved our premise, models, and visualizations through over 200 beta tests making major and minute changes to our observations of content and to the overall presentation of information during the update brief. Through this design prototyping stage, the MCIC determined the capability requirement to present the model of distributed situational awareness desired for IEBA in an IE common operating picture (or IE COP). This IE COP will allow sensemaking by commanders and staffs of

any unit to improve its collective intelligence.

An IE COP must capitalize on available, layered data flows (from NetOps, Intel, publicly available information [PAI], electromagnetic spectrum operations, offensive and defensive cyberspace operations, space, friendly/adversary force disposition, weather, significant activities, etc.) to visualize the IE and deliver operational insight visually similar to the doctrinal modified combined obstacle overlay product but as close to realtime as can be maintained. This begins with a geographic display of operations, activities, and investments (OAIs) from friendly/adversary forces and across the information environment. Publicly available information then accumulates around these as entities generate and project information. This either clouds or enhances the output of our distributed shared awareness model with further data sources (whether they be real, perceived, or misinformed) all of which are then enriched across existing security enclaves with appropriately accessed intelligence products. IEBA (per Stanton's model) is gained from the IE COP by the ability to aggregate and disaggregate visual information as necessary to convey the understanding at the point of a decision (through *Sensemaking*).

Potential enrichment data (similar to modified combined obstacle overlays) can include but is not limited to information from Service and joint offensive and defensive cyberspace operations, U.S. and partner intelligence community data and overlays, and other sources. Visualized OAIs created into dashboards with timely data feeds allow for the synthesis of distributed shared awareness for all concerned with those OAIs up and down the chain and provide it with minimal interaction and coordination costs.

IEBA through a Standardized IE COP

To repeat it again and summarize: the right information is displayed to the right command in a timely context for the commander and staff to take decisive action as appropriate. As this information tailoring advances, sensemaking

An adaption of existing programs as a minimum viable product. (Adapted from researchinnovations.com and netanomics.com.)

Data feeds for integration into IE COP include, but are not limited to:

- Operations, Activities, & Investments-elements physically tied to the AOR or directly associated with events, people, and places in AOR or AOI. Includes combat reporting (SPOTrep, MISREP, SALUTE, etc).
- Publically Available Information (PAI)-this must be synthesized into useful information through ARCHER hosted applications (to be determined, potentially Pulse, Decrypt, Dataminr, Scraawl, etc).
- Finished intelligence reports & METOC. Data from things like CRITICs, relevant IIRS, or other agency reporting, and other finished intelligence reporting and weather state and predictions associated with OAIs can further contextualize and add to the integrated understanding of the IE for the commander and his staff.
- Signature Management-COMSEC, OPSEC, EMCON, and tactical data all enhances IEBA.
- Electromagnetic spectrum (EMS) OAIs for display of EMS operations, adversary capabilities, and other effects. Also EMS ISR capes that allow greater understanding for force disposition and assured C2.
- Space based OAIs-friendly and adversary capabilities, units, and effects to both. Proper care must be taken to ensure the data enclave is appropriate for space capabilites and operations, so the ability to fuse some capes/effets would be representational or visible only on certain enclaves.
- Cyberspace operations-DCO & Net Ops status data, ongoing T10 cyberspace ops (Cyber-COP, IKE, or JCC2) or overlays showing peplanned cyber fires can be displayed in addition to force disposition of elements on the ground like hunt forward ops, CMEs, and other relevant cyber forces.

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effectiveness increases. IEBA informed by an IE COP with the OAIs, PAI, and analytic tools to associate and link elements of data promptly enhances any unit's ability to achieve information advantage in warfighting. Standardization of the IE COP facilitates IEBA around OAIs and PAI, enriched with classified enclave data, will enhance unity of effort for the MCIC. Command-mandated use and governance of existing programs of record already exist from the Joint Staff and various combatant commands. The near-realtime display of the IE COP facilitates IEBA. Analysis and assessment enhance unit and individual understanding created over time, as a function of intelligence-based products and based on the operational data from near-realtime feeds. At the MCIC, over the first year, this standardization aimed to enhance the IEBA of the commander and the staff of his six total commands.

Standardization across the Service requires inclusion and definition of terms into the Information doctrine. Doctrinal definitions of IEBA and the IE COP will enhance the unity of effort for the MCIC, the Service, and the Joint Force. Sensemaking and unity of effort go hand in hand. In practice, this may mean a lot of work in the form of the creation and management of OAIs. However, that work is already necessary and tied to units' planning and execution tasks, so visualizing them in dashboards made to order for both exercise and operation commander's critical information requirements (with good friendly force and priority information requirements) will only lead to a more capable staff. Doing this right can reveal commander's critical information requirements that trip through comparison of changes to baselines, and it can aid the assessment of performance and effectiveness for subordinate units—among many potential outcomes. Through these sensemaking actions, Marines will maximize information advantage at speed and scale. Standards and definitions will prevent overload from too much data and give units the proper context for OAIs and dashboard displays.

Just as the Marine Corps paved the way for the conduct of information in *MCDP 8* and the implementation of information forces in *MCWP 8-10, Information in Marine Corps Operations*, the time is at hand to firmly establish the concept of IEBA. At the MCIC that includes the capability to visualize the IE in near realtime with consolidation of data feeds of all available sources pertinent to informing a command's mission, scoped, and scaled as needed: the IE COP. Logically after *MCDP 8* and *MCWP 8-10*, a MCRP may be called for to detail the work. Perhaps call it "Conduct of IEBA for Marines." While this may get accused of adding a new idea at the end of the article, this proposed MCRP would provide standardization and guidance for commands to manage the use of OAIs and IE COPs. At the very least, we could all have the same single definition for what IEBA means.

Conclusion

The MCIC seeks to integrate and maximize our information forces' capabilities, resources, and activities—to include our commander's time. We do this with an appreciation for Stanton's model of distributed shared awareness, created through sensemaking efforts to enhance collective intelligence and conduct IEBA with and through an IE COP. Over time this current operations practice at MCIC is intended to inkblot out to inform running estimates, analyses, and assessment products, and reveal activity in the IE less easily seen when modeled in a legacy, stove-piped fashion. The MCIC believes that the IE COP meets the current capability need for IEBA and over time our continued application of design will improve our ability to provide it to our commander.

Notes

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3. M.G. Glavy, "The Information Warfighting Function," *Marine Corps Gazette*, 106, No.4 (2022).

4. *MCBUL 5400 17J*.

5. During activation and IOC phases, the MCIC is currently located within the MARFOR G-3, which serves as the MCIC G-3 under the shared staff services construct along with the G-2, G-4, G-7, etc.

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19. G. Klein, B. Moon, and R.R. Hoffman, "Making Sense of Sensemaking 1: Alternative Perspectives," *IEEE Intelligent Systems* 21, No. 4 (2006).

20. Ibid.