

United States Joint Forces Command

**The Joint Warfighting Center
Joint Doctrine Series**

Pamphlet 5



***Operational Implications of the
Collaborative Information
Environment (CIE)***

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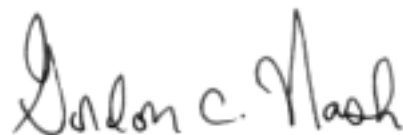
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Preface

This US Joint Forces Command (USJFCOM) Joint Warfighting Center (JWFC) pamphlet, ***Operational Implications of the Collaborative Information Environment (CIE)***, is the fifth pamphlet of a “**Joint Doctrine Series**” intended to facilitate understanding of key concepts that emerge from the Joint Concept Development and Experimentation Program and related joint doctrine development initiatives. JWFC Doctrine Pamphlet 5 is designed to give readers a basic knowledge of the value of collaboration capabilities, how they might be implemented in the near future, and possible operational implications.

Collaboration capabilities can affect all aspects of joint operations. Although these capabilities can improve efficiency and common understanding during routine, peacetime interaction among participants, their potential value is most evident during time-compressed operations associated with combat and intense non-combat operations. These capabilities are important to Department of Defense efforts to transform the way we plan and execute joint operations. To accomplish this transformational task, we must improve collaboration among combatant commands, Services, agencies, and multinational partners. An **environment of collaboration** can enable and integrate such a cooperative effort among these organizations and help the joint force achieve decision superiority.

Your comments and ideas are welcome and encouraged to help improve this important enabling capability. Point of contact for JWFC Doctrine Pam 5 is Mr. Rick Rowlett, JW 2114, 757-686-6167 (DSN 668) ricky.rowlett@jfc.com.mil.



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Major General, U.S. Marine Corps
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*" Essential to the power of adaptive planning
and execution is an ability to conduct large
scale, vertical and horizontal collaboration.
Frankly, the required collaboration is on a scale
that dwarfs any existing commercial
application or the commercial world's
understanding of collaboration."*

Admiral E.P. Giambastiani
Commander
United States Joint Forces Command

Remarks for Air Force Association
"Integrated Air Warfare" Symposium
Orlando, Fla. Feb. 13, 2004

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Section I — Introduction

The Chairman of the Joint Chiefs of Staff's joint vision¹ requires the Armed Forces of the United States to increase strategic and operational responsiveness dramatically by further developing today's capabilities for joint command and control (C2). Most importantly, the joint force must focus on teamwork, built on confidence and trust, to create effective joint teams at all levels. To accomplish this transformational task, we must improve collaboration among combatant commands, Services, combat service support organizations, US Government departments and agencies, and multinational partners. An **environment of collaboration** enables and integrates such a cooperative effort and helps the joint force achieve **decision superiority**—better decisions arrived at and implemented faster than an opponent can react, or in a noncombat situation, at a tempo that allows the force to shape the situation or react to changes and accomplish the mission.²

The Value of Collaboration

Collaboration means working together.³ A collaborative environment is one in which participants share data, information, knowledge, perceptions, ideas, and concepts. In *Understanding Information Age Warfare*,⁴ the authors use military planning as an example of a collaborative activity.

*“The classic military example is collaborative planning, where actors with different functional and geographic areas of responsibility focus their attention on achieving assigned missions. Their goals are to create a common (shared) understanding of the situation; take advantage of their differential knowledge, expertise, information, and capabilities; and organize the activities they control in time and space such that they will (a) avoid mutual interference and (b) have a synergistic effect. In other words, they want to plan so their actions will be synchronized.”*⁵

Collaboration has always been an essential element of warfare. Over time, our ability to collaborate has been increased greatly by the development of various

¹ Chairman Joint Chiefs of Staff, *Joint Vision 2020*, 2000.

² Ibid, p. 8.

³ Webster's II New Riverside University Dictionary, 1994, p. 280.

⁴ David S. Alberts et. al., *Understanding Information Age Warfare*, August 2001.

⁵ Ibid. p. 186.

communications devices and computers. Today, secure voice, data, and video capabilities allow joint force commanders (JFC) to conduct “**virtual**” meetings with large numbers of participants to discuss and decide courses of action for joint operations. Electronic mail and other collaborative tools enable planners to involve a variety of people and agencies in the planning process in a much more efficient and responsive manner than sequential message traffic sent through the local communications center.

Collaboration can be asynchronous or synchronous. “**Asynchronous**” means participants do not have to be working together at the same time. Planners in different headquarters, geographical locations, and time zones may sequentially use collaborative tools such as electronic mail. Collaboration occurs, but not concurrently among participants, though a much greater volume of information can be transferred and shared through this method of collaboration.

“**Synchronous**” collaboration means participants are working together at the same time. This can occur when they are located together physically, such as in a planning conference. Synchronous collaboration can occur also through video and other collaboration tools such as InfoWorkSpace™. **Synchronous and asynchronous collaboration are complementary; both contribute to a fully enabled collaboration environment.**

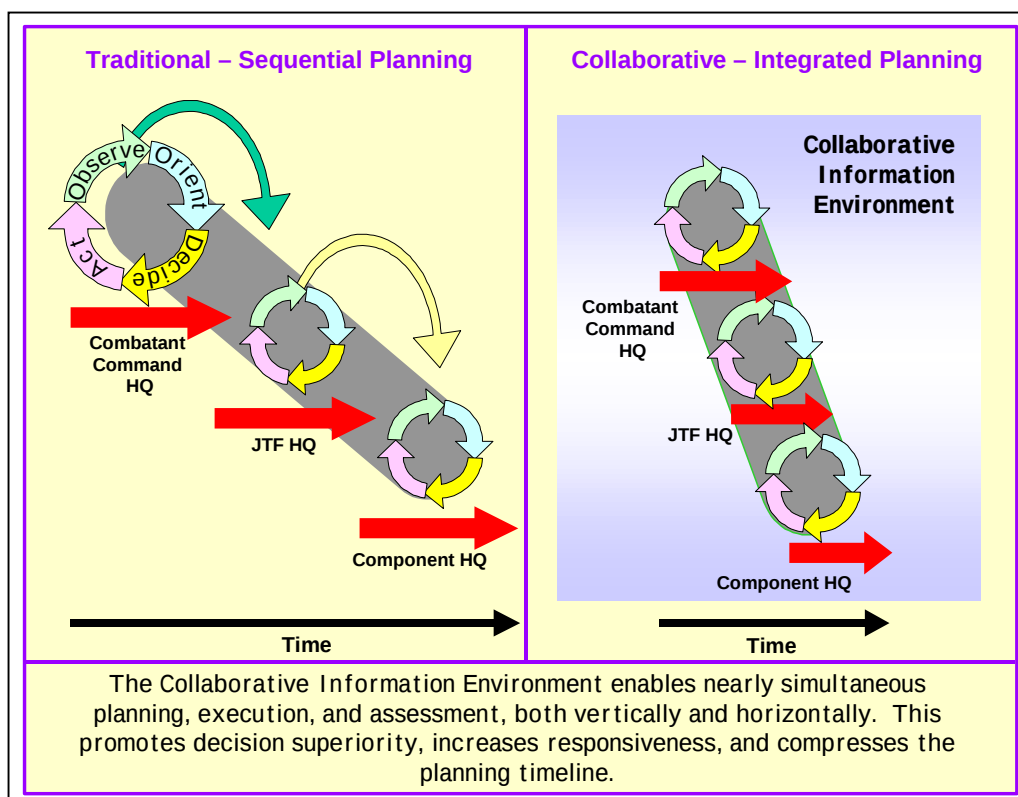


Figure 1: Compressing the Planning Process

Collaboration capabilities can affect all aspects of joint operations. Although these capabilities can improve efficiency and common understanding during pre-crisis interaction among participants, their value is most evident during time-compressed operations associated with combat and intense non-combat operations. Collaborating with subordinates, a JFC can establish commander's intent throughout the joint force components without the time delay and potential misinterpretation associated with traditional messages. Planners at the joint force headquarters can develop potential courses of action with component planners regardless of physical location. Commanders can participate in course-of-action analysis and select a course of action without the traditional sequential briefing process. Plans and orders can be posted on interactive web pages for immediate use by subordinate elements. An important result is a compression of the planning timeline that may be achieved, as **Figure 1** depicts. Similar benefits apply during execution, when commanders, planners, and others can decide quickly on branches and sequels to the campaign plan and on other time-critical actions to respond in changes to the situation. All of this occurs with improved understanding of commander's intent, objectives, desired effects, and required tasks. However, users always should understand that both synchronous and asynchronous collaboration are essential, that collaboration does not guarantee good decisions, and that quick decisions are not necessarily better than those achieved deliberately.

Conceptual Background

Since its inception in 1998, the Joint Concept Development and Experimentation Program has explored initiatives to improve collaboration. Two early concept white papers—**Common Relevant Operational Picture (CROP)** and **Joint Interactive Planning (JIP)**—addressed collaborative planning in some detail. These concepts supported the information needs of a standing joint force headquarters (SJFHQ) concept found in the **Adaptive Joint Command and Control** white paper.

The CROP and JIP concepts evolved into a new concept, **Collaborative Information Environment (CIE)**, prior to the Jul-Aug 2002 Exercise MILLENNIUM CHALLENGE 2002 (MC 02). In MC 02, CIE capabilities were viewed as having significant potential for improving future joint operations. Key findings included the following:⁶

Collaborative Information Environment

A virtual aggregation of individuals, organizations, systems, infrastructure, and processes to create and share the data, information, and knowledge needed to plan, execute, and assess joint force operations and to enable a commander to make decisions better and faster than the adversary.

⁶ USJFCOM MC 02 Final Report.

- The joint task force (JTF) was able to establish a persistent collaborative environment across all echelons of command.
- The JTF was able to command and control on-going operations using the collaborative tools.
- While operating in a CIE, the JTFHQ and component staffs were able to attain a high state of situational awareness.
- The JTF was able to attack operational targets and achieve desired military effects using effects-based concepts and collaboration tools.
- A compatible CIE linkage to engaged agencies is essential for the effective harmonization of actions among members of the interagency community.
- Collaboration was the key to JISR successes.

Based on MC 02 results, USJFCOM submitted a Change Recommendation Package to the Joint Staff in Sep 02. The Joint Requirements Oversight Council (JROC) endorsed the Change Recommendation Package in Feb 03.⁷ The resulting JROC memorandum prescribes a number of tasks designed to facilitate the implementation of collaborative capabilities throughout the joint community. A 1 Oct 03 concept white paper⁸ contains the latest version of the CIE concept.

USJFCOM has designated the CIE as a “prototype”—*a model suitable for evaluation of design, performance, and production potential*.⁹ The CIE and other prototypes focus on improving near-term joint warfighting capabilities; they are linked on the USJFCOM's **Prototype Path**¹⁰ to assist in the fielding of the SJFHQ core element (SJFHQ (CE))¹¹. Specifically, the CIE prototype is *a tool and process that are intended to provide common situational awareness and understanding to decision makers without today's time and space limitations*.¹² The CIE conceptual effort also supports “**achieve decision superiority**,” an important mid-term focus area of USJFCOM's **Concept Development Path**.¹³

⁷ JROC memorandum for the Assistant Secretary of Defense (Command, Control, Communications, and Intelligence) and Commander, US Joint Forces Command, 5 Feb 03.

⁸ USJFCOM J-9, *A White Paper for Collaborative Information Environment*, 1 Oct 2003.

⁹ JP 1-02, Department of Defense Dictionary of Military and Associated Terms, 12 Apr 01 (as amended through 5 Jun 03).

¹⁰ *The Joint Concept Development and Experimentation Campaign Plan FY 2004-2011* (15 Dec 03) establishes two experimentation paths—the Prototype Path and the Concept Development Path.

¹¹ “Core element” is a term being used to distinguish this organization from a fully staffed headquarters. Geographic combatant commands are in the process of fielding SJFHQ core elements, with fielding to be completed in FY 05.

¹² Ibid, p. 18.

¹³ Ibid, p. 22.

Key Terms

The CIE is intended to be a key enabler of current and future joint concepts.¹⁴ Since this pamphlet will refer to many of these concepts, following is a brief summary of key terms and constructs to assist in understanding their meaning.

- **Collaborative Information Environment:** A virtual aggregation of individuals, organizations, systems, infrastructure, and processes to create and share the data, information, and knowledge needed to plan, execute, and assess joint force operations and to enable a commander to make decisions better and faster than the adversary. (Source: *CIE Concept Primer*)
- **Effects-based Operations (EBO):** Operations that are planned, executed, assessed, and adapted based on a holistic understanding of the operational environment in order to influence or change system behavior or capabilities using the integrated application of selected instruments of power to achieve directed policy aims. (Source: *SJFHQ (CE) SOP*) The CIE, SJFHQ (CE), and other near-term capabilities now in prototyping will help the JFC conduct EBO.
- **Operational Net Assessment:** ONA, a key enabler of EBO and the SJFHQ (CE), is the integration of people, processes, and tools that use multiple information sources and collaborative analysis to build shared knowledge of the adversary, the environment, and ourselves. (Source: *ONA Concept Primer*) See JWFC Pamphlet 4 for more information on the ONA.
- **Standing Joint Force Headquarters Core Element:** This organization is a full-time, joint C2 element that is part of the geographic CCDR's staff. One SJFHQ (CE) prototype organization exists at USJFCOM headquarters to help designated combatant commands as they implement their own SJFHQ (CE), and USJFCOM also will field a deployable SJFHQ (CE). Collaboration capabilities are important to all SJFHQ (CE) functions. (Source: *SJFHQ (CE) SOP*) See JWFC Pamphlet 3 for more information on the SJFHQ (CE).

The Way Ahead

Prototyping of collaborative capabilities to support SJFHQ (CE) implementation is a continuing, multi-year process of experimentation, concept refinement, and capability development. USJFCOM presently is fielding interim collaborative capabilities in the geographic combatant commands (GCC). Initial implementation began in November 2002 when USJFCOM provided US Southern Command (USSOUTHCOM) and US Pacific Command (USPACOM) with the first increment of collaboration tools and training to complement their SJFHQ (CE).¹⁵ For the past year, USJFCOM has been

¹⁴ USJFCOM, *Joint Concept Development and Experimentation's Concept Primer – CIE*, Oct 2003, p. 3.

¹⁵ USJFCOM Public Affairs, *USJFCOM Tests and Implements New Info Sharing Prototype for Combatant Commands*, 11 Dec 2003, pg 4.

helping USCENTCOM implement collaboration capabilities to facilitate operations in the Persian Gulf. Other GCCs will receive their initial increments in the near future. Major exercises such as TERMINAL FURY 04 in USPACOM—as well as USJFCOM-generated activities such as limited objective experiments, workshops, and SJFHQ (CE) SOP development—have helped refine and validate collaborative processes and products.

The **initial increment** of collaborative capabilities is based on those used during MC02, such as IWS. The **follow-on increment** is envisioned as an enhanced version that introduces open standards (elimination of proprietary solutions). Increment two also addresses building better knowledge management policies and procedures that support multinational information sharing and security. The **third increment** ushers in the global information grid enterprise services (GIG-ES) and the Next Generation of Collaborative Services (NGCS). GIG-ES will host the services needed by the warfighter for collaboration and knowledge management and is not centered on any given process or location. Section III of this pamphlet contains more information.

Section II — Implementing an Environment of Collaboration

The Global Information Grid (GIG) is an important Department of Defense (DOD) initiative that will facilitate a world-wide environment of collaboration for the purpose of conducting joint and multinational operations. The GIG includes all owned and leased communications and computing systems and services, software (including applications), data, security services and other associated services necessary to achieve information superiority. It supports all DOD, national security, and related Intelligence Community missions and functions across the levels of war and range of military operations. The GIG provides capabilities from all operating locations (bases, posts, camps, stations, facilities, mobile platforms, and deployed sites), as well as interfaces to coalition, allied, and non-DOD users and systems.¹⁶

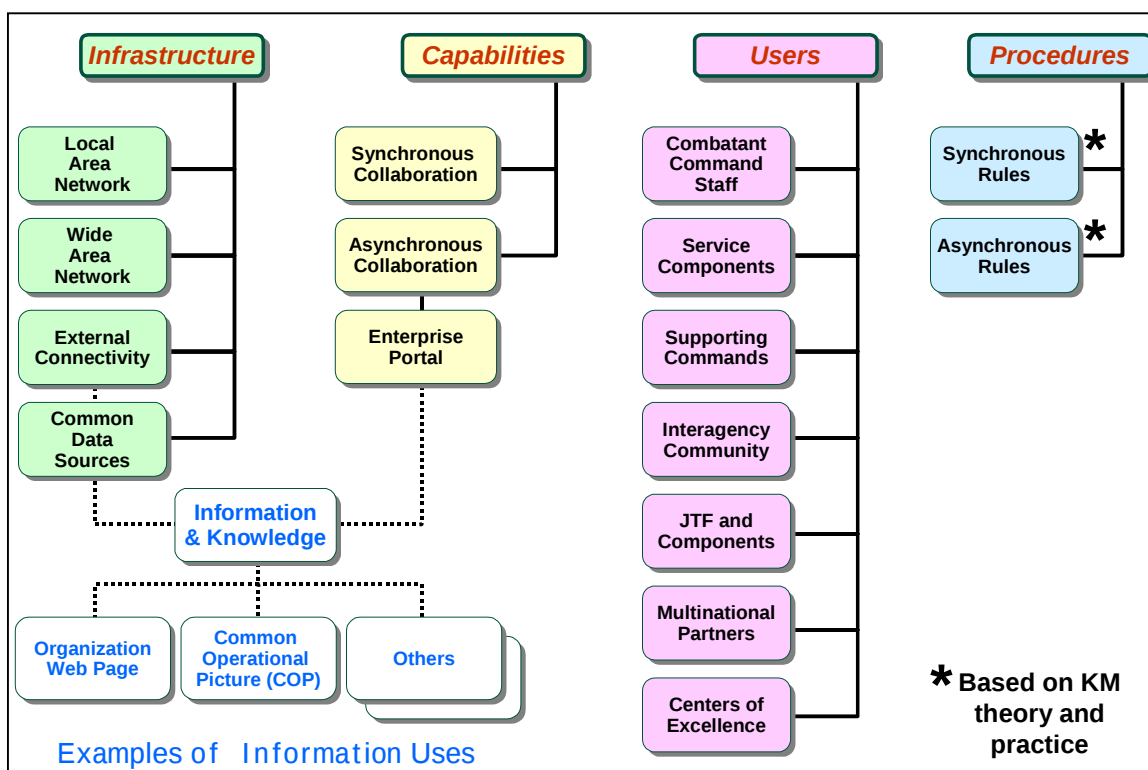


Figure 2: CIE Components

¹⁶ Capstone Requirements Document for Global Information Grid, JROCM 134-01, 30 Aug 01.

A fully functioning environment of collaboration requires more than just **collaborative capabilities** that help participants share **information and knowledge**. A second component of this environment is **infrastructure**—the various command, control, communications, and computers (C4) systems on which the tools reside and the networks that link these systems. The C4 systems, networks, and collaborative tools need procedures—based on accepted theory and practice and established to meet warfighter needs—which regulate use in ways that facilitate collaboration. The full benefit of these capabilities is realized only with a fourth component—**users** who are trained to use the tools and systems and educated to understand the advantages and power of a collaborative information environment. **Figure 2** shows these CIE components. GIG development encompasses initiatives targeted at many of the components in Figure 2.

The USJFCOM and Joint Staff CIE initiative complements DOD's GIG efforts. The GIG could be characterized as having a strategic focus, although its impact extends much lower. USJFCOM collaboration initiatives could be characterized as focusing at the operational level, although collaborative capabilities will extend to both the strategic and tactical levels. While the GIG has a predominant focus on systems and applications that help form a global network, USJFCOM concentrates on helping commanders and staffs understand how to work in an environment of collaboration that

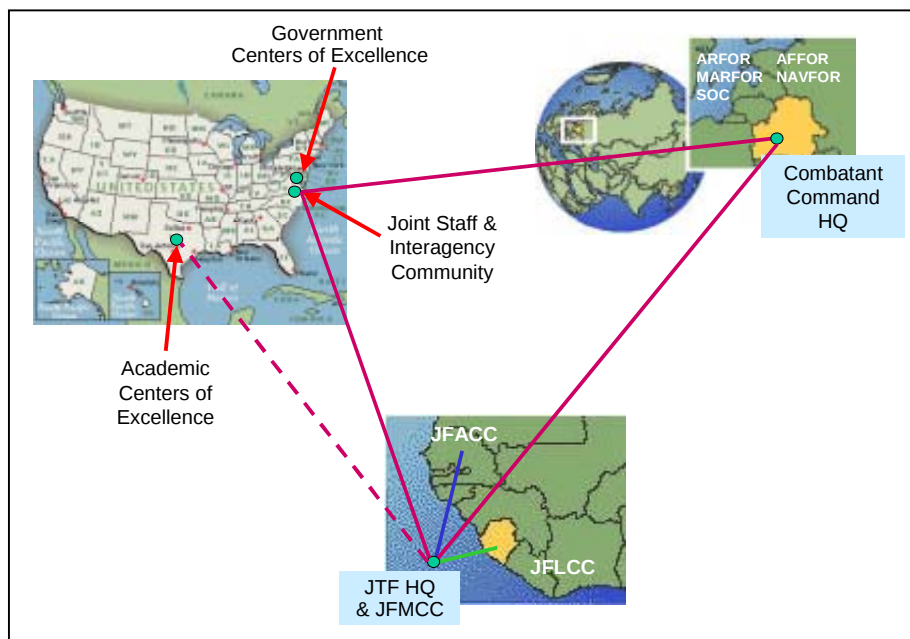


Figure 3: Global Distributed Collaborative Planning

compresses planning and decision processes. GIG components provide the capability to achieve **information superiority**. With emphasis on the human dimension, the CIE provides additional capability to achieve **decision superiority**. **Figure 3** shows that the global nature of the GIG, enhanced by collaborative capabilities and processes, facilitates distributed, collaborative strategic and operational planning regardless of the physical location of participants.

A collaborative environment can exist at many levels. As mentioned earlier in this section, a mature GIG will promote a global collaborative environment, which facilitates interaction, planning, and decision-making between combatant commands, agencies, multinational partners, and others in peace and war. Each combatant command has its own collaborative environment comprised of CIE components in Figure 2. Because the GIG provides many of these services, they will be the same (or similar) across the combatant commands. Unique aspects of the command's collaborative environment will be dictated by Joint Strategic Capabilities Plan (JSCP) tasks, joint mission essential tasks (JMETs), requirements associated with the area of responsibility (AOR), contingency plans, and ongoing operations.

JTFs and their components will operate within the GCC's collaborative environment in a GCC AOR, but will also have unique elements that constitute their own organizational CIE due to differences in mission, organization, location, and other factors. Yet these organizations would be able to collaborate synchronously with each other, the GCC HQ, and other organizations because of common infrastructure elements, collaborative tools, and KM procedures.

Collaboration Capabilities and Initiatives

USJFCOM's role is to help combatant commands increase their ability to collaborate, with an eventual goal of establishing a fully functional collaborative environment within each command that is extendable throughout DOD and beyond as necessary and feasible. USJFCOM combines concept development and experimentation with prototype fielding to provide near-term capabilities while exploring conceptual initiatives. Current fielding efforts focus on collaborative capabilities and processes that support implementation of an SJFHQ (CE) in each GCC. Follow-on increments will establish enhanced collaborative capabilities on a broader basis throughout combatant commands (see Section III for more information). These capabilities are somewhat irrelevant unless they help joint forces achieve shared situational awareness and the ability to make better decisions faster than the adversary. Following are examples of capabilities and other initiatives that will facilitate collaboration.

- **Collaboration Tools.** A suite of synchronous and asynchronous collaboration tools enables CIE capability for globally distributed joint forces. NetMeeting™ and InfoWorkSpace™ (IWS) are examples of synchronous collaboration tools, while SharePoint Portal Server™ (SPPS) is an example of an asynchronous collaboration tool. There are some differences among synchronous and asynchronous collaboration tools, but all have similar basic capabilities in that they enable collaboration with a number of participants regardless of their physical location. The standardization of collaboration tools is not yet achieved, but is an important ingredient for future joint, multinational, and interagency operations.

With collaborative suites, participants at collaborative workstations will have access to capabilities listed in **Table 1**. They can participate in private, synchronous collaboration sessions with one other person or in large “auditorium” sessions with several hundred participants, regardless of their physical location. Briefing charts, maps, text documents, and other displays will appear on the monitor for all participants to see and discuss. Participants can exchange information using both audio and text “chat” modes. All participants hear the commander’s intent at the same time, without the delay associated with the typical distribution process for plans and orders. The commander can participate in course-of-action development

and selection rather than waiting for the staff to prepare and present briefings. Decision-support and visualization tools help extend shared situational awareness beyond current boundaries to enable enhanced planning and decision-making. These capabilities and others will increase efficiency and situational awareness, decrease the time required to make many decisions, promote a common understanding of plans and orders, bring diverse and superior experience to bear, and enhance combat effectiveness during execution.

- **Decision Support Tools.** These supplement collaborative tools described above. In the SJFHQ (CE), for example, a suite of decision support applications supports the ONA process, an important contributor to effects-based planning. Emerging collaborative capabilities will use new information technologies, decision-support systems, and advanced processes to plan and execute joint operations. “Intelligent” software agents will search a “virtual information warehouse” to find information that supports planning and execution. These agents will extract, fuse, and translate this information to make it useful for decision makers. Using decision templates, the agents will alert users when new, relevant information is available or existing information has been updated. Automated decision-support tools, such as course-of-action-analysis and effects-analysis tools, will help planners rapidly analyze many alternatives. Modeling and simulation tools will simulate mission execution, projecting not only first-order effects, but also second-order and potential unintended effects.

- **Virtual Information Warehouse.** The CIE’s Virtual Information Warehouse is a conceptual initiative that aims at establishing a primary repository for information and knowledge products necessary for joint operations in a collaborative environment. The technology that allows access to information

Collaborative Capabilities

- o Secure environment from unclassified through top-secret levels, as well as with multinational partners
- o Voice and text chat
- o Shared view capability
- o Advanced white-boarding
- o Multiple virtual workspaces that parallel the unit organization or functions (command group, staff, boards, centers, cells)

Table 1: Collaborative Capabilities

available in or through the “warehouse” should be transparent to the user. Planners and commanders should be able to retrieve information relevant to their tasks from a variety of authoritative sources without having to search for the sources and connect to each.

Rather than a single entity, the “warehouse” could consist of a combination of servers that encompass all databases and electronic document repositories in the combatant command headquarters and other designated combatant command locations. The warehouse also would function as a conduit to other sources of information within the combatant command, such as Service and functional component HQ, American embassies, and allied HQ. Users also can access external sources (other combatant commands, agencies, centers of excellence, etc.) through the warehouse directly from their workstation display without having to find and establish their own links. In essence, the warehouse is “virtual” because all assured sources of relevant information appear to the user to reside within the warehouse, regardless of the sources’ physical location.

A range of intelligence, operations, logistics, and other DOD-assured information resources would populate the databases and repositories accessible in or through the virtual warehouse. Logging on to the appropriate web page gives the user access to a large menu of these assured information sources. They would provide information such as weather, socio-economic data, force structure, logistic data, imagery, terrain, friendly and enemy force locations, current plans and orders, and infrastructure relevant to the AOR. Users can tailor their display by adding icons or hyperlinks for the specific sources relevant to their tasks.

The warehouse’s local servers contain software applications that facilitate information assurance, fusion, and user-level tailoring to meet specific requirements. Sophisticated information management and dissemination capabilities will enable near-real-time access to both raw data and fused information. Related capabilities will ensure a common operational picture (COP) regardless of level of command or physical location of the user, in part because the warehouse will ensure users access approved sites.

- **Common Operational Picture.** The ability to achieve a common operational picture is important to collaboration and an essential contributor to shared situational awareness and understanding. Current joint doctrine defines the COP as, “A single identical display of relevant information shared by more than one command.”¹⁷ The combination of GIG and CIE capabilities could advance the notion of a COP to a continuously updated (near-real-time) display that provides the same information from common, approved data sources to multiple users regardless of their location or the “resolution” of their display. For example, the Joint Force Air Component Commander’s air operations center will be concerned with aircraft and missile tracks throughout the joint operations area, while an

¹⁷ Joint Publication 1-02, Department of Defense Dictionary of Military and Associated Terms, 17 Dec 03.

Army corps tactical operations center will focus on those in the corps area of operations. These two operations centers would use map displays of different scale for planning and execution, but the continuously updated tracks on these maps should represent “common” information relevant to the organization’s needs. Although the workstation displays in each operations center are not “identical,” operators at each location are working with a common operational “picture” at different resolutions. The airborne tracks will be portrayed at exactly the same global positioning system coordinates on the different displays, and the supporting information available to operators will be identical.

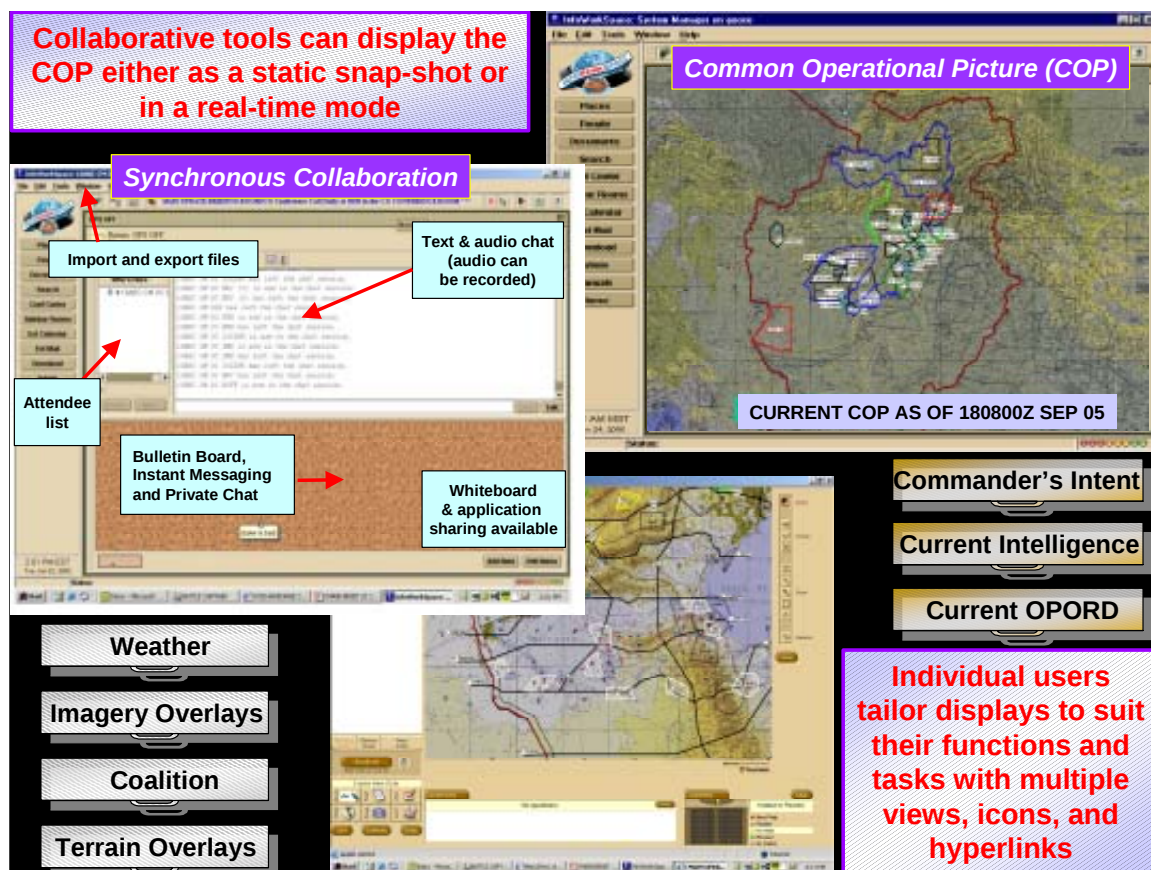


Figure 4: A Collaborative Display

As **Figure 4** depicts, other collaboration capabilities will allow users to tailor their COP displays, yet maintain the “common” and “relevant” aspects of the operational picture. For example, adversary weapons characteristics should be available through the virtual information warehouse from what appears to the user as the single, assured source of that information. Since this source should be common to all users, these capabilities should appear as identical to any user who retrieves them. Likewise, icons that link to weather, terrain, and infrastructure data and graphics can provide identical information to both operators and logisticians at the joint force and component HQs. Finally, the COP includes links to behavioral elements as well as physical information.

Examples include a statement of the commander's intent and an intelligence assessment of likely adversary reaction to our current operations. **Thus the COP is not only enabled by other collaboration capabilities, but is an essential component of an environment of collaboration.**

- **Web-based Enterprise Portal.** This portal—an electronic gateway—functions currently as the individual user's personalized point of entry to information in the local network and the Global Information Grid. If the virtual information warehouse matures as a conceptual initiative and fielded capability, the enterprise portal would link to it as well. The portal could be represented to the user as the command's approved web site displayed at the user's workstation. However, users would tailor the site's composition to their requirements by selecting from a large menu of approved icons and hyperlinks. Each of these would connect to current, assured information in the warehouse, which would be represented at the user's workstation in the form of data tables, documents, decision support tools, links to external sources, the COP, and other items relevant to the user's function and tasks. The user would arrange these windows and icons in a manner that suits individual work style.

- **Knowledge Management (KM).** Knowledge management is *the handling, directing, governing, or controlling of natural knowledge processes (acquire/validate, produce, transfer/integrate knowledge) within an organization in order to achieve the goals and objectives of the organization.*¹⁸ The KM concept of operations will focus initially on the process procedures that support SJFHQ (CE) implementation, but will expand later to address the KM process and procedures that support a more comprehensive environment of collaboration.

CIE's Relationship to Other Concepts and Prototypes

Standing Joint Force Headquarters (Core Element). This new organization—an initiative of the Secretary of Defense—is a full-time, joint, C2 element within the geographic combatant commander's staff. Its daily focus is warfighting readiness, and it is a fully integrated participant in the deliberate and crisis-action plans and operations of the CCDR's staff. The SJFHQ (CE) provides the combatant command with a staffed, trained, and equipped joint C2 capability, specifically designed to enhance situational understanding within designated focus areas. The SJFHQ (CE) exploits new organizational and operational concepts and capabilities to enhance the command's peacetime planning efforts, accelerate the efficient formation of a JTF HQ, and facilitate crisis response by the joint force. **An environment of collaboration, with capabilities**

¹⁸ Joint Publication 6-0, *Doctrine for Command, Control, Communications, and Computer (C4) Systems Support to Joint Operations*, 2nd Draft, 9 May 03.

described in Section II, is essential to the SJFHQ (CE)'s daily operations. See JWFC Pam 3¹⁹ and the SJFHQ (CE) *Concept of Employment*²⁰ for more information.

Effects-based Operations. Current concept thinking in USJFCOM defines EBO as operations conducted to ". . . influence or change system behavior or capabilities using the integrated application of selected instruments of power to achieve directed policy aims."²¹ An effects-based approach to operations has four components: knowledge superiority, an effects-based planning process, dynamic and adaptive execution, and accurate, timely effects assessment.²² **CIE capabilities are important to all EBO components, but are particularly critical during crisis-action planning and follow-on combat operations.** Constant, synchronous collaboration will help the joint force achieve decision superiority, operate more efficiently, avoid fratricide, and achieve strategic objectives faster than today.

Operational Net Assessment. The SJFHQ (CE) has overall responsibility on the combatant commander's staff for ONA development and maintenance. ONA integrates people, processes, and tools that use multiple information sources and collaborative analysis to build shared knowledge of the adversary, the environment, and ourselves.²³ ONA also is a key contributor to EBO's "knowledge superiority" component. As the name implies, ONA focuses on the operational level; it consists of both process and products intended to significantly enhance both deliberate and crisis-action effects-based planning. Beginning in peacetime, ONA integrates planning and intelligence activities continuously through a joint operation and transition to a post-operation state. It relies extensively on collaboration capabilities to access centers of excellence and other sources through the virtual information warehouse.

Other Collaboration Programs. The Defense community has been working on a number of collaboration programs that relate to USJFCOM's CIE initiative. One example is the Joint Intelligence Virtual Architecture (JIVA). The CIE provides a collaborative environment that facilitates fully integrated planning, execution, and intelligence activities. JIVA, a similar program, currently exists within the intelligence community and uses a Joint Collaborative Environment tool. There are many details to resolve about how the CIE and JIVA should interact. Issues that warrant further investigation include how to handle requests for information and analysis in a collaborative environment; disclosure and release protocols associated with multi-level security in interagency and multinational environments; interoperability at the data level; and use of GIG enterprise services.

¹⁹ Joint Warfighting Center Pamphlet 3, *Doctrinal Implications of the Standing Joint Force Headquarters (SJFHQ)*, 16 June 2003. This document is available on JWFC's web site.

²⁰ *Concept of Employment*, USJFCOM Standing Joint Force Headquarters Prototype, 25 Jun 03.

²¹ USJFCOM *Standing Joint Force Headquarters (Core Element) Standard Operating Procedure & Tactics, Techniques, and Procedures*, draft, 15 Apr 04. p. G-2.

²² Concept Primer, *Effects-based Operations (EBO)*, USJFCOM PAO, Nov 03. This document is available through the USJFCOM PAO and on USJFCOM J-9's web site.

²³ USJFCOM J-9 *Operational Net Assessment Concept Primer*, Oct 03.

Section III — CIE Integration in the Joint Community

The JROC has endorsed implementation tasks for the deployment and development of collaboration capabilities throughout the joint community. The Assistant Secretary of Defense (Networks and Information Integration) (ASD/NII) and USJFCOM are executing implementation tasks to support fielding interim collaboration capabilities in combatant commands during FY04-05, and are developing a long-term collaboration enterprise architecture and acquisition strategy.

To facilitate implementation, USJFCOM has established a CIE Management Office to ensure unity of effort within USJFCOM and to act as a common clearinghouse for CIE-related efforts outside of USJFCOM. Through this office, USJFCOM will facilitate global collaboration standards, establish common operating procedures for collaboration, and serve as the joint warfighter's advocate for collaboration-related issues. ASD/NII and USJFCOM are collaborating on a development pathway that implements collaboration capabilities in three general increments.²⁴

- **Increment 1: ESTABLISH INTERIM CIE CAPABILITY IN THE COMBATANT COMMANDS.** Install interim CIE into geographic combatant commands and selected supporting commands, Services and agencies to enable SJFHQ (CE) implementation and solicit feedback. **Duration: up to 18 months.**

- o **Increment 1a** is three to six months in duration and enables the immediate implementation of collaboration capabilities within the SJFHQ (CE) as coordinated with combatant commands.
- o **Increment 1b** is 15 to 18 months in duration and consists of enhancing Increment 1a to include a robust, organic capability in the SJFHQ (CE) and other selected staff elements of the GCCs. This supports the SJFHQ (CE) full operational capability by FY 05.

Increment 2: INTERIM CIE MANAGEMENT. USJFCOM will establish an interim CIE Development Process. It includes developing and publishing

²⁴ USJFCOM Instruction 3100.11, *U.S. Joint Forces Command Charter for Collaborative Information Environment (CIE) Management Office and CIE product Development Implementation Team (PDIT)*, draft, 18 Mar 04.

appropriate procedures and building close coordination between JFCOM CIE efforts and system-of-record developers and DOD agencies. Planning for transition from the CIE prototype to a program of record occurs during this project. This project includes establishing robust configuration management for the collaborative environment, establishing processes to bring new processes and technology into the interim CIE, refining and delivering requirements other Programs of Record, and providing the interim CIE with technical support.
Duration: 24 months.

- **Increment 3: TRANSITION TO PROGRAMS OF RECORD/LIFE CYCLE DEVELOPMENT.** This project continues until all elements of the CIE are the responsibility of a funded Program/Service/Agency of record. It includes managing, directing and executing the transition of interim CIE technology, requirements, and provisioning from the prototype to appropriate DOD agencies. Facilitating standards development to support CIE standardization will require close and continuous coordination with major collaboration partners, such as the Joint Staff, Services, and defense agencies.

Increment 1 began in November 2002 when CIE developers and engineers began site surveys at combatant command HQs and provided the capability for remote users to reach back to the USJFCOM SJFHQ CIE. Besides helping these commands install collaboration suites, USJFCOM also provided combatant commanders with support through a pool of functional, operational, and technical CIE experts.

Enterprise Service Capability. The CIE end state is to be further defined by project management processes detailed by ASD/NII and USJFCOM. Combatant commands, Services, and agencies will transition smoothly from current to future sustainable programs and programs of record that will continue to develop and manage collaboration capabilities. For example, it is desirable that the eventual CIE program of record and other programs like JIVA, mentioned on page 14, are consistent in the approach to integrating planning, execution, and intelligence activities.

Section IV — Operational Implications

Introduction

Analysis of recent operations reveals that secure, reliable, real-time collaboration is an essential element of military operations. USJFCOM's joint experimentation—in conjunction with combatant commands, Services, and agencies—has demonstrated and validated specific collaboration capabilities.²⁵ As Section II mentions, an environment of collaboration requires more than just a set of collaborative tools; it requires infrastructure, procedures, and people as well.

This section explores some of the potential doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) issues associated with fielding collaboration capabilities.²⁶ An overarching implication is that the various functional processes that will address these issues must be responsive to the potentially fast pace of transformation-related change. For example, the 2001 *Quadrennial Defense Review* stated that the joint doctrine process must evolve, become more efficient and streamlined, and be more directly linked to the concept development and experimentation process.²⁷ Doctrine change recommendations, based on joint experimentation, must be incorporated into doctrine without delay. Services, combatant commanders, and supporting agencies must be fully involved in the doctrine process. Functional processes that focus on the other DOTMLPF areas must adjust as well.

DOTMLPF Implications

Doctrine

New collaborative capabilities (tools and processes) can improve joint operations without significant impact on joint doctrine if it already accommodates the general use of the capabilities. For example, effective use of decision aids and collaboration tools can shorten the crisis action planning process by enabling the JFC and staff to collaborate virtually and nearly simultaneously on identification, comparison, and selection of courses of action. However, this compression would not necessarily change the steps of crisis action planning as described in JP 5-0, *Doctrine for Planning Joint Operations*.

²⁵ Major General Gordon C. Nash, Commander, Joint Warfighting Center, *Memorandum for the Director for Operational Plans and Joint Force Development, J-7, Joint Staff*, 8 August 2003.

²⁶ For a more detailed discussion of DOTMLPF implications see USJFCOM J-9, *A White Paper for Collaborative Information Environment*, 1 Oct 2003.

²⁷ *Quadrennial Defense Review (QDR) 2001*, Office of the Secretary of Defense, 2001, pg 37.

Moreover, joint doctrine typically does not address the specific use of materiel capabilities except in the context of their overall contribution to an aspect of joint operations. For example, the SJFHQ (CE) and Common JTF SOPs might describe the procedures for using individual decision aids and collaboration tools, while JP 5-00.2²⁸ might only mention that the capabilities exist and summarize general staff responsibilities associated with their use.

However, a fully implemented environment of collaboration could compress the planning process and change the military decision-making process to the point that the current steps would require revision. For example, the CIE could enable ONA to accomplish many of its tasks in an integrated, parallel manner rather than the sequential processes that characterize current planning. The nature of the content of JP 5-00.2 and its current revision schedule (Revision First Draft programmed for Oct 04) make this JP an ideal candidate during the revision process to capture many of the joint doctrine impacts, not only of CIE, but also of the SJFHQ (CE) and its other enabling concepts and capabilities. JP 3-0, *Doctrine for Joint Operations*, and JP 5-0, *Doctrine for Planning Joint Operations*, currently under revision, should address these issues. The new CJCSI 5120.02, *Joint Doctrine Development System*, contains an expanded discussion on the relationship of doctrine to concepts and provides a Joint Test Publication option that can help examine concept-based prototypes in a field setting.

Organization

Joint experimentation has demonstrated the potential value of a cross-functional organization such as the SJFHQ (CE). In MC 02, for example, the SJFHQ reduced the ad hoc nature of activating a JTF HQ, helped surmount the JTF startup learning curve, and provided continuity from pre-crisis through execution to transition.²⁹ In MC 02, CIE helped enable a modified organization that integrated planning and intelligence activities continuously through a joint operation and transition to a post-operation state. Collaboration capabilities may change the way JTF and higher headquarters organize and operate. Collaboration will facilitate planning systems that are more flexible, interoperable, adaptive, and responsive to rapid changes during execution. Collaboration capabilities allow a significant number of “virtual” participants, so teams may tend to be much larger, with the opportunity for a greater level of informal interaction. A fully implemented environment of collaboration could allow the joint force HQ to organize in new functional ways compared the current staff structure described in JP 5-00.2.

Training

Personnel will have to continually exercise their collaborative skills to maintain proficiency. This includes practicing person-to-person as well as organization-to-organization, both vertically and horizontally.

²⁸ JP 5-00.2, *Joint Task Force Planning Guidance and Procedures*, 19 Jan 99.

²⁹ Exercise MILLENNIUM CHALLENGE 2002 Final Report.

Joint training and exercises are essential to building a joint team that includes interagency and multinational partners. Collaboration capabilities will greatly increase opportunities for distributed training in general. Linking modeling and simulation tools to collaborative tools will allow large groups of geographically distributed people to train together at the same time. Personnel in governmental agencies, centers of excellence, multinational headquarters, Service headquarters, and supporting combatant commands will be able to train together in real-time. This could require changes and incorporation of relevant capabilities in the Joint Training System.

During actual contingencies, collaboration capabilities should greatly enhance enroute mission planning and rehearsal. Organizations will be able to plan and rehearse courses of action with actual assigned and attached forces and adjust plans and orders prior to execution.

Materiel

Many materiel initiatives related to command and control systems accommodate or incorporate collaboration capabilities. For example, Section II mentioned the GIG, IWS, and DCTS as important capabilities related to current and future collaboration. Another example is the Joint Enroute Mission Planning and Rehearsal System—Near Term (JEMPRS-NT), which allows the JFC and staff to continue collaborative planning and rehearsal during deployment. As with many C2 materiel initiatives, **interoperability** is always a key consideration and **born joint** a philosophical underpinning. The Deployable Joint Command and Control Operational Requirements Document states that it is the materiel solution for the SJFHQ (CE). This implies it is an eventual program of record for CIE.

Leadership and Education

To be able to function effectively in the CIE requires both training and education. If a fully implemented environment of collaboration fundamentally alters the military decision-making process, our Service and joint schools must adjust accordingly. For example, a JFC who participates in a collaborative session to develop potential courses of action could significantly shorten the planning process by approving a course of action before the session closed. However, another JFC might prefer to let the analysis and comparison process continue in a more traditional, sequential manner, even though collaboration capabilities might enable an earlier decision. The best approach will depend on the situation, and neither approach might be right in every set of circumstances. Working with specific tools—a function of training—must become second nature for all users. But using the full potential of the collaborative environment, particularly by commanders and other senior leaders, requires education, leader development, and arguably a culture change.

Personnel

Figure 2 in Section II shows “users” as one of the four primary components of a collaborative information environment. The intellectual capabilities, physical skills, and motivation of DOD personnel have been essential to our current military dominance. Services will continue to rely on high-quality people to operate the increasingly sophisticated systems of the future. Since the CIE incorporates “reachback” to centers of excellence and agencies, the personnel qualifications and skills of our DOD civilians will become increasingly important to the JFC. This has implications for recruiting to meet both military and government civilian requirements.

Facilities

There are facilities-related design implications associated with fielding the materiel and organizations associated with CIE. For example, the SJFHQ (CE) will likely have some unique facilities-related requirements in order to accommodate the collaboration capabilities necessary for its role in the combatant command.

Conclusion

Emerging collaboration capabilities have demonstrated their value in joint experimentation and actual operations. A comprehensive environment of collaboration will affect the way we plan and execute joint operations, requiring that we change joint doctrine, training, and education accordingly. The potential result of the conceptual initiatives described in this pamphlet is an environment of real-time collaboration across all elements of the joint force and with supporting commands, relevant agencies, multinational partners, and centers of excellence. The essence of this collaboration emphasizes shared mission planning and presentations, with virtual, face-to-face planning collaboration occurring among the right participants just as in a physical environment, but regardless of where they are physically located. These capabilities promote parallel rather than serial information processing, broaden the knowledge base, and increase both operational efficiency and “speed of command.”

Even though these are sophisticated capabilities, the joint community’s collaboration efforts pursue the next level of development—one that immerses the joint force in a pervasive environment of collaboration as a routine way of daily business. This transformational capability will put US commanders at the forefront in making superior decisions in future operations.

USJFCOM JWFC welcomes comments on these and other perspectives concerning the potential impact of CIE development and collaborative capabilities on joint operations.

Glossary

Part I — Abbreviations and Acronyms

AOR	area of responsibility
ASD	Assistant Secretary of Defense
C2	command and control
CIE	collaborative information environment
CJCS	Chairman of the Joint Chiefs of Staff
COA	course of action
COE	center of excellence
CONOPS	concept of operations
COP	common operational picture
CROP	common relevant operational picture
DCTS	defense collaborative tool suite
DOD	Department of Defense
DOTMLPF	doctrine, organizations, training, materiel, leadership and education, personnel, and facilities
EBO	effects-based operations
GCC	geographic combatant command
GIG	Global information Grid
HQ	headquarters
ISR	intelligence, surveillance, and reconnaissance
IWS	InfoWorkSpace
JCS	Joint Chiefs of Staff
JFC	joint force commander
JIP	joint interactive planning
JIVA	Joint Intelligence Virtual Architecture
JP	joint publication
JROC	Joint Requirements Oversight Council
JS	Joint Staff
JTF	joint task force
JWFC	Joint Warfighting Center
KM	knowledge management
MC02	MILLENNIUM CHALLENGE 2002
NGCS	Next Generation Collaborative Services
ONA	operational net assessment
OSD	Office of the Secretary of Defense
SJFHQ (CE)	standing joint force headquarters (core element)
SOP	standing operating procedure
SPPS	SharePoint Portal Server
USJFCOM	United States Joint Forces Command
USPACOM	United States Pacific Command
USSOUTHCOM	United States Southern Command

Part II — Terms and Definitions

center of excellence (COE). An institution that possesses special knowledge or expertise in a particular area. Centers of excellence are often incorporated into the collaborative environment to facilitate development of products that support combatant command functions and operations. A COE may be a government or non-government organization, such as academia or industry. (*SJFHQ (CE) SOP*)

collaborative information environment (CIE). A virtual aggregation of individuals, organizations, systems, infrastructure, and processes to create and share the data, information, and knowledge needed to plan, execute, and assess joint force operations and to enable a commander to make decisions better and faster than the adversary. (*CIE Concept Primer*)

common operational picture (COP). A single identical display of relevant information shared by more than one command. A common operational picture facilitates collaborative planning and assists all echelons to achieve situational awareness. (*JP 1-02*)

decision superiority. Better decisions arrived at and implemented faster than an opponent can react, or in a noncombat situation, at a tempo that allows the force to shape the situation or react to changes and accomplish the mission. (*Joint Vision 2020*)

effects-based operations (EBO). Operations that are planned, executed, assessed, and adapted based on a holistic understanding of the operational environment in order to influence or change system behavior or capabilities using the integrated application of selected instruments of power to achieve directed policy aims. (*SJFHQ (CE) SOP*)

global information grid (GIG). The globally interconnected end-to-end set of information capabilities, associated processes, and personnel for collecting, processing, storing, disseminating, and managing information on demand to warfighters, policy makers, and support personnel. The GIG includes all owned and leased communications and computing systems and services, software, data, security services, and other services necessary to achieve information superiority. (*JP 1-02*)

information superiority (IS). The capability to collect, process, and disseminate an uninterrupted flow of information while exploiting or denying an adversary's ability to do the same. (*Joint Vision 2010*)

joint interagency coordination group (JIACG). A multifunctional advisory element that represents the civilian departments and agencies and facilitates information sharing across the interagency community. It provides regular, timely, and collaborative day-to-day working relationships between civilian and military operational planners. (*SJFHQ (CE) SOP*)

knowledge management (KM). The handling, directing, governing, or controlling of natural knowledge processes (acquire/validate, produce, transfer/integrate knowledge) within an organization in order to achieve the goals and objectives of the organization. (*J-9 Knowledge Management Concept of Operations*)

operational net assessment (ONA). The integration of people, processes, and tools that use multiple information sources and collaborative analysis to build shared knowledge of the adversary, the environment, and ourselves. (*ONA Concept Primer*)

standing joint force headquarters core element (SJFHQ (CE)). A full-time, joint, command and control element that is part of the geographic combatant commander's staff. It has a daily focus on warfighting and is a fully integrated participant in the combatant command staff's planning and operations. (*SJFHQ (CE) SOP*)

web-based enterprise portal. An electronic gateway that enables users to access the command's local data sources and, eventually, the virtual information warehouse.

“In today's collaborative information environment, every level of command—throughout the entire force and including coalition partners—is electronically linked to the combatant commander's decision-making process. Subordinate commanders and staffs understand the context behind key changes across the battlespace and are fully aware of changes in the commander's intent to guide their actions during specific missions.”

Admiral E.P. Giambastiani
Commander
United States Joint Forces Command

Remarks for Air Force Association
“Integrated Air Warfare” Symposium
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