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APPLYING “COLLABORATION” TO UNITED STATES EUROPEAN COMMAND (USEUCOM) MISSION PROCESSES

Mr. Gregory G. Chapin
Senior Systems Engineer
 MITRE Corporation European Operations
 Geb. 2302, Zi. 109
 Patch Kaserne
 70569 Stuttgart, Germany
 Telephone: +49-711-680-5786
 Fax: +49-711-687-7799
 Email: gchapin@mitre.org

LCDR Steve Dodd
Deputy Chief of Targets
 USEUCOM Intelligence Directorate, Targets Branch
 From Dec 1996 to Oct 1999
 Telephone: 001-902-427-0550 extension 0154
 Fax: 001-902-427-5724
 Email: tn22@marlant.hlf.dnd.ca

Foreword

“[The] ability to reach-back and use capabilities in the continental United States to perform functions formerly accomplished only in the theater of military operations is one of the highlights of operation Allied Force. Such capability improves responsiveness to urgent requirements in a conflict and reduces the amount of equipment and the number of personnel that must be transported to the theater. In short, the capability to integrate our force globally yields significant improvements in our ability to respond to crises, particularly during their initial stages...

Extensive growth in communications capacity enabled an unprecedented degree of reliance on U.S.-based forces to provide direct support for in-theater tasks. Targets in Kosovo and the Federal Republic of Yugoslavia were developed through the concerted effort of numerous agencies in the United States cooperating closely with commands in Europe. Planning and integration of cruise missile attacks by bombers operating from the continental United States and the United Kingdom and by ships and submarines operating in the Mediterranean were closely coordinated by commanders and planners who were

widely separated geographically. Bomb damage assessments of strikes made against targets in theater were conducted by agencies and commands located in the United States in close support with efforts by commands in the European theater. This system of using geographically dispersed activities to perform and integrate bomb damage assessment (BDA) became known as federated BDA. Expert personnel located in the United States and Europe performed detailed planning of information operations. Kosovo operations continued a trend of increasing global integration of U.S. forces and commands to support operations in a distant theater.

The European Theater’s unprecedented reliance on organizations and personnel in the United States and elsewhere was enabled by advances in information technology. High-capacity communications made possible the exchange of large amounts of data such as high-resolution imagery and secure video teleconferencing. In addition, extensive growth and availability in defense data and communications networks enabled unprecedented coordination by staff members in European commands and supporting commands outside of Europe by secure e-mail. Secure

high-capacity networks using Web-based technology permitted personnel; engaged in theater to access up-to-date information posted for their use on military Web sites around the world.”¹

This paper describes how collaboration can be applied to mission processes to support deliberate and crisis planning and operations. Operation Allied Force operators stated that proper application of collaboration improved the effectiveness of information processes, improved product quality and benefited federated efforts by geographically separated partners. During Operation Allied Force, USEUCOM operators demonstrated that collaboration can benefit mission effectiveness. Applying collaboration to existing or modified mission processes needs to be continued, refined and expanded to include NATO allies.

This paper serves as a reminder of the most important system component, the military operators, who effectively applied collaboration to benefit mission processes. The assistance of Lt Col Western, LTC Stearns, LCDR Kraft, and SMSgt Schwarting is appreciated. The dedicated efforts of LCDR Dodd as operational advisor and key contributor are also recognized.

Direct comments and questions about this paper to Mr. Greg Chapin.

List of Reviewers

The author recognizes and appreciates the contributions, review, and comments from the following people.

Mr. Patrick Brown, MITRE
Maj Don Comi, USAF, USEUCOM, Current Operations Branch
CWO Cornelis deWaart, Multi-National Intelligence Coordination Cell (MNICC), UAV/WEB
LT Tom Disy, USN, COMSIXTHFLT, TLAM Strike Cell
LCDR Steve Dodd, USN
LTC Juan Dusmet, Spanish Army, Battlefield Information Collection and Exploitation Systems (BICES)
LCDR Cynthia Gaston, USN, Chief, Multi-National Intelligence Coordination Cell (MNICC)/ Joint Analysis Center Molesworth
Ms. Isma Granger, MITRE
Mr. Jack Hammond, MITRE, (BICES)
Col Uwe Holland, German Air Force, Intelligence, BICES
Maj Pat Johnson, USAF, U.S.JFCOM Cruise Missile Support Activity (CMSA)

LCDR Rob Kraft, USN, USEUCOM, Targets Branch
LtCol Tony Montgomery, USAF, USEUCOM, Deputy Staff Judge Advocate/Chief of Operations Law
Mr. Spurge Norman, MITRE
Ms. Karen Pagel, MITRE
LCDR Doug Peabody, USN, COMSIXTHFLT, TLAM Strike Cell
Mr. Winston Rogers, MITRE, BICES
Ms. Maggie Scheid, MITRE
SMSgt Ron Schwarting, USAF, USEUCOM, Production Branch
LTC Frank Stearns, USA, USEUCOM, Watch Chief
Col Marc Thompson, USAF, USEUCOM, Chief, Production Requirements Division
LtCol Paul Turner, USAF, USEUCOM, Systems Branch, Chief of NATO and Coalition Intelligence Support, Systems, Linked Operations-Intelligence Centers Europe (LOCE)
Ms. Ruth Ann Valentine, MITRE
LtCol Jeff Western, USAF, USEUCOM Chief of Targets

Introduction

This paper describes the United States European Command's (USEUCOM's) application of "collaboration"² to mission processes. The main points presented are:

1. USEUCOM is judiciously applying collaboration to benefit mission processes. USEUCOM is:
 - Applying collaboration daily to mission processes; not just talking about it
 - Supporting operations and contingency planning with collaboration to reduce process timelines and improve product quality; not conducting demonstrations, experiments, or studies
 - Collaborating in an operational environment with the associated constraints and security accreditation requirements; not in laboratories or across networks using equipment not representative of USEUCOM's environment
 - Benefiting from lessons learned and best practices
 - Expanding collaboration when and where it makes sense

According to Operation Allied Force participants, collaboration mitigates the effects of information overload, improves team decision-making, and

² "Collaboration" is more than just the technological capabilities (e.g. web-based applications, whiteboard, text chat, and audio). For this paper, collaboration includes:

- Technological capabilities
 - Collaborative session techniques
 - Concept of operations (e.g., process owners, roles and responsibilities, and procedures)
 - Standardized product templates
- Attachment 1 describes the primary collaborative techniques and capabilities used at USEUCOM.

¹ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, pp. 122-124

synchronizes situational awareness. USEUCOM participants indicate that collaboration is positively impacting mission processes.

2. Operation Allied Force demonstrated the benefits of collaboration and highlighted USEUCOM's operational requirement to collaborate with NATO allies to support operations. As a result, USEUCOM senior leadership is advocating the expansion of collaboration within the intelligence community, including expansion to NATO allies. NATO should consider satisfying the collaboration requirement. First, NATO might consider satisfying this requirement within the targeting community, focusing on target development and nomination, target approval, and Air Tasking Order (ATO) generation and management. Challenges and issues addressed by USEUCOM to satisfy the collaboration requirement are discussed. Like USEUCOM, NATO may encounter some similar and some unique challenges and issues.
3. USEUCOM encountered and addressed several challenges and issues to apply collaboration successfully to mission processes. USEUCOM's lessons learned and best practices are provided for NATO's consideration and potential use.

USEUCOM Experiences Applying Collaboration to Mission Processes

"The command, control, communications, and computer (C4) support to Operation Allied Force was highly successful. Several important communications capabilities saw their first significant combat application: use of Web-based technologies for coordination and information sharing; video teleconferencing for command, control, and coordination; and e-mail for coordination and tasking."³ This section describes USEUCOM's use of collaboration for combat applications during Operation Allied Force.

USEUCOM is applying collaboration to three mission processes.

- Tomahawk Land Attack Missile (TLAM) Mission Planning
- Final Phase of Fixed Targets Development and Nomination for Approval
- Synchronization and Sharing of Current Intelligence

A summary of each process describes:

- Need and Objective
- Process and Participants

- Approach
- Results

Comments from Operation Allied Force participants on applying collaboration to USEUCOM's mission processes conclude this section.

TLAM Mission Planning

Need and Objective:

Before applying collaboration, COMSIXTHFLT tasked the Cruise Missile Support Activity (CMSA) with Tomahawk Land Attack Missile (TLAM) mission planning using message traffic in sequential fashion. According to COMSIXTHFLT and CMSA participants, the ambiguity and uncertainty inherent in cumbersome, text only message tasking needed to be replaced by a more efficient tasking mechanism and process. CMSA frequently contacted COMSIXTHFLT for additional information or clarifications to satisfy the Mission Planning Requests (MPRs). Participants indicated that this methodology needed modification to improve accuracy, effectiveness, and responsiveness of TLAM strikes.

Process and Participants: TLAM mission planning is the first mission process in USEUCOM to use collaboration actively. The USEUCOM process owner⁴ is COMSIXTHFLT TLAM Strike Cell, Plans. Primary participants include:

- COMSIXTHFLT Gaeta, Italy: TLAM Strike Cell, Plans
- U.S. Joint Forces Command (JFCOM) Cruise Missile Support Activity (CMSA) Norfolk, Virginia

Other participants include:

- Headquarters United States European Command (USEUCOM) Stuttgart Germany: Targets, Crisis Action Plans

Approach: COMSIXTHFLT provides targeting and mission information to CMSA by completing a web-based MPR form. CMSA retrieves the MPR from the web and uses the information to work the task. The web-based MPR form with pull down menus improves the communication and coordination process. The selectable menus facilitate tasking and planning by providing a mandatory specific standard list of field declaration options. If necessary, CMSA reviews certain MPR fields with COMSIXTHFLT to obtain clarifications and ensure the tasking is understood. As the tasking organization, COMSIXTHFLT obtains relevant imagery products. COMSIXTHFLT and

³ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.26

⁴ The process owner is the responsible for creating a group with a mission focus, directing the participants, and controlling collaborative sessions. Collaborative session focus, participant roles and responsibilities, and results are the process owner's responsibility. Reference the operational category of the Lessons Learned and Best Practices from USEUCOM's Collaborative Experiences section for recommended process owner responsibilities.

CMSA use collaboration to simultaneously review and annotate the imagery products. The simultaneous review expedites task completion and synchronizes understanding. CMSA uses the MPR and collaborative session results to fulfill the request by producing the TLAM mission and associated TLAM Target Aimpoint Graphic (TAG).

Results: COMSIXTHFLT and CMSA participants indicated that applying collaboration and using the web-based MPR form improved the TLAM mission planning process. Participants indicated that the modified approach resulted in improved accuracy, effectiveness, and responsiveness of TLAM strikes compared with the former approach. The MPR template assisted in standardizing terminology. Accuracy and completeness in satisfying information requirements improved. TLAM mission planning participants indicated that collaboration removed tasking ambiguity. As a result, participants estimated that response times from mission tasking to planning completion were nearly cut in half. COMSIXTHFLT's and CMSA's continued operational use and advocacy for the web-based MPR form and collaboration appears to be another indication of success.

Final Phase of Fixed Targets Development and Nomination for Approval

"During the course of the campaign, NATO developed mechanisms for delegating target approval authority to military commanders. For selected categories of targets — for example, targets in downtown Belgrade, in Montenegro, or targets likely to involve high collateral damage — NATO reserved approval for higher political authorities. NATO leaders used this mechanism to ensure that member nations were fully cognizant of particularly sensitive military operations, and, thereby, to help sustain the unity of the alliance.

Legal reviews of selected targets were conducted at successive echelons of the chain of command. Targets nominated for approval by SACEUR received legal reviews in the field. Targets nominated that met the criteria requiring NCA approval received detailed legal scrutiny by the Legal Counsel to the Chairman of the Joint Chiefs of Staff and by the DOD General Counsel. Legal reviews involved evaluation of certain targets as valid military targets as governed by applicable principles of the laws and customs of armed conflict."⁵ As described below, the USEUCOM targets community used collaboration to support portions of the fixed targets coordination and approval process.

Need and Objective: The extended air campaign against Serbia lasted 78 days and required a more efficient targets development and production process.

"During Operation Allied Force, NATO forces conducted over 23,300 strike missions against an array of targets. These strikes were directed at roughly 7,600 target aim points associated with a variety of fixed targets as well as at just over 3,400 flex targets."⁶ The USEUCOM Chief of Targets requested that the fixed targets development and nomination process be modified, leveraging collaboration to improve coordination and approval. The objective was to improve process efficiencies to increase target availability in support of mission objectives and strike operations.

According to Operation Allied Force collaborative session participants, the process used prior to applying collaboration is important to understand in order to fully appreciate the benefits gained by modifying the process to use collaboration. Nine geographically separated sites worked on and coordinated products sequentially. One site forwarded its initial work as email attachments, message traffic, fax, and/or phone calls to other sites with different responsibilities. Another site made product changes and sent the updates to participating sites. The process continued until the final product was sent to decision-makers for review and approval. Decision-makers received an email with the attached product information and either accepted the product information or returned it for further development.

The serial workflow extended the process timeline and provided opportunities for the nine sites to introduce ambiguities and errors. Participants indicated that communicating point-to-point, without consensus of other participants, created confusion, reduced accuracy of product information, and caused duplication of efforts. The sites involved did not always have a thorough understanding of other sites' tasks and goals. Therefore, some sites only understood the purpose, interdependencies, and value of their contributions from a parochial perspective. Process deficiencies made execution and approval too time consuming and difficult due to the following:

- Redundant information flowing to decision-makers
- Sequential coordination and approval by multiple organizations
- Maintaining currency of information and products existing in multiple versions and media types
- Understanding the rationale behind changes to avoid repetitious errors
- Tracking the status of products held for refinement or outstanding action
- Inconsistent quality control and standardization

Process and Participants: The collaborative sessions supported portions of the overall targeting process.

⁵ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.24

⁶ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.87

The USEUCOM targets community used sessions to construct and obtain theater agreement on final target approval briefings for decision-makers. The USEUCOM process owner is the Chief of Targets, Headquarters European Command Targets branch. Participants included:

- Headquarters United States European Command (HQ USEUCOM) Stuttgart, Germany: Targets, Crisis Action Plans, Judge Advocate/Operations Law
- Joint Task Force (JTF) NOBLE ANVIL Naples, Italy: Joint Target cell, Judge Advocate (JA)
- United States Air Force Europe (USAFE) Ramstein AB, Germany: 32nd Air Intelligence Squadron (AIS) Targets
- Joint Analysis Center (JAC) Royal Air Force (RAF) Molesworth, United Kingdom: JAC Targets
- COMSIXTHFLT Gaeta, Italy: TLAM Strike Cell, Plans and Targets
- Defense Intelligence Agency (DIA)/Joint Staff (JS) J2T Washington DC: Targets
- Combined Air Operations Center (CAOC) Vicenza, Italy: CAOC Targets US representatives

Approach: Daily, USEUCOM and US national-targeting agencies held regularly scheduled, collaborative sessions. A standardized template containing specific target information required for approval aided the communication and coordination process. The template standardized terminology and ensured accurate documentation of required targeting information prior to delivery to executive decision-makers. The collaborative sessions focused on targeting information. Participants used a concept of operations with roles and responsibilities and standard operating procedures to properly prepare for and control sessions.

The Joint Task Force (JTF) targets cell led the sessions. Headquarters USEUCOM targets branch controlled the target information during sessions and monitored quality control. Intelligence product development or other functional personnel (e.g., legal and operations) contributed to or reviewed the product information. Collaboration enabled participants to view imagery products and collate existing intelligence information into a single product. Collaboration allowed the target information to be reviewed, discussed, modified, and documented concurrence of JTF decisions and action items. The JTF targets cell approved or held target information for release to crisis action plans branch. The crisis action plans branch forwarded the target information to executive decision-makers for final approval or provided additional requirements during the session.

Results: The collaborative sessions successfully facilitated the coordination and approval of fixed targets during the Operation Allied Force air campaign.

USEUCOM and US national target intelligence analysts used collaboration effectively to share intelligence information. Collaboration greatly aided the production of target materials used by senior level decision-makers (e.g., United States National Command Authority (NCA) and North Atlantic Council (NAC). USEUCOM targets community representatives estimate that the timeline decreased from 2-4 days to 2-3 hours. Participants indicated that coordination and synchronization benefited, improving process efficiencies and product quality. The collaborative sessions required detailed target development work prior to convening a session. This work is dependent on a sufficient number and right functional combination of trained personnel with access to current and accurate information. The USEUCOM targets community believes the potential exists to improve the quality and timeliness of intelligence throughout the targeting process by modifying processes to include collaboration where appropriate.

Collaboration removed or reduced the process deficiencies describe under *Need and Objective*. Posting synchronized information to web-sites replaced multiple email attachments that contained product information and modifications. Simultaneous participation improved the feedback cycle. As a result, the rework time of target information for approval briefings significantly decreased while the overall understanding and ultimate value of the information significantly improved.

Another indication of success is the USEUCOM targets community continued use and refinement of collaborative sessions to support operations and contingency planning. Collaborative sessions are now applied from beginning-to-end for target development, nomination, and production processes. USEUCOM's dynamic Area of Responsibility (AOR) required expansion of participants since Operation Allied Force. As a result, eight new sites now participate in collaborative sessions.

Synchronization and Sharing of Current Intelligence

Need and Objective: The decentralized, independent, and point-to-point sequential phone coordination of USEUCOM intelligence watches often results in circular or unsynchronized reporting. The Director of Intelligence and HQ USEUCOM Watch Chief requested that the USEUCOM watches use collaboration to begin working together as a single watch.

Process and Participants: The USEUCOM Watch community's collaborative sessions are aimed at enhancing intra-theater intelligence watch coordination, synchronization, and situational awareness by facilitating a single, comprehensive

intelligence picture among USEUCOM's geographically dispersed intelligence watches. The Watch community holds daily sessions, where each organization's important issues are presented and discussed. Ad-hoc meetings can be called to coordinate and share reports on high-interest or fast breaking events. Stations from other theaters or from the national community may participate. The goal is for collaboration to become the primary means of coordination among USEUCOM intelligence watches.

USEUCOM had to identify and appoint a process owner. The intelligence watches across USEUCOM did not have a theater-level process owner. The Intelligence Production Chief appointed the Chief of the Headquarters European Command Watch as the process owner. Participants include

- HQ EUCOM Stuttgart, Germany: HQ Watch, Crisis Action Team (CAT) Watch (when active)
- Joint Analysis Center (JAC) Royal Air Force (RAF) Molesworth, United Kingdom: I&W Watch
- United States Air Force Europe (USAFE) Intelligence Operations Center (IOC)

An expansion plan to add intelligence watches across USEUCOM is being executed.

Approach: The Director of Intelligence's daily top issues and priorities are the focus for sessions. A concept of operations and standard operating procedures are used to focus and control watch sessions. Headquarters USEUCOM Watch leads the session and shares the top intelligence issues with participating watches. Each participant watch obtains leadership's top intelligence issues and priorities, provides an update status on each issue, and recommends adding issues. Session results are documented and posted to a web-site. Addressing fast-breaking events, developing spot reports, and working issues together using collaboration to share and analyze intelligence data (e.g., maps, imagery, and reports) are planned.

Results: The watch collaborative sessions are held daily. USEUCOM is executing the plan to expand site participation and insert additional collaborative techniques and capabilities into sessions. For example, watch sessions may use whiteboard capabilities to share imagery, review and adjust indicator lists, and review maps and charts that have situation overlays. The daily sessions are institutionalizing a collaborative mindset and are providing a foundation for significant returns. The daily review and coordination of the top intelligence issues:

- Ensure awareness of the Director of Intelligence's top issues and priorities
- Provide components and Joint Task Forces (JTFs) the opportunity to modify or update daily issues
- Provide a forum to submit new issues

- Improve synchronization of current intelligence and operations
- Expedite situational awareness concerning developing events
- Allow non-participants to obtain session results from a web-site

Participant Comments on Applying Collaboration to USEUCOM's Mission Processes

As USEUCOM's experiences demonstrate, collaboration can mitigate the effects of information overload, improve team decision-making, and synchronize situational awareness. Collaboration provided one means to execute a theater-federated process with worldwide participants as described in the Report to Congress. "A federated intelligence process was instituted to facilitate burden-sharing among intelligence processing centers worldwide. This approach reduced deployment costs while maximizing the use of existing finite resources. The federation process was highly successful and depended on information sharing and agreements among participants. It would not have been possible, however, without applied technology, innovation, and pre-planning of exercises."⁷

According to Operation Allied Force participants, collaboration appears to be positively impacting the coordination, synchronization, accuracy, quality, and timelines of USEUCOM mission processes. USEUCOM experiences using collaboration demonstrated some of the phenomena anticipated by the Joint Vision 2010. "Joint Vision 2010 anticipates these phenomena — from use of technologies such as video teleconferencing — by observing '...higher echelons will use these technologies to reduce the friction of war and to apply precise centralized control when and where appropriate. Real time information will likely drive parallel, not sequential planning and real time, not prearranged, decision-making. The optimal balance between centralized and decentralized command and control will have to be carefully developed as systems are brought into the inventories'."⁸

Participants made the following comments on the benefits of collaboration to USEUCOM's mission processes. The comments are divided into four categories.

- Process Improvements
- Productivity Improvements
- Product Improvements
- Resource Alternatives

⁷ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.53

⁸ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.28

Process Improvements

- Provided an easy method to keep participants informed on current process and product status
- Raised concerns and ensured participants knew process steps
- Brought various disciplines together and enabled cross-functional (e.g., intelligence, operations, legal) process participation
- Added quality to the product review process
- Facilitated the coordination process prior to product delivery to executive decision-makers
- Provided a regularly scheduled forum where thoughts and ideas could be traded based on knowledge, experience, and facts that each participant provided
- Brought time-sensitive products to the attention of the key players in the approval process. Reduced frequency of losing products in the approval queue where they could spend weeks before being worked.
- Eliminated serial workflow and reduced the number of product modifications. The difficult and convoluted process went smoother and faster after the collaborative sessions began.⁹
- Provided a forum for sites to make a final, coordinated check and provide late-breaking updates on product information

Productivity Improvements

- Provided an exponential increase in productivity
- Decreased estimated production time significantly
- Reduced the discussion and lead site's approval cycle of products
- Revolutionized the process, significantly reducing staff effort

Product Improvements

- Advanced the development of a standard template for presenting product information, creating a consistent product for decision-makers
- Provided a single product template that represented each product's information. This template provided participants with a common reference point that resulted in better understanding and improved team decision-making.
- Synopsized complex product information and gave participants a common frame of reference to facilitate discussion. Product templates were suitable for presentation to executive decision-makers, further streamlining the approval process.

⁹ Participants realized that the serial decision process is not necessary given up-front, collaborative coordination. Once a primary decision is made, many subsequent actions do not require additional decisions to be made. The decisions only need to be executed.

Resource Alternatives

- Provided senior to mid-level decision-makers and operators (e.g., targeting and analytical) an alternative to video teleconferences (VTCs) that were dominated by flag-level officers
- Let operators participate from their workspaces and allowed access to key information and materials during sessions

Collaboration with NATO Allies

"Although experience in Operation Allied Force confirmed that the United States and our allies have made significant accomplishments working together, it also made clear that improvements are necessary...

Among the most important of these are deficiencies in command-and-control and information systems, secure communications, precision strike capability, air operations support, and mobility systems. During Allied Force these shortcomings ... impeded our ability to operate more effectively with NATO allies."¹⁰

This section discusses the requirement, recommendation, and challenges associated with improving collaboration between NATO allies to support operations.

1. Operation Allied Force demonstrated that collaboration with NATO allies is necessary. Several USEUCOM military operators validated that collaboration with NATO allies is an operational requirement.
2. USEUCOM recommendations are provided for NATO's consideration in satisfying the requirement to improve collaboration between NATO allies
3. Challenges and issues faced by USEUCOM to apply collaboration successfully are described. NATO may encounter some similar and some unique challenges and issues.

Collaboration with NATO Is an Operational Requirement

Operation Allied Force clearly demonstrated, collaboration with NATO allies is necessary. One lesson learned by the USEUCOM targets community is that increased and improved collaboration between NATO allies to support the targeting process is needed. As a result, USEUCOM operators have stated the requirement to collaborate with NATO to support operations. Since USEUCOM is a participant in NATO operations, a reliable collaborative capability with NATO counterparts is essential.

Several USEUCOM operators stated that improved collaboration with NATO allies is a top priority.

¹⁰ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.xix

Intelligence operations and geo-spatial information services personnel validated the requirement to collaborate with NATO allies. A US representative at the Combined Air Operations Center (CAOC) targeting cell stated the requirement to allow collaboration across security enclaves (SECRET US ONLY to SECRET RELEASABLE TO NATO). NATO should continue or begin to address the challenges and issues with increased emphasis and additional resources to improve or replace existing capabilities between NATO allies and satisfy the collaboration requirement.

Recommendations to Satisfy the Collaboration Requirement

Based on Operation Allied Force lessons learned, NATO should consider satisfying the collaboration requirement. First, NATO might consider satisfying this requirement within the targets community focusing on target development and nomination, target approval, and Air Tasking Order (ATO) generation and management.

Tasking an existing or new NATO working group to work the collaboration requirement is offered for NATO's consideration. The working group could:

- Coordinate with NATO and member nation operators to identify a process owner and develop a Concept of Operations
- Develop Standard Operating Procedures and provide training
- Work with NATO network domains and site technical representatives to develop an architecture that maximizes interoperability and integrates into the enterprise baseline and participant sites' system baselines
- Work with information security representatives to provide procedural and technical solutions that meet accreditation and security risk management requirements

Challenges and Issues to Satisfy the Collaboration Requirement

Like USEUCOM, NATO will encounter challenges and issues to satisfy the collaboration requirement. The working group will need to address the NATO and Member Nations' challenges and issues encountered. USEUCOM has encountered and addressed several challenges and issues that NATO may encounter. Some challenges and issues faced by NATO may be more complex than or different from USEUCOM's experiences since NATO is a supra-national organization comprised of multiple sovereign nation-states. Some of the challenges and issues that may need to be addressed are:

Policy: Leadership, representing both NATO and member nations, must identify what information and

products can be shared during collaborative sessions. Otherwise, releaseability issues may reduce the benefit collaboration can have on time sensitive mission processes. Leadership must balance the risk associated with conducting NATO collaborative sessions against the potential consequences to personnel and mission if information is not shared in a timely fashion. Collaboration and information sharing is always a risk and requires investments of time, staff, and other resources. Leadership must determine whether the investment and risk of sharing information is worth the potential returns. A compromise between the "need to know" and "need to share" policies needs to be made.

For example, U.S. information releaseability policy may inhibit collaboration with NATO unless modifications are made. "In addition to dissemination problems on the data networks discussed above, U.S. sensitivity to releasing certain types of information greatly inhibited combined planning and operations in some areas."¹¹

The Report to Congress addresses facilitating distribution of U.S. intelligence products to warfighters and allies. "Much of the U.S. information in question should be classified at the SECRET collateral level releasable to the coalition operation so that it can be effectively used by both U.S. and coalition warfighters. To the extent possible, imagery and signals intelligence data should classified 'SECRET/NOFORN Releasable to NATO,' and sources and methods should be protected 'by exception,' rather than the other way around."¹² "The Department will explore ways to permit intelligence and other information to be classified at the lowest possible classification level in order to ensure its availability to warfighters and coalition partners, while still protecting intelligence sources and methods."¹³

Process Owners and Concept of Operations (CONOPs): The identification and appointment of a process owner with existing or formally announced, delegated executive authority that is recognized by all participant sites may be more complex since NATO is a supra-national organization. Likewise, a dedicated, cooperative effort will be required to develop a useful CONOPs.

Infrastructure and Interoperability: The network connectivity and information infrastructure required for collaboration needs to be provided to participant sites. USEUCOM's collaborative efforts leveraged existing U.S. infrastructure and connectivity. General systems

¹¹ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.50

¹² Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.51

¹³ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.134

engineering expertise will be required to assist with the planning and management of the supra-enterprise architecture.

The Report to Congress highlights problem areas.

"Although successful in some areas, NATO [command, control, communications, and computers] C4 capability was limited by the lack of C4 agreements and the need for more stringent enforcement and implementation of existing agreements. Problem areas included (1) sharing of bandwidth and C4 assets, (2) C4 network integration training standards at the combined and joint task force level, (3) spectrum management within combined and joint task forces, (4) network security, (5) lack of timely compliance with NATO standardization agreements (STANAGs), and (6) releasability of information. In addition, the C4 host nation agreement process needs to be expedited, and the focus of the agreements should be on standards and architectures rather than specific hardware."¹⁴

"Information interoperability was sometimes a major problem. This was true during both U.S. joint operations and combined NATO operations. Interoperability concerns were noted in how information is disseminated (the supporting C4 infrastructure) and how to disseminate it securely (releasability of various levels of classification). Dissemination networking and procedures were ad hoc, and it was never possible to present a common operational picture to joint and allied commanders... In summary, we see that interoperability will be the cornerstone for future alliance participation."¹⁵

NATO and U.S. are providing mechanisms to assist in formalizing command, control, communications and computers (C4). Formal C4 policies will likely benefit efforts to provide a collaborative infrastructure by addressing needs documented in the Report to Congress. "As the United States and NATO fielded these capabilities, some policy differences emerged that highlighted the need for increased emphasis and coordination in the alliance. The Defense Capabilities Initiative and NATO's Strategic Concept provide mechanisms to assist in formalizing C4 policies. Intensive efforts in this vital area of alliance command, control, communications, and computers will contribute to improved interoperability and reduction in the imbalance in capabilities."¹⁶

One possibility is to use NATO's existing network domains as a starting point. The four key NATO intelligence network domains should be considered in

the analysis and development of solutions. The four key NATO intelligence network domains are:

- The NATO-nations Battlefield Information and Collection Exploitation Systems (BICES)
- Allied Command Europe's (ACE) ACE Command and Control Information System (ACCIS) centered around CRONUS, with its intelligence applications
- Allied Command Atlantic's (ACLANT) Maritime Command and Control Information System (MCCIS)/National Intelligence Data Transfer System (NIDTS), with its intelligence applications
- United States European Command's (USEUCOM) Linked Operations-Intelligence Centers Europe (LOCE)

Other NATO networks that are used by different functional communities should probably also be considered. Operation Allied Force demonstrated clearly the need and benefits of having the required combination of functional representatives (e.g., intelligence, operations, legal) participate in collaborative sessions.

The Intelligence Projects Integrated Working Group (IPIWG)¹⁷ continues to discuss issues such as the use of collaboration tools. Web access and email capabilities are already available between NATO domains and partially satisfy the collaboration requirement. BICES is currently evaluating and attempting to use some collaborative capabilities. NATO could benefit from the International Military Staff (IMS) Intelligence Division and the IPIWG working together on collaboration. This group could build on the existing network domains to provide an initial set of collaborative capabilities.

Culture: Differences in culture, language, automation skills, as well as experience in collaboration and information sharing may impact mission groups in NATO more than USEUCOM. Symbology, terminology, and language usage need to be standardized.

Funding: The acquisition approach and resources to provide collaboration and the associated dependencies (e.g., infrastructure, operational and technical support, and training) must be determined.

¹⁴ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.47, 48

¹⁵ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.49, 51

¹⁶ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.26

¹⁷ SHAPE's ACE Intelligence Architecture Working Group (AIAWG) created the Intelligence Projects Integration Working Group (IPIWG) and tasked it to develop a feasible, Near-to-Mid Term NATO Wide Intelligence Architecture taking into account existing systems and ongoing projects. The four major NATO intelligence-related systems (or domains) listed above are part of this effort.

Lessons Learned and Best Practices from USEUCOM's Collaborative Experiences

USEUCOM experienced several overarching lessons learned and improvements needed that are documented in the Report to Congress. "...[T]he Department needs to further develop and refine tactics, techniques, and procedures for federated intelligence efforts and to reassess and size long-haul communications needs accordingly. Planning for intelligence communications needs must include deployable systems and technicians. Additionally, the Department needs a clear policy and implementation plan to explain when and how coalition partners can be connected to U.S. networks and, when and how data can be shared with those partners."¹⁸

"The widespread use of video teleconferencing and other advanced technologies for command and control and collaborative planning presented numerous limitations and challenges. In order to optimize the application of these systems and accustom operational commanders to their effects, appropriate doctrine, tactics, techniques, and procedures must be developed. In addition, these technologies should be included regularly in future large-scale joint and combined training exercises."¹⁹ USEUCOM's lessons learned and best practices using collaboration may assist in optimizing the application of collaboration and accustomizing operational commanders to the effects of collaboration.

Lessons learned and best practices from USEUCOM's experiences are provided for NATO's consideration and potential use to satisfy the collaboration requirement. Lessons learned and best practices are grouped into three categories.

- Technical
- Operational
- Accreditation and Approval to Operate

Technical Lesson Learned and Best Practices

According to Operation Allied Force participants, the performance, reliability, and simplicity of the collaborative capabilities within the operational environment are the primary factors that affect operator acceptance and use. The technical lessons learned and best practices that assisted in providing collaboration capabilities with acceptable performance, reliability, and simplicity in the USEUCOM operational environment are provided below.

Basic Capabilities: Capabilities need to be simple to allow operators with basic computer skills to

participate. A trade off between complex capabilities and keeping the system simple should be made with military operators. Use of capabilities will probably evolve as the process matures and increased benefits are realized.

Network Infrastructure and Architecture: Collaboration is dependent on network infrastructure and connectivity to mission-essential participants. The stability, network capacity (bandwidth), and configuration of the network infrastructure directly impact the performance and reliability of collaborative sessions. Network capacity should be viewed as an operational resource. Operators should perform a cost-benefit analysis that compares the mission benefits of collaborative capabilities with other capabilities and requirements that consume bandwidth. An optimal mixture of network infrastructure, design of the collaborative capabilities, and procedural techniques are required to maximize performance and reliability.

The impact to network bandwidth needs to be assessed. Accreditation and the "approval to operate" are based on this assessment. Network impact is difficult to assess since items that consume bandwidth change dynamically during a collaborative session. It is similar to asking what is the impact to network bandwidth of email with attachments or Internet activity.

Some variables that affect performance, reliability and required network bandwidth are:

- Enterprise server location based on an analyses of several items listed below
- Physical location of participants
- Number of simultaneous participants from Local Area Network LAN, from Wide Area Network (WAN)
- Concept of operations (e.g., roles and responsibilities)
- Frequency of server access and file transfers across LAN and WAN
- Information structure and movement within the process
- Technical support
- Collaborative techniques and procedures used (e.g., single-point application sharing vs. giving control to multiple different sites, sharing multiple small files or one large file)
- Collaborative capabilities used
- Size of information being shared
- Configuration of enterprise servers and workstation clients (e.g., audio codec selected)
- Network architecture, management control, and distribution path alternatives

The mission process using collaboration should be compared with the old process as a way to view and assess the overall impact to network capacity. For

¹⁸ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p.53

¹⁹ Kosovo/Operation Allied Force After-Action Report to Congress, 31 January, 2000, p. xxii

example, the modified process using collaboration eliminated numerous emails with attachments sent by multiple sites to multiple sites during the old process. This network capacity savings should be included in the overall assessment.

Integration: Integration of collaborative capabilities into the enterprise baseline and into each participant site's local system baseline is recommended. Capabilities should require few modifications to existing baselines. Requiring a separate workstation for collaboration in existing spaces is not acceptable. The collaborative capabilities should work on existing workstations with minimal modifications. Collaborative capabilities should be independent of workstation make and operating system. Workstation make and operating system independence decreases investment costs and increases the probability of new participants quickly joining the collaborative architecture at garrison and deployed sites.

The collaborative capabilities (e.g., text chat, voice audio), mission applications (e.g., presentation and imagery software), site information repository (e.g., local or network drives where information is stored), and software product templates were integrated into the existing enterprise or sites' system software baselines. Collaborative capabilities must be developed to work within the designated environment's system baseline configuration. The collaborative capabilities must interoperate with the network infrastructure, software (e.g., browser profiles, security permissions, and user account privileges) and hardware (e.g. sound cards) baselines. Collaborative capabilities with a high degree of integration into or interfaces with the enterprise or sites' system baselines should be resilient as possible to baseline component configuration settings and system baseline changes.

Collaborative session participants continue to access their local site's information repository, from workstation or site network drives. No additional effort is required to retrieve, store, and post or disseminate information. Participants use the site information repository since the familiar structure allows information to be located efficiently. Participants develop and share products by using local mission applications software. Integration significantly reduces application and information repository training requirements.

Acceptance Testing: Testing the collaborative capabilities' performance and reliability in the operational environment prior to acceptance is imperative. Collaborative capabilities may meet a specification and perform well in a laboratory environment. However, the system may not integrate easily or well into the operational enterprise baseline and participating sites' baselines.

Interoperability: Collaborative capabilities should be interoperable with enterprise and participating sites' mission application software. Proprietary software or equipment should be avoided. Adhering to commercial international standards increases the probability of achieving interoperability. Using mainstream commercial products improves the ability to evolve with future technologies while providing operators capabilities today.

Configuration Management: Configuration management and testing need to be approached from a mission group perspective. The mission group perspective consists of interdependent baselines. Configuration management and testing of interdependent baselines present unique challenges compared with traditional independent baselines. Interfaces and dependencies of the interdependent baseline must be identified and tested when collaboration dependent participant sites' or enterprise baseline configuration items are modified. For example, one participant site may upgrade the browser component of its baseline. The browser upgrade may make some collaborative capabilities (e.g., audio, and text chat) incompatible with the existing enterprise capability used by the mission process group. Therefore, the site's baseline must be made compatible with the mission process group's capabilities.

Technical Support: Technical support is required on a 7 day by 24-hour basis during operations. Technical support representatives need to assist operators and team with local technical personnel. Local technical personnel are often required to isolate and resolve technical issues manifested as symptoms when using enterprise collaborative capabilities. The symptoms could be caused by the local site's system baseline or network infrastructure and only experienced when using collaborative capabilities.

Professional Relationships: Integration of collaborative capabilities into the enterprise and sites' baselines to achieve good performance and reliability depends on professional relationships developed between general systems engineering and site technical and security personnel; and between general systems engineering representatives and military operators. Good professional relationships between participating sites' military operators, technical and security personnel are instrumental in successfully achieving the implementation of the collaborative capabilities.

Operational Lesson Learned and Best Practices

Technical lessons learned and best practices are not sufficient to realize the potential benefits of collaboration. Operational lessons learned and best practices must complement the technical ones. Operation Allied Force lessons learned demonstrate that collaboration can benefit mission effectiveness

when judiciously applied to existing or modified processes, a process owner is appointed who carries out the recommended responsibilities listed below, and a Concept of Operations (CONOPs) is documented. Collaboration does not replace the need for the right functional combination of well-trained, prepared personnel who have access to current and accurate information. Operational lessons learned and best practices that contributed to using collaboration successfully during Operation Allied Force are provided below.

Appointment of Process Owner: The command or enterprise must identify and appoint a process owner with existing or formally announced, delegated authority and responsibility that is recognized by all participant sites. A process owner must be appointed for each collaborative mission group, mission process, or routine collaborative session, as appropriate. The process owner may appoint an operational advisor to assist with these responsibilities. Recommended process owner responsibilities are:

- Must understand the entire process and the current operation in detail
- Own and provide mission group's requirements
- Identify participants and sites
- Coordinate with and assist participant sites to get capabilities funded and implemented
- Provide military direction, guidance, and information to participants
- Develop Concept of Operations (CONOPs) (e.g., how to use when and where to meet; define and assign roles and responsibilities before, during, and after session.)
 - Identify what sites will have the leader, information coordinator, and/or production developer role(s).
- Provide network connectivity requirements
- Identify process and products, for potential modification with collaboration
- Develops the Standard Operation Procedures (SOPs). The SOPs document session step-by-step specific instructions for each participant. The SOP development is instrumental in modifying the process, selecting and developing collaborative techniques, capabilities, and standardized product templates.

Concept of Operations (CONOPs): Defining roles and responsibilities and preparing for the collaborative sessions is important to achieve success. The process owner or delegate leads this effort with the assistance of the general systems engineer. Session roles (e.g., leader, information coordinator, product developer) and responsibilities assigned take into account the process timeline, experience, control desired, command structure, and number of participating sites. Participants have the capability and opportunity to provide local expertise. The interdependent roles and

responsibilities require definition for the “before”, “during”, and “after” phases of the collaborative session. These roles and responsibilities are critical to establish and execute successful sessions. Roles and responsibilities of federated partners must also be defined and documented. All sites, except site(s) with the lead role, participate for coordination purposes. Examples of three key roles²⁰ are listed below.

Leader: The leader works with the information coordinator to ensure preparation and execution of collaborative sessions.

Before Session

- Determine what items to review and assign preparation responsibilities
- Identify products to review and revisit during session
- Inform sites of key personnel and functional skill mix required during session
- Develop agenda and set schedule

During Session

- Focus on running the session and obtaining results in a reasonable time frame
- Task development work and issue priorities
- Assign action items and suspenses
- Chair session in close coordination with information coordinator
- Approve or hold information and product release
- Act as final authority on questions and decisions

After Session

- Write and provide summary of session and actions to participants

Information Coordinator: The information coordinator works with the leader to ensure preparation and execution of collaborative sessions. The information coordinator is responsible for information and product management.

Before Session

- Schedule session time and setup conference on server
- Coordinate agenda with session lead site
- Test participant sites' systems
- Gather product information for sessions

During Session

- Manipulate data and share product information with participant sites
- Make and save final product changes
- Record text log of significant audio discussion, decisions with rationale, actions, suspenses, and product hold or approval status

After Session

- Save log and provide to participants
- Post products in proper format for participants, consumers, and next phase of process

Product Developer: The product developer provides

²⁰ A site may have multiple roles or role may be shared by multiple sites.

product information to the information coordinator before or during sessions.

Before Session

- Perform detailed development, research, and analysis
- Address data and information shortfalls
- Develop product for session review

During Session

- Obtain priorities from lead
- Provide rationale or explain product information

After Session

- Work action items assigned from lead site

Product and Information Management: The information coordinator works with the process owner or delegate and the general systems engineers on the following tasks.

- Select mission application software to use and develop standard product templates to organize information that is the focus of the collaborative session
- Determine information used in session, information structure, and information repository location for products
- Determine product format
- Develop an information flow and structure to transfer and hold product information between various stages in the process
- Develop information change procedures to ensure the currency, accuracy, and integrity of the information. Information change procedures for shared information is critical to provide version control and conduct successful collaborative sessions.

The importance of information management to conduct productive collaborative sessions cannot be over emphasized.

Nurturing: Nurturing is an important human factor component to successfully apply collaboration. Nurturers assist in institutionalizing collaboration as an alternative method for supporting mission processes and inserting additional collaborative techniques and capabilities as military operators' work schedules permit. As a minimum, a nurturing team should have a general systems engineer and military operator to bridge across each other's disciplines. The resources and time spent with operators on modifying mission processes and applying technology should be equal to or greater than resources and time spent on technology development and fielding issues to improve overall mission benefit. "Buttonology" training is not sufficient. Mission process training proved to be beneficial in executing collaborative sessions with mission groups.

Personnel, Data, and Preparation: Successful collaborative sessions are not guaranteed. Conducting successful collaborative sessions is similar to holding

productive meetings. The existence of current, accurate, and validated information is important. The right functional combination of trained personnel to prepare for, participate in, and contribute to collaborative sessions are paramount to conducting successful sessions, making good decisions, and ensuring product quality.

Session Participation Control: Mission process owners control collaborative session participation. Process owners or designates must be able to immediately add or delete participants to sessions. Participants required network access accounts on a properly configured workstation. This is important since operators may deploy to various sites and numerous augmentees assist locally or in a federated manner during crises. Battle rhythm and mission requirements often dictate expedient addition or deletion of participants. Participants require group or organizational accounts to improve collaboration benefits to some mission processes.

Some reviewers indicated that using collaboration in a NATO environment may be less open than U.S. only sessions. Controls on participation, including the country level, need to be provided with the appropriate privacy and security mechanisms to allow flexible selectivity to address releaseability issues during collaborative activities.

Accreditation and Approval to Operate Lessons Learned and Best Practices

Obtaining accreditation and "approval to operate" for collaboration requires dedicated effort. Personnel who provide accreditation and give "approval to operate" for information systems must be included in the team from the beginning. Sharing information and collaborating over networks requires close cooperation with information security representatives to implement procedural and technical solutions that satisfy both collaboration and accreditation requirements.

Summary

The United States European Command (USEUCOM) is applying collaboration successfully in an operational environment to support deliberate and crisis planning, and operations. According to Operation Allied Force operators, proper application of collaboration improves the effectiveness of information processes, improves product quality, and benefits federated efforts by geographically separated partners. Collaboration allows USEUCOM's geographically separated sites to work as a team and manage increased battle management complexity by mitigating the effects of information overload, improving team decision-making, and synchronizing situational awareness.

USEUCOM's Operation Allied Force lessons learned clearly show the requirement to work with NATO allies in a collaborative environment. USEUCOM operators validated the requirement to collaborate with NATO allies. USEUCOM senior leadership and the targeting community are leading advocates for this requirement. NATO should consider satisfying the collaboration requirement. An existing or new working group could be appointed to energize, resource, and satisfy this requirement. First, NATO might consider satisfying this requirement within the targeting community, focusing on target development and nomination, target approval, and Air Tasking Order (ATO) generation and management.

USEUCOM encountered and addressed several challenges and issues to provide collaborative capabilities and apply collaboration to benefit mission processes. USEUCOM Operation Allied Force lessons learned and best practices are provided for NATO's consideration and potential use to satisfy the collaboration requirement. Technical lessons learned and best practices highlight performance, reliability, and simplicity as the primary factors that affect operator acceptance and use. Operational lessons learned and best practices demonstrate that collaboration can benefit mission effectiveness when judiciously applied to existing or modified processes, a process owner is appointed who carries out the responsibilities recommended, and a Concept of Operations (CONOPs) is documented. Collaboration does not replace the need for the right functional combination of well-trained, prepared personnel who have access to current and accurate information.

The investments made and risks taken by NATO and member nations to improve and increase collaboration could provide significant benefit to NATO's mission effectiveness and alliance solidarity by:

- Allowing military resources to be allocated more effectively and used more efficiently
- Improving alliance coordination, synchronization of situational awareness, and decision-making.

The "need to know" constraint must be balanced against the "need to share" necessity to satisfy time dependent allied operational requirements to execute effective missions.

Attachment 1

Primary Collaborative Techniques and Capabilities Used at USEUCOM

Text chat: Participants use text chat as one of the primary communication capabilities during collaborative sessions. A date/time-stamped, formal log is created and saved using text chat. Some users indicated that text chat is used more than audio once

experience is gained using the system. Each product has a historical log with key points, questions, actions, and current product status. The information coordinator uses text chat to document key points and final decisions made using audio. The historical log allows participants to agree and view the group's final decision. Text chat allows sites to provide feedback to the information coordinator. For example, sites notify the session information coordinator when product information is in view. Text chat also provides an alternative means to communicate if audio is not available or practical.

Voice Audio: Participants frequently use the voice audio capability in a coordinated manner to express concerns that were not easily communicated with the text chat tool or to discuss contentious and complex issues. Normal military radio procedures ensure clarity and brevity. Audio is disabled when participants are not speaking to conserve bandwidth and reduce feedback. Audio significantly reduces the time to reach consensus or make decisions during sessions. Audio generates interaction and synergy, enhancing the quality of products. Overall, participants indicate text chat-only sessions slow and reduce the information exchange among key participants. However, productive sessions have been conducted using text chat only. Audio better enables the leader to direct sessions. The leader uses audio to guide the session while participants provide responses using text chat. Participants use audio to direct requests to the information coordinator for information or product manipulation. Operators emphasize that the combination of text chat and audio used in the right proportion is extremely beneficial and that both capabilities are required.

Application Sharing Capability to Share Products and Information: Application sharing provides products and information to participants during collaborative sessions. Single-point controlled application sharing is when a single collaborative session participant, the information coordinator, shares a digitized product or relevant information with participants. The information coordinator manipulates the application and modifies the product after the proposed changes are discussed via text chat and/or audio, and approved by the leader. The information coordinator does not give up control of the application. Reasons for using single-point controlled application sharing are to:

- Conserve bandwidth and reduce latency effects
- Allow control of session and reduce chaos
- Allow participation of new operators on different shifts from multiple sites with varying computer skills
- Keep techniques simple
- Reduce training requirements

Operation Allied Force military operators who participated in collaborative sessions commented on some of the benefits of application sharing. Application sharing:

- Maintains standard or native product file format and eliminates the need to perform format translation (e.g., From PowerPoint format to whiteboard format and back to PowerPoint format after collaborative session). Inflexible operational process timelines do not allow personnel to pre and post-process information. Operators prefer to work in the process product's native format, make changes, and save to the designated information repository.
- Allows use of core mission application software and provides the ability to take advantage of all the capabilities (e.g., zoom) resident in the application being shared
- Allows use of the primary information repository
- Allows participants to see the information coordinator's cursor movement. This is beneficial in providing feedback. Participants know that the information coordinator is manipulating the application. Using the whiteboard does not provide this feedback.

Whiteboard

Some sessions import imagery into the whiteboard to facilitate discussions. Participants share and annotate images using whiteboard capabilities to coordinate tasking and synchronize understanding. More team discipline and training is required when using whiteboard capabilities compared with single-point application sharing since any participant may modify the whiteboard at any time. The changes made during the session have to be repeated in the native application if the whiteboard does not support saving in the product's native application format.

Web-Based Technology

Web-based access to product information is a key component of USEUCOM's application of collaboration to mission processes. Providing information on web-sites significantly reduces staff workload by decreasing the number of duplicate email or phone requests for information. Rapid access to the most current and accurate information for intelligence and operations planning and execution provides a significant benefit according to Operation Allied Force participants. Web-based forms and databases reduce workload, limit ambiguities, and decrease the number of information updates.