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14. ABSTRACT

In the race to embrace net-centric warfare, many proponents laud its ability to revolutionize the way the United States and its coalition partners fight future wars. Net centric warfare is credited for much of the successes the coalition enjoyed in Operation Iraqi Freedom and Operation Enduring Freedom. While The net-centric warfare concept does hold great promise it poses extensive integration and execution challenges for the Combined/Joint Forces Air Component Commander (C/JFACC) in the Theater Air Ground System (TAGS) during coalition air operations. The idea of achieving ***seamless, fully integrated, interoperable*** command and control operations among coalition forces will be an elusive dream, unless efforts are made toward renewed emphasis on management and oversight by Congress, parity of resources among the Services, and reinventing the Information Management Officer.

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Coalition Air Command and Control Interoperability and Net Centric Warfare: Who Manages Coalition Air C2 Interoperability in the Netted Environment?

by

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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Signature:_____

14 February 2005

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Chapter

There is a need to develop one integrated, user friendly C4I architecture that captures blue and red, air ground and maritime forces at the same time.

General Tommy Franks

Interoperability is the foundation of effective joint, multinational and interagency operations. The joint force has made significant progress towards achieving an optimum level of interoperability, but there must be a concerted effort toward continued improvement.
Since our potential multinational partners will have varying levels of technology a tailored approach to interoperability that accommodates a wide range of needs and capabilities are necessary.

Joint Vision 2020

Introduction

The literature is rife with proponents of net-centric warfare extolling the virtues of its ability to revolutionize warfighting. They contend that net-centric warfare has created another Revolution of Military Affairs (RMA)[1] which has given the United States (U.S.) military a decided advantage in the War on Terror as seen in the instantaneous transmittal of information technology, accessible at a moments notice in the heart of combat, and a much lighter mobile force. The argument is centered on the premise that a networked battlefield will afford the warfighter superior decision support tools which will: increase situation awareness, increase the ability to make and transmit decisions rapidly to the front lines, and increase the ability to transmit/share information laterally and vertically. Some argue net-centric warfare has encapsulated this vision of the twenty first century warfare which is fully integrated, interoperable, and self-synchronized.[2] In their fervor, many proponents of net-centric warfare appear to have paid little attention to the fact that the Department of Defense's (DOD) vision transcends the U.S. military service, and impacts how the United States operates as members of a coalition in peace keeping missions or combat operations.

Thesis

It can be argued that while the concept of net-centric warfare does hold great promise, it also poses significant integration and execution challenges for the C/JFACC in the Theater Air Ground System (TAGS)[3] and coalition air operations. Specifically, this paper argues that the C/JFACC will be limited in optimizing the benefits of network centric technology in aviation command and control (Air C2) systems without: (a) standardization of network management and integration between joint and coalition partners (interoperability), (b) equity in resources required to field joint and combined aviation management support tools (parity), and most importantly, (c) training and implementing a joint and combined network information manager (IMO) concept to support coalition operations. This paper will also explore the current challenges of Air C2 as they relate to "net-centricity", and the way ahead for combined aviation operations in a network centric environment. As a caveat, this paper focuses on aviation *ground* C2 systems, and does not included airborne C2 platforms which also have their own challenges in the netted environment.

Nexus of Aviation Command and Control and Net-centric Warfare

The C/JFACC's primary mission is that of synchronizing and integrating the actions of assigned, attached, and supporting air capabilities/forces in time, space, and purpose.[4] The mission to function as the Area Air Defense Commander (AADC) and Airspace Control Authority (ACA) is also that of the C/JFACC. Battle management of the Air C2 functions between U.S. joint and coalition forces over hundreds, sometimes thousands, of miles makes the C/JFACC heavily reliant on command, control, communication, and computer information (C4I) systems to successfully execute aviation operations. Proponents of the net-centric warfare concept appear to have focused exclusively on the medium or technology of

the "net" while eschewing fundamental doctrinal concepts critical to joint and coalition command and control. The DOD's haste to embrace net-centric warfare will continue to marginalize the functional effectiveness in Air C2 if the pace of adaptation does not involve analogous implementation efforts between the joint services and coalition partners.

The Theater Air Ground System Air C2 Conundrum - A Scenario

Imagine a coalition conflict with United States and United Kingdom (U.K.) aviation assets afloat, in addition to U.S., U.K., Australian, and Kuwaiti aviation assets on land. It is D-2[5] and neither Her Majesty's Ship (HMS) nor Marine forces aboard U.S. Navy amphibious ships are able to access the theater Air Tasking Order (ATO). A call to the Army's Air Support Operations Center (ASOC), the Australians or the Kuwaiti aviation operations centers will reveal much the same dilemma. Most surprising, is that a call to an Air Force Wing Air Operations Center (WOC) will reveal they too, have the same dilemma experienced by their fellow aviation partners.

An attempt to resolve the above issue may result in the following C/JFACC[6] prescriptions:

C/JFACC (1) "*Use the Theater Battle Management Core System (TBMCS), as mandated by C/JFACC message, it's the theater system of record for ATO planning, dissemination and execution."*

The Army responds: "*We do not have TBMCS. The ASOC is required to, but they have little or no expertise on the system."*

The U.K., Australian, and Kuwaiti warfighters respond: "*We do not have that system, could you send it to us with a liaison officer (LNO) who knows how to uses it?"*

The Navy and the Marine Corps respond: *We have TBMCS versions 1.01 and 1.1 respectively, with varying levels of expertise on how to use it."*

C/JFACC then responds: (2) "*What version of TBMCS are you on? Sorry, the Air Force fielded a newer version just for this conflict and its not backwards compatible with yours. (3) Use your TBMCS web remote access via laptop to get the ATO; or,* (4) *Download the ATO*

from the C/JFACC's webpage; or (5) *If you have the Army Deep Operations Coordination System (ADOCS) you can get the ATO using that system?* And finally, (6) *I am not sure why you didn't get the ATO it was sent two hours ago via email. Do you know what your data transmission rate is?"*

In response to options (1) through (6) most joint/coalition forces (including some Air Force Wing Operations Centers) respond, "*We cannot consistently use the web applications you recommend C/JFACC. Each time we try to access the webpage for the ATO our connection times out during download due to a lack of bandwidth."*

During the same conflict many more fissures appear in the coalition TAGS. On D+15, disseminated changes to Air Defense Warning conditions are not received by some U.S. Army, Marine and other coalition forces. Theater airspace changes are not received by the Kuwaitis, nor reflected in the Army sector. Airspace boundary changes reflected in TBMCS Airspace Deconfliction System (ADS) differ from those in ADOCS and the Global Command and Control System (GCCS). Another call to the C/JFACC concerning which system provides the top Air C2 Current Operations Picture (COP), and who will ensure the accuracy of air COP results in a "pregnant pause" and subsequent routing to several cells in the Combined Air Operations Center (CAOC). Add to the above, similar problems associated with integrating coalition use of C2 systems such as the Link Monitoring System (LMS) 16, Air Defense Systems Interrogator (ADSI), Shared Early Warning Display, (SHEWD) Joint Range Extension (JRE), and Intelligence Operations Server (IOS), to name a few, and coalition Air C2 becomes significantly degraded. The complexity of the Joint TAGS (see Attachment 1) demonstrates the magnitude of the coordination requirement necessary to conduct Air C2 operations. This becomes even more complicated in coalition operations.

Implications of "Net-centricity" on C/JFACC Air C2

Some would argue that the above scenario is improbable, and the concerns are mainly tactical in nature. This author would argue that these tactical concerns have definite

operational implications. First consider the issue of accuracy. Tactical inputs and updates of these C2 systems provide the basis for the shared battlespace awareness at the operational and strategic levels which is integral to net-centric Air C2. If the system is not populated with accurate data, then critics of net-centric warfare have more to fear than increased occurrence of micromanagement at the tactical level by the operational commander. These commanders will be micro-managing based on inaccurate or flawed data. This is even more troubling if one considers the idea that in today's network centric environment these tactical concerns are becoming more and more the purview of the operational commander. Dr Milan Vego of the Naval War College believes,

> NWC is a tactical concept . . . . Network-centric warfare places too much emphasis on tactical level of war. The prominence of terms such as battlespace dominance, situational awareness and information grid are the best proof of how tactics and technology dominate thinking in the U.S. Military. . . . Carried to its extreme NWC will lead to a complete "tacticization" of strategy where strategy is defined and dominated by purely tactical considerations.[7]

Dr. Vego's concern provides viable grounds to question whether the idea of U.S. "information superiority" achieved during Operations ENDURING FREEDOM (OEF) and IRAQI FREEDOM (OIF) was just a façade, achieved largely because the coalition fought a much weaker force. These operations were fought against an enemy with an extremely degraded or non-existent "air breathing" threat and a significantly degraded level of Air C2. As such, the C/JFACC Air C2 system was not overly stressed. During OIF, the pace of operations was such that coalition Air C2 participants could implement stopgap measures to enable successful operations with minimal, or less than catastrophic impact on the C/JFACC's Air C2 operations. OIF it could be argued, was a success largely because of gross asymmetry in

opposing capabilities that afforded the C/JFACC the time and space on the battlefield to absorb the impact of fissures in coalition Air C2.

A second related challenge for the C/JFACC is maintaining a combined Common Operational Picture (COP). Net-centric warfare in the Air C2 world "…now means having the COP on high definition, flat screen display on the commander's desktop,"[8] or, in the case of OIF, numerous sixty-inch, or lager plasma screens displayed in the CAOC. As the authors of "Realizing the promise of Net-centric Warfare" point out,

> Today's COP (as controversial a topic as NWC itself) can range from situational displays with unsophisticated symbols, to a theater quality audio visual experience incorporating 3-D graphic symbols, video, and real-time feeds from UAVs and troops on the ground. In command centers throughout the military more manpower is spent updating these displays (manually and automatically) for the commander than is spent actually analyzing the enemy's action. For now, netting the force means ensuring that the COP (accurate or not) looks the same throughout the force.[9]

Managing and maintaining the Air C2 COP during OIF, meant fusing the inputs from disparate coalition Air C2 systems. Varying levels of Air C2 technology and capabilities among the Services required creativity and ingenuity by servicemen at the tactical level to create the joint COP. Integrating our coalition partners into the Air C2 COP required even more innovation at the tactical level because of myriad of issues related to system compatibly, security and releaseability. The result has been an ad hoc approach to system fusion and integration which is detrimental to effective management exploitation of information.

Related to accuracy and timeliness is the bandwidth required by the C/JFACC to ensure data transfer, and coordination laterally, horizontally, and vertically over both tactical and non-tactical systems. The migration towards "netting" the individual warfighters increases the requirement for bandwidth at all levels of coalition warfighting. This problem will be magnified in the future warfighting environment if joint and coalition players continue

to develop and field parochial, stovepipe systems. How then can the C/JFACC mitigate this problem? How can the CFACC ensure joint/coalition forces are equally netted and integrated? This author would argue achieving "*seamless"* interoperability and parity in Joint/Combined Air C2 systems may gain a modicum of success, but such a goal may not be realistically achievable. The most viable option may be to train and designate Joint/Combined Information Managers, to overcome the interoperability shortfalls that will inevitably exist in coalition operations.

"Net-Centricity" and Air C2 Interoperability

A major quandary for the C/JFACC in today's era of combined warfare is not just achieving compatibility, (which it can be argued the joint forces have not yet attained in joint air C2) but interoperability. Interoperability is defined in *Joint Pub 1-02* as: "The ability of systems, units, or forces to provide services to and accept services from other systems, units or forces and to use the services so exchanged to enable them to operate effectively together."[10] Additionally, in 2002, Deputy Secretary of Defense Paul Wolfowitz established a deadline of 2008 for the Services to achieve interoperability.[11] This has considerable implications for coalition Air C2 operations considering that, within the DOD, each service has its own euphemism for its vision of net-centric warfare. Additionally, at this juncture, each Service appears to approach its move towards net-centric warfare based on their parochial views. The Air Force has C2 Constellation, the Navy and the Marine Corps FORCEnet, the and Army FCS/Warfighter Information Network Tactical. These programs are all a part of the DOD Global Information Grid (GIG) but with Service-specific visions on how to get there.

Consider, also, that between the U.S. and its major coalition partners, United Kingdom and Australia, there exists varying definitions and approaches to network centric warfare. The United Kingdom has adopted a vision which differs from the United States. called *Network Enabled Capability (NEC).* Unlike the U.S. approach, the U.K.'s NEC does not envision the network as the end in and of itself, but only the means by which sensor information is distilled by the commander and disseminated to the shooter.

> the U.K. explains the difference in their approach relative to that of the US due to the knowledge that the UK's ability to go down the NCW path will be resource limited. Therefore they say they've put the emphasis not on wholesale transformation of the forces but rather on the "key enablers" of operational effectiveness. Under the U.K.'s concept the network is not centric to what they are trying to do.[12]

Aldo Borgu, Policy Director of the Australian Strategic Policy Institute, reveals that the Australians coined *Network Enabled Operations (NEO)* as their version of net-centric warfare.

> Under NEO, platforms are treated as nodes of a network and all elements of the network collect, share and access information. This shared information is used to create a common, real-time battlespace picture which in turn allows a greater level of situational awareness, coordination and offensive potential than is currently the case.[13]

With such variance in Service and coalition visions and definitions of this concept, it is easy see to how parity, compatibility, and interoperability in adopting systems to support Air C2 may be elusive to planners and users.

To further exacerbate the problems discussed above, communications security restrictions imposed on coalition partners also factor in achieving interoperability in coalition Air C2. As Mr. Borgu aptly points out,

> Even in the recent Gulf War (OIF) – where Australia was only one of three countries to substantively support the U.S. in its efforts of remove Saddam's regime in the face of wider international isolation – the ADF still faced numerous obstacles in getting access to U.S. classified operational networks, even when it may have affected our ability to properly execute our mission.[14]

The United Kingdom also experienced the same problems indicated by the Australians during OIF. According to the U.K. Ministry of Defense, in *OIF Lessons for the Future*, the limited degree of interoperability between U.K. and U.S. communication Information System (CIS) also had an impact on the ability to support coalition planning and operations in a high tempo environment.[15] During OIF, in theory, Combined Enterprise Regional Information Exchange (CENTRIX)[16] was seen as the panacea to provide coalition users with some modicum of access to classified releasable information. However, reality proved that at many levels the system provided limited utility in providing the full spectrum of information necessary to execute Air C2 operations. These security and releaseability restrictions undermined coalition relationships. At the heart of the matter is the perception that the United States. has full spectrum access to information required for mission planning and command and control, while coalition partners were restricted from the same information required to do similar, and, in some cases the very same mission. Simply put, it became a matter of trust.

Let's look for example at OIF during the friendly fire incident involving a coalition airplane and U.S. Patriot. During the initial aftermath of the shooting, a coalition liaison officer working in a coalition command post attempted to surreptitiously glean information by looking over the shoulder of his fellow U.S. watch officer at the Secret Internet Protocol Network (SIPRNET) to pass along information to his headquarters. His system, CENTRIX, just did not have timely or accurate data. He was summarily castigated and temporarily removed from position. He returned to duty once the circumstances surrounding the incident were investigated and resolved. Nonetheless, such incidents undermine already tenuous coalition relationships, and provide additional challenges to achieving interoperability.

Challenge of achieving Parity in Coalition Air C2

Parity is defined as "functional equivalence, as in weaponry or military strength or value."[17] Some would contend that achieving such a thing within the Services borders on the impossible. And, one could further argue, that if system parity is elusive among U.S. Services it will be even more challenging between U.S. and coalition partners. Achieving this end becomes more difficult as the data consumption and distribution rate of the force increases. Consider that during Operation DESERT STORM more than 500,000 troops were supported with 100 megabits per second (Mbps) of bandwidth. Comparatively, OIF forces numbered approximately 350,000. However, they had more than 3,000 (Mbps) of satellite bandwidth, which is 30 times more bandwidth for a force 45 percent smaller.[18] How does the C/JFACC stack up in the bandwidth consumption arena during OIF? In a 30,000 square foot facility, the C/JFACC is estimated to have access to,

> "data roughly equated to what is required for up to 30 entire carrier battle groups (almost 300 naval vessels). The approximate 3,000 computer systems, three antennas, five satellites, 128,000 feet of cable lines and 160,000 feet of fiber optic cord provided Moseley and his staff with the command and control…"[19]

According to the Air Forces Analysis and Assessment Division, the C/JFACC total bandwidth increased 596%,[20] and "during the three weeks of the war, no C/JFACC base experienced any significant outage in communication."[21]

This is an extremely remarkable feat for the C/JFACC, however the challenge lies in the coalition "needlines" required to "feed the beast" (in this case the C/JFACC) with the Air C2 data required to provide battlespace awareness. The reality is the C/JFACC can ill afford to become sanguine in the capability of the CAOC as an Air C2 instrument if it cannot interface with its subordinates. Arguably, if CAOC's only requirement was to interface

internally and with the Air Forces (ARFOR), it would be close to a perfect instrument, except that is far from the case. The operational factors of time and space in a netted environment will continue to be a challenge for the C/JFACC in coalition Air C2 because the C/JFACC's major function is that of supporting C/JFLCC forces which may be thousands of miles away from the CAOC supported by mobile tactical communications. In order to support those forces there must exist common systems among the Services and coalition which interface and can basically plug and play.

Historically, except for temporary enabling C/JFACCs, the C/JFACC has enjoyed the luxury of being housed in fixed facilities, and in less than austere conditions. Many joint and coalition agencies required to integrate with the C/JFACC are not afforded this perk. Joint and coalition agencies nested with C/JFLCC or Coalition/Joint Forces Maritime Component Commander (C/JFMCC) are mobile and rely heavily on tactical communication which takes exception to being moved. Unlike the C/JFACC, most other coalition users required to interface with the C/JFACC experienced technology blackouts/outages during OIF. Unlike the Air Force, many joint and coalition partners do not possess the requisite funding to procure a state of the art communications backbone required for Air C2 interfaces. Additionally, many do not possess the funding, personnel and expertise to field new versions of C2 systems just in time for, or during a conflict. Many joint and coalition C2 agencies rely on the remarkable ingenuity of their personnel to implement temporary solutions to these seams or lack of parity in resource and systems. This was evident during OIF and impacted many C2 systems including GCCS. This has remarkable implication for maintaining accurate battlespace awareness. However, many times operational commanders are unaware that the

"Emperor had no clothes" in the Air C2 picture as major fissures in Air C2 interfaces go unnoticed due to lack of oversight and management.

It seems the pursuit of parity will continue to be thwarted by the joint forces. According to Army Major General Marilyn Quagliotti, Vice Director of the Defense Information Systems Agency (DISA), "We are still developing stovepipe systems, [and] they are still getting through our governance structure."[22] The culprit in this case is the joint services procurement of GCCS, the central feed for the combined Air C2 COP. According to DISA, GCCS currently runs under sixteen different databases, with multiple architectures specified for different military branches and divisions.[23] DISA plans on fielding a new version of GCCS which it hopes the joint Services will implement. This is an ambitious undertaking with immense potential if oversight and accountability measures are in place to ensure the same.

Who has the solution to the Coalition Air C2 conundrum?

There are no easy answers to the Air C2 dilemma. At this point many of the concepts espoused in net-centric warfare are visions, policy documents and strategic concepts. But there is much that can be done to optimize Air C2 in the net-centric environment. The first is to adopt **realistic expectations**. It may be possible, but unlikely, that the U.S. armed forces will fully achieve "*seamless fully integrated"* netted Air C2 among the Services in the near term. Service cultures, funding and politics will continue to thwart progress in this area. This is even more elusive between U.S. coalition and allied partners. While more and more countries embrace technology, many countries, especially our European allies, are in the throes of scaling back their military capability and funding for the same. The United States has achieved a modicum of success via interfacing with coalition partners with existing

coalition and North Atlantic Treaty Organization (NATO) networks. This means that the United States will need to have realistic expectations of what other countries will bring to the table in terms of capabilities, and may have to consider the expense associated with procuring enough technology to support the requirement for our coalition partners to bridge the inevitable gap that will exist in order to achieve netted Air C2.

A second answer lies in **oversight, management and resourcing for Air C2** among the Services. This would mean parity in funding among the Services for procurement of C2 assets. This endeavor requires close scrutiny of service requirements, procurement and implementation by DISA and better congressional oversight relative to achieving the services system interoperability goals. The Revolution of Military Affairs (RMA) Council established in the late nineties, using members of the Defense Resource Board, appeared to be a step in the right direction. However, this body appears to have had limited success in managing the Service's disparate resources requirements.

An examination of how the joint services fund their organizations responsible production and integration of command and control technologies for FY 03 revealed the following: Air Force's Electronic Systems Center (ESC) received approximately three billion dollars, the Army's Communication and Electronic Command (CES) two billion dollars, and the Navy's Space and Naval Warfare Systems Command five billion.[24] While on the face, this may seem an equitable distribution, there exists a stark disparity in the distribution of funding to the Service operational commands. The Air Force's Air Combat Command (ACC) receives approximately fifty billion dollars from which it is able to use to fund Air C2 initiatives.[25] This is in large part due to their ingenuity in designating the CAOC a weapons system. The Army and the Navy have smaller budgets than the Air Force, spread across an

array of competing programs only a portion of which is Air C2. As such, within the Services, there exists an imbalance in parity of resources for Air C2 systems. The Air Force usually leads the way in Air C2 acquisition while the other Services attempt to "catch up." It will take a significant amount of management and oversight to level the playing field for all the Services.

Additionally, U.S. policymakers and the DOD have a responsibility to its warfighters to continue to work with NATO nations to maintain updated minimum systems and interoperability criteria. Arguably, many countries lack the funding to undertake netting their forces to U.S. standards. But for emerging nations, this establishes a benchmark of minimum requirements for interface during operations. This is a significant undertaking considering our own joint Services are challenged to do the same.

The third solution to the Air C2 dilemma rests with **reinventing the Information Management Officer (IMO)**. Who manage the net in Air C2? At this juncture it appears no one does. With so many issues associated with the medium (hardware, software, communication backbone, various systems and platforms) of net-centric Air C2, maybe all that is needed in this Air C2 dilemma is the human element. The IMO means different things to different people among commands. Some organizations consider them a part of the J-3[26] while others a part of the J-6.[27] They may also be considered special staff officers; working directly for the Chief of Staff producing technology related graphs and products for the commander. A contributing factor is that there is no adequate definition of the role of the IMO. Two joint publications that address the role of the IMO are *Joint Task Force Information Management* (JTF-IM) and *Joint Task Force Headquarters Operations* (CJCS-SM 3500). The definition of the IMO during operations in both documents focuses on

managing the battle rhythm, webpages and storing lessons learned, [28] (often during combat operations). Updating battle rhythm and webages is not an effective use of the IMO. What is needed most is an entity to bridge the operations, information, communications and intelligences systems divide to conduct Air C2 management, data assurance and fusion.

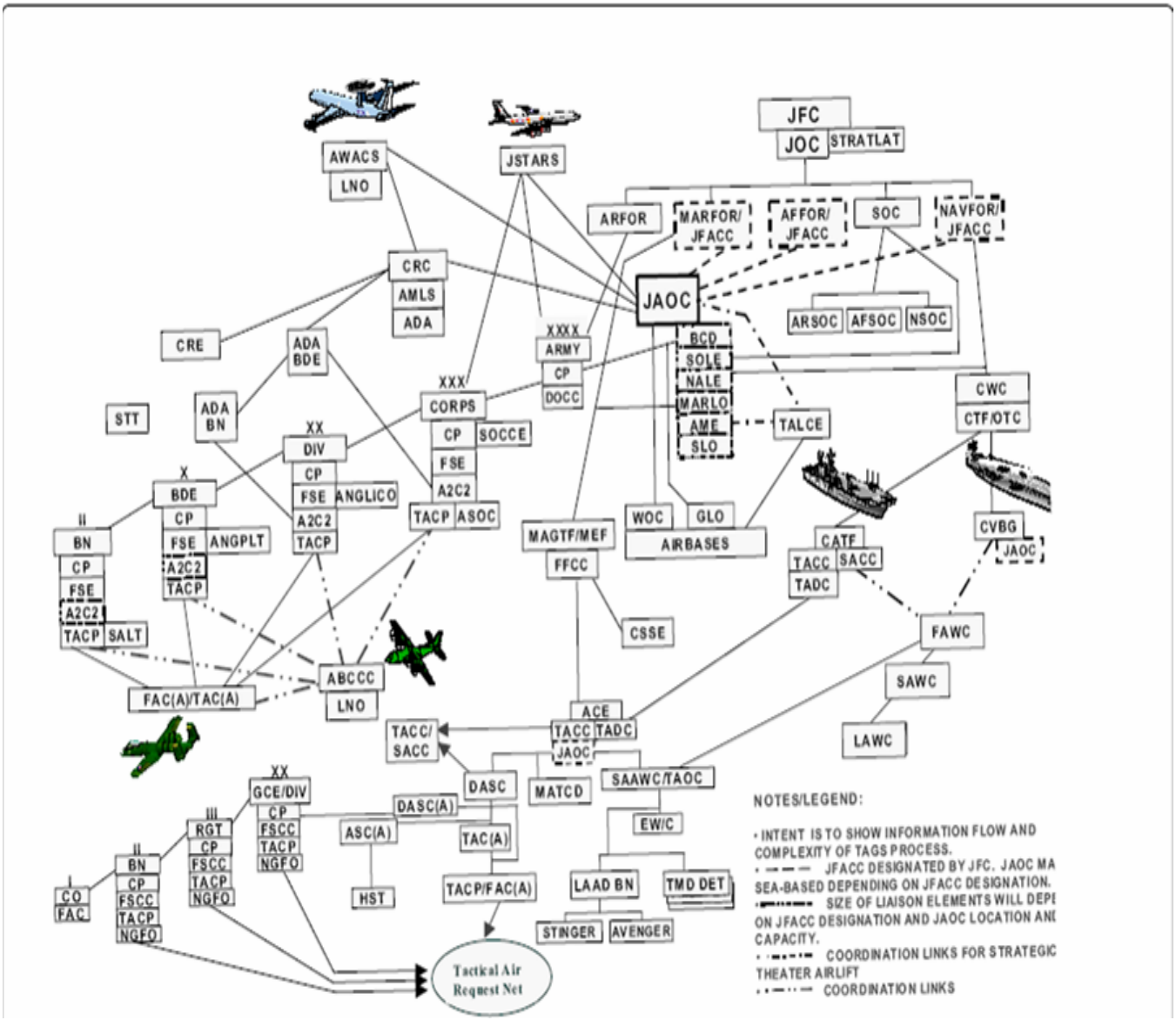
As such, reinventing the IMO is the most viable option for the C/JFACC in becoming more effective in combating or embracing the ubiquitous effects of "net-centricity" on Air C2. This requires a reassessment of the role of the IMO and the establishment of an information management cell within the CAOC's Combat Operation section, staffed with representatives from the J-6, J-2, and J-3. It should contain coalition representatives with expertise in Air C2 systems, networks, data-links and operations. This cell should conceptually subsume all the coalition TAGS integration Air C2 requirements. They would promulgate business rules for coalition Air C2 interfaces and applications. They would actively manage the COP between the CAOC and joint/coalition Air C2 agencies. They also would be responsible for ensuring all agencies interfacing with the C/JFACC use mandated systems or advise of suitable compromise. While the idea of joint air schools (purple air) appears abhorrent to many in the joint forces, at a minimum Joint/Coalition IMOs would have to attend the Joint Forces Air Component Commander (Air C2 Warrior) Course at Hurlbert Field. The C/JFACC should also be held accountable for sending Air C2 liaison officers to major joint/coalition air operations centers. All too often the C/JFACC requires that components provide liaison officers (LNOs) but never reciprocate. While the IMO does not provide all the answers, it certainly is a more reasonable approach to optimizing the disparate Air C2 coalition capabilities, and move coalition forces closer toward achieving a measure of interoperability in the netted environment.

Conclusion

Net-centric Warfare and Air C2 – The Endgame.

This paper has argued that while it may be reasonable to achieve some degree of compatibility, *seamless fully integrated* interoperable, optimized, netted Air C2 will continue to elude the joint and coalition forces. Joint/Coalition forces are, for the most part, constrained by resources, Service cultures, and a lack of net-centric warfare doctrine to fully achieve the vision of fully interoperable netted Air C2. Some could argue that what can reasonably be expected is that technology will continue to be procured, fielded and implemented among the Services based on parochial Service requirements with "lip service" paid to interoperability. The rapid pace of implementation and adaptation of technologies in the U.S. military will continue to place our coalition Air C2 partners at a disadvantage. Unless DISA and Congress become actively engaged in oversight and holding the Services accountable, joint interoperability will remain a chimera. Until the Services achieve parity in systems and resources in Air C2, users will have to focus on the near term. The most logical solution lies in reinventing the IMO and developing an information management cell. Task these warriors, many of whom have post graduate education in this area, with optimizing and fusing the disparate networks and operations functions which will continue to be seen in the coalition battlespace for the near future. This would make the C/JFACC more effective externally as well as internally and better able to execute the most important part of its Air C2 mission, supporting the ground component, while we strive towards the goal of full integrated interoperability.

Attachment 1, Joint Forces Theater Air Ground System (TAGS) (Source FM-100-02-2)



* Coalition Forces increase the complexity of system integration and interoperability requirements.

Notes

[1] Robert S. Bolia, "Overreliance on Technology in Warfare: The Yom Kippur War as a Case Study," *Parameters,* (Summer 2004): 46.

[2] Clay Wilson, "Network-centric Warfare Oversight Issues for Congress". *Congressional Research Service.* Available at http://fpc.state.gov/documents/organization/33858.pdf. Accessed 5 January 05.

[3] Multi-Service Procedures for Air Ground Systems defines Theater Air Ground System (TAGS) as "a system of systems, a synergy of various components air ground systems, orchestrating the planning and execution of air ground operations."

[4] U.S. Joint Chiefs of Staff, *Command and Control of Joint Air Operations,* (10 September 2001), vii.

[5] "D" represents generic day when conflict begins.

[6] C/JFACC used here to connote decision makers or operators in the CAOC and not necessarily the operational commander.

[7] Dr. Milan Vego, " Net-centric is not decisive," *United States Naval Institute Proceedings,* (January 2003), 52.

[8] David W. Roberts, Joseph H. Smith, "Realizing the promise of Network-centric warfare," (Paper Joint Forces Staff College March 2003), 4.

[9] Ibid.

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