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**6. AUTHOR(S)**

Carl M. Bradley

Paper Advisor (if Any): CDR Alan Wall

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While aircraft, Unmanned Aerial Vehicles (UAVs) and C4I systems played a critical role in the coalition's success against the Iraqi regime during *Operation Iraqi Freedom*, at the operational level of war, the C4I and airborne ISR assets experienced significant seams in their ability to provide timely, accurate, fused, and actionable intelligence to Strategic, Operational and Tactical users. The key factors affecting the ability of ISR assets to support rapid maneuvers during *OIF* included compressed engagement times, incompatible and inadequate C4ISR systems, eleventh hour TTP and planning considerations, a lack of intelligence analysis tools, and Service unfamiliarity with the other Service ISR capabilities.

The operational commander can take several steps to stem the tide in significant ISR seams during *OIF*. Foremost among them is to engage JFCOM (Joint Forces Command) in its role as the DoD's executive agent for joint interoperability and integration to support and sponsor joint exercises that focus on C4ISR training requirements in a joint environment. Services must receive guidance through JFCOM to ensure future C4ISR systems are not procured in such a way to field stovepipe systems unable to function in a joint environment. Finally, joint doctrine for ISR must be updated to discuss decision making tools necessary to support ISR operations during rapid maneuvers.

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# INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE IN SUPPORT OF *OPERATION IRAQI FREEDOM*: CHALLENGES FOR RAPID MANEUVERS AND JOINT C4ISR INTEGRATION AND INTEROPERABILITY

By

Carl M. Bradley
Lieutenant Commander, USN

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

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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9 February 2004

## Abstract

While aircraft, Unmanned Aerial Vehicles (UAVs) and C4I systems played a critical role in the coalition's success against the Iraqi regime during *Operation Iraqi Freedom*, at the operational level of war, the C4I and airborne ISR assets experienced significant seams in their ability to provide timely, accurate, fused, and actionable intelligence to Strategic, Operational and Tactical users. The key factors affecting the ability of ISR assets to support rapid maneuvers during *OIF* included compressed engagement times, incompatible and inadequate C4ISR systems, eleventh hour TTP and planning considerations, a lack of intelligence analysis tools, and Service unfamiliarity with the other Service ISR capabilities. .

The operational commander can take several steps to stem the tide of significant ISR seams experienced during *OIF*. Foremost among them is to engage JFCOM (Joint Forces Command) in its role as the DoD's executive agent for joint interoperability and integration to support and sponsor joint exercises that focus on C4ISR training requirements in a joint environment. Services must receive guidance through JFCOM to ensure future C4ISR systems are not procured in such a way to field stovepipe systems unable to function in a joint war fighting environment. Finally, joint doctrine for ISR must be updated to discuss decision making tools necessary to support ISR operations during rapid maneuvers.

## Introduction

*Operation Iraqi Freedom* (*OIF*) was arguably the finest example of the U.S. military's ability to wage joint coalition air, ground, and naval operations to support the nation's National Security Strategy. Marines and the Army rapidly maneuvered toward Baghdad from the Iraqi southern border in a coordinated land campaign against the Iraqi military that covered ground in one quarter the time it took to do so in the first Gulf War. Special Operations Forces (SOF) performed Combat Search and Rescue and destroyed missile systems capable of deploying Weapons of Mass Destruction (WMD). Coalition air forces supported ground operations and carried out precision strikes against a vast array of targets in record time while ensuring air superiority over the country. These US and coalition operations all have one common thread; Each of these missions and the forces performing them were supported by Command, Control, and Communications, Computers (C4), Intelligence, Surveillance and Reconnaissance (ISR) assets, and the professionals who manage them within the Combined Forces Commander (CFC).

While these aircraft, Unmanned Aerial Vehicles (UAVs) and C4I systems played a critical role in the coalition's success against the Iraqi regime, at the operational level of war, the C4I and airborne ISR assets experienced significant gaps or seams with regard to their ability to provide timely, accurate, fused, and actionable intelligence to Strategic, Operational and Tactical users.[1] These C4ISR challenges resulted from the extreme speed of maneuvers, incompatible and Service-unique C4ISR systems, distributed command structures, and the

[1] National overhead satellites also played a significant intelligence role during *OIF*. This paper focuses on airborne collection systems with salient points germane to overhead systems as noted. The C4I acronym applies to those C4 systems used to support Intelligence operations.

chasm between the huge amounts of raw information being collected by sensors and the *OIF* intelligence effort's ability to direct, collect, exploit, analyze, and disseminate fused intelligence products.

**Background**

In just 21 days, the coalition removed Saddam Hussein and the ruling Ba'ath Party from power and decisively defeated Iraqi military forces. Assigned ISR assets were capable of providing 24 hour intelligence collection coverage to support the CFC's operational and strategic objectives as outlined below:[2]

- Defeat or compel capitulation of Iraqi forces
- Neutralize regime leadership
- Neutralize Iraqi TBM/WMD delivery systems
- Control WMD infrastructure
- Ensure the territorial integrity of Iraq
- Deploy and posture CFC forces for post-hostility operations, initiating humanitarian assistance operations for the Iraqi people, within capabilities
- Set military conditions for provisional/permanent government to assume power
- Maintain international and regional support
- Neutralize Iraq regime's C2 and security forces
- Gain and maintain air, maritime and space supremacy

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[2] Lt. General T. Michael Moseley, "*Operation Iraqi Freedom—By the Numbers*," USCENTAF (United States Central Command Air Forces), Assessment and Analysis Division, April 30, 2003, 4.

The coalition planned for and waged war emphasizing mobility and speed, precision, and information dominance. These characteristics were exhibited by the ISR assets employed by the U.S. and coalition forces and the amount of data collected. Of the 1,801 aircraft used during *OIF*, 80 aircraft were dedicated to the ISR mission. They included RQ-1 Predator and RQ-4 Global Hawk UAVs, EP-3, P-3C "Orion", U-2, E-8C Joint Surveillance Target and Radar System (JSTARS), and RC-135 "Rivet Joint" (collecting signals intelligence) aircraft, to name a few.[3] They flew approximately 1,000 sorties and collected 3,200 hours of streaming video, 2,400 hours of SIGINT, and 42,000 battlefield images.[4] The ISR effort was managed from the Combined Air Operations Center located at Prince Sultan Air Base (PSAB), Saudi Arabia, under the command of the Combined Forces Air Component Commander (CFACC), Lt. General T. Michael "Buzz" Moseley, USAF.

Information alone does not constitute intelligence. Prior to information being of use to commanders it must first undergo the basic intelligence cycle, which is accomplished in five phases: *Planning and Direction, Collection, Processing and Exploitation, Production,* and *Dissemination*. While this review may seem elementary, the intelligence cycle is critical if intelligence professionals are expected to provide fused, timely, accurate, and actionable intelligence to commanders. Knowledge of the intelligence cycle is also seminal to understanding the reason for those intelligence seams experienced during *OIF*. All too often ISR collection activities in *OIF* were truncated from the full intelligence cycle, either by

[3] For a comprehensive unclassified list see Walter J. Boyne, Operation Iraqi Freedom: What Went Right, What Went Wrong, and Why (New York: Tom Doherty Associates, 2003).

[4] Moseley, *Operation Iraqi Freedom—By the Numbers*, 3.

necessity or design, to support the rapid scheme of maneuver on the ground and in the air. This oftentimes resulted in perishable, inaccurate, incomplete, and untimely intelligence products.

**Speed and Time – C4I**

Effective C4I systems ensure joint intelligence and total battlespace information awareness is provided to the warfighter through the use of common tactics, techniques, and procedures (TTPs). These systems should also provide the warfighter with the flexibility to support any mission, at anytime, anywhere. In *OIF*, C4I systems experienced significant seams while attempting to address these challenges.

Admiral E. P. Giambastiani, Commander, U.S. Joint Forces Command, said it best:

> "Where we fall short is when we're in a high-speed, fast-moving campaign, like this one was, where our forces are moving very rapidly. The ability to be able to do effects assessments or battle damage in a rapid fashion lacks (sic) seriously behind the movement of our forces."[5]

His comment directly reflects the significantly compressed sensor to shooter timelines experienced during *OIF*, which ironically stems from our tremendously enhanced C4ISR capabilities since the first Gulf War. The available intelligence assets brought to bear against the Iraqi regime and its military provided persistent around-the-clock surveillance of targets of interest, collecting information from the ground, air, and space. For example, operational commanders at the Combined Air Operations Center (CAOC) often employed UAVs to cue other assets to find, fix, track, target, engage and assess time sensitive targets (TSTs) with speed and precision, thereby increasing the probability of kill while minimizing collateral

[5] Statement of Admiral E. P. Giambastiani, Commander, U.S. Joint Forces Command, Before the House Armed Services Committee, October 2, 2003.

damage and risk to manned aircraft.[6] As the war started, SOF, Army, and Marine forces maneuvered towards Baghdad at a record pace. By the commencement of air operations at A-hour on March 21, 2003, coalition air forces commenced air strike operations and flew over 1,700 sorties, and launched 504 Tactical Land Attack Cruise Missiles (TLAM) and Conventional Air Launched Cruise Missiles (CALCM) in a 24 hour period.[7]

These strikes were aimed to destroy hundreds of targets. One immediate effect these compressed engagement times had on operational commanders was to create a demand for a faster, more streamlined capability to deliver effects-based battle damage assessments (BDA) to decision makers for potential re-strike recommendations and Joint Intelligence Preparation of the Battlespace (JIPB) updates. The immense number of targets, limited ISR assets, and insufficient personnel with BDA expertise, analytical tools, and sensor capabilities created a tremendous strain on the intelligence support architecture and prevented a thorough assessment of damage to the majority of targets.

Methods for reviewing tactical aircraft weapon system video (WSV), for example, lacked the C4I systems and personnel expertise necessary to forward the WSV to the CENTCOM Joint Intelligence Center ( JICCENT) in Tampa, FL, for timely analysis and use by commanders. The WSV often arrived for analysis at JICCENT eight to ten hours after the aircraft completed its mission. Once there, JICCENT lacked the requisite subject matter experts to quickly exploit the large number of WSV, thereby exacerbating the time delay of

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[6] The CAOC identified 3 types of targets as TSTs: Leadership, WMD and terrorists. Dynamic targets were similar mobile targets prosecuted using the same tools . Some 156 TST missions and 868 dynamic target missions were executed. See Moseley, *Operation Iraqi Freedom – By the Numbers*, 9.

[7] Moseley, *Operation Iraqi Freedom—By the Numbers*, 15.

fused BDA reports.[8] Fusion of the thousands of aircrew Mission Reports (MISREPS) accompanying the WSV was also delayed. As a result, the updates to the Common Operating Picture and Common Intelligence Picture (COP/CIP),[9] necessary to provide decision makers with updated enemy and blue force dispositions, were behind schedule or did not occur. The exploitation and production, analysis, and dissemination processes were unresponsive to the operational speed of maneuver.

The speed of maneuver had some negative impact on direction and collection efforts by CFACC collection managers as well. As more targets of opportunity (those not scheduled for surveillance and reconnaissance) were rapidly re-tasked to airborne UAVs and other aircraft such as the U-2, collection managers had difficulty with the complex effort of tracking, prioritizing and synchronizing the collection of targets and known areas of interest. This huge effort required a collaborative tool to de-conflict asset tasking, priorities, and targets. Analysts were often relegated to using spreadsheets as the speed of operations continued. To add to these difficulties, targeteers worked without a master target database to track targets.[10] Performing the required tasking, production, exploitation and distribution (TPED) tasks at a wartime pace without sufficient analytical tools resulted in imperfect

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[8] Author's knowledge of theater Intel reporting requirements for CENTCOM Theater. Videos were emailed, using SIPRNET or File Transfer Protocol (FTP), to the CAOC, and from there, transmitted to JICCENT in Tampa via FTP. The large size of each WSV demanded high bandwidth not available to many tactical units such as Navy aircraft carriers at sea, for example. The FTP method mitigated bandwidth limitations aboard ship. The slow dissemination process was well documented prior to *OIF* and was never thoroughly addressed by intelligence and operational planners.

[9] An in-depth discussion of COP/CIP issues is presented in the next section

[10] CENTAF-HQ USAF, "Intelligence Database Management," Joint Universal Lessons Learned (JULLS) No. 41434-62689, 13 April 2003, [22 January 2004].

analysis that had a domino effect on subsequent collection and targeting plans.[11] Collection and targeting efforts were bogged down with overlapping and duplicative requirements and analysis. One target, for example, could be tasked and imaged with 3 different ISR assets one day even though the previous day's imagery of the same target had yet to be exploited by imagery analysts and might already have satisfied the requirement.[12]

While the commander's Priority Intelligence Requirements (PIRs) should drive the collection process as described in joint doctrine, it appears this was not always the case. The collection effort was responding to the speed of maneuver on the battlefield. Notwithstanding this fact, the direction and collection process became deferential to tactical or time sensitive events as opposed to executing a synchronized and prioritized collection plan based on PIRs. Statistics of ISR collection missions tasked against PIRs during *OIF* were not available. Yet CFACC ISR cell collection managers reported that reconnaissance requirements did not always align with operational needs because of the fast paced dynamic tasking necessary to support operations and the lack of collaboration tools required to track targets and collection efforts.[13] Those "needs" are outlined in the PIRs.

Interestingly, the highest percentage of apportioned CFACC missions, 50.7 percent, supported the Combined Force Land Component Commander (CFLCC) to defeat Iraqi ground forces and conduct security and stabilization operations. Missions supporting the Combined Force Special Operations Component Commander (CFSOCC) were second with

[11] "CENTAF A2 Warfighter Takeaways Brief From *OIF* LL." *OIF* Lessons Learned Conference, 9th Air Force, 31 July 2003, [13 January 2004].

[12] CENTAF-HQ USAF, *Intelligence Database Management*, JULLS No. 41434-62689.

[13] CENTAF A2, *CENTAF A2 Warfighter Takeaways Brief From OIF LL*.

12.5 percent. The CFLCC and CFSOCC mission percentages correlate with the military objectives as outlined above. Unfortunately, the CFACC did not count apportionment percentages by mission for ISR assets, referring to ISR as "the cost of doing business." [14] Those numbers would enable observers to match the missions with existing PIRs and better determine if assets were focused on the commander's intelligence guidance.

Ironically, many of the events discussed are a direct consequence of advances in C4I systems that have increased the distances, network centric access, and obviously the speed through which information is transmitted and managed by commanders across all levels of war. Video teleconferencing, satellite (Iridium) telephones, streaming video, the Internet, and multiple high speed data links all contributed to a more joint operation than coalition forces executed during the first Gulf War. This connectivity was all the more critical when key *OIF* commanders and their supporting communications centers were separated by more than 7,000 miles, roughly the distances from CENTCOM's theater to the U.S. east coast. Basing rights and political sensitivities within the theater also generated geographically distributed JFC component commanders. The CAOC/CFACC operated out of Saudi Arabia while the CFLCC was headquartered in Kuwait. CFSOCC and CFC commanded operations from within Qatar as the JFMCC coordinated maritime assets from Bahrain. All needed to reach-back to CENTCOM and Washington, DC during operations.

These distributed command structures necessitated an increase in available bandwidth and enabled the high degree of decentralized C2. Total bandwidth prior to *OIF* increased by

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[14] Moseley, *Operation Iraqi Freedom—By the Numbers*, 4.

596%, up to 783 Mb from 113 Mb, and the demand continued to far exceed available capacity in the AOR. Commanders were demanding more bandwidth to manage the large amounts of data available to them. According to CAOC commanders, restricted bandwidth and communications capabilities limited the number of targets warfighters were able to engage during compressed engagement timelines.[15]

In order to support remote TPED of Predator, Global Hawk, and U-2 ISR operations, the Defense Information System Agency activated circuits at a cost of over 3 million dollars. Remote sites in Nevada, California, and Virginia were used to process information from these sensors near real time while providing immediate feedback to the CAOC and other theater commanders. The process was reasonably effective as ground stations were instrumental in warning commanders of Iraqi mobile missile threats identified through U-2 and UAV imaging sensors. [16]

The distributed command structure of intelligence analysts and operations during *OIF* created a demand for bandwidth that could not be met. Some intelligence elements were dissatisfied with having to synchronize daily Battle Rhythms with analysts working 7,000 miles away. Some analysts preferred face-to-face coordination as opposed to VTCs. Poor data transmission, poor weather, and scheduling conflicts oftentimes prohibited successful VTCs.

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[15] Staff Sgt. Jason L. Haag, "OIF Veterans Discuss Lessons," Air Force Print News, 31 July 2003 . <http://www.af.mil/news/story.asp?storyID=123005347> [15 January 2004].

[16] "Intelligence Network at Beale Demonstrates Advances in Battlespace Awareness," Defense Daily, 219 (August 21, 2003): 1.

While there is certainly a need for more bandwidth, C4I network users and planners need to better create resourceful C4I systems that limit the need for ever increasing bandwidth. Bandwidth efficient C4I systems coupled with inventive TTPs can achieve that goal. Elevated bandwidth is a double edged sword. More and faster does not always equate to better.[17] More information and intelligence reaches customers and decision makers in quicker time but this is effective only when TTPs and C4ISR systems are in place to support compressed decision cycles.

**Joint Operations**

While it would appear that ISR assets in *OIF* performed in an ideal joint manner based upon the scale of operations and obvious demand for their capabilities, the Services continued to stovepipe information and subject matter expertise to their individual services. The 1st MEF, for example, deployed a MEF ISR command element to Camp Commando in Kuwait to support 1 MEF maneuvers. This element performed invaluable JIPB in concert with the other Services, JICCENT, the National Intelligence Community (NIC) and a United Kingdom signals battalion, and provided timely targeting to support MEF operations.[18] While this effort confirms the U.S. military's commitment to developing fused intelligence products across Services, agencies, and coalition partners, the point is moot to Navy Carrier Air Wings. Lessons learned from the Navy's aircraft carrier-based Intelligence Centers (CVICs) reported a significant shortfall in ground intelligence products and IPB analysts necessary for

[17] Anthony H. Cordesman, "The Lessons of the Iraq War: Main Report . Eleventh Working Draft: July 21, 2003," July 2003, <http://www.csis.org/features/iraq_instantlessons.pdf >, [12 January 2004].

[18] Colonel Al Baldwin, USMC, "I MEF ISR in *OIF*," Headquarters, U.S. Marine Intelligence Department Intelligence Community Newsletter, (June 2003): 9.

Navy tactical aircraft to conduct combat air support for SOF forces in the north and ongoing operations in southern Iraq.[19] As a temporary fix, some CVICs received augmentation in the form of Marine intelligence analysts.[20] To fully integrate the ISR effort, JFC J2s and subordinate J2s need to ensure fused intelligence products and analysis are made available across all levels of war through a common network centric architecture that maximizes manpower and level of effort.

Many ISR assets were successfully employed by the Services with minimal integration problems. Available UAVs operated closely with SOF to find, fix, track, target, engage and assess C2 and SCUD missile threats in western Iraq. Streaming video was sent to AC-130 "Spectre" aircraft to provide detailed targeting information in the engagement phase. The 1st MARDIV enjoyed tremendous C4I integration with the JSTARS, which provided near real time reporting on enemy ground unit locations and "no go" terrain thereby enabling units to maneuver deep into the enemy's battlespace.[21] Marines also operated with Navy P-3C maritime patrol aircraft. The P-3Cs provided Marines with indications and warning surveillance of engaged friendly forces, and disposition of enemy forces ahead of them. Seams still existed between the Navy and Marine units, however. Differences in communications suite capabilities required a Marine liaison officer (LNO) aboard the aircraft

[19] "Carrier Intelligence Center (CVIC) Analytical Capabilities Against Ground Forces," Navy Lessons Learned No. LLCC0-02988, 15 April, 2003, [13 January, 2004].

[20] LCDR J. Bock, Carrier Air Wing 3 Intelligence Officer, interview by the author, 15 January 2004, written notes, U.S. Naval War College, Hewitt Hall, Newport, RI . The Navy eventually entered into an MOU with the Marine Corps to provide CVICs with imagery analysts while deployed. Not all CVICs received this augmentation.

[21] 1st Marine Division, "Operation Iraqi Freedom (*OIF*) Lessons Learned,"May 2003, <http://www.globalsecurity.org/military/library/report/2003/1mardiv_*OIF*_lessons_learned.doc> [14 January

and intensive concept of operations planning.[22] The inability to train with other units prior to the war was a common theme reiterated in many of the Service's lessons learned documents.

**C4I Integration**

> "The integrated common operating picture [COP] was a very powerful tool. Tracking systems were previously Service unique. Workarounds were developed for *OIF*, but there is a need to develop one integrated, user friendly, C4I architecture that captures blue and red air, ground and maritime forces."[23]

The workarounds General Franks alluded to above were the short term planning for the creation and maintenance of the COP/CIP that occurred just prior to commencement of the war. Last minute planning resulted in inaccurate and absent threat Order of Battle (OOB) during the first phases of the war. According to one CENTAF report, the CFACC began tracking enemy air, defensive missile, and long range surface-to-surface missile OOB just prior to the war without sufficient and mature TTPs to perform the mission.[24] Upon shifting to that mission during the eleventh hour, CFACC analysts discovered that the four C4I systems employed to create and update OOBs for the COP/CIP were incapable of providing interoperable interfaces for data transfer into the COP/CIP system. As a result, the CFACC was forced to coordinate with JICCENT in Tampa, FL for JICCENT to receive a spreadsheet

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2004].

[22] "Dissemination of MPR ISR Products to Land and Sea Forces," Commander U.S. Naval Central Command (COMUSNAVCENT), Navy Lessons Learned No. LLCC0-03270. September 12 2003. This document also details shortfalls in imagery analysts necessary to exploit P-3C imagery for dissemination to operational and tactical units.

[23] Statement of General Tommy R. Franks, Former Commander US Central Command, Before the Senate Armed Services Committee, July 9, 2003.

[24] "CFACC ACCE Intelligence Preparation," Joint Universal Lessons Learned System No. 41436-94678, 13 April 2003, [13 January 2004].

every six hours that contained the necessary OOB information. The data was then manually entered by JICCENT into the master database to update the COP/CIP. The issue produced confusion amongst other intelligence elements that were not informed of the changes in production and OOB responsibilities. This last minute workaround is surprising when one considers that US and coalition intelligence elements had 12 years to develop TTPs and C2 relationships to ensure unity of effort. While military personnel were often transferred from the CAOC after a 6 month rotation, the existing CAOC and JFC intelligence organizations are codified in Joint doctrine and are not new.

From the intelligence cycle perspective one thing seems certain, not all ISR assets arrived in theater with a TPED plan in hand to input information and intelligence into one COP/CIP in a time sensitive manner. The existing MASINT (Measurement and Signals Intelligence) C4I structure, required production times, and necessary expert analysis, that did not support suitable COP/CIP input and display for MASINT data. To address the shortfall, some individual analysts, many who enjoyed a personal or professional familiarity with one another prior to the operation, coordinated face to face or over secure communications circuits to pass data across components. This TPED workaround was often referred to as the "Bubbas Network."[25] These actions, while noble in effort, truncated the intelligence cycle and prevented proper intelligence dissemination to the proper units and decision makers. This was not the case for all intelligence disciplines. The ELINT (Electronic Intelligence) TPED seems to have been the model to follow. The ELINT data had a well formulated and

[25] "The Joint Common Operational and Common Intelligence Pictures (COP/CIP)," Navy Lessons Learned No. LLCC0-03291, 15 September 2003. [13 January, 2004].

mature TPED that allowed national, theater, and tactical ELINT information to flow into common displays in a timely fashion.

**Recommendations**

The operational commander can take several steps to bridge the gaps resulting from the critical factors that limited their ability to provide timely, accurate, fused, and actionable intelligence to Strategic, Operational and Tactical users. Foremost among them is to engage JFCOM (Joint Forces Command) in its role as the DoD's executive agent for joint interoperability and integration. This role places JFCOM at center stage as a source for solutions to ensure C4ISR integration and training throughout the DoD.

Joint exercises go far toward providing integration and training opportunities in a joint and coalition environment. Unfortunately C4ISR has not received the attention necessary to contend with the challenges presented during joint operations. Previous joint exercises have neglected C4ISR; treating it more as a support function to operations. Participating intelligence personnel were often culled from disparate units without regard to real-world training benefits, joint integration, and interoperability issues normally addressed to support ongoing or future operations. Future exercises sponsored by JFCOM, such as *Unified Endeavor*, which concentrate on training future JTF commanders and their component intelligence staffs on C4ISR, can make certain the right force mix participates and trains for integrated operations in a joint environment.

Although a significant step, joint exercises and training will benefit operational commanders more if the exercises are inculcated into the routine turnaround training cycles

the Services use to manage unit deployment schedules. An often heard phrase within military circles is *they train like they fight*. In reality, the Services have few opportunities during normal training cycles to train and operate in a JTF or CJTF battlespace environment. Incorporating joint exercises and training into their routine training schedules will enable all Services to become more familiar with ISR capabilities and limitations.

In concert with its joint exercise mission, JFCOM can also play a larger role in assuring interoperability and integration of DoD C4ISR systems by tracking the research and development (R&D) and procurement efforts Services pursue to design and purchase these systems. As the central clearinghouse for Service C4ISR requirements, JFCOM can unite the Services so they work towards the same ends and no longer develop and purchase stovepipe systems that fail to pass the joint, integrated, and interoperable tests. These steps will enable JFCOM to lay the foundation for a solid C4ISR roadmap that all Services, regardless of mission, can follow.

Current joint doctrine addresses the collection phase of ISR on the periphery only, with a cursory overview of how these assets support other TTPs or TST events. Apart from existing classified documents,[26] the most current dedicated ISR Joint Publication, JP-3-55, is over ten years old and provides only basic descriptions of the intelligence cycle.[27] Future ISR joint doctrine can mature and develop through the implementation of previous operational lessons learned, and by exercising C4ISR TTPs and C4ISR systems during JFCOM

[26] The Joint Service Tactical Exploitation of National Systems (JTENS) manual is an example of such a publication. While it provides a wealth of knowledge on TPED for national collection systems, its security classification engenders its use by a small cadre of specialized intelligence collection managers who are aware of the manual's utility and existence.

[27] Joint Chiefs of Staff, Doctrine for Reconnaissance, Surveillance, and Target Acquisition Support for Joint

sponsored joint exercises. The resulting doctrine ought to include checklists, analytical and decision making tools, and C2 structures for JFCs to use as a template to support future fast paced ISR operations. The development of updated ISR joint doctrine can provide JFCs with critical capabilities necessary to train forces and avoid the repetition of negative lessons learned discussed here.

**Conclusions**

The C4ISR assets and systems employed during *OIF* were a crucial ingredient to the coalition's success. Nevertheless, key factors impaired C4ISR assets and their systems from providing *OIF* commanders, across all levels of war, with timely, accurate, and actionable intelligence.

The key factors affecting the ability of ISR assets to support rapid maneuvers during *OIF* included compressed engagement times, incompatible and inadequate C4ISR systems, eleventh hour TTP and planning considerations, a lack of intelligence analysis tools, and Service unfamiliarity with the other Service ISR capabilities. A lack of interoperability between Service-unique C4ISR systems prevented the uninterrupted flow of information and intelligence across the intelligence cycle to warfighters.

Speed of maneuver by air and ground forces, accompanied by compressed engagement times and persistent ISR assets, placed a significant strain on the ISR architecture. Speed forced intelligence support components to streamline TPED methods. The inability of supporting intelligence elements to quickly respond to demanding

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Operations (RSTA), Joint Pub 3-55, Washington, DC: 14 April 1993.

operational requirements and rapid maneuvers was exacerbated by a lack of intelligence analysis tools to swiftly track and correlate large amounts of data.

Eleventh hour TTPs and planning for C4ISR architectures created confusion and misunderstanding among JFC and subordinate intelligence components. A shortage of experienced intelligence analysts delayed intelligence production, analysis and dissemination of time critical intelligence products. Consequently, incomplete, inaccurate, and delayed OOB and COP/CIP products were forwarded to commanders for use as decision making tools. Joint operations, now, more than ever, rely on effective C4ISR systems and TTPs that can provide timely, accurate, and actionable intelligence to support rapid maneuvers across Service lines.

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