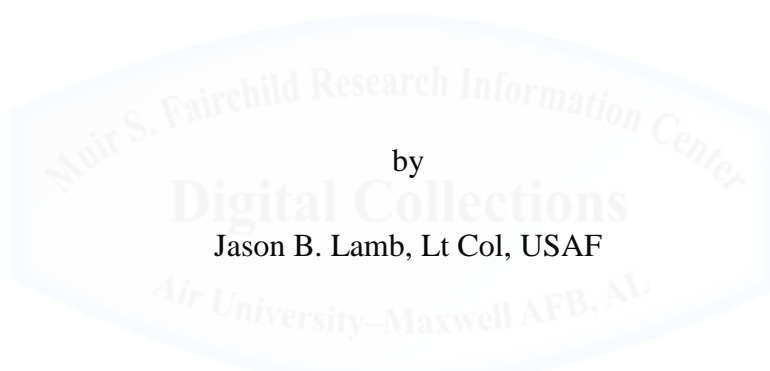


AIR WAR COLLEGE

AIR UNIVERSITY

GAMING THE SYSTEM: A GAME THEORY ANALYSIS OF
THEATER AIRBORNE ISR



A Research Report Submitted to the Faculty

In Partial Fulfillment of the Graduation Requirements

Advisor: Col Jill Singleton

13 February 2014

DISCLAIMER

The views expressed in this academic research paper are those of the author and do not reflect the official policy or position of the US government, the Department of Defense, or Air University. In accordance with Air Force Instruction 51-303, it is not copyrighted, but is the property of the United States government.



Biography

Lt Col Jason B. Lamb is assigned to the Air War College, Air University, Maxwell AFB, AL. He received his commission through the United States Air Force Academy in 1995. After graduating intelligence officer training, Lt Col Lamb served in a variety of assignments that include target intelligence team chief, information operations planner, airborne intelligence officer, commander's action group staff, flag-level executive officer, fighter wing chief of intelligence, combatant command-level joint planner, political affairs strategist, and intelligence squadron commander. He has deployed in support of Operations SOUTHERN WATCH, IRAQI FREEDOM, and ENDURING FREEDOM. Lt Col Lamb has Masters Degrees in Organizational Management, National Security Studies, and Air and Space Strategy and is a 2008 graduate of the School of Advanced Air and Space Studies. Most recently, Lt Col Lamb deployed with the Third Infantry Division to Kandahar Air Base, Afghanistan as Regional Command – South's Director for Intelligence, Surveillance, and Reconnaissance from August 2012 to June 2013.

Abstract

Using game theory as a framework and recent operations in Afghanistan as a case study, this work demonstrates that the current joint ISR allocation “game” is almost exclusively driven by operational priorities without substantive regard for the intelligence value of the requirements. The current system operates on the assumption that subordinate units are self-policing and only submit well-considered collection requirements with optimized Essential Elements of Information. While this is true in many cases, ground components possess organizational cultures that favor maximizing the number of assets allocated, so collection managers naturally pursue bidding strategies to that end. Efficiency and effectiveness of ISR employment are secondary considerations because neither affects subsequent allocation. To change this requires a new definition of success about ISR that is less focused on quantity of assets allocated and more focused on effects achieved. The joint community can accomplish this by developing policy, doctrine, and codified tactics, techniques, and procedures that change the game from zero sum (*i.e.*, “win-lose”) to non-zero sum in which “win-win” is not only possible but incentivized. While Afghanistan serves as the case study for this project, the findings and recommendations are not unique to that conflict. Without action, the ISR mistakes of Afghanistan will be repeated in the next conflict. As the United States cannot count on facing a conventionally weak adversary in the future, any mistakes will incur far greater costs than in either Iraq or Afghanistan. One must remember that while game theory provides insights, the stakes could not be higher—life and limb of those in harm’s way depend on the ISR overhead.

“ISR has become the coin of the realm. There just is an unlimited appetite for it. It’s voracious, and I think that’s not going to stop...”¹

-- James Clapper, Director of National Intelligence

Introduction

Operations in Iraq and Afghanistan featured highly focused targeting of insurgent networks, which put a premium on theater airborne intelligence, surveillance, and reconnaissance (ISR). Warfighter demand for ISR is insatiable as demonstrated by Secretary of Defense Gates’ establishment of the ISR Task Force and the Army standing up Task Force ODIN, which resulted in a sustained and unprecedented ISR surge in Afghanistan.² Never before has the Department of Defense (DOD) amassed so many ISR assets in one place. Yet no matter how many assets are deployed, demand continues to outstrip capacity by a wide margin. Theater airborne ISR is likely at the “high water mark” in terms of numbers of platforms based on the foreseeable fiscal environment. Given this budgetary reality and the inevitability of future military operations, there is an obvious need to maximize the utility of every ISR sortie.

Numerous and distinguished ISR professionals have written on the need for improved ISR effectiveness and proposed well-thought out strategies, but there has not been a significant change to ISR employment in recent years. This suggests that there are other barriers to improving the employment of ISR. Economics, the scientific field concerned with distribution of scarce resources, should provide some insights into how airborne theater ISR would be best allocated. Nested within economics is game theory. Noted game theorist Dr. Roger Myerson defines game theory as “the study of mathematical models of conflict and cooperation between intelligent, rational decision-makers. Game theory provides general mathematical techniques for analyzing situations in which two or more individuals make decisions that will influence one

another's welfare."³ As there is a relatively fixed pool of theater airborne ISR assets, allocation to one party frequently means that it is unavailable to another, so clearly, decisions relating to ISR do "influence another's welfare." Through the game theory lens, one can think of the current ISR process as the "game," the requesters of theater airborne ISR as the "players," and the Joint Forces Command ISR Division as the arbiter.

Thesis

Using game theory as a framework and recent operations in Afghanistan as a case study, this paper will demonstrate that theater airborne ISR allocation processes must change to account for the organizational cultures of the requesting units to ensure more efficient and effective use of limited assets.

The Game

In the words of Dr. Thomas Ferguson, "Games are characterized by a number of players or decision makers who interact, possibly threaten each other and form coalitions, take actions under uncertain conditions, and finally receive some benefit or reward or possibly some punishment or monetary loss."⁴ Every game has its own rules and objectives. Theater Airborne ISR is no different. After covering selected concepts of game theory, this project will review relevant doctrine, which in this context, one can think of as the recommended rules and objectives of the game. Finally, this paper will examine how the ISR game functions in reality to include the "house rules" that have evolved over time. The principle finding is that joint doctrine on ISR is sound, but the formal tactics, techniques, and procedures (TTPs) for requesting, allocating, and executing ISR lack the mechanisms necessary to maximize efficiency and effectiveness.

Selected Game Theory Concepts

As previously defined by Dr. Myerson and pioneered by Drs. von Neumann and Morgenstern, modern game theory seeks to use mathematical models to explain conflict and cooperation between parties. While there are many areas of game theory, the one most applicable to this project is strategic games, which form a model of interaction between profit maximizing players. In strategic games, each player has a payoff function that he aims to optimize based on the simultaneous decisions of all players. In “A Primer on Strategic Games,” Dr. Krzysztof Apt outlines three basic assumptions for strategic games: 1) players choose their strategies simultaneously and each player receives a payoff from the resulting joint strategy, 2) each player is rational, seeking to maximize payoff, and 3) players have common knowledge of the game and of each other’s rationality.⁵

Another key aspect of this game is that it is iterative. ISR is requested, allocated, and executed on a daily basis. In single iteration games, players have one opportunity to maximize payoff without having to consider the ramifications of their actions. In iterative games, however, players must consider factors such as reputation. If players cooperate with each other and develop trust, stable strategies (*i.e.*, equilibria) can emerge benefitting all players.⁶

The next key concept is the coordination mechanism. Dr. Myerson describes a coordination mechanism as “a plan for how social decisions should depend on people's reported information, and changing the coordination mechanism in a society effectively changes the game that its members will play... Given the information, preferences, and resources that people have in a society, different social coordination mechanisms could yield different games, each of which could have many different equilibria.”⁷ In the context of this project, a coordination mechanism is the means by which ISR is requested and allocated.

Related to the concepts of trust and the coordination mechanism is accountability. The arbiter of a game must have the means to ensure player compliance with the rules. To that end, the game must enable the arbiter to incentivize compliance with the rules and punish rule breaking. Dr. Myerson describes these means as “incentive-compatible mechanisms, which satisfy certain incentive constraints. These incentive constraints express the basic fact that individuals will not share private information or exert hidden efforts without appropriate incentives... Incentive constraints help us to explain many failures of allocative efficiency that we observe in the world.”⁸ Incentive compatible mechanisms create an environment in which each player knows that the best strategy is to follow the rules, no matter what other players do.⁹

The final game theory concept necessary for this analysis is the payoff construct, which is either zero sum or non-zero sum. In zero sum games, the payoff pool is fixed, which means that one player’s gain is another’s loss. As it relates to the ISR process, an ISR asset allocated to one player for a given time cannot be simultaneously allocated to another player. For this reason, one can think of zero sum games as “win-lose.” Non-zero sum games, on the other hand, do not have a fixed payoff pool. In non-zero sum games, it is possible to have win-win, win-lose, and lose-lose outcomes. As it relates to ISR, it is possible to achieve wide-ranging effects depending on which sensors are employed against various collection problem sets. If all of the players receive optimum assets, win-win is possible. Conversely, if all of the players receive incompatible assets, lose-lose occurs. Finally, if some players get optimal assets and others do not, a win-lose occurs.

Joint Doctrine

Having established the baseline game theory concepts and terminology necessary for this project, the next step is to examine the United States Department of Defense (DOD) approach to

ISR as codified in joint doctrine and writings. According to Joint Publication 2-0, the commander's priority intelligence requirements (PIRs) drive the intelligence process. PIRs are the pieces of intelligence the commander needs to know about the adversary to develop a strategy and to focus operations. Essential Elements of Information (EEIs) are the most critical pieces of information that help to answer PIRs.¹⁰ If intelligence does not currently exist to answer a PIR, a request for information (RFI) is generated which drives the creation of a collection requirement. Collection managers then prioritize the collection requirements as the basis of a collection strategy and plan. JP 2-0 describes the collection planning process thus:

Prioritization [of collection requirements] should be based on the commander's intent, objectives, approved PIRs, and the current situation to ensure that limited assets or resources are directed against the most critical requirements. A coordinated, coherent, target-specific strategy is developed to satisfy validated and prioritized collection requirements. The collection strategy is a scheme for collecting information from all available sources to satisfy [specific information requirements].¹¹

Even when collection managers do their best to optimize ISR in a collection plan, JP 2-01 acknowledges that requirements typically outstrip ISR capacity stating:

ISR resources are typically in high demand, and requirements usually exceed platform capabilities and inventory. The mission may require ISR resources not assigned to the theater or components of the subordinate joint force. The joint force collection manager must ensure that **all requests for additional ISR resources are based on validated needs** as established by the command's formal intelligence requirements process. The proper allocation of collection and associated PED [processing, exploitation, and dissemination] capabilities **ensures that limited ISR resources are optimally aligned against DOD's highest-priority IRs.** [Emphasis in original]¹²

To accomplish this "optimal alignment," JP 2-01 offers four collection management principles: early identification of requirements, prioritization of requirements, multidisciplinary approach, and task available assets first. Using those four principles, collection managers must develop a collection plan. JP 2-01 describes collection planning, even going so far as to provide

an example collection plan format and a collection tasking worksheet, but it does not provide a methodology for determining allocation beyond a reference to intelligence priorities, nor does it discuss measuring effectiveness or efficiency.

Indeed, the only joint doctrine that specifically addresses ISR assessments is found in United States Joint Forces Command's pre-doctrinal *Commander's Handbook for Persistent Surveillance*, which says, "Collections activities are continuous, and include monitoring the overall satisfaction of these requirements and assessing the effectiveness of the collection strategy to satisfy the original and evolving intelligence needs."¹³ It includes an entire chapter on assessing persistent surveillance in terms of measures of performance (MOP) and measures of effectiveness (MOE).¹⁴ Additionally, the handbook lays out three assessment phases that cover asset performance, mission performance, and mission effectiveness.¹⁵ In its final chapter, the handbook's authors highlight that existing joint doctrine needs updating to include "linkage to ISR force management, ISR operations management, and ISR assessment."¹⁶ Further, AFDD 2-0 is in apparent conflict with JP 2-0 on the issue of evaluation and assessments. In AFDD 2-0, evaluation is a subset of Analysis and Production while JP 2-0 clearly states that evaluation should be a continuous effort across the intelligence cycle.¹⁷ Thus, formal joint doctrine provides intent and concepts but is lacking in the areas of asset allocation and assessments methodology. Having reviewed the relative strengths and weaknesses of doctrine, what remains is to examine the key players and then determine how the International Security Assistance Force Joint Command (IJC) has operationalized joint doctrine.

The Key Players

While individual units rotate through Afghanistan on at least an annual basis, the players are relatively stable if viewed through a service lens. For example, Regional Command (RC)-South and RC-East are United States Army commands and RC-Southwest is a Marine Corps command; units rotate in and out but the branch of the armed service in charge remains the same. Consequently, the organizational cultures of each of the RCs are stable at the macro level and it is reasonable to assume that the land components will play a similar role in future conflicts. Dr. Edward Schein defines organizational culture as “a pattern of shared basic assumptions that was learned by a group as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems.”¹⁸ One can think of an organization’s culture as its personality. Establishing the personality of the game’s players is essential to understanding how each plays the game. Consequently, this portion of the project will examine Army, Marine, Air Force, and special operations forces (SOF) cultures with the limited aim of explaining the aspects of those cultures most likely to influence their approach to ISR.¹⁹ More specifically, this analysis will focus on ideals, warfighting tenants, artifacts, and view of ISR (see Table 1).

Army

In describing the culture of the Army, Carl Builder wrote, “If the Army worships at an altar, the object worshiped is the country; and the means of worship are service.”²⁰ Service is measured in terms of the number of people serving (*i.e.*, end strength). Because end strength is so highly valued, those placed in command of soldiers are seen to have a sacred charge to defend their area of responsibility with the personnel assigned. As the ability to control battle space is

linked closely with the amount of resources assigned, Battle Space Owners (BSOs) seek to have as many resources as possible at their disposal and those in charge tend to measure their relative value to the mission based on the amount of resources allocated to them. As a result, one can expect army organizations to pursue an ISR strategy that seeks to maximize the number of assets allocated because it is better to have them and not need them than the reverse.

Marine Corps

While a department of the Navy, the Marine Corps has a separate and distinct culture.²¹ The Marine Corps self-image is based upon acting as the nation's first responder expeditionary force as evidenced in its historic motto of "first to fight." This is also apparent in the Marine Expeditionary Force (MEF) construct, which is a self-contained operational-level warfighting unit with capability to operate in air, sea, and land. Rapid response into uncertain threat environments with relatively light equipment has given rise to the unofficial motto "improvise, adapt, and overcome." This approach to operations is results oriented placing a premium on both making the most of the resources assigned and acquiring additional resources whenever possible as a means of countering the unanticipated. Consequently, Marine units will likely use an ISR strategy that seeks to acquire the maximum number of assets, as they will find ways to make use of whatever they can get.²²

Air Force

The Air Force owes its existence to the technology that enabled powered flight. In his "Message from CSAF" at the beginning of *Global Vigilance, Global Reach, Global Power for America*, General Welsh observes that technological advances permit the Air Force to perform its missions, including ISR, in ways unthinkable in 1947.²³ The Air Force embraces ISR as one of its five core mission areas as specified in DOD Directive 5100.01, *Functions of the*

Department of Defense and Its Major Components. The Air Force seeks to accomplish this mission using the concept of distributed operations. Air Force Doctrine Document 2-0 uses this example, “a single global integrated ISR mission may be collecting on maritime target sets; using an airborne platform; transmitting collected data over space-based satellite communications to analysts in another part of the world who are creating and disseminating intelligence products through cyberspace.”²⁴ As it is impossible to provide persistent, in-depth ISR coverage of the entire globe, the Air Force leverages technology to provide tailored support as necessary to decision makers and warfighters. In other words, the Air Force employs an effects-based approach to ISR that attempts to minimize forward presence in favor of reach back to ISR centers of excellence.

Special Operations Forces

SOF units in Afghanistan needing ISR support are typically conducting operations targeting high-level individuals within enemy networks. Given the sensitivity and importance of these targets, operational security is of great importance. Additionally, high-value individual targeting requires very specific ISR capabilities collecting for extended periods to get the necessary intelligence to conduct an operation. For these reasons, SOF has demonstrated a willingness to give up some of the ISR allocations it receives through the request process in exchange for more stability in allocations to facilitate planning.²⁵

Table 1. Organizational culture comparison

	Ideal	Warfighting tenant(s)	Artifact(s)	View of ISR
Army	End strength	Battle space control	Battle Space Owner	“Just in case” More is better
Marine Corps	First to fight	Improvise, adapt, and overcome	Marine Expeditionary Force	“I’ll find a use” More is better
Air Force	Technological innovation	Global vigilance, reach, and power	Global integration and distributed operations	“Just in time” Effect is better
Special Ops	Secrecy	Operational security	Trigger-based operations	“On demand” Predictable is better

The Game in Practice²⁶

The purpose of this section is to examine ISR in Afghanistan from a game theory perspective. In other words, what is the format of the game and how is it played? While IJC is a NATO organization with many partner nations making valuable contributions, the United States dominates the ISR enterprise and will likely do so in future conflicts. Consequently, this assessment will focus on more enduring concepts applicable to future DOD operations.

Collection Requirements Bidding and ISR Allocation

In Afghanistan, brigade sized units and below typically have some ISR capabilities organic to them. The same holds true for most SOF units. Any requirements that units cannot fill themselves are submitted to higher echelon for prioritization. The RCs and theater-level SOF review subordinate unit requests for ISR to ensure they are valid. Validity determinations are based on asset availability windows, sensor suitability for the target, and other operational parameters. So long as units correctly fill out all of the fields in the ISR request, IJC typically leaves the validity determination to the submitting organizations. Thus, IJC relies on the RCs and SOF to exercise good faith in following process rules and adhering to the principles outlined in joint doctrine.

Additionally, the RCs prioritize ISR requests based on RC commander operational priorities. There are no limits on the number of requests that can be made, and there is a general expectation that the higher one's priority, the greater the number of assets one can expect to be allocated. RCs nearly always submit their collection requirements under the highest operational priority possible to maximize requirement fill rate. In many cases, the linkages to the operational priorities are tenuous, which lead to allegations of "gaming the system" and an atmosphere of distrust between the requesting organizations.²⁷ In one specific case, an IJC collection manager

was aware that a RC was bidding its request under an inappropriately high priority but was unable to convince the RC to change its strategy. Failing to get the offending RC to “play by the rules,” the IJC collection manager’s advice to another RC was to “game the system within reason.”²⁸ As four of the six RC-level Directors of ISR are Army or Marine, it is not surprising that strategies seeking to maximize ISR allocation are pervasive.²⁹ Furthermore, IJC does not impose any form of penalty for violating the bidding rules, so all bidders are incentivized to pursue aggressive strategies.

Once IJC receives all of the bids for ISR support from the RCs and SOF, IJC collection managers consolidate and prioritize the requests using weighted formulas within an electronic spreadsheet designed for this purpose. Factors considered include IJC operational priority, requesting organization priority, and specific times requested. The intelligence value of the requested collection, however, is not a major consideration. As a result, collection of a relatively minor piece of intelligence informing a high priority operation will secure ISR support over a more significant intelligence need tied to a lower priority operation. The spreadsheet and its formulas are available to the units and at least one RC dedicated hundreds of man-hours to breaking down the formulas to improve its bidding strategy to maximize its ISR allocations.³⁰

As one IJC Director of ISR explains, the spreadsheet “bid math” provides the “science” portion of the allocation process but it is the collection manager’s role to provide the “art” by making changes to the allocations in line with the IJC commander’s operational intent.³¹ With few exceptions, changes made tend to be minor suggesting that the spreadsheet bid calculations act as an “anchor” in the allocation process. As noted by the United States Air Force’s Negotiation Center of Excellence, the stronger the anchor, the closer the end result will be to that starting point.³² On this issue, one IJC collection manager admitted, “It is really surprising how

much ISR that RC gets. I don't know how they do it."³³ Thus, the requestor's knowledge of the bidding system skews the allocation of ISR because the theater-level collection managers have demonstrated an unwillingness to deviate from the bid math anchor.

Execution

After ISR is allocated, supported units establish contact with supporting units to begin coordination concerning the concept of operations and the EEIs. Because allocations are driven by operational priorities, some units can receive multiple assets while others receive none. This can become an issue as brigade-level units typically have four junior personnel assigned to perform ISR-related duties and SOF units usually have even fewer. This was true in Iraq and is unlikely to change in future conflicts. These personnel are responsible for concurrently ingesting the results of previous collection operations, monitoring current day operations, coordinating upcoming operations, and bidding for future allocations. Understandably, units with high operational priority can become quickly overwhelmed. IJC and the RCs exercise little oversight of the coordination and execution phase of operations because doing so would be perceived as a violation of the sanctity of the battle space owner. When one RC Director of ISR attempted to ascertain how a unit was coping with its ISR, a flag officer within that RC ended the effort saying, "If you provided the ISR they requested, that's all you need to know."³⁴ Similarly, the RCs vigorously rebuffed any attempts by the IJC ISR Division to investigate the utility of the assets allocated.³⁵ How then was success measured? The answer lies in the assessments process.

Assessment

As sociologist William Bruce Cameron famously observed, "Not everything that can be counted counts, and not everything that counts can be counted."³⁶ Both of the two IJC Directors of ISR interviewed for this project highlighted the difficulties associated with developing

meaningful MOEs. One stated, “The effort to capture the value of situational awareness, over watch, and hours of pattern of life remains elusive to measurement and thus prevents us from getting a complete and accurate measure of ISR effectiveness.”³⁷ Limitations aside, measures are necessary to determine success and what an organization chooses to count reveals what it considers important. In the case of ISR, IJC measures effectiveness in terms of battlefield effects (*e.g.*, number of insurgents killed, caches cleared, etc.) and performance in terms of how many hours of each capability are generated. To that end, IJC ISR puts together a monthly assessment that focuses on percentage of requirements filled, percentage of allocation to each RC and SOF, and a survey of the RCs and SOF about how satisfied they are with the performance of the ISR allocated. As one collection manager put it, “You can capture all of those metrics without even turning the sensor on.”³⁸ In other words, assessments are kinetic operations-centric and do not contain intelligence-related measures of effectiveness.

In most cases, the RCs did not do much better with their internal assessments processes. For example, one of the RCs deemed ISR successful if it received more ISR than other RCs. When that RC’s new Director of ISR changed assessment measures to focus on effects achieved in place of allocation percentages, one brigade-level collection manager complained, “My brigade commander is not going to be happy because he uses those numbers to beat his chest.”³⁹ If any RCs and SOF elements attempted to develop meaningful ISR MOEs, the effects were limited to their organizations and did not influence IJC’s allocation process.

Findings and Recommendations

Examination of Theater Airborne ISR in Afghanistan from a game theory perspective provides insights into how IJC allocates assets and how the system can be changed to improve the efficiency and effectiveness of ISR. The findings and recommendations include:

Finding 1: Land components tend to treat ISR as a zero sum game

For slightly different reasons, both the Army and the Marine Corps tend to view ISR as a zero sum game whose objective is to gain as many assets as possible. As a result, the RCs pursue bidding strategies to maximize their allocations and tolerate misrepresentation as a means of increasing their share. Because the RCs view ISR allocations in win-lose terms, trust is low between the RCs and with SOF.⁴⁰ While this view may benefit the RC with the highest operational priority, it does so at the expense of the theater as a whole.

Finding 2: Theater ISR lacks incentive-compatible mechanisms

IJC ISR does not have the mechanisms in place to hold subordinate units accountable even when it knows those units are “gaming the system.” So long as IJC cannot incentivize compliance and punish misbehavior, subordinate units will pursue any strategy that will benefit them the most and cheat when necessary. Under these circumstances, only inexperienced, irrational, or altruistic players would pursue a strategy that diminishes their payoff.

Finding 3: Organizational subordination affects the effectiveness of ISR

As captured in joint doctrine, successful ISR requires the close collaboration of operations and intelligence. Doctrine is also equally clear that the collection of intelligence is the primary purpose of ISR, yet ISR is aligned under the operations staff element at IJC.⁴¹ This construct has some benefits in improving ISR synchronization with kinetic operations but it does so at the cost of inhibiting ISR’s primary role in delivering broad decision advantage and

enabling both planning and strategy. When the operations division controls ISR, it controls intelligence collection operations, which means that ISR may not contribute substantively to the commander's PIRs. In fact, ISR contributions to PIRs are not measured or tracked, which leaves collection managers unable to determine the intelligence "return on investment" for the ISR allocated. Furthermore, the neglect of PIRs forces commanders to develop strategies and set operational priorities with unnecessarily dated and incomplete intelligence about the adversary.

Finding 4: Air Force risks its credibility when distributed operations fall short of promises

Expanding on an increasingly popular truism in the DOD, General James Amos observed, "virtual presence is actual absence. Actual presence demonstrates shared commitments and shared dangers."⁴² As the Air Force works toward its virtual global presence via the distributed operations concept, it must be careful to fill its promises lest its credibility be damaged and its relevance wane. This is especially true when Air Force personnel fill less than 10% of the collection management and ISR billets in theater.⁴³

Finding 5: Doctrine does not provide sufficient guidance on measuring ISR performance

While JP 2-0 describes the need for formal assessment methods and procedures across intelligence functions, none currently exist for ISR.⁴⁴ Consequently, organizations develop their own measures that reflect organizational cultural values. In the case of IJC, ISR assessments were operationally based because of the ISR division's alignment under the operations directorate instead of intelligence.

Recommendation 1: Align ISR under the intelligence component of all staffs within theater

In addition to addressing numerous cultural conflicts between echelons, this will help to address commander PIRs and prevent operations from being the primary driver of intelligence,

which can devolve into “whack-a-mole” type reactive strategies driven by enemy-initiated actions.

Recommendation 2: Refine doctrine and develop multi-service TTPs for ISR

The joint force needs to develop TTPs that address ISR strategies to address common problem sets with corresponding measures of effectiveness.⁴⁵ While every collection problem is different, developing baselines for common problems will provide a valuable starting point from which to deviate. Similarly, standardized measures of success will help mitigate unproductive organizational cultural influences. Lastly, the joint and service staffs must update doctrine to reflect the continuous and cross-cutting nature of assessments as captured in JP 2-0.

Recommendation 3: The Air Force needs to lead or abandon ISR at the operational level

The Air Force should increase the number of Air Force Directors of ISR at the division level (*i.e.*, RC) or transfer theater airborne ISR responsibility and assets to the land components. If the Air Force provides capabilities without leadership, it will be relegated to a purely supporting role.⁴⁶ If the Air Force increases its leadership role, those leaders will be able to provide first hand insights as the distributed operation concept matures.

Recommendation 4: Develop incentive-compatible mechanisms for ISR allocation

While ultimately the decision of the Joint Force Commander, the ISR allocation system needs to provide the JFC ISR division the means to incentivize cooperation and punish rule breaking.⁴⁷ On this point a Marine observed, “Collections also suffers from lack of tasking discipline. While he was deployed, the G-2 took some ISR sortie time away from some of the maneuver battalions to force some tasking discipline on them. This worked and made them come up with more focused tasks and requirements for their assets. Once that G-2 left, though, everyone went back to being sloppy.”⁴⁸

Conclusion

In war, the appetite for ISR is insatiable. Battle space owners have demonstrated a willingness to request ISR beyond what can be used efficiently or effectively. Thus, ISR demand in Afghanistan and future operations will always outstrip capacity. Service views about ISR are culturally driven and will not change unless compelled to do so. To change this requires a new mindset about what constitutes success in theater ISR from quantity of assets allocated to effects achieved. From a game theory perspective, the nature of the game must be altered from zero sum to non-zero sum.

This study has shown that the current ISR allocation “game” is almost exclusively driven by current operational priorities without substantive regard for the broader strategic intelligence value of the requirements. The current system operates on the assumption that subordinate units are self-policing and only submit well-considered collection requirements with optimized EEIs. While this is true in some cases, ground components possess organizational cultures that favor quantity, so collection managers naturally pursue bidding strategies that maximize allocations. Efficiency and effectiveness of ISR employment are secondary considerations because neither affects subsequent allocations. Thus, the joint community must restructure the game via policy and codified TTPs to penalize the pursuit of quantity and incentivize effectiveness.

While Afghanistan serves as the case study for this project, the findings and recommendations are not unique to that conflict. Without action, the ISR mistakes of Afghanistan will be repeated in the next conflict. As the United States cannot count on facing a conventionally weak adversary in the future, any mistakes will incur far greater costs than in either Iraq or Afghanistan. One must remember that while game theory provides insights, the stakes could not be higher—life and limb of those in harm’s way depend on the ISR overhead.

Notes

¹ James R. Clapper. Remarks delivered at GEOINT 2011 Symposium. Henry B. Gonzales Convention Center, San Antonio, TX, October 17, 2011.

² Thom Shanker, "At Odds With Air Force, Army Adds Its Own Aviation Unit," *New York Times*, June 22, 2008. <http://www.nytimes.com/2008/06/22/washington/22military.html> (accessed October 8, 2013).

³ Roger B. Myerson. *Game Theory: Analysis of Conflict* (Harvard University Press, 1991), 1.

⁴ Dr. Thomas S. Ferguson, "Game Theory," http://www.math.ucla.edu/~tom/Game_Theory/Contents.html (accessed October 15, 2013).

⁵ Krzysztof R. Apt. "A Primer on Strategic Games," *Lectures in Game Theory for Computer Scientists*, edited by Krzysztof R. Apt and Erich Grädel, (Cambridge University Press, February 14, 2011), 1-2.

⁶ For more on strategies and cooperation in iterative games, see N. J. Raihani and R. Bshary, "Resolving the Iterated Prisoner's Dilemma: Theory and Reality," *Journal of Evolutionary Biology* 24 (2011): 1628-1639.

⁷ Roger B. Myerson, "Perspectives on Design in Economic Theory," *The American Economic Review* 98, no. 3 (June 2008), 587.

⁸ Myerson, "Perspectives on Design," 587.

⁹ John O. Ledyard, "incentive compatibility," *The New Palgrave Dictionary of Economics. Second Edition*. Edited by Steven N. Durlauf and Lawrence E. Blume (Palgrave Macmillan, 2008). http://www.dictionaryofeconomics.com/article?id=pde2008_I000027 (accessed October 15, 2013).

¹⁰ Joint Publication 2-0, *Joint Intelligence*, I-8.

¹¹ Ibid, I-13, 14.

¹² Joint Publication 2-1, *Joint Intelligence Operations*, III-8.

¹³ United States Joint Forces Command, *Commander's Handbook for Persistent Surveillance*, IV-3.

¹⁴ While JP 2-0 does address MOPs and MOEs in general terms on page I-22, it does not address the more difficult matter of application to ISR in the same way the *Commander's Handbook for Persistent Surveillance* does.

¹⁵ Ibid, VI-5.

¹⁶ Ibid, VII-2, 3.

¹⁷ Joint Publication 2-0, I-21, 22 and Air Force Doctrine Document 2-0, 50.

¹⁸ Edgar Schein, *Organizational Culture and Leadership*, 3rd ed. (San Francisco, CA: Jossey-Bass, 2004), 17.

¹⁹ The absence of the Navy from stand-alone analysis is not intended to be a slight; it is simply a limitation of the Afghanistan case study where the Navy does not play a dominant role in ISR. In the author's personal experience, the Navy ISR asset community's culture closely resembled the Air Force's and the Navy's special operations forces are considered as part of the SOF subculture analysis.

²⁰ Carl Builder, *Masks of War* (Baltimore, MD: The Johns Hopkins University Press, 1989), 20.

²¹ In *Masks of War*, Carl Builder argues the Marine Corps' derives its culture from its parent organization, the Navy. He describes the Navy as worshiping at the altar of tradition. It is the

contention of this paper that while the Marine Corps is proud of its traditions, tradition does not explain its approach toward operations including ISR.

²² The author validated the assertions in this section with two Marine classmates in AWC Class 2014. See also, LtCol Michael Taylor, USMC. "Service Culture and the Joint Force." Strategy Research Project, US Army War College, 2011.

²³ United States Air Force. *Global Vigilance, Global Reach, Global Power for America*, 2013, http://www.af.mil/Portals/1/images/airpower/GV_GR_GP_300DPI.pdf (accessed October 12, 2013), 1.

²⁴ Air Force Doctrine Document 2-0, *Global Integrated Intelligence, Surveillance, and Reconnaissance Operations*, January 6, 2012, 9.

²⁵ Matthew Atkins, Lt Col, USAF (Special Operations Joint Task Force Director for ISR and later Director of Intelligence, 2012-2013), interview with author, September 2013.

²⁶ This section relies heavily on interviews and the personal experience of the author, frequently summarizing the majority view. Critiques of the ISR system are not intended to detract from the outstanding service and contributions of those involved. In the author's experience, everyone involved in with Theater Airborne ISR was doing his or her absolute best to provide the right ISR capability to the right place at the right time. Please see the bibliography for a complete listing of the interviewees and their positions.

²⁷ Personal communications with multiple unnamed sources at IJC and four Regional Commands, September 2012 – June 2013. This information is well known within the ISR community within Afghanistan but shared by the individuals in question on the condition of anonymity.

²⁸ Telephone conversation with an IJC collection manager while the author was the RC-South Director of ISR, September 2012. This information was shared on the condition of anonymity.

²⁹ During the period examined for this study there were six regional commands. RC-East, South and Southwest were led by United States forces and the rest were coalition member led. An Army major led RC-East ISR, a Marine major led RC-Southwest ISR, and an Air Force lieutenant colonel led RC-South ISR. The only other Air Force led ISR section was in RC-Capitol, which was led by a Turkish captain.

³⁰ Discussion with an RC-level Director of ISR while the author was the RC-South Director of ISR, December 2012. This information was shared in confidence with the author at the IJC ISR Conference in Kabul, Afghanistan.

³¹ Thomas Hensley, Col, USAF (IJC Director of ISR, 2012-2013), personal conversation with author while the author was the RC-South Director of ISR, Fall 2012.

³² United States Air Force Negotiation Center of Excellence, "Practical Guide to Negotiating in the Military, 2nd ed.," <http://culture.af.mil/NCE/>, 6.

³³ Telephone conversation with an IJC collection manager while the author was the RC-South Director of ISR, Fall 2012. This information was shared on the condition of anonymity.

³⁴ Author's personal experience while deployed as RC-South's Director for ISR, August 2012 – June 2013.

³⁵ Thomas Hensley, Col, USAF (IJC Director of ISR, 2012-2013), personal conversation with author while the author was the RC-South Director of ISR, Winter 2012.

³⁶ William Bruce Cameron, *Informal Sociology: A Casual Introduction to Sociological Thinking* (New York: Random House, 1963), 13.

³⁷ Thomas Hensley, Col, USAF (IJC Director of ISR, 2012-2013) and Patrick Shortsleeve, Col, USAF (IJC Director of ISR, 2013-2014), separate interviews with author, September 2013. The quote is attributable to Col Patrick Shortsleeve.

³⁸ Personal conversation with an unnamed RC Division Collection Manager while the author was the RC-South Director of ISR, Spring 2013. The identity of the individual is withheld at the discretion of the author.

³⁹ Author's personal experience while deployed as RC-South's Director for ISR, August 2012 – June 2013.

⁴⁰ Lt Col Matthew Atkins (SOJTF Director of ISR and later J2) reinforced this observation in his interview saying, "The IJC system was flawed, so you had to cheat to keep up with all the RCs that were doing the same thing."

⁴¹ As noted by one senior Air Force intelligence officer, this is a clear violation of joint doctrine but IJC is a NATO command and besides, there is no such thing as "doctrine police."

⁴² General James F. Amos, "Crisis Response and Expeditionary Operations: The Future of the United States Marine Corps," a speech given at the Center for Strategic and International Studies, Washington, D.C., November 8, 2012. Transcript by Federal News Service, 6.

⁴³ Thomas Hensley, Col, USAF (IJC Director of ISR, 2012-2013), interview with author, September 2013.

⁴⁴ Joint Publication 2-0, I-22.

⁴⁵ For more detailed recommendations on assessing ISR, see Joint Forces Command's *Commander's Handbook for Persistent Surveillance*. See also, Sherrill Lingel, Carl Rhodes, Amado Cordova, Jeff Hagen, Joel Kvitky, and Lance Menthe. *Methodology for Improving the Planning, Execution, and Assessment of Intelligence, Surveillance, and Reconnaissance Operations*. Technical Report, Santa Monica, CA: RAND Corporation, 2008.

⁴⁶ This view was expressed by an intelligence flag officer at the 2011 AF ISR Agency Commanders Conference that the author attended as a squadron commander. This same general officer championed the creation of Air Force intelligence Lieutenant Colonel Director of ISR positions in RC-South and RC-East. The author was the first to fill the position in RC-South.

⁴⁷ For more on cooperation in various game constructs, see Robert Axelrod's *The Evolution of Cooperation*. Basic Books, 1984.

⁴⁸ Christopher Paul, et al, *Alert and Ready: An Organizational Design Assessment of Marine Corps Intelligence* (Santa Monica, CA: RAND National Defense Research Institute, 2011), 64.

Bibliography

- Air Force Doctrine Document 2-0. *Global Integrated Intelligence, Surveillance, & Reconnaissance Operations*, 6 January 2012.
- Amos, James F. General, USMC. "Crisis Response and Expeditionary Operations: The Future of the United States Marine Corps," a speech given at the Center for Strategic and International Studies, Washington, D.C., November 8, 2012. Transcript by Federal News Service.
- Anderson, Dagvin, Col, USAF. "A Holistic Approach to Intelligence, Surveillance, and Reconnaissance." AF Fellows Research Report, Air University, 2011.
- Atkins, Matthew, Lt Col, USAF (ISAF SOF Director of ISR and CJ2, 2012-2013). Interview by author. September 2013.
- Axelrod, Robert. *The Evolution of Cooperation*. New York: Basic Books, 1984.
- Brams, Steven J. *Negotiation Games: Applying Game Theory to Bargaining and Arbitration*. New York: Routledge, 1990.
- Brown, Jason M., Col, USAF. "Strategy for Intelligence, Surveillance, and Reconnaissance." AWC Research Report, Air University, 2013.
- Builder, Carl H. *The Masks of War*. Baltimore, MD: The Johns Hopkins University Press, 1989.
- Cameron, William Bruce. *Informal Sociology: A Casual Introduction to Sociological Thinking*. New York: Random House, 1963.
- Clapper, James R. HON. Remarks delivered at GEOINT 2011 Symposium. Henry B. Gonzales Convention Center, San Antonio, TX, October 17, 2011.
- Department of Defense Directive 5100.01. *Functions of the Department of Defense and Its Major Components*, 21 December 2010.
- Ferguson, Thomas S. "Game Theory" http://www.math.ucla.edu/~tom/Game_Theory/Contents.html (accessed October 15, 2013).
- Flynn, Michael T., LTG, USA, and Charles A. Flynn, BG, USA. "Integrating Intelligence and Information: "Ten Points for the Commander." *Military Review* (January-February 2012): 4-8.
- Frengle, Royce, Maj, USAF. "Beyond Afghanistan: Effective Combined Intelligence, Surveillance and Reconnaissance Operations." ACSC Research Report, Air University, 2010.
- Frost, Peter J, Larry F. Moore, Meryl Reis Louis, Craig C. Lundberg, and Joanne Martin. *Organizational Culture*. Beverly Hills, CA: Sage Publications, 1985.
- Garlauskas, Markus V. "Intelligence Support for Military Operations." *Joint Forces Quarterly* (Winter 2002-03): 102-108.
- Heap, Shaun Hargreaves, and Yanis Varoufakis. 1995. *Game Theory: A Critical Introduction*. London: Routledge, 1995. eBook Collection, EBSCOhost (accessed October 12, 2013).
- Hensley, Thomas, Col, USAF (Director of ISR, ISAF Joint Command, 2012-2013). Interview by author. September 2013.

- Huggins, Lawrence, LtCol, USMC (Commander, 2d Special Operations Bn operating in Regional Command – Southwest, 2012-2013). Interview by author. September 2013.
- Hunt, Trevor, Capt, USMC (Intelligence Officer, 2d Special Operations Bn operating in Regional Command – Southwest, 2012-2013). Interview by author. September 2013.
- Joaquin, M. Ernita and Thomas J. Greitens. “The Accountability-Performance Link.” *Public Performance & Management Review* 34, no. 3 (March 2011): 323-349.
- Johnson, Daniel R., Lt Col, USAF. “An "ISR Strategy" for Joint Campaign Strategy, Planning, Execution, and Assessment.” Air War College, Maxwell AFB, AL: Air University Press, Maxwell Paper No. 34, September 2004.
- Joint Publication 2-0. *Joint Intelligence*, 22 October 2013.
- Joint Publication 2-01. *Joint and National Intelligence Support to Military Operations*, 5 January 2012.
- Joint Publication 3-55. *Doctrine for Reconnaissance, Surveillance, and Target Acquisition Support for Joint Operations (RSTA)*, 14 April 1993.
- Koistinen, Cassandra, LCDR, USN (collection manager and ISR plans officer in Regional Command – South, 2012-2013). Interview by author. September 2013.
- Ledyard, John O. "incentive compatibility." *The New Palgrave Dictionary of Economics. Second Edition*. Eds. Steven N. Durlauf and Lawrence E. Blume. Palgrave Macmillan, 2008. The New Palgrave Dictionary of Economics Online. http://www.dictionaryofeconomics.com/article?id=pde2008_I000027 (accessed October 15, 2013).
- Lingel, Sherrill, Carl Rhodes, Amado Cordova, Jeff Hagen, Joel Kvitky, and Lance Menthe. *Methodology for Improving the Planning, Execution, and Assessment of Intelligence, Surveillance, and Reconnaissance Operations*. Technical Report, Santa Monica, CA: RAND Corporation, 2008.
- Martin, Nathan, MAJ, USA (division collection manager in Regional Command – South, 2012-2013), Interview by Author. September 2013.
- Morgan, Gareth. *Images of Organization*. Thousand Oaks, CA: Sage Publications, Inc, 2006.
- Myerson, Roger B. *Game Theory: Analysis of Conflict*. Cambridge, MA: Harvard University Press, 1991.
- Paul, Christopher, Harry J. Thie, Katharine Watkins Webb, Stephanie Young, Colin P. Clarke, Susan G. Straus, Joya Laha, Christine Osowski, and Chad C. Serena. *Alert and Ready: An Organizational Design Assessment of Marine Corps Intelligence*. Santa Monica, CA: RAND National Defense Research Institute, 2011.
- Raihani, N. J. and R. Bshary. “Resolving the Iterated Prisoner’s Dilemma: Theory and Reality.” *Journal of Evolutionary Biology* 24 (2011): 1628-1639.
- Rothkopf, Michael H. “Decision Analysis: The Right Tool for Auctions.” *Decision Analysis* 4, no. 3 (September 2007): 167-172.
- Rozumski, Paul, Maj, USAF (Deputy Director of ISR, Regional Command – South, 2013). Interview by author. September 2013.

- Schein, Edgar H. *Organizational Culture and Leadership*. Third Edition. San Francisco, CA: Jossey-Bass, 2004.
- Shanker, Thom. "At Odds with Air Force, Army Adds Its Own Aviation Unit." *New York Times*, June 22, 2008. Accessed electronically at www.nytimes.com/2008/06/22/washington/22military.html (accessed October 8, 2013).
- Shortsleeve, Patrick M, Col, USAF (Director of ISR, ISAF Joint Command, 2013-2014). Interview by author. September 2013.
- Taylor, Michael W., LtCol, USMC. "Service Culture and the Joint Force." Strategy Research Project, US Army War College, 2011.
- United States Air Force. *Global Vigilance, Global Reach, Global Power for America*, 2013, http://www.af.mil/Portals/1/images/airpower/GV_GR_GP_300DPI.pdf (accessed October 12, 2013).
- United States Government Accountability Office. *Intelligence, Surveillance, and Reconnaissance: Actions are Needed to Increase Integration and Efficiencies of DOD's ISR Enterprise*. Report to Congressional Committees, Washington, D.C.: GAO, 2011.
- United States Department of Defense. Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, *Report of the Defense Science Board Task Force on Defense Intelligence, Counterinsurgency (COIN) Intelligence, Surveillance, and Reconnaissance Operations*. Washington, DC: February 2011. <http://www.fas.org/irp/agency/dod/dsb/coin.pdf> (accessed September 12, 2013).
- United States Joint Forces Command. *Commander's Handbook for Persistent Surveillance*, ver 1.0. Suffolk, VA: Joint Warfighting Center, 20 June 2011.
- USAF Negotiating Center of Excellence. *Practical Guide to Negotiating in the Military*, 2nd ed. <http://culture.af.mil/NCE/> (accessed September 30, 2013).
- Wicker, Christopher (collection management expert with 10 years' experience in Afghanistan (most recently Regional Command – Capitol) and USCENTCOM). Interview by author. September 2013.
- Young, William, MAJ, USA (Division Collection Manager, Regional Command – East, 2012-2013). Interview by author. September 2013.