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From Warden's Air Force to Boyd's Air Force

by

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Abstract

Today's intelligence, surveillance, and reconnaissance (ISR) processes are largely vestiges of the industrial age and function much like an assembly line. Complex problems are broken down into discrete taskings to be collected and analyzed by separate intelligence disciplines and returned to the requestor to comprehend. This process often requires little initiative or critical thought on the part of collectors or analysts, and offers limited flexibility in mission execution. The process is further reinforced by the way ISR units are organized, which keeps ISR analysts focused solely on their piece of the puzzle instead of the problem as a whole. Additionally, the service still adheres to a simplistic approach, inspired by Colonel John Warden's "Five Rings," that oversimplifies the analysis of an adversary by overlooking the complex internal dynamics of enemy systems. To transform into an information age fighting force, the Air Force must become the service of Colonel John Boyd. It must move from its traditional hierarchical system to an adaptive ISR command and control paradigm and restructure Air Force intelligence squadrons into multi-intelligence discipline (multi-INT) organizations.

The United States Air Force of 2016 is the most potent, lethal, and effective air & space force in the world, but is increasingly at risk of losing its edge against potential adversaries. Much of the literature regarding Air Force modernization appropriately articulate the need to invest in a variety of upgraded and next-generation systems in order to maintain a technological advantage against a future foe. The Air Force's dilemma, however, is that its organizational concepts and operational processes lag woefully behind, a shortfall that will become even more acute with the exponential advancement of technology in the decades to come. While these antiquated concepts affect a variety of Air Force missions, nowhere are they more apparent than in the intelligence, surveillance, and reconnaissance (ISR) enterprise. In order to ensure commanders of 2036 and beyond possess the required information to maintain decision advantage, Air Force modernization efforts must look beyond investments in new ISR platforms and sensors. To truly be prepared for the uncertainty of future battlefields the Air Force must embrace a new model of ISR command & control and the establishment of agile, multi-intelligence discipline (multi-INT) squadrons as the building blocks of the ISR enterprise. The Air Force must abandon its industrial age culture and fully embrace the information age. In short, it must become the Air Force of Colonel John Boyd.

In many respects, today's Air Force warfighting culture reflects two key influences: scientific management theory and the ideas of Colonel John A. Warden III. The first influence can be seen in the Air Force's embrace of the notion of centralization, notably in the doctrine of centralized control, decentralized execution. While virtually all military organizations are hierarchical in nature, consist of clearly defined roles, and rely extensively on standardized procedures – all hallmarks of a classic Weberian bureaucracy – the Air Force culture goes a step further by consistently and unapologetically defending the notion of centralization for the sake of

efficiency. This type of bureaucratic model formed the intellectual backbone of nineteenth and twentieth-century management practices and was one of the true innovations of the industrial age.¹ Indeed, these structures were ideal for precisely that era when workers were expected to perform repetitive, menial tasks, often specializing in the output of a single component without knowledge of the whole.

While this approach may be appropriate for the routine administration of a factory or the non-operational aspects of a military organization, this doctrine has bled over into the execution of Air Force operations resulting in processes that negatively impact operational efficacy, particularly in the ISR community. The Air Force inadvertently created an assembly line mentality, resulting in processes that are highly linear and prescriptive, requiring little initiative or critical thought on the part of the individuals closest to the fight. The most obvious example is the current collection management and ISR tasking methodology, which takes a commander's often complex problem set and breaks it up into discrete taskings by separate intelligence discipline [i.e. signals intelligence (SIGINT), imagery intelligence (IMINT), etc.]. These taskings are further parsed out, prioritized, and input into different systems depending on whether it will be collected by an airborne platform or a space-based asset. Once collected and analyzed by different organizations, the bit of intelligence is sent back to the requestor to be re-aggregated into a coherent picture.

Particularly when paired with the 72-hour air tasking order (ATO) cycle, this process is slow and inflexible, and creates "stove-pipes" of specialized information rather than a common understanding of a problem set. This highly-segmented process is further reinforced by the way ISR units are organized, which is typically by intelligence discipline. These self-imposed organizational seams keep Air Force analysts focused solely on their small piece of the puzzle

rather than the problem as a whole, while simultaneously creating single points of failure and bottlenecks in the flow of information. This is particularly troublesome because the aggregation of information by the requesting organization is rarely as seamless as the doctrinal process would suggest, thus leaving huge gaps in the shared understanding of a situation.

The second key influence on today's Air Force is the legacy of retired Colonel John A. Warden III. As one of the primary architects of the highly successful Operation Desert Storm air campaign, he is rightly regarded as a noteworthy airpower theorist and practitioner. His methodical approach to targeting, as typified by his famous "Five Rings," has dominated Air Force thinking and practice on the subject for the past two and a half decades. Warden conceptualized an adversary as a system, comprising various elements and the links between them. He then classified each node of the system into one of five categories visualized as five concentric circles: leadership, population, infrastructure, organic essentials, or fielded military forces. Warden adopted the Clausewitzian concept of centers of gravity (COGs) as the most important nodes and links whose "health and actions have a disproportionate impact on the rest of the system."² Warden highlighted the importance of the temporal dimension of conflict, and advocated for parallel warfare, vice the traditional serial approach, as a way to utilize time to one's advantage.³

Where Warden's ideas come up short, however, is in his underlying belief that all adversaries could be templated according to his Five Rings. This concept represents a strikingly linear way of thinking in which similar inputs produce similar and predictable outputs. Such simplistic notions of cause-and-effect do not take into account the innumerable action-reaction cycles that characterize modern warfare,⁴ which will only accelerate and become more complex by 2036. It also does an additional disservice by causing analysts and planners to overlook the

complex internal dynamics of an adversary system, which as physicist Per Bak states, can be “simply, bewilderingly unknowable.”⁵ This manner of thinking reinforces the Air Force’s aforementioned bureaucratic, centralized, requirements-driven culture. Under this paradigm, a commander or other decision-maker starts with an understanding of an adversary in his or her mind. They then submit collection requirements to help fill in the perceived gaps in their knowledge, and the Air Force fulfills those collection requirements by employing air or space based assets. Information is then received by the requestor and the cycle starts over again. The problem with this arrangement is that it discounts the inherent difficulty in defining what is known and unknown about an adversary, particularly as systems become more dynamic and complex. By only searching for the “known knowns,” to borrow a phrase from former Secretary of Defense Donald Rumsfeld, we are not well-postured to react to the serendipitous or unexpected,⁶ or the “unknown unknowns.” ISR collectors and analysts are thus passive; virtual assembly line workers churning out widgets of info, unaware of the actual problem they may be involved with solving and unable to inform decision-makers that they are not even asking the right questions because they have underestimated or misunderstood the enemy system.

The Air Force now stands at a crossroad. It can continue to operate as a twentieth century bureaucracy that celebrates centralized control and it can continue to propagate a manner of thinking that wishes away complexity. The Air Force can pursue another path; one that not only embraces uncertainty but learns to thrive in it. It can leave behind the organizations and processes of a bygone era and become an information age fighting force. The intellectual foundation for this transition already exists. Colonel John Boyd sagely articulated a vision of warfare the Air Force can no longer afford to overlook.

Boyd is perhaps best known for his concept of the observe, orient, decide, act (OODA) loop, a deceptively simple yet insightful representation of human and organizational decision-making and adaptation. It is a manifestation of an understanding that decisions are not made in reaction to the world but rather to an image of the world in the minds of the people making decisions. The OODA loop is often viewed in a tactical context and simplified with a focus exclusively on the speed of execution. In reality, the key to the OODA loop is as much about accurate and effective orientation as speed. As a model of adaptation and institutional learning it has implications far above the tactical level.⁷ Beyond the OODA loop, Boyd's greatest contribution came from his conceptualization of warfare as a contest between complex adaptive systems, comprising dynamic networks of interactions that react and reorganize in response to changing events.⁸ In this respect, armed forces can be viewed more accurately as perpetually evolving ecosystems than the unresponsive closed systems of Warden's Five Rings.

Boyd believed the way to deal with this inherent complexity and infinite number of actions and reactions is by properly organizing and commanding forces. He conceptualized a form of command & control (C2) that was not hierarchical or directive in nature, but instead was based on the open flow of information and shared view of organizational purpose.⁹ In order to compete with a complex adaptive system, one must abandon industrial age, centralized processes and become a complex adaptive system that embraces a form of self-organization. He envisaged small teams operating "relatively autonomously to pursue entrepreneurial activities,"¹⁰ another way of saying they take the initiative. This concept is perfectly in line with Joint Publication 3-0 which states "successful mission command demands that subordinate leaders at all echelons exercise *disciplined initiative* and act aggressively and *independently* to accomplish the mission."¹¹ It is the type of command philosophy espoused by retired Marine Corps General

Paul Van Riper, who during his highly successful stint as the commander of Red Forces during Millennium Challenge, told his staff that he was “in command but out of control” because he had provided guidance and intent but would not issue detailed directives of any kind.¹²

The precedent for adopting this type of C2 structure in ISR has already been set. In 2010, the Combined Air & Space Operations Center (CAOC) at Al Udeid Airbase began implementing ISR mission-type orders (MTOs) for limited durations in direct support of major named operations in Afghanistan. The MTO broke the traditional collection management paradigm and replaced it with a process that put ISR collectors and analysts in direct contact with a supported unit. The information needs of the supported commander bypassed the typical 72-hour ATO cycle and instead flowed directly to those executing the missions. This flattening of a traditionally hierarchical system armed ISR operators and analysts with greater understanding of the overall concept of operations, schemes of maneuver, and most importantly the commander’s intent. It provided the all-important context, the “why” behind the operation. It produced a more holistic view of the larger intelligence problems that needed to be solved rather than the piecemeal requests for specific bits of information from each intelligence source. In turn, this unfettered communication provided the supported unit with a more flexible, responsive, and engaged reach-back ISR element that delivered more timely and relevant tailored intelligence products. In other words, it fostered the exact type of “entrepreneurial activity” Boyd portended based on trust, initiative, and a free flow of information.

In many respects, the participants in these MTOs were a temporary “teams of teams,” to use the term popularized by retired General Stanley McChrystal, who also embraced this collection method with resounding success during his own commands in Iraq and Afghanistan. As a geographically dispersed enterprise, with Marine forces on the ground in Afghanistan, RC-

135 crews and U-2 pilots overhead, Air Force remotely piloted aircraft (RPA) crews in Nevada, and a group of analysts in California, the participants never met one another face-to-face.

Instead they formed an ad hoc team that leveraged the best of each organization for a particular set of intelligence problems in support of a single operation. MTOs are certainly not the panacea for all that ails the Air Force from a C2 perspective; however they should be considered along with other less rigid alternatives to traditional models as a normalized part of conducting operations. It is a step forward in the evolution away from the traditional hierarchical notion of centralized control, decentralized execution toward “centralized command, distributed control, and decentralized execution.”¹³

The maturation of time-dominant fusion—an analytic tradecraft “focused on rapid discovery by correlating what is new with what is known”¹⁴—further bolsters flexible ISR C2 effectiveness. This concept is certainly not new, but advances in technology have enabled practice to catch up with theory by allowing correlation to take place as close to the point of collection as possible. A similar concept called Activity-Based Intelligence (ABI) is being championed by the National Geospatial Intelligence Agency (NGA), among others. At its core, it seeks to “replace the linear methodology of individually exploited pieces of data with an activity-based analysis approach” to more quickly and effectively tackle the hardest intelligence problem sets.¹⁵ ABI’s rapid data correlation has the potential to help answer questions that were never asked, Secretary Rumsfeld’s “unknown unknowns.” When paired with a flexible tasking mechanism, the rapid series of feedback loops enabled by time-dominant fusion and ABI has the ability to fundamentally change operations by allowing ISR operators to exploit the temporal dimension of warfare. Following Boyd’s logic, rapid correlation produces more accurate orientation, which in turn enables more rapid decision-making.

The true value of these multi-INT methodologies will come when they are able to fully leverage “big data” and transform the “four Vs” – volume, velocity, variety, and veracity – from challenges into assets.¹⁶ These refer to the sheer amount of data available, the speed at which information travels, the rapidly increasing types of data sources available, and the reliability of that data. A significant aspect of these challenges is technological and the Air Force seems to be taking the necessary first steps toward solving that foundational issue. According to the Air Staff’s *ISR 2023: Delivering Decision Advantage* document, the Air Force has ‘bought in’ to the idea of a shared ISR IT infrastructure across all services and combat support agencies by supporting the implementation of the intelligence community information technology environment (IC ITE) and Joint Intelligence Enterprise (JIE).¹⁷ This common architecture will break down the stove-pipes created by incompatible, proprietary IT systems developed and implemented by competing vendors over the course of decades. It will eliminate the architectural barriers to cross-organizational collaboration and unleash a deluge of available data across the IC.

Establishing a common infrastructure is a necessary step, but not sufficient to enable the ISR enterprise to provide decision advantage in 2036. The Air Force must fundamentally change its approach to intelligence and reshape its ISR force structure. First, this means abandoning or automating single-INT exploitation, particularly low-value functions like large-scale full-motion video (FMV) exploitation. In the near-term, the service is already exploring emerging technology that can scan video for basic pattern recognition and provide activity alerts that would empower a single analyst to exploit multiple simultaneous feeds. In the mid- and long-term, these functions should be completely automated; streaming automatically-annotated feeds to an end-user in near-real time and producing meticulously meta-data tagged archived footage

that can be retrieved as needed as part of a multi-INT analysis. The same type of technology must be applied to communications intelligence (COMINT), where emerging speech-to-text technology should be incorporated to alleviate the manpower burden of the current near-real time translation mission. As these technologies mature, intercepted communications could simply be added to the vast stores of data that can be queried and analyzed based on the rapidly changing information needs of a dynamic operating environment.

A critical part of the transition away from assembly line style quick-look exploitation will be restructuring Air Force intelligence squadrons into more flexible organizations. This means giving squadron commanders the latitude to organize as they see fit based on the task at hand, to experiment with different organizational constructs, and tinker with workflows. The current concept of exploitation “crews” are a vestige of the ISR enterprise’s hallowed past and a reminder of its origins in the flying community. However, this concept is obsolete in the current operational context and will become more so over time. Intelligence squadrons must be provided with maximum freedom of action through extensive use of direct liaison authority (DIRLAUTH) with external agencies and organizations that can contribute to mission accomplishment. This will empower commanders to continue to propagate “teams of teams” and thus harness the power of a problem-solving network.

The composition of squadrons must reflect a new way of approaching intelligence, and thus must trade the overwhelming majority of entry-level single-INT analysts for a balanced mix of manpower skilled in a variety of intelligence disciplines. Training programs will need to be developed to grow analysts that can conduct ABI or whatever operational approach replaces it, so that analysts are empowered to be creative problem solvers, not automatons solely focused on churning out widgets of sole-source data. The game-changing aspect of this approach is its

ability to draw on all sources of data, to include the vast and largely untapped realm of open-source information. Today this treasure trove of open-source information includes social media and twenty years from now it is likely to include sources that have yet to be invented. Another significant data source will be the 5th and perhaps 6th-generation aircraft that in a contested environment decades in the future may be the only air-breathing collection platforms available. The concept that assets like the F-22 and F-35 are truly multi-role aircraft is hard to fathom in today's bureaucratic and centralized Air Force culture that, perhaps unintentionally, promotes tribalism. As retired Lieutenant General David Deptula notes, these assets "will enable us to conduct information age warfare...if we exploit their 'nontraditional' capabilities in a fashion that becomes the new 'traditional.'"¹⁸ The Air Force must fundamentally transform organizations designed to collect and analyze specialized information from dedicated assets into flexible information integrators, to include information from traditionally "non-traditional" sources.

The Air Force has always been the service that embraced and celebrated technology. It is a service that was born out of a desire for organizational change in order to fully harness the awesome potential of airpower, but it is at a turning point. Although it has been the vanguard of technological innovation for decades and is currently leveraging countless capabilities of the information age, many of the Air Force's processes and much of its thinking remains firmly ensconced in the industrial age. The Air Force must abandon its cultural affinity for centralization and embrace a new model of ISR C2, while creating agile, empowered, multi-INT squadrons as the building blocks of its ISR enterprise. To remain the most potent, lethal and effective air & space force in the world in 2036 and beyond, the Air Force must abandon the legacy of Colonel John Warden and become the Air Force of Colonel John Boyd.

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Notes

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 - 3 Ibid, 115
 - 4 Fadok, David S. “John Boyd and John Warden: Airpower’s Quest for Strategic Paralysis,” (Maxwell AFB, AL: Air University Press), 278
 - 5 Ramo, Joshua C. “The Age of the Unthinkable” (New York: Little, Brown & Co.), 53
 - 6 Herman, Michael. “Intelligence Power in Peace and War” (Cambridge, UK: Cambridge University Press), 289
 - 7 Fadok, David S., 366
 - 8 Osinga, Frans P. B. “The Enemy As A Complex Adaptive System: John Boyd in the Postmodern Era,” (Annapolis, MD: Naval Institute Press), 61
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 - 11 Joint Publication 3-0: Joint Operations, II-2
 - 12 Gladwell, Malcom. “Blink: The Power of Thinking Without Thinking” (New York, NY: Back Bay Books), 118
 - 13 Deptula, David A. “A New Era of Command and Control of Aerospace Operations,” (*Air & Space Power Journal*, July-August 2014), 63
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 - 18 Deptula, David A., 8