United States Air Force White Paper

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The Digital Air Force

Our world is entering a new age of technological discovery and advancement. Big data analytics and the Internet of Things are transforming societies and economies, and expanding the power of information and knowledge. Every part of our communities, businesses, and nations will be touched by this phenomenon, including the military forces that protect them.

These advances are fueling a revolution in how we fight and evolving the character of war. Victory in combat will depend less on individual capabilities, and more on the integrated strengths of a connected network of weapons, sensors, and analytic tools. Today's Air Force must transform to employ the data, technology, and infrastructure we need to prevail. We have no choice—we must change to dominate this future.

To compete, deter, and win over our great power adversaries, we are forging a Digital Air Force that will:

1. Field a 21st century IT infrastructure responsive to the demands of modern combat

2. Leverage the power of data as the foundation of artificial intelligence and machine learning to enable faster decision-making and improved warfighter support

3. Adopt agile business practices that improve the effectiveness and efficiency of our management enterprise

Where We Are

Today, the Air Force operates in a complex security environment marked by rapid technological change and an evolving character of war. Our adversaries seek to challenge us across every battlespace domain, fielding forces designed to exploit our dependencies and frustrate our American way of war. They seek to oppose our advantages across the spectrum of conflict with advanced air defenses, counter-space weapons, and continuous probing and attacks on our cyber networks.

These adversary systems were designed against our current force: a collection of exquisite, yet discrete platforms. These aircraft, satellites, and other systems perform synchronized, yet independent, and in many cases analog, missions. In some cases, these platforms are unable to share data with others, limiting real-time cooperation across the force and leading to stovepipes of data and knowledge. This challenge is further exacerbated when we try to coordinate systems across our air, land, sea, space, and cyber domains. In the past, we could "deconflict" the diverse elements of our force and still achieve operational and tactical success. However, the Information Age is upon us, rapidly making these antiquated processes and systems obsolete. This now requires the integration and fusion of these diverse elements.

Unlike the government-sourced innovation of our prior era, today's advances stem from powerful discoveries in the commercial sector. Companies and countries now collect vast quantities of data, using it to derive powerful insights, train machine-learning algorithms, and fuel information

flow between distributed systems. More than 90% of the world's data was created over the past two years, revealing an increasingly digitized world of information and connectivity. These developments have revolutionized business and commerce, and will similarly influence the future of war.

The Digital Air Force embraces the potential of this data-driven revolution and prepares us for future conflict environments steeped in shared information and powered by rapid decision-making.

Where We Are Headed

Faced with the increased speed and scope of future war, the Air Force must move from platform-centric to network-centric operations. We must develop families of systems that fuse and share the ubiquitous data collected throughout the battlespace and rear echelons. Our warfighting and command and control systems will leverage this data to produce insights about adversary positions and intentions. Machine-learning algorithms and artificial intelligence will support commanders by rapidly analyzing potential courses of action and accelerating our decision-cycle to confuse and overwhelm our adversaries. By correlating multi-spectral and multi-source data, we will find adversaries that try to hide in the "noise," helping us prosecute fleeting, mobile, or time-sensitive targets with greater confidence and precision.

In this future, every platform must "connect, share, and learn" in a widespread system of systems. To do so, Airmen and their platforms must communicate on protected and resilient communications links. These networks must possess distributed capabilities that are self-healing against the loss of individual nodes, allowing information to route through alternative paths to continue powering the air, space, and cyber effects demanded by combatant commanders. For example, the Air Force's initial concept for the Advanced Battle Management System depends upon this vision of fused data from numerous sources, and provides a pathfinder for true multi-domain command and control.

Additionally, our expected budget environment will continue to be constrained; there are never enough resources to fund every requirement. Our future enterprise will leverage industry-standard technology and systems to reduce overhead, gain efficiencies, and generate superior management outcomes in support of the warfighter. We must fundamentally reform our business practices to free scarce funding for efforts that increase the lethality and readiness of the force.

How We Will Get There

To achieve this vision, we must synergize three interconnected and mutually supporting reform efforts: IT architecture, data management, and business operations reform. Every segment of the Air Force will be impacted by these changes: we are driving to integrate warfighting, information operations, cyber, and business practices as a vehicle for dominating great-power competition. The weight of this reform demands direction from the most senior levels, so the Under Secretary of the Air Force will oversee and manage this critical path forward.

We are developing the Digital Air Force through several important initiatives. First, we are producing a digital architecture that will provide the common backbone for data and information flow. We are moving to cloud-based solutions for storing and sharing data, ensuring that all Airmen

have uninterrupted access to the data they need, where and when they need it. These systems will be resilient and secure, allowing data transmission in the most challenging electromagnetic environments. Furthermore, we are revamping how we conceive of digital security and driving new standards for system verification so we can connect new, innovative systems at the speed of relevance.

Secondly, we are designing data management architecture and standardized policies to support the free exchange of data between platforms. This requires data that is gathered, stored, and transmitted in commonly read and digested formats to minimize the delay between receiving, processing, and using information derived from multiple systems.

Finally, we are changing how we manage our people and business systems. We are moving day to day IT infrastructure management to contracted service providers, allowing our cyber professionals the freedom to focus on warfighter tasks and connecting information operations to our tactical and strategic ends. We are changing how we recruit and train our personnel to operate these systems and manage an infrastructure designed for warfighting effect. Also, we are moving to rationalize, consolidate, and refine our business management systems and practices, merging requirements, activities, and systems where appropriate, and implementing plans that foster innovation, process improvement, and force development.

Dominating the Future

The National Defense Strategy is clear—we face a future of rapid technological change and an evolving character of war. To prevail over our competitors, we must confidently embrace the revolutionary power of the Information Age. This will require a fundamental change in how we manage and share information, and we will drive this change throughout the force.

Ultimately, we must move beyond antiquated processes, systems, and mindsets. We will pursue new ways to leverage technology and institute a culture of innovation and informed risk-taking. We will become a Digital Air Force.