Leveraging the Past to Prepare for the Future of Air Force Intelligence Analysis

Brien Alkire, Abbie Tingstad, Dale Benedetti, Amado Cordova, Irina Danescu, William Fry, D. Scott George, Lawrence M. Hanser, Lance Menthe, Erik Nemeth, David Ochmanek, Julia Pollak, Jessie Riposo, Timothy Smith, Alexander Stephenson

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About the cover: Air Force intelligence analysis has been a key enabler to the application of air power in the past and will continue to be an enabler of future operations in the air, space, and cyberspace. The inset is a photo of a U.S. Army Air Forces (AAF) intelligence officer during World War II (U.S. Army Air Forces photo). The intelligence section of the AAF was one of the first organizations to bring in civilian experts to help analyze German industry. Allied bombing of the oil targets they identified helped to weaken the German war economy. The cover also includes a photo of Senior Airman Meaghan G. Holley at a modern analyst workstation (U.S. Air Force photo by Senior Airman Justyn M. Freeman). She led a ten-member target analysis team that located and relayed the positions of more than 4,300 compounds to coalition forces, leading to the seizing of three weapon caches and more than $2 million in narcotics. She was named one of the 12 Outstanding Airmen of the Year in 2015.

Preface

Irregular warfare has been the primary focus of the U.S. military ever since the attacks of September 11, 2001. Given the recent focus on irregular warfare, the U.S. Air Force (USAF) Deputy Chief of Staff for Intelligence, Surveillance and Reconnaissance asked the RAND Corporation to conduct a project to help ensure that the USAF has the capability to provide intelligence analysis in support of a broader range of operations.[1] The project identified lessons from past operations that either had direct implications for USAF intelligence analysis or USAF intelligence analysis could help to address. The project also identified the future challenges for USAF intelligence analysis. This report describes the findings of the project and recommends steps the USAF can take to address the lessons of the past and to prepare for the future.

The research reported here was commissioned by Lt Gen Robert P. Otto, Deputy Chief of Staff for Intelligence, Surveillance and Reconnaissance, Headquarters USAF, and conducted between October 2014 and July 2015 in the Force Modernization and Employment Program of RAND Project AIR FORCE as part of fiscal year 2015 project "Air Force ISR Enterprise: Leveraging the Past to Prepare for the Future." The report should be of interest to intelligence professionals within the USAF, USAF personnel who depend on intelligence analysis to support USAF core missions, and the broader intelligence community.

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[1] For purposes of this project, we define *intelligence analysis* as "a cognitive activity—both art and science—applying tools and methods to collected data and information to create and deliver intelligence knowledge with the goal of providing decision advantage to commanders and decisionmakers" (DCS for ISR, 2014, p. 5).

Contents

Figures

Tables

Summary

Motivation

Irregular warfare (IW)[2] has been a primary focus of the U.S. military since the attacks of 9/11. Nearly three-quarters of active-duty U.S. Air Force (USAF) personnel have joined the service since that time,[3] and many have limited experience in supporting operations other than IW. Although the nation continues to be engaged in IW operations, the 2014 Quadrennial Defense Review and recent USAF vision signal that the USAF must also be prepared to support a broader range of operations. The deputy chief of staff (DCS) for intelligence, surveillance, and reconnaissance (ISR) asked the RAND Corporation to recommend steps the USAF can take to provide intelligence analysis that supports a broader range of potential service and combatant commander needs.

Research Questions and Approach

The DCS for ISR asked RAND to answer two research questions in order to help the USAF prepare to provide intelligence-analysis capability to support a broad range of needs:

- What are key lessons from past operations?
- What additional challenges will USAF intelligence analysts face in the future?

The DCS also asked RAND to recommend steps the USAF can take to address the lessons from the past and to prepare for future challenges. Specifically, the research team considered recommendations for analysis tools, training and career-field development, processes, and doctrine.

In consultation with the sponsor, the research team decided that it would identify relevant lessons from the past and potential challenges of the future by eliciting information from three sources: a survey, semistructured discussions with subject-matter experts (SMEs), and literature reviews. Chapter One describes the methodology in detail. First, the team used the three sources to develop initial hypotheses. It then used independent samples from the same three sources to test those hypotheses. Although survey participation was limited to intelligence personnel from

[2] IW can include activities and operations, such as counterterrorism, unconventional warfare, foreign internal defense, counterinsurgency, and stability operations. See Under Secretary of Defense for Policy, 2014.

[3] This RAND estimate, made in May 2015, is based on demographic information obtained from Air Force Personnel Center, 2012, and totals obtained from "USAF Almanac 2015," 2015.

within the USAF ISR enterprise,[4] the team conducted discussions with SMEs from a broad range of organizations (see Chapter One for details).

To help identify future challenges, the research team also conducted mission analysis of defense planning scenarios. In particular, the team examined joint operations in the land, maritime, special operations, air, space, and cyberspace domains that were associated with campaign simulations and wargaming of select scenarios and identified the USAF intelligence-analysis activities that would have been required to support those operations. Chapter Three describes this work.

The research team evaluated the role of analyst tools in addressing lessons from past operations and meeting challenges of the future. This involved collecting input from analysts on the types of tools that they find useful and information exchanges with government and nongovernment organizations that develop software tools. In the course of this effort, we identified one of three future challenges. Chapter Four describes this work.

The research team also evaluated options related to training and career-field development that could help address the lessons of the past and prepare for the future. We conducted additional literature reviews and SME interviews for this purpose. RAND researchers visited Goodfellow Air Force Base in Texas to attend courses and observe exercises. We conducted semistructured discussions with career-field managers. Although this helped us identify recommendations for addressing the lessons from the past and prepare for the future, we gleaned several additional insights that merit discussion in their own right. Chapter Five describes these.

As with all research projects, limitations had to be placed on the scope in order to complete the research with the time and resources that were available. These limitations might have resulted in inaccuracies and imperfections. Two key limitations of this project are that it focused attention on intelligence analysis to support operations and that it focused attention on analysis capability as opposed to analysis capacity. We made the decision to impose these limitations in coordination with the sponsor. This report attempts to mitigate the imperfection resulting from a focus on operations by articulating some of challenges to intelligence analysis for other parts of the USAF ISR enterprise, such as those of the USAF Office of Special Investigations, that we came across in the course of our project. These are described in an appendix, available separately. Although we do not orient our findings and recommendations toward those parts of the USAF, that does not mean that the associated analysis issues are less important or worthy of careful investigation. To help mitigate the imperfection resulting from focus on capability as opposed to capacity, we include some estimates of the number of targets needing service in

[4] For the purposes of this project, we define the USAF ISR enterprise as 25th Air Force (the 9th Reconnaissance Wing, 55th Wing, 363rd ISR Wing [363 ISRW], 480 ISRW, and 70 ISRW), the National Air and Space Intelligence Center, intelligence directorates at major commands, elements of the air and space operation centers, and unit-level intelligence support.

phase 2/3 operations of select defense planning scenarios.[5] This helps to quantify some important analytic capacity metrics to meet future needs. We provide those estimates in a separate appendix.[6]

Findings

The research identified nine relevant lessons from past operations, which arose repeatedly in multiple sources. We grouped them into the following categories: lessons on building analytic foundations, lessons about partnerships, and lessons about development and employment of skills. Note that we did not prioritize the lessons or categories, and the numbering or order in which we present them does not imply any prioritization. We summarize them in Table S.1. See Chapter Two for details.

Table S.1. We Identified Nine Lessons from Past Operations

Category	Lesson
Lessons on building analytic foundations	1. Many processes, such as critical thinking, can be employed across different missions and levels of intelligence.
	2. Knowledge required to provide context is lacking or limited to support USAF missions other than IW.
	3. Success in operations depends on analyses conducted across multiple timelines, organizations, and levels of war. They build on one another and require integration.
	4. Roles and responsibilities for analysis activities to support phase 2/3 operations in air, space, and cyberspace are not well defined or practiced.
Lessons about partnerships	5. Joint, national, and partner analytic capabilities and capacities are not sufficiently leveraged.
	6. ANG and USAF Reserve contributions have been important but could be better utilized and are hindered by integration challenges.
	7. Integration of general-purpose and special operations force capabilities has resulted in more successes for both forces.
Lessons about development and employment of skills	8. The United States has repeatedly faced unplanned security challenges.
	9. It has been difficult to balance development of analytic expertise with career progression milestones.

The research identified three new challenges that USAF intelligence analysts will likely face in the future:

- The pace of future conflicts could stress needs for foundational intelligence and challenge readiness to conduct analysis during phase 2/3 operations.

[5] The phase numbers refer to military operations to seize the initiative (phase 2) and for dominance (phase 3), as defined in Section E of JP 3-0 (Joint Chiefs of Staff, 2011, Figure V-3).

[6] This appendix is not publicly available. Please contact us for instructions to request it.

- Analysts might need more expertise with intelligence from and for the space and cyberspace domains because operations in those domains might be more prominent.
- The volume of data and limitations on collection that anti-access and area-denial developments impose will challenge analysts.

We describe the first two challenges in Chapter Three and the third challenge in Chapter Four.

Recommendations

We developed eight recommendations that will help address the lessons from past operations and prepare USAF intelligence analysts to meet future challenges. These recommendations involve changes to doctrine, training, materiel, leadership, or personnel. They fall into the categories of defining the roles and responsibilities of analyst airmen, training and developing those analysts, equipping them with tools, and investing in the readiness of the analyst force. We summarize these recommendations in Table S.2 and describe them in detail in Chapter Six.

Table S.2. We Make Eight Recommendations

Category	Recommendation
Define the roles and responsibilities of analyst airmen	Form a committee to federate roles and responsibilities for analysts across the enterprise and use programs of analysis or similar to document them.
	Update doctrine to better reflect analysis for operations in addition to IW.
Train and develop analyst airmen	Create an intelligence-analyst professional development program spanning multiple USAF specialty codes.
	Develop requirements for new mobile training team courses on cyber and space ISR and an analysis refresher, and modify the existing critical-thinking course.
	Institutionalize mentorship and exchange of knowledge between analysts.
	Increase the priority of select assignments within the joint and national communities.
Equip analyst airmen with tools	Fully support the IC information technology enterprise, increase investments in single-INT tools, and foster user-driven analytics for multi-INT tools.
Invest in readiness of the analyst force	Expand the scope of existing or develop new exercises in order to practice analytic activities for operations other than IW.

NOTE: IC = intelligence community. INT = intelligence-collection discipline. *Single-INT* refers to intelligence derived from a single intelligence-collection discipline (INT), while *multi-INT* refers to intelligence derived from multiple intelligence-collection disciplines.

Acknowledgments

We would like to thank the project sponsor, Lt Gen Robert P. Otto, Deputy Chief of Staff (DCS) for Intelligence, Surveillance and Reconnaissance (ISR), Headquarters (HQ) U.S. Air Force (USAF), for the opportunity to conduct this research. We would like to thank the following senior leaders in the USAF ISR enterprise for their valuable guidance and feedback: Lt Gen John N. T. Shanahan, 25th Air Force commander; Maj Gen Linda R. Urrutia-Varhall, HQ USAF Assistant Deputy Chief of Staff of Intelligence, Surveillance, and Reconnaissance; Maj Gen Veralinn Jamieson, HQ Air Combat Command Director of Intelligence (A2); Mark Tapper, Defense Intelligence Senior Leader, HQ USAF/A2; Jon 'Doc' Kimminau, Defense Intelligence Senior Leader, Analysis Mission Technical Advisor to the DCS for ISR. The project benefited from the input received from many USAF intelligence-analysis experts, including Brian Fishpaugh, Col Brian J. Ray, David R. Coffey, Maj Michael Kreuzer, Scott Fullenkamp, Kenny O'Neal, and Frank von Heiland. We appreciate the hard work provided by the project action officer, Maj Erik Olsen. The research team greatly appreciates the help of Paul McVinney, chief of the Air Force Lessons Learned Pentagon Operating Location for the Curtis E. LeMay Center for Doctrine Development and Education. The project benefited from inputs from countless others with whom we met across the enterprise, including National Air and Space Intelligence Center, the ISR wings, the air and space operation centers, and the major command A2s. In particular, we would like to thank Col Jason M. Brown and Lt Col David Vernal for the engaging discussions we had on multiple occasions. We also greatly appreciate the help and input we received from the joint and national communities.

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Abbreviations

A2	intelligence directorate
AAR	after-action review
ABI	activity-based intelligence
ACC	Air Combat Command
AD	air defense
AETC	Air Education and Training Command
x AF	numbered Air Force, where *x* is the number (e.g., 25 AF is the 25th Air Force)
AFB	Air Force base
AFLL	Air Force Lessons Learned
AFPC	Air Force Personnel Center
AFRL	Air Force Research Laboratory
AFS	Air Force specialty
AFSC	Air Force specialty code
AFSPC	Air Force Space Command
ANG	Air National Guard
AOC	air and space operation center
AOR	area of responsibility
AST	Advanced Skills Training
ATR	automatic target recognition
BDA	battle damage assessment
C2	command and control
CCDR	combatant commander
CFETP	Career Field Education and Training Plan
CFM	career-field manager
CFSP	Core Function Support Plan
CIA	Central Intelligence Agency

COCOM	combatant command
CSO	combat systems operator
CTSAC	Critical Thinking and Structured Analysis Course
DART	distributed common ground/surface system analysis and reporting team
DCGS	distributed common ground/surface system
DCS	deputy chief of staff
DGS	distributed ground station
DoD	U.S. Department of Defense
ELINT	electronic intelligence
FEQ	field evaluation questionnaire
FMV	full-motion video
FY	fiscal year
GMTI	ground moving target indicator
GPF	general-purpose force
GS	General Schedule
HQ	headquarters
IADS	integrated air defense system
IC	intelligence community
IFTU	Intelligence Formal Training Unit
INT	intelligence-collection discipline
IQT	initial qualification training
ISIL	Islamic State of Iraq and the Levant
ISR	intelligence, surveillance, and reconnaissance
x ISRW	numbered intelligence, surveillance, and reconnaissance wing, where *x* is the number (e.g., 363 ISRW is the 363rd Intelligence, Surveillance, and Reconnaissance Wing)
ITE	information technology enterprise
I&W	indications and warning
IW	irregular warfare

JAC	joint analysis center
JEMA	Joint Enterprise Modeling and Analytics
JIOC	joint intelligence operations center
JP	joint publication
JSPOC	Joint Space Operations Center
MAJCOM	major command
MQT	mission qualification training
MTT	mobile training team
NASA	National Aeronautics and Space Administration
NASIC	National Air and Space Intelligence Center
NATO	North Atlantic Treaty Organization
NSA	National Security Agency
OB	order of battle
OBP	object-based production
OC	operations center
ODNI	Office of the Director of National Intelligence
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OOD	Operation Odyssey Dawn
OPLAN	operation plan
OPM	U.S. Office of Personnel Management
PED	processing, exploitation, and dissemination
POA	program of analysis
RC	Reserve Component
RPA	remotely piloted aircraft
x RW	numbered reconnaissance wing, where *x* is the number (e.g., 9 RW is the 9th Reconnaissance Wing)
SEI	Special Experience Identifier
SIGINT	signals intelligence

SME	subject-matter expert
SOF	special operations force
STRT	Specialty Training Requirements Team
TMAP	Threat Modeling and Analysis Program
TPT	Training Planning Team
UGT	upgrade training
UNICORN	Unified Collection Operation Reporting Network
USAF	U.S. Air Force
USAID	U.S. Agency for International Development
x WG	numbered wing, where *x* is the number (e.g., 55 WG is the 55th Wing)

Chapter One. Introduction

Background

Since the attacks of 9/11, the U.S. Air Force (USAF) intelligence, surveillance, and reconnaissance (ISR) enterprise[7] has developed and provided combatant commanders (CCDRs) with impressive tactical competencies and capability to conduct ISR in support of irregular warfare (IW)[8] operations in Central and South Asia, the Middle East, and North Africa. However, nearly three-fourths of the active-duty force joined the service after 9/11,[9] and many USAF personnel have limited experience in supporting operations other than IW. As a result, USAF officials are concerned that the USAF ISR enterprise is not sufficiently prepared to provide intelligence-analysis support to meet broader service and CCDR needs.

Some of this concern stems from lessons identified during ISR operations related to the civil war in Libya, which occurred in the spring of 2011. The intelligence community (IC) realized that certain skills and capabilities needed for a conventional conflict might have atrophied over the course of the past intense focus on IW. This is because the civil war in Libya presented a different set of challenges. The mission rapidly transitioned from a noncombatant evacuation operation to a no-fly zone to a mandate to protect civilians. Although the joint force air component commander, Maj Gen Margaret H. Woodward would later describe the operation as a great success, she would also warn that, in some regards, it should serve as a wake-up call. Lessons about ISR that one source has identified include that the joint IC did not provide adequate or sufficient preplanned target intelligence; approval to provide ISR resources, including ISR assets equipped with full-motion video, did not occur in time for operations; and communication barriers hindered the sharing of information and intelligence between U.S. and other North Atlantic Treaty Organization (NATO) forces (Greenleaf, 2013).

In 2012, the president's defense strategic guidance (U.S. Department of Defense [DoD], 2012b) directed the U.S. military to begin the transition from today's wars and to prepare for future challenges, including a rebalance toward the Asia–Pacific region (DoD, 2012b). This

[7] For the purposes of this project, we define the USAF ISR enterprise as the 25th Air Force (25 AF) (the 9th Reconnaissance Wing [9 RW], 55th Wing [55 WG], 363rd ISR Wing [363 ISRW], 480 ISRW, and 70 ISRW), the National Air and Space Intelligence Center (NASIC), major command (MAJCOM) intelligence directorate (A2), elements of the air and space operation centers (AOCs), and unit-level intelligence support.

[8] IW can include activities and operations, such as counterterrorism, unconventional warfare, foreign internal defense, counterinsurgency, and stability operations. See Under Secretary of Defense for Policy, 2014.

[9] According to "USAF Almanac 2015," 2015, and demographics obtained from the Air Force Personnel Center (AFPC) in May 2015 (AFPC, 2012), 60 percent of officers have been in the service for 13 years or less (37,447 out of 62,884), and 77 percent of enlisted have been in the service for 13 years or less (196,950 out of 255,289). Taken together, this means that 74 percent (234,397 out of 318,173) of active-duty personnel have been in the service for 13 years or less.

fostered a change in strategic focus and bolstered efforts to evaluate ISR needs in new environments and potential operations.

As the United States withdraws most forces from Afghanistan in 2016 and rebalances to the Pacific, it faces a more complex and varied threat environment. For instance, relations between Russia and the United States have strained in the wake of the Russian invasion and annexation of the Crimean Peninsula from Ukraine in March 2014 (Cohen, 2014). In May 2014, a grand jury in the Western District of Pennsylvania indicted five Chinese military hackers for computer hacking, economic espionage, and other offenses (U.S. Department of Justice, 2014). In August 2014, the USAF began a persistent and sustained campaign of directing airpower against the Islamic State of Iraq and the Levant (ISIL) (Lyle, 2014). In this campaign, armed ISR platforms are providing a means for component commanders to strike targets of opportunity (Martinez, 2014). Later, ISIL took over large swaths of Syria near the border with Turkey, positioning with rocket launchers and tanks, a threat to ISR operations (Fantz and Capelouto, 2014).

The introduction to *Air Force ISR 2023: Delivering Decision Advantage* captures the overall challenge:

> The challenge for [US]AF ISR is to maintain the impressive tactical competencies developed and sustained over the past 12 years, while rebuilding the capability and capacity to provide the air component commander and subordinate forces with the all-source intelligence required to conduct full-spectrum cross-domain operations in volatile, uncertain, complex, and ambiguous environments around the globe. We are outstanding at the former, but must rejuvenate our rich heritage of expertise in the latter. (USAF, undated [a], p. 1)

Research Objective and Questions

The objective of this research was to recommend steps the USAF can take to develop the intelligence-analysis capability it needs in order to support broad service and CCDR needs. This research was sponsored by the Deputy Chief of Staff (DCS) for ISR and was conducted between October 2014 and July 2015. To help meet the objective, the sponsor asked RAND to answer two key research questions:

1. What lessons can be drawn from past operations?
2. What new challenges will USAF intelligence analysts face in the future?

The sponsor asked RAND to evaluate roles for analysis tools and to consider changes to training, career-field development, processes, and doctrine that would be needed to help address the lessons from the past and prepare USAF intelligence analysts for the challenges of the future.

What Is Intelligence Analysis?

Joint Publication (JP) 2-0, which is the doctrine that provides guidance for conducting joint and multinational intelligence activities across the range of military operations, describes

intelligence as an understanding of information that has been related to the operational environment and considered in the light of past experience (see Chairman of the Joint Chiefs of Staff, 2013a, p. I-1). That is, it can be defined as a type of knowledge. The word *intelligence* is also sometimes used to describe activities undertaken to produce that knowledge, and it can also be used to describe the organizations that engage in such activities (see Krizan, 1999, p. 7; Johnston, 2005, p. 4; and Chairman of the Joint Chiefs of Staff, 2013a, p. GL-8). In a 2014 white paper titled *Revolutionizing AF Intelligence Analysis* (DCS for ISR, 2014), the DCS for ISR notes that "intelligence analysis"[10] does not appear in the glossary of JP 2-0 (Chairman of the Joint Chiefs of Staff, 2013a). The white paper offers the following definition, which we used in our research:

> **Intelligence analysis** is a cognitive activity—both art and science—applying tools and methods to collected data and information to create and deliver intelligence knowledge, with the goal of providing decision advantage to commanders and decision makers. (p. 5)

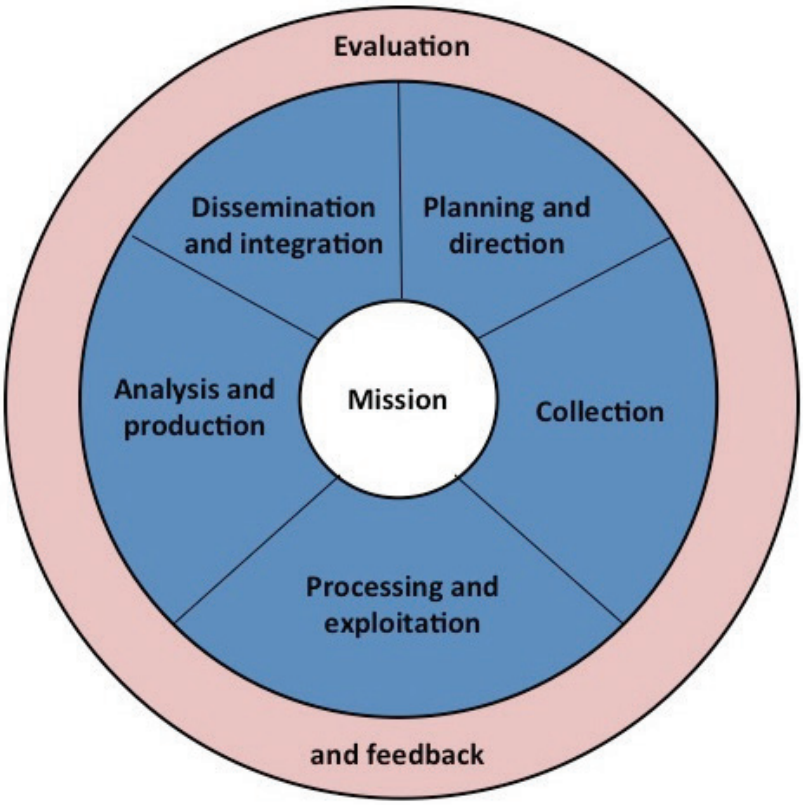
Sometimes the word *fusion* is used interchangeably with *analysis* at the operational level, and JP 2-0 defines fusion as follows:

> **Fusion:** In intelligence usage, the process of managing information to conduct all-source analysis and derive a complete assessment of activity. (p. GL-7)

Although JP 2-0 does not define *analysis*, it does associate analysis with the analysis and production step of the joint intelligence process, which we depict in Figure 1.1.

[10] When the context is clear, we interchangeably use *analysis* to mean *intelligence analysis*.

Figure 1.1. The Joint Intelligence Process



SOURCE: Chairman of the Joint Chiefs of Staff, 2013a.

However, many intelligence analysts with whom we spoke noted that analysis can be conducted in any step of the joint intelligence process besides the analysis and production step. In addition, alternative intelligence processes are worthy of consideration, including target-centric analysis (Clark, 2010) and Gregory F. Treverton's real intelligence cycle (Treverton, 2001). For these reasons, we did not limit our attention to analysis conducted within the analysis and production step of the joint intelligence process.[11]

As we discuss in Chapter Five, personnel in the USAF ISR enterprise possess many different Air Force specialty codes (AFSCs). Many outside the 1N (enlisted intelligence) and 14N (officer intelligence) AFSCs, including civilians, might be involved in conducting intelligence analysis according to the white-paper definition. Conversely, many personnel with 1N and 14N AFSCs might not be conducting intelligence analysis in a particular assignment. For instance, some assignments within the distributed common ground/surface system (DCGS) have roles and responsibilities that do not correlate with the white-paper definition. One of the national

[11] We discuss activity-based intelligence (ABI) and how it relates to intelligence processes in an appendix. That appendix will be provided to the USAF and will not be available to the general public. Contact the authors for instructions on requesting it.

intelligence agencies defines an analyst according to the number of intelligence disciplines with which the person is involved, but that definition might be too limited for the USAF (see Chapter Five for details). For these reasons, we do not attempt to identify which USAF personnel should be considered intelligence analysts. Instead, we apply the white-paper definition of intelligence analysis and examine that analysis as it applies to the USAF ISR enterprise.

IC Directive 203 establishes the analytic standards that are the core principles of intelligence analysis applied across the IC, including the USAF (Office of the Director of National Intelligence [ODNI], 2015). The directive governs the production and evaluation of intelligence analysis and analytical products. It describes the responsibilities of intelligence analysts for rigor in their analytic thinking and work practices. It also describes the roles and responsibilities of the deputy director of national intelligence (DNI) for intelligence integration, the chief of the Analytic Integrity and Standards Group within the office of the deputy DNI for intelligence integration, and the heads of IC elements, including the USAF.

Constraints and Limitations of the Research

Some constraints or limitations were imposed on the research in order to make it possible to complete the project with the resources that were made available and within the allotted time. These decisions were made in consultation with the research sponsor.

First, the project focused attention on intelligence-analysis support to operations, as opposed to, say, intelligence-analysis support to the USAF Office of Special Investigations. Although operations were the focus, the research team did collect some information about the intelligence-analysis needs associated with other parts of the USAF ISR enterprise, and we provide some discussion of them in an appendix.[12]

Second, the research focused attention on intelligence-analysis capability rather than capacity. In conversations with the research sponsor, we determined that trying to address both would be too ambitious, and the sponsor preferred that the research focus attention on the needed capability for intelligence analysis. However, in an appendix, we provide some details about the number of targets needing service in phase 2/3 operations of future scenarios.[13]

Methodology

In simple terms, the research team identified relevant lessons from the past and potential challenges of the future by eliciting information from three sources: a survey, semistructured

[12] Specifically, we provide them in Appendix D, which is not publicly available. Please contact the authors for instructions on requesting the appendix.

[13] We provide them in Appendix C, which is not publicly available. Please contact the authors for instructions on requesting the appendix.

discussions with subject-matter experts (SMEs), and literature reviews. Next, we describe the approach in more detail.

We used induction and deduction methods with qualitative sources to aid us in answering the key research questions and to help us to develop recommendations.[14] The first step is induction, in which evidence is collected to induce hypotheses about lessons from past operations and likely challenges in the future. The second step is deduction, in which an independent set of evidence is used to deduce whether each hypothesis is true or false. That evidence sometimes suggests or inspires avenues for recommendations.

As mentioned, we used three sources to provide evidence for the induction and deduction. The first was a survey of the USAF ISR enterprise. Appendix B provides a sample survey. The survey questions were closely related to the key research questions. The USAF sent out the call for participation, but participation in the survey was voluntary, and the names and organizations of participants were protected and not made known to the USAF. The survey had a 22-percent response rate (54 participants out of 250).[15] Participants included officer (39 percent), enlisted (19 percent), and civilian (41 percent) personnel.

The second source was semistructured discussions with SMEs.[16] We developed a semistructured discussion protocol for this purpose (see Chapter Two for more information about this protocol). The effort included discussions with USAF ISR personnel in the Air Staff, the Air National Guard (ANG), elements of 25 AF, the A2 staff at headquarters (HQ) and at MAJCOMs, NASIC, and the AOCs. We visited the combatant commands (COCOMs) and associated joint intelligence operations center (JIOC), joint information center, or joint analysis center (JAC)[17] in order to get their perspectives on the intelligence-analysis support that the USAF provides and how the needs for that analysis might change in the future. We had discussions with analysts and leadership at other elements of the IC. We visited Goodfellow Air Force Base (AFB) in Texas, the Air Education and Training Command (AETC), and AFPC to investigate training and career-field development issues and get information that might be needed for developing recommendations. We met with Air Force Research Laboratory (AFRL) to learn about analyst tools under development. We also worked to get some perspectives from outside DoD and IC channels. For instance, we gathered information during visits to the National Aeronautics and Space Administration (NASA) and Google and interviewed television production personnel. The personnel we interviewed came from many backgrounds, ranging from a former Secretary of the Air Force to an enlisted airman recently returned from an intelligence-analysis assignment down-

[14] By *recommendation*, we mean suggested steps the USAF can take to address the lessons from past operations and prepare for the challenges of the future.

[15] See Chapter Five for more information on the personnel composition of the USAF ISR enterprise.

[16] In this report, we informally refer to these semistructured discussions as *interviews* or *discussions*.

[17] Joint information centers, JAC, and JIOC are similar types of organizations. Henceforth, we simply refer to them all as JIOCs.

range, providing support to special operators at the tactical level. Table 1.1 provides additional details about the organizations and communities we visited to conduct discussions with SMEs.

Table 1.1. We Conducted Semistructured Discussions with Subject-Matter Experts from Many Communities and Organizations

Organization or Community	Comment
Air Staff Intelligence (HQ, USAF/A2)	
ANG Intelligence (ANG/A2)	
25 AF	Discussions included the HQ staff, ISR wings (480 ISRW, 363 ISRW, and 70 ISRW), and DCGS sites (DGS-1, DGS-2, DGS-4, and DGS-5)
NASIC	We held discussions during a multiday visit.
AOCs	603 AOC, 613 AOC, 624 OC, and JSPOC
COCOMs and associated JIOC	U.S. Pacific Command, U.S. Central Command, U.S. European Command, U.S. Strategic Command, U.S. Northern Command
USAF MAJCOMs	ACC, U.S. Air Forces in Europe, Pacific Air Forces, AETC, Air Force Materiel Command
Other elements of the IC	Defense Intelligence Agency, NSA, National Geospatial-Intelligence Agency, Under Secretary of Defense for Intelligence, ODNI, National Intelligence Council, CIA
Subordinate commands and subunified commands	Joint functional component command for ISR, U.S. Cyber Command
AFPC	Engaged with 14N CFMs
Goodfellow	Engaged on officer and enlisted training
AFRL	Engaged with AFRL on the topic of analyst tools
NASA	Engaged with NASA to gain perspectives from other parts of the government
Google	Engaged with Google on processes, tools, and career development issues
Television production	Engaged with television production staff on commercial tools and workflow processes

NOTE: DGS = distributed ground station. OC = operations center. JSPOC = Joint Space Operations Center. ACC = Air Combat Command. NSA = National Security Agency. CIA = Central Intelligence Agency. CFM = career-field manager.

The third and final source was literature reviews. We formally coordinated this activity with the USAF Lessons Learned office. The coordination included interactions to identify USAF lessons-learned reports to include in our review (for example, see USAF, 2014c) and sharing preliminary findings[18] at different stages of the research. However, our literature review went well beyond USAF lessons-learned reports. We included reports published by the joint community on lessons learned (for example, see Joint and Coalition Operational Analysis, 2012), history books (for example, see Keegan, 2003), defense strategy documents (for example, see DoD, 2012b), reports on future warfighting concepts (for example, see Air–Sea Battle Office,

[18] By *finding*, we mean the answers to the two research questions.

2013), training materials (for example, see USAF, 2013a), and government reports on matters of intelligence.[19] We include an extensive bibliography with this report.

Chapter Two provides more details about how we used the induction and deduction methods as part of a structured process to identify lessons from past operations.

Our methodology also employed scenario research to aid us in identifying new challenges that USAF intelligence analysis will likely face in the future. In particular, we reviewed a selection of defense planning scenarios available from government sources (not publicly available), as well as future warfighting scenarios under development at RAND for government sponsors (also not publicly available). These scenarios are aligned with U.S. national security policy, stress U.S. military capabilities in a variety of ways, and correspond to operations other than IW. We then examined the results of recent wargames of these scenarios[20] and the results of campaign modeling and simulation of these scenarios that we obtained from the USAF. These results provide details about joint operations that would need to be conducted to meet U.S. objectives in these scenarios. We applied our expertise and judgment to identify the intelligence-analysis capabilities that would be needed to support these operations. This includes the intelligence-analysis activities that would be conducted during phase 0 of war, as well as those activities that would be conducted during combat. We used our judgment to identify which of those intelligence-analysis activities were in direct support of the application of airpower and which leveraged key USAF capabilities. As we describe in Chapter Three, we used these to develop focus areas for USAF intelligence-analysis capabilities and to aid in identifying new challenges that USAF intelligence analysts will likely face in the future.

We evaluated the role of analyst tools (software applications) in helping to address lessons from the past and prepare analysts for the future. The induction and deduction methods described above provided input for this task. For instance, we elicited SME input on tools during interviews and from the survey responses. We also exchanged information with AFRL and conducted literature reviews. We drew on results from recent RAND publications on tools for supporting the processing, exploitation, and dissemination (PED) of USAF intelligence data and information. This task also identified an important challenge that USAF intelligence analysts will likely face in the future.

Similarly, we evaluated options for training and career-field development in addressing lessons from past operations and in meeting the challenges of the future. We conducted site visits at Goodfellow AFB, where we interviewed staff, sat in on courses, and observed exercises. We interviewed CFMs and conducted extensive literature reviews of training materials. Although the original intent of this task was to generate ideas for training and career-field development–related recommendations to address lessons and prepare for future challenges, it revealed several

[19] Two examples are National Commission on Terrorist Attacks upon the United States, 2004; and Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction, 2005.

[20] For instance, RAND researchers participated in Unified Engagement 2014.

insights that are worthy of discussion in their own right. We have devoted a chapter to these activities and insights.

Although many of the research methods were qualitative in nature, they were carefully structured and executed. We received materials to familiarize us with different types of biases that might affect our work and on bias-mitigation techniques for avoiding them.[21] This material was briefed in a team meeting. We were instructed to actively seek sources with confirmatory and critical viewpoints in order to avoid a type of bias known as premature formation of views.[22] We sought joint perspectives and analogies from related fields in order to avoid a USAF parochialism bias.[23] To avoid biases that would result in willful disregard of new evidence and defensive avoidance, we had preliminary findings undergo peer review while the research was still ongoing.[24]

Outline

We devote Chapter Two to lessons from past operations. It presents the lessons and provides more details about the methodology that we used to identify them. Chapter Three provides more information about our scenario research and describes two new challenges that USAF intelligence analysts will likely face in the future. Chapter Four summarizes our evaluation of analyst tools and roles of analyst tools in addressing the lessons of the past and preparing for the challenges of the future. It highlights an additional challenge that USAF intelligence analysts will likely face in the future. The topic of Chapter Five is training and career-field development. We discuss insights we gained and some of the training and career-field development–related recommendations for addressing lessons of the past and challenges of the future. Chapter Six summarizes our findings and our recommendations for addressing them.

The need to reassess USAF intelligence-analysis capability in the context of changes to U.S. national security strategy was one of the primary motivations for conducting this project. In Appendix A, coauthor William J. Fry provides a historical perspective on the necessary relationship between national security policy and intelligence.[25] Appendix B provides the survey questions we used as part of our methodology.

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[21] These materials were adapted from Krizan, 1999.

[22] As examples, we included critiques of the 9/11 commission report and of air–sea battle concepts for future warfighting in our literature review: Posner, 2004; Etzioni, 2014.

[23] For instance, the literature view drew extensively on joint lessons-learned reports.

[24] The midterm briefing underwent informal peer review by two colleagues who were not associated with the project. Both have prior employment experience in the IC. We also published short papers, called "one-pagers," with select findings from the research. These were published before the research was completed, and they underwent informal peer review.

[25] This perspective was written in coordination with the project and to meet an officer senior developmental education requirement of Air University.

Additional Appendixes

We also composed several additional appendixes, available separately.[26] Appendix C augments the material in Chapter Three by providing additional information on scenario research and the demands of future operations. It includes some estimates on the numbers of sorties and targets that will need to be serviced in a selection of scenarios. It also provides some discussion of the intelligence-analysis capability needed to support operations in space and cyberspace in a scenario.

Appendix D summarizes some of the analytical challenges for other parts of the USAF ISR enterprise, including the USAF Office of Special Investigations.

Finally, Appendix E provides information about ABI. ABI is often described as an analytic methodology that aids an analyst in identifying entities of potential interest in targeted or incidentally collected data, without the aid of known signatures. In that sense, it is a methodology for resolving "unknown unknowns." However, the term *ABI* is also sometimes associated with a collection practice or phase of exploitation. As discussed in Appendix E, ABI complements the joint intelligence process, and the analytic cycle of ABI can help to drive collection. The appendix describes the fundamentals of ABI, examines past and current applications of it, and provides some perspective on current application within the USAF ISR enterprise and the potential for further adoption. Although this appendix is not publicly available, we include several references on the subject in the bibliography.[27]

[26] These items are not publicly available. They will be published as part of an upcoming report. Please contact the authors for instructions on requesting them.

[27] Useful references on ABI include Atwood, 2015; and L. Long, 2013.

Chapter Two. Lessons from Past Operations

Definition of a Lesson

Lesson reports, lessons-learned reports, lessons-identified reports, after-action reports, and other reports that track findings about performance during operations or other activities (real or exercised) are important mechanisms organizations can use to document information about what went well, what did not go well, what needs to be fixed, and what recent changes should be kept.

The Joint Chiefs of Staff Joint Lessons Learned Program manual defines a lesson as follows:

> **Lesson:** Validated observation(s) that summarizes a capability, process, or procedure to be sustained, disseminated, and replicated (best practice); or that identifies a shortfall requiring corrective action (issue). (Chairman of the Joint Chiefs of Staff, 2014b, p. GL-8)

It defines a lesson learned as follows:

> **Lesson learned:** A resolved issue or practice that improves military operations or activities at the strategic, operational, or tactical level, and results in an internalized change to capability, process, or procedures, and is appropriately institutionalized to improve warfighting capabilities. (p. GL-8)

In this chapter, we expand on the discussion of our methodology that we provided in Chapter One and describe more details on how we went about identifying lessons from past operations. We describe nine lessons that our research identified and that will motivate of some of the recommendations that we summarize in Chapter Six.

Overview of Methodology for Identifying Lessons

Our methodology focused on ensuring that we included a wide range of inputs and had a clear and structured process for developing our findings. We did not cherry-pick lessons based on our own experiences or allow individual reports or interviews to unduly influence our findings. To limit potential bias, we developed a structured process to catalog and research hundreds of inputs from literature, interviews, and the survey conducted as part of this project. Although this is a new process developed for the purposes of this project, it is founded in established lesson-research methods, which we reviewed prior to beginning our work (we describe some of these references below).

We gathered hundreds of inputs into a database from USAF and joint documented lessons, information from other literature, and individual perspectives from interviews and the survey. We applied our own judgment to ensure that we described each input in sufficient detail. Our criteria for sufficient detail were to ensure that there was some supporting evidence in the source material and that there was sufficient information for our researchers to understand and represent

the implications. We also eliminated from consideration any lesson inputs that we judged were outside of our scope. We judged a lesson input to be within the scope if it had direct implications for USAF intelligence analysis or if it highlighted an issue that we felt that USAF intelligence analysis could address. In some cases, we conducted follow-up research (such as reviewing additional literature or conducting additional interviews) to better articulate the lesson, to find supporting evidence,[28] or to understand its implications. Finally, we grouped lessons that were the same or similar but that came from independent sources, using our own subjective judgment. This process of eliminating lesson inputs that either lacked sufficient detail or were outside the scope, eliminating those that appeared in only a single source, and combing the rest resulted in nine lessons. The nine lessons fell into three broad categories:

- lessons on building analytic capabilities
- lessons on leveraging partnerships
- lessons on developing and employing analytic skills.

In the next sections of this chapter, we provide more details on how we collected and screened lesson inputs and then aggregated and categorized the lessons. The reader wishing to immediately get to the lessons can skip ahead to the section titled "Nine Lessons from Past Operations."

How We Identified Relevant Lesson Inputs

We cast a wide net in our literature review for information about past operations relevant to our research. We included official USAF lessons-learned documents prepared by the Air Force Lessons Learned (AFLL) community, as well as some that the joint community prepared (for example, Joint and Coalition Operational Analysis, 2012). In addition, we searched the broader military literature for documents either that identified or suggested lessons or from which we could derive lessons. We also included the results from our semistructured discussions with experts in different parts of the USAF ISR and operational communities, as well as from the joint and national elements of the IC. For this purpose, we created a semistructured discussion protocol that included question themes directed at identifying, based on participant experiences, areas for improvement, as well as new good practices.

Our project survey, which we reproduce in Appendix B, also specifically asked five questions from which we were able to derive some observations from past operations:

- If you work within an organization focused on generating analysis products and services, what are the most significant challenges experienced in performing analysis and production?
- What will be the most significant challenges for performing analysis and production in the next five to ten years?

[28] Note that we did not have the resources to independently validate the supporting evidence.

- Are there aspects of ISR support to operations developed over the past thirteen years that should be formally institutionalized so that they can be effectively employed in the future—if yes, what are they?
- Are there any areas in which the ISR Enterprise needs to be more agile (i.e., organizationally, develop new analytical capabilities or shift analytical focus)—if yes, how and why?
- In your opinion, what type of education, training, experience, and skills are required for ISR to conduct operations in current and future environments? Please explain.

To maintain some consistency with respect to what qualified as a lesson and which lessons were within our project scope, we screened each lesson input about past operations in our literature search, interviews, and survey.

In addition to the aforementioned Joint Chiefs of Staff Joint Lessons Learned Program manual, several other guidance documents address the topic of lessons learned, after-action reports, and related topics that various departments and agencies within the U.S. government have produced. However, we did not identify any that the USAF had written for broader dissemination. One document we found helpful as we established criteria for identifying lesson inputs in our own project context was the Center for Army Lessons Learned handbook titled *Establishing a Lessons Learned Program* (Center for Army Lessons Learned, 2011), which defines a lesson learned as follows:

> knowledge or understanding gained by experience. The experience may be positive (a best practice), as in a successful test, mission, exercise, or workshop, or negative, as in a mishap or failure . . . A lesson must be significant in that it has real or assumed impact on everyday operations. It must be valid in that it is factually and technically correct; applicable in that it identifies a specific design, process, or decision; and it reduces or eliminates the potential for failures and mishaps or reinforces a positive result. Basically, it is the knowledge acquired from an observation or an adverse experience that causes a worker or organization to improve. (p. 3)

Another example publication on a related topic is the U.S. Agency for International Development (USAID) handbook for after-action reviews (AARs) (USAID, 2006), which defines AAR as follows:

> a leadership and knowledge sharing tool that helps professionals within USAID and across the partner community to better understand important events, activities, or programs. That knowledge, gleaned from and compiled by those closest to the review, can be used by senior leadership to improve results and then can be shared with others who are planning, developing, implementing, and evaluating similar efforts. Managed and conducted by those closest to the activity, AARs identify how to correct deficiencies, sustain strengths, and focus on improved performance of specific tasks, activities, events, or programs. (p. iii)

The lesson inputs identified in our literature review, interviews, and survey vary in terms of focus and theme and often differed across other characteristics, such as scope and whether there was a clearly defined problem or good practice. Thus, we developed a series of questions based

on available lesson literature and discussions with the AFLL community that we answered in order to characterize the lesson input and determine whether they provided sufficient detail for inclusion in our research. We developed these questions using joint and other military doctrine, as well as some lessons-learned concepts from other U.S. government agencies. As a rule, if we could not provide answers for each of the questions, we did not include the lesson in our subsequent analyses, regardless of whether it was identified as an "official" lesson in the source or not. In some cases, an input appeared to be important, but, if we could not answer these questions, we did not feel that we had sufficient information to ensure that we were interpreting the lesson correctly. In this way, these screening questions were an attempt to limit our own biases in interpreting the information inputs we collected. These are the questions we attempted to answer for each lesson input to facilitate this screening process:

- What is the issue to be corrected, or what is the idea to be repeated?
- What is the reference for the observation?
- Was the observation formally reported as a *lesson* or is it part of an informal report or SME interview or survey?
- To what organizations does the observation apply? Is the observation internal to the USAF, or might it apply to the joint community?
- Does the observation focus more on strategic, higher-level issues (e.g., need for additional targeting capability) or more on a tactical problem or solution (e.g., need for more workspaces at a specific location)?
- Is evidence for the observation rooted mostly in opinion or in factual observation? Is there a concrete example to substantiate the observation?

Here we discuss three real examples to illustrate how we employed these questions to identify and characterize lessons. The first involves four implications we identified in an article written by Maj Jason R. Greenleaf focused on the U.S.-led Operation Odyssey Dawn (OOD) in Libya and subsequent NATO Operation Unified Protector, specifically with regard to the air war (Greenleaf, 2013):

> The United States should address deficiencies in the organizational structures of geographic combatant commands . . . If [the COCOMs] are to have the same responsibilities and authorities as other commands, then appropriate resources and mission sets need alignment. (p. 34)
>
> . . . the global force management/request for forces process demands further examination and refinement. The movement toward lean supply chains and a "just-in-time" mentality restricts the flexibility of operations. (p. 34)
>
> . . . America must consider standardizing equipment and integrating it with that of NATO's European members. (p. 35)
>
> . . . the inherent trust and familiarity among partners involved at the operational and tactical levels seemed mission or at least slow to develop . . . we must make regional exercises and training more realistic and inclusive. (p. 36)

Overall, these four implications meet the criteria implied in our seven questions above; we can easily answer all of the questions posed, with little ambiguity. They all clearly state issues to

be corrected, with no implied ideas to be repeated, and, although the initial reference in our first example is the Greenleaf article, we found multiple sources that reflect these points. In this case, these implications are informally stated rather than considered in the context of a formal lesson documentation process. They appear to focus on strategic-level issues that apply to the joint community. Although stated in the quotations as opinions, the article as a whole provides concrete examples to substantiate the claims.

Our second example comes from the Joint and Coalition Operational Analysis (JCOA) *Decade of War*, Vol. I, which illustrates a range of joint lessons from recent operations in the Middle East. One of the lessons identified in this document states, "Special Operations Forces (SOF)–General Purpose Forces (GPF) Integration: Multiple, simultaneous, large-scale operations executed in dynamic environments required the integration of general purpose and special operations forces, creating a force-multiplying effect for both" (Joint and Coalition Operational Analysis, 2012, p. 2). The intent here is to document a type of partnership that has been valuable in past operations, which implies that operating procedures established for facilitating SOF–GPF integration might need to be institutionalized for the future. This lesson is presented in a formal joint document and shows how forces can be leveraged together at the strategic level. This lesson is stated through the use of opinions but is specific about both the activity to be repeated and the positive impact.

Finally, we present an example of a lesson input that did not meet our criteria above. During an interview, an SME stated the following: "The USAF will need to enhance its use of open sources of intelligence." Although this is perhaps an interesting insight, it is not even clear whether there is a basis for this in the expert's past operational experience or whether this is an identified future challenge. In addition, there is no information about a specific practice to repeated or issue to be corrected. Finally, this statement lacks detail about whether it is related to skills, training, tools, or other fields within the scope of the project, making it hard to determine whether it is sufficiently related to the research being conducted. (We might guess that it is, because new sources of intelligence generally imply a need for new skills, training, tools, and other fields within the study scope, but, to minimize the impact of research bias, an important aspect of the lesson research was to not guess what might be implied.)

After we screened observations for sufficient detail as described above, we further examined them based on their relevance to our research objectives given our scope. We included an observation in our research only if it addressed at least one of the following:[29]

- a deficiency in exploitation, analysis, or production
- a good practice related to exploitation, analysis, or production

[29] Note that, although exploitation, analysis, and production are steps associated with the joint intelligence process described in Chapter One, we included observations that addressed similar roles in other parts of this and of alternative intelligence processes.

- a potential future solution related to a real or perceived issue with exploitation, analysis, or production.

We also screened each observation for applicability to at least one of the following:

- skills
- training
- force management
- career development
- analytical processes and tradecraft
- associated analytical tool sets.

We can apply these scoping criteria to the examples we discussed earlier. In the case of the air war in Libya, synchronizing hardware, communications, and training with NATO European partners has implications for exploitation, analysis, and production as subsets of the broader set of capabilities presented during the air war. In a stretch, we also included the lesson on operational flexibility because it could also apply to the management of the force engaged in exploitation, analysis, and production. Although it was important for other areas of inquiry, we did not include the OOD lesson on matching missions and capabilities because we felt that there was relatively little association with exploitation, analysis, and production and very little in terms of possible USAF actions because this observation is more focused on Global Force Management.

We acknowledge that our rejection of a lesson input through our rather rigorous screening process does not necessarily mean that the lesson input was invalid. For instance, it is entirely possible that our process eliminated a lesson input from consideration simply because the statement of that lesson input failed to provide supporting evidence. That does not mean that it was invalid, and we could have missed important lessons as a result. However, we adopted this screening process because it implements many measures to reduce the introduction of researcher bias. It is our hope that we reduced the risk of missing important lessons by collecting lesson inputs from many sources. In doing so, we would hope that some of those sources would convey the inputs in way that facilitates identification of a lesson according to the criteria of our process.

How We Aggregated Relevant Inputs into Lessons

Once we had screened each observation as described in the previous sections, we examined our database to find similarities in content. Our objective was to identify observations that were related or similar between multiple, independent sources in order to articulate lessons that were consistent and applied broadly. To do this, we first identified key words that summarized content in each. We then calculated key-word frequencies to find major themes in our observations. We summarized these in word clouds, such as that in Figure 2.1. Once we established major themes using the key-word frequencies, we grouped relevant observations together and examined their detailed content carefully before articulating the main ideas in a single, broad statement that became our nine lessons. This method of using major themes in our observations prevented us

from fully considering observations that were rare, even if these had merit. Although we did examine these rarer observations so that we were aware of their content, we did not include them in our primary research because our project timeline prevented us from sufficiently following up on each of these to determine their applicability to our work.

Figure 2.1. Word Cloud Summarizing Lesson Data Theme Frequencies

NOTE: The larger and darker the term, the higher the frequency of that term's occurrence within the database.

We ultimately articulated nine lessons from past operations that arose repeatedly in multiple sources and grouped them into three categories. We did not prioritize the lessons or categories. We also collected information on two themes, which provide supporting evidence for two future challenges that we identified in our scenario research:

- need for expertise with intelligence from and for the space and cyberspace domains
- pace of future conflicts stressing limited foundational intelligence and challenging analyst readiness for new environments.

See Chapter Three for details on these two themes and the associated future challenges.

Nine Lessons from Past Operations

Here, we briefly describe the nine lessons that we found arose repeatedly as common themes among many sources we employed. Our intent with these overviews is to provide the reader with some insight into our findings and help motivate our project recommendations. Although each lesson merits additional research and discussion, doing so is beyond the scope of our project and

this report. However, our limited look at these important topics could provide some ideas for areas that require additional consideration by the USAF and others.

Lessons on Building Analytic Capabilities

This section includes four lessons that all relate to building analytic capabilities within the USAF. As we discuss, these four lessons relate to each other.

The first two lessons below build a characterization of analysis activities that we developed during the course of our work, which is that analysis activities can be decomposed into two elements: *process* and *context*. Processes include cognitive activities, such as critical thinking, bias mitigation, induction, and deduction. Context represents background knowledge about the analysis problem and the operational environment, as well as the experiences of the analysts. Important aspects of context include the intelligence problem to be solved, how quickly an answer is required, importance of the answer to the consumer, and how the answer will be used. Table 2.1 highlights some important aspects of context and process for three distinctly different intelligence problems.

Table 2.1. Examples of Process and Context

Intelligence Problem	Intelligence Level	Example of Process	Example of Context
Is Taliban leadership in a particular village?	Tactical	Critical-thinking skills, induction and deduction, call-chain analysis	Knowledge of Taliban leadership, village cultural perspectives, operational time frame, Afghanistan region
Are there I&W of attacks in space?	Operational	Critical-thinking skills, induction and deduction, network analysis of a counterspace weapon	Knowledge about enemy (red) intent, counterspace OB, tactics, and doctrine; operational time frame; orbital regimes
What are the evolving air defense threats?	Strategic	Critical-thinking skills, induction and deduction, network analysis of an integrated IADS	Knowledge about foreign air defense weapon systems, ten- to 20-year time frame, anti-access and area-denial environment

NOTE: I&W = indications and warning. OB = order of battle. IADS = integrated air defense system.

Next, we discuss two lessons related to process and context that emerged from our research.

1. Many Processes, Such as Critical Thinking, Can Be Employed Across Different Missions and Levels of Intelligence

We found that many analytic processes appear to be similar across operations or intelligence problems. Analysts who had worked across different mission sets (e.g., tactical intelligence for IW and strategic intelligence for conventional warfare) reported to us that their analytic process "tool kit" was similar regardless of the problem to which it was applied. In the example in Table 2.1, critical thinking, induction, deduction, and some kind of analysis of relationships can be applied to either intelligence problem, even though the specifics of the target are quite

different. We also found support for this lesson in our conversations with analysts who had received the same basic training in analytic processes (e.g., at Goodfellow) but were now performing very different analytic roles (e.g., a NASIC analyst and someone performing intelligence support for a fighter unit). Many seemed to find the basic analytic tools from their training useful, even if they were applying them in a vastly different context from the examples that they received in training (many were trained on IW targets that they did not see again in their subsequent jobs).

The implication of this lesson is that one aspect of analysis activities—the processes used—can be fairly streamlined for training and analytic applications. However, our interviews revealed that analysis activities to support different types of missions can have unique needs for context. We describe the associated lesson in the next section.

2. Knowledge Required to Provide Context Is Lacking or Limited to Support U.S. Air Force Missions Other Than Irregular Warfare

In contrast to processes, the observations we collected revealed that analytic context can vary substantially between operations and levels of intelligence. Although an IW analyst and an air or air defense threat analyst can use similar analytic processes in their work, the background knowledge required and consumer requirements can be very different. Looking at context that is important for analysis at different levels of intelligence reveals another important contrast. Whereas intelligence at the strategic level requires in-depth knowledge about red systems and threats, analysis for intelligence at more tactical levels demands in-depth understanding of own, allied, and coalition (blue) systems and the application of airpower.

An ongoing concern for the USAF, revealed in part by lessons from Libya and other emerging problem sets that are not IW focused, is that the contextual depth that analysts have for certain missions and levels of intelligence is declining at a time when strategists suggest that they will become increasingly important in preparing for challenging future operations. Our research of lessons suggests that this issue is particularly prevalent at the operational and tactical levels of intelligence and has come about as a result of emphasis on IW. Senior analysts in the USAF and joint community raised concerns about preparation to support tactical operations in conventional warfare. Lessons from Georgia (2008), Libya (2011), and the recent crisis in Ukraine provide examples of how limited understanding of context in some areas has become. This is not just a current problem. For example, the joint community faced challenges understanding context in Afghanistan and Iraq when operations first kicked off. Thus, this issue of building and rebuilding analytic capability in understanding context for different operations and levels of intelligence appears to be an enduring issue, one that is unlikely to resolve itself without action as future challenges grow more diverse and complex.

Although this issue of context is a joint concern, it has important consequences for parts of the USAF enterprise providing intelligence support for air, space, and cyberspace operations during combat, especially for the AOC, MAJCOM/A2, DCGS, and unit-level intelligence.

However, our research suggests that challenges related to developing and retaining context for diverse operational environments are not universal within the USAF. For example, broad analytic capability at NASIC and the 70 ISRW has not been lost, including maintaining some context needed for strategic intelligence of air and air defense threats, space, and some cyber. This does not mean that these organizations have no analytic challenges. They do, including lack of adequate collection (affected by a shift in focus toward IW), analytic capacity to meet growing Intelligence Mission Data requirements, and lack of integration with operational and tactical intelligence organizations within the USAF. These challenges merit their own concern but do not represent problems with retaining context for specific operations.

The implication of this lesson is that, although analysts can undergo similar training and development of skills for conducting analytic processes, the context they need for their work cannot be absorbed in a "one-size-fits-all" environment. There are good reasons that analysts receive training specific to their missions after basic schooling. When it comes to preparing for a potentially diverse future threat environment, this lesson suggests that getting even the most methodologically skillful analysts up to speed in a new mission area will not be trivial, especially if the future contingency is a surprise or very fast-paced. In a surprise contingency, there could be little analytic foundation on which to build. In a fast-paced environment, there is very little time (if any) to develop new analytic experts before the war is potentially lost. Analysts with whom we spoke who had previously experienced shifts in focus for the context of their work reported that several types of activities helped them become more agile, including experience from deployments, exercises, educational opportunities (including those outside of the military), mentoring (even informal), and opportunities to brainstorm with others in their units about emerging analytic challenges.

Taken together, these findings about analytic process and context highlight an important dichotomy with respect to analyst training and development needs. Both need to be considered in training, development, and force management.

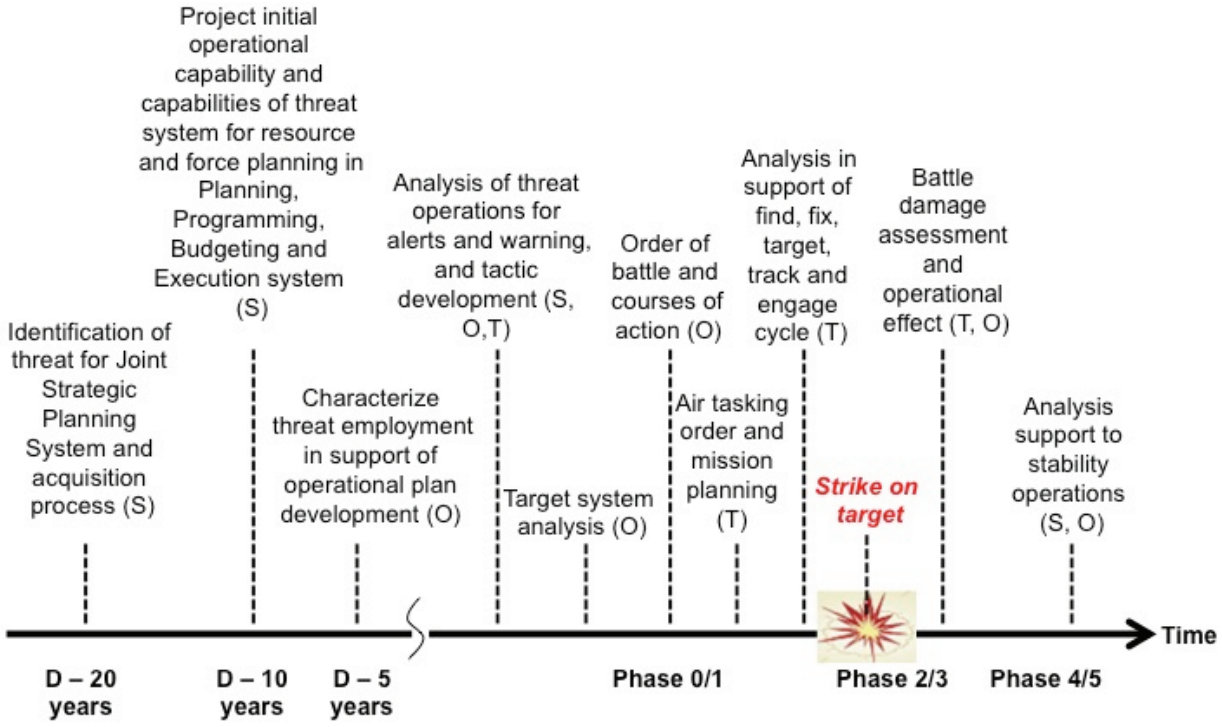
In the next section, we describe the third lesson we identified.

3. Success in Operations Depends on Analyses Conducted Across Multiple Timelines, Organizations, and Levels of War; They Build on One Another and Require Integration

This is also a lesson about building analytic foundations. We found that successes or challenges in past operations often depended, to some extent, on the amount and continuity of analytic activities across all phases of war—in some cases, decades prior to the conflict. The degree of analytic success also was contingent on the involvement of multiple analytic organizations working on different intelligence activities. For example, many have touted the relative lack of up-to-date information available prior to operations in Libya as something that initially hindered the ultimate success of coalition operations. In contrast, some recent humanitarian operations were able to make use of previously collected information to more accurately assess damage and residents' needs.

We illustrate how analytic activities build on each other with the diagram in Figure 2.2 that shows the many different analytic activities that ultimately provide the foundation for a notional strike on a target in phase 2/3 of war. Analytic activities are varied in focus and methods, occur over multiple time spans, and are conducted by multiple organizations. These include support to acquisition of the strike platform, development of the operation plan (OPLAN), target system analysis, and continue poststrike with battle damage assessment (BDA).

Figure 2.2. Timeline of Analytic Activities



NOTE: S = strategic. O = operational. T = tactical.

This lesson suggests a benefit from adopting an enterprise approach in which the different organizations, activities, and timescales are recognized and have their activities more integrated than they are today. The stronger the analytic foundation, the fewer obstacles there will be for operational preparation and the employment of analytic context necessary for effective response. We describe this lesson in further detail in a separate report (Alkire, draft in process).

4. Roles and Responsibilities for Analysis Activities to Support Phase 2/3 Operations in Air, Space, and Cyberspace Are Not Well Defined or Practiced

Interviews with analysts and experts in the COCOM intelligence directorates, JIOCs, MAJCOM/A2s, and AOCs and those working with DCGS suggested that analytic roles and responsibilities, particularly those associated with operational- and tactical-level intelligence-

analysis activities conducted during phase 2/3 operations, are not well defined or practiced. Several analysts reported the following:

- lacking a clear vision of how their work fit into the broader analytic or operational problem set
- completing work they later learned was unintentionally duplicative of that of others
- being asked to answer intelligence questions beyond their perceived roles and levels of training and experience
- conducting self-directed analysis because it was not clear who, if anyone, else was responsible for an emerging issue
- not having a clear notion of whom to call for assistance on a variety of intelligence problems.

There are many compounding reasons behind these observations. Some of the SMEs we interviewed cited a perceived shortage of personnel at organizations, such as the AOC, that would perform tactical and operational analysis during phase 2/3 operations in conventional warfare. A second reason is the high level of focus on IW that might prevent official allocation of sufficient resources to emerging problem sets. A third appears to be limited articulation of and training on roles and responsibilities and a lack of analytically focused exercises in which to practice these roles and responsibilities to support operations other than IW.

As we discuss in Chapter Three, the pace of operations in future conventional-warfare scenarios could prove very challenging if this lesson is not properly addressed.

Lessons About Partnerships

Three of the lessons we identified feature developing and leveraging different types of partnerships. Partnerships were a major theme across many of the observations in our research, and we see these as maintaining or increasing in importance in the future, particularly as budgets decrease and the diversity of potential future threats increases. Although some of the challenges and successes defined below are common between the different partnership lessons, each one also has particular aspects that are distinct, which is why we separated them.

Analytic partnerships with other communities, including joint, partner (including coalition), and the national IC, can expose USAF analysts to new ideas, data, analytic techniques and tools, and expertise. However, the USAF might not be fully taking advantage of opportunities to partner with these other communities. In some circumstances, opportunities might be leveraged but are not necessarily shaped in such a way that fully benefits USAF and COCOM needs. Here, we discuss these partnership lessons in more detail, beginning with joint and national partnerships, followed by working with coalition and partner nations.

5. Joint, National, and Partner Analytic Capabilities and Capacities Are Not Sufficiently Leveraged

Our findings suggest that ties with joint and national elements of the IC have been important for developing analytic agility and depth. The USAF has also provided analytic capabilities that have benefited joint and national information needs.

However, our findings suggest that these partnerships might not be working as efficiently as they could. We found an interesting contrast in the observations we collected: Recent operations in general have been very joint in nature and included agencies across the U.S. government; however, the USAF analytic community itself does not appear to be taking full advantage of partnerships with these other communities. Additional capabilities, data, training, and tools could be helpful to the USAF. In addition, USAF analytic capabilities are not always advertised to these other communities. Ideally, partnerships are a two-way street, and the observations we collected suggest that analytic benefit in this case could be improved in both directions.

When collaborations occur between the USAF and joint or national elements of the IC, they seem to result in success for both partners. For example, some elements of the DCGS in different areas of responsibility (AORs) have managed to work with other services on emerging threats to the benefit of all. Another example is USAF analytic units taking full advantage of the combat support provided by NSA to address the analytic needs of interest to air components.

In our research, we gathered information about a range of factors that appear to affect the strength of relationships with other elements of the IC and the USAF's ability to leverage these. These fell mainly into four categories: experience of personnel in joint and national IC element positions, amount of communication among organizations and between analysts, pursuit of opportunities (including at the [geographically] local or [operationally] tactical level) to work together, and various policies and system issues that inhibit data-sharing and analysts' ability to discover each other.

In addition, we found that, with respect to opportunities for USAF analysts in national element positions, it might not be so much a matter of the *number* of positions but rather *what* those positions are. In fact, the USAF has a large number of personnel involved with national IC missions—in many cases, colocated with the relevant agencies. Our findings suggest that sufficient numbers of these assignments might not be in

- positions of leadership
- mission areas of particular importance to the USAF or air components
- relevant to subsequent assignments, limiting opportunities to bring back relevant knowledge and tools to the USAF.

The same might be true for joint elements of the IC, but we did not have sufficient observations in our research to determine this.

Many of the analysts and other experts we accessed for this project could not imagine a future conflict in which the United States would not be working with partner nations. Nations have long joined in coalitions to battle common enemies, but the coalition environment has

increasingly been the norm for the past several decades. Although only a handful of partner nations today have capabilities that approach those of the United States in certain aspects of warfare, partners at all levels of capability have been key enablers and force multipliers, according to many of our interviewees. The diplomatic value of working with partner nations also cannot be understated.

When it comes to intelligence analysis in particular, some partners might have unique access to data and ability to interpret information (via their insights on *context*) that can be important to operational success. Our research indicates that creating a partnering environment in which information can be shared even more readily could be a benefit to any future operation.

There have been some good examples of challenges overcome during Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF) with respect to working with partners. Working within a complex coalition was not easy in early stages of the operations and continued to be challenging. Many steps were taken to ease these difficulties, including finding ways to more easily and quickly share information. These positive developments in which lessons were essentially learned and practiced in real-time operations include developing the organizational and technological networks necessary to link and share information with a very complex coalition. For the United States, this included developing solutions for releasing information and working with partners that have different cultures, information systems, and procedures. Although the solutions were not always perfect, the act of working through these issues is something the United States has documented and should continue to document for use in developing future coalitions, no matter what kind of warfighting environment.

However, many SMEs with whom we spoke suggested that the policies that the COCOMs provided to the USAF for information release were overly restrictive and confusing. This appears to have led, in some cases, to overly restricted information-sharing because analysts do not necessarily fully understand the policies and procedures for information-sharing. Our research suggests that the USAF needs to carefully coordinate policies and procedures for release with the COCOMs and, when possible, have templates prepared in advance.

SMEs also indicated the importance of having opportunities for USAF analysts to work with international partners. This could include both exercises and day-to-day operations when opportunities present themselves. This could help to develop and streamline releasability issues and provide opportunities for analysts to develop an understanding of partner needs and capabilities and sociocultural sensitivities.

Our research also suggests that there are important issues with regard to developing networks for sharing information from unconnected and incompatible systems. Tools for mitigating these gaps and assisting with releasability have helped, but there might still be issues to address here.

Finally, a very important aspect of working with partners is understanding their information needs (again, partnerships are two-way streets) and demonstrating that the United States and the USAF are reliable information partners. In some cases, the lack of good analytic partnering from the United States has led to some degradation of partner willingness to collaborate on analysis.

For example, one COCOM expressed to us that there were instances in which USAF analysts failed to meet their analytic responsibilities, which included information-sharing with two important partners, leading to a decline in the information-sharing with those two partners. In this particular instance, the partner information-sharing was very important to the COCOM's overall strategy in regions where there is very little information and analysis available, so this analysis issue created a diplomatic problem, as well as a missed opportunity to build analytic foundations.

In the next section, we cover the sixth lesson from past operations.

6. Guard and Reserve Contributions Have Been Important but Could Be Better Utilized and Are Hindered by Integration Challenges

One slice of the analytic community that was prominently featured in the observations we collected is the ANG and USAF Reserve. Reserve Component (RC) support has provided helpful surge capability in past operations, and some mechanisms could be employed to provide additional analytic foundation and flexibility for the Active Component. In Table 2.2, we show some examples of ways in which the RC can help support Active Component analytic needs. These mechanisms are already being employed in one way or another, but we found support for potentially expanding or adjusting them to support Active Component requirements.

Table 2.2. Mechanisms for Leveraging the Reserve Component

Type of Need	Example RC Support Mechanism
Surge	Activation (units or individuals)
Foundational analysis for long-term challenges	ANG operations incidental to training; existing or additional reserve units
Hedge against surprise contingency	Recruitment of personnel with diverse skills; expanding use of the Individual Ready Reserve

The most commonly recognized mechanism is activation. This type of surge capability is useful for short-term, immediate needs and can involve activating an entire unit or adding capacity to an active unit a few personnel at a time. Full-time reservists can also help meet present needs. Although our sources were clear that using the RC in these ways has been very beneficial for Active Component mission success, several challenges and issues also arose. There might be a need for additional education within the Active Component community about how to access resources in the RC. In addition, the process of matching RC volunteers with active-duty missions might not always best leverage unique skills and experience. Finally, reserve personnel appear enthusiastic about adding capability to the Active Component, but many also value their officially part-time status, so protracted surges could, under some circumstances, limit enthusiasm.

Other mechanisms available through the RC could be useful in helping meet longer-term analysis needs through existing training or—in the case of the RC—full-time reservist activities. We consider longer-term needs to be those that are not undertaken in response to an imminent threat or in support of ongoing operations. Rather, these longer-term needs relate to requirements that are necessary to build analytic foundations to prepare for possible future contingencies but are of lower immediate priority.

For these needs, there could be opportunities to leverage ANG weekend operations when the analysis will also benefit training ("operations incidental to training"). This enables only limited hours of support, but, in some cases, they might be sufficient. In addition, it requires some start-up investment in relationships between ANG and active-duty units and good understanding and communication of requirements. The USAF might also push for additional RC squadrons, as has been done over the past few years to meet emerging targeting, acquisition, intelligence, and other needs. This requires some investment but could cost considerably less than establishing a new active-duty squadron, is likely more flexible in terms of structure and nature of support, and could draw long-term, recently retired or commercial talent. That said, establishing new reserve units does cost money, which is in short supply in the current budgetary environment. Finally, both ANG and USAF Reserve units conduct two-week training periods or tours each year. It might be worth investigating whether these can be further leveraged to support the joint goals of training the RC and providing intelligence-analysis support to Active Component missions. In some cases, these training sessions are already timed to coincide with active-duty exercise events, but perhaps this concept could be expanded to leverage more opportunities to practice and exercise intelligence analysis.

Finally, there are always uncertain—in some cases, deeply so—future requirements. These are needs for information about threats that are "known unknowns" of very low present priority or even "unknown unknowns" that emerge as important only when a crisis arises. Many of these will not become priorities for analysis until the last minute, when an unexpected situation arises, much too late for building strong intelligence foundations within the Active Component. The RC can be very helpful in hedging against uncertainty in these situations. For example, the ANG might be able to use training operations to explore new analytic topics or methods, perhaps in some cases drawing on civilian experience. The USAF Reserve, in coordination with associated active-duty units, could focus two-week annual tours on exercising new scenarios. The USAF could also make a strategic decision to increase participation in and leverage of the Individual Ready Reserve, those who are affiliated with the USAF Reserve but do not train or receive compensation, and those who are not officially linked with any active-duty units. There might be steps that can be taken to encourage additional retired or civilian personnel to participate in the Individual Ready Reserve, remain more actively engaged (e.g., through virtual means or investing in their participation in an exercise every few years), and more quickly deployed (e.g., by ensuring that contact information and skills are regularly updated, investigating mechanisms by which clearances and other paperwork could be "fast-tracked").

Of course, there are constraints to employing any of these mechanisms, including policy and budget, some of which are more flexible than others. The opportunities to work more with the RC must be weighed against these; in some cases, there might be actions that can be taken to reduce barriers. We found several examples of constraints. Those that might be most relevant to the duties and authorities of our project's sponsoring office appear to include the development of clear Active Component analytic needs; clarification of RC roles and responsibilities; understanding and educating the community on mechanisms for employing the RC; encouraging participation in the RC after ending active service; and advocating for additional budget to support activation and mobilization, training, and exercises, including personnel across the total force.

In the next section, we cover the seventh lesson from past operations.

7. Integration of General-Purpose Force and Special Operations Force Capabilities Has Resulted in More Successes for Both Forces

The most consistently positive lesson—that is, something to be repeated in the future—we saw in the research was the success of GPF and SOF integration in some aspects of recent operations. Among other forms of integration, GPF or conventional forces supported SOF needs for ISR and analysis. In doing so, SOF received much-needed support for their operations, and GPF gained experience in supporting unique missions. The model of GPF support to SOF debuted in recent operations demonstrates how the analytic community can effectively be flexed to provide support and provided some good opportunities for career development. In some cases, this might have also elevated GPF personnel satisfaction with their positions because SOF missions provided an increase in diversity of the missions supported.

Moving forward, it will be important to retain and perhaps build on positive experiences integrating GPF and SOF capabilities, including for intelligence analysis. Some future operations could rely heavily on SOF and require surges in analysis to prepare and support missions. The larger GPF analytic workforce can draw on broad capability across a range of types of intelligence and areas of focus. However, this will require ensuring that training to support SOF remains in place or easily accessible should the need arise. Providing conventional forces opportunities to work with SOF will also enable analysts to exercise their skill sets more broadly and could help retention for some analysts who might not have many diverse opportunities when supporting conventional missions.

Lessons About Development and Employment of Skills

Lessons 8 and 9 are related to analyst skill development and maturation and employment. Lesson 8 articulates a macro-challenge that analysts (and others) in the USAF and DoD more generally share. Lesson 9 lays out specific challenges in developing analytic skills and experience that USAF officers and enlisted have encountered during their career development processes.

In the next section, we describe the eighth lesson from past operations.

8. The United States Has Repeatedly Faced Unplanned Security Challenges

Throughout military history, the United States (and other countries) has faced unplanned security challenges that have shaped the analytic force retrospectively, rather than proactively. Intelligence resources have a hard time adapting to the surprise scenarios. U.S. national security strategy during the Cold War was focused on deterring nuclear war with the Soviet Union and, in the event that deterrence failed, winning nuclear war (see Appendix A for a historical perspective on the relationship between national security strategy and intelligence). Fortunately, deterrence did not fail. However, the United States faced unplanned hot wars in Korea and Vietnam during the Cold War that did not end well for the United States. Two SMEs, in separate interviews, characterized OEF and OIF in a similar fashion—that is, as unplanned security challenges.

IW operations that kicked off in the beginning of this century resulted in some major adjustments for the USAF, including in ISR and USAF intelligence analysis. The USAF ISR enterprise did adapt to meet needs for IW, and these methods and procedures are valuable foundations for future, similar conflicts. However, this shift was by no means instantaneous and caused the USAF to lose some capability and capacity to provide intelligence analysis in support of conventional warfare. As we discuss in Chapter Three, the pace of operations in future conventional-warfare scenarios could be far less forgiving of adaptation. Yet, the next major conflict might not be one that the United States is fighting now, nor one of those for which it is planning. A balance must be struck between preparing the analytical force to support potential conflicts in the future and helping to build an agile intelligence-analysis force that can adapt to unplanned security threats.

In the next section, we address the ninth and final lesson from past operations.

9. Balancing Development of Analytic Expertise with Career Progression Milestones Has Been Difficult

Building analytic foundations and helping manage operations within a complex enterprise requires analytic leadership. The USAF has developed some expert analyst leaders, but officers and enlisted both expressed challenges balancing development of analytic expertise with career progression milestones. The basic trade-off relates to the fact that analysts need time and experience to nurture expertise, but the requirements for progression in a particular career field mean that developing analysts cannot necessarily focus on their trade, leading to some stagnation of analytic effort. This appears to be a very prevalent issue: It was the one that arose most frequently in our interviews. Here, we first discuss the factors that led to or hindered strong analytic leadership expressed in the observations we collected. Then, we describe why officers and then enlisted face challenges in balancing the development of their analytic expertise with career development.

Generally speaking, the development of strong analytic leaders resulted from (and, in some cases, resulted in) the following factors:

- long dwell time in a particular job
- relevant prior experience
- diverse educational opportunities (inside and outside of the military)
- experience with deployments
- good working relationships with other organizations
- support for analytic creativity.

The USAF understandably places emphasis on broad development and experience for officers to establish a strong pool of leaders. However, the information we gathered suggests that this might have a trade-off relevant to the development of USAF intelligence analysis, in that it appears challenging to develop officers with sufficient topical expertise to lead analytic activities, when required by their jobs. We saw examples in which this caused some delays in analytic progress, such as when limited civilian personnel periodically slow their efforts to help train officers with little experience in the field in which they are about to lead activities. We also observed examples of officers frustrated by the lack of topical continuity to the point of considering separating from service. This is clearly an issue that requires ample consideration from multiple angles, and we have not attempted to make far-reaching recommendations on this topic within the context of our project. However, some of our recommendations offer pathways that could help with these challenges.

Enlisted also face some similar challenges balancing analytic expertise needs with career development. Senior enlisted reported being drawn away from analysis tasks toward management, which can result in some drain of analytic capability, as well as occasional dissatisfaction with careers, because these analysts can no longer focus on the work they feel they entered the service to do. This could be even more problematic as the United States prepares for future conflicts in which the analytic skills of these senior enlisted are needed to provide capacity and train and mentor others.

More broadly, many enlisted personnel reported that they often lacked understanding of "the bigger picture" when supporting current, or preparing to support future, missions. Sometimes this involved having very little information about the context for a specific analytic task that prevented analysts from offering much of their skills beyond basic exploitation—to use terms from our section on building analytic foundations, enlisted analysts suggested that they too often conducted only very basic analytic processes in a rote manner, rather than being able to also bring in the context that could enable higher-level processes, such as critical thinking. Many enlisted personnel felt that their (and the analytic community's) ability to support broader operations beyond IW was very limited, if present at all. For example, many did not think they were adequately versed in U.S. capabilities that would be employed in conventional conflicts. This might prevent them from knowing what types of analysis to conduct and how to tailor analytic products in those contexts.

Enlisted personnel discussed some types of opportunities that they thought did or would help them gain broader experience in their careers and enable them to better exercise their analytic capabilities. This included time in joint and national elements of the IC, which provided valuable perspective and experience working on sometimes more-diverse areas of operations. Gaining progressive experience within a single AOR—for example, by starting at a DGS location and then moving to an AOC followed by working in a MAJCOM HQ (or vice versa)—enabled those fortunate enough to experience this to understand the broader concerns within an AOR, as well as what role USAF analytic organizations play in supporting operations. Other valuable perspective-broadening activities included mentoring and training to provide exposure to the broader mission area and different types of support to operations. Brainstorming opportunities enabled by site or unit leadership (e.g., one day per week or month dedicated to discussion of upcoming analytic challenges) also appear to have been effective for broadening perspective and increasing analyst flexibility. Finally, some senior enlisted raised the question as to whether some in their ranks should be permitted to continue to mature in their analytic roles whereas others would take on the more traditional manager role. However, they acknowledged the challenges this would pose for promotion considerations and the potential strain on the number of enlisted analysts at more-senior levels of career progression.

Ensuring That Lessons Are "Learned"

During the course of the research, we found that some lessons, although often articulated, do not appear to have resulted in changes. In addition, some statements that were identified as *lessons* did not appear to include sufficient detail or validation to make them actionable. There are reasons that lessons cannot be immediately addressed or even defined, but there might be practices the USAF could consider, in addition to the committed efforts of the AFLL community, that could better enable lessons to be quickly identified, validated, documented, and learned. These include the following:

- developing a standardized approach for identifying lessons, applied with regular periodicity, across USAF organizations and collected for validation by a board representing a range of interests at a central node. AFLL has a process in place for establishing lessons, so could be consulted on the development of this approach.
- creating a more visible process for tracking lessons to help ensure that they are learned as efficiently and effectively as possible, noting that sometimes lessons require time to mature or resources that must be identified before implementation can occur.

Chapter Three. The Demands of Future Operations and Implications for U.S. Air Force Intelligence Analysis

This chapter identifies the key operational challenges that would be associated with potential future conflicts. Understanding those challenges provides a basis for shaping the evolution of U.S. forces and, by extension, the analytic expertise and capacity within the USAF ISR enterprise. In this chapter, we make recommendations about the sorts of operational challenges that merit primary attention from the leaders of USAF intelligence. We then highlight key factors arising from those challenges that can help to determine the demands that will be placed on USAF intelligence, in peacetime, as well as in crisis and conflict. An appendix to this report provides information regarding the scale and scope of air operations that USAF intelligence would be called on to support in conflicts involving the most capable U.S. adversaries.[30] Finally, we offer a listing of the primary analytical problems facing the USAF ISR enterprise as it lays the foundation for understanding potential adversaries and supporting joint operations against them.

The Role of Scenarios

To make choices about investments and activities that shape the force, planners must have as clear an understanding as possible of the future demands that could be placed on the force. In a dynamic environment in which our ability to predict the future is, to say the least, limited, defining scenarios that are intended to depict a plausible range of future operational challenges is one proven way to inform decisions in the presence of uncertainty about future demands.[31]

It is axiomatic that one cannot anticipate or prepare for all possible contingencies. The future, in any precise sense, has unknowable and resource constraints (money, manpower, the time and attention of decisionmakers) will always place limits on the extent to which one can invest in capabilities that might be called for to deal with any contingency. Setting priorities is, thus, an essential part of force planning. The first question to consider is, "Which missions should be used to size and shape the force and which should be treated as, essentially, lesser-included cases?"

[30] This appendix is not publicly available. It will be published as Appendix C in Alkire et al., draft in process. Contact the authors for instructions on how to request it.

[31] For a discussion of scenarios, selection criteria applying to them, and the roles they should play in force planning, see Chapter Three of Khalilzad and Ochmanek, 1997.

When they were last officially articulated, there were 12 distinct missions for which the armed forces of the United States were directed to be prepared.[32] The USAF has responsibility to provide the U.S. military portfolio with five interdependent and integrated core missions: air and space superiority, ISR, rapid global mobility, global strike, and command and control (C2) (see USAF, 2013b). Since the end of World War I, the armed forces of the United States have been sized and shaped primarily around the imperative of deterring and defeating large-scale aggression by state adversaries. In the parlance of DoD's current array of missions, this would mean that the missions of deterring and defeating aggression and projecting power despite anti-access and area denial should be used as the primary determinants of conventional forces and capabilities. The identity and details of the scenarios that DoD has developed to depict future conflict against state adversaries are not publicly available, but the broad outlines of the challenges facing U.S. armed forces in the future are well known:

- Potential adversaries are fielding large numbers of systems, including accurate, long-range ballistic and cruise missiles; advanced surface-to-air missile systems; fourth-generation fighter aircraft and air-to-air missiles; counterspace weapons; electronic warfare systems; modern surveillance sensors; and cyberattack capabilities, all of which can enable broad-based anti-access and area-denial strategies. China, today and for the foreseeable future, fields the most daunting array of these capabilities and poses clear and growing challenges to U.S. interests, allies, and partners in East Asia. As such, it represents the pacing threat for modernizing U.S. air and naval forces and U.S. operational concepts for power projection.[33]
- Russia, for its part, is developing and deploying leading-edge weapon systems, and it presents the most stressing challenge calling for air–land combined-arms operations. Since the takeover of Crimea and aggression in eastern Ukraine, Russia's leaders have shown themselves to be willing to use force to alter the territorial and political status quo in Europe, posing a clear threat to NATO's eastern flank.

For purposes of tracking the leading edge of adversary force modernization and operational concepts, the USAF should focus its analytical resources on the types of operational challenges that China and Russia pose.

Warfights against regional adversaries, such as Iran or North Korea, would not represent entirely lesser-included cases of the demands of the China and Russia fights.

For example, a conflict involving either North Korea (today) or Iran (in the future) could require early efforts to neutralize modest-sized but, presumably, well-protected nuclear

[32] These are to counter terrorism and IW; deter and defeat aggression; project power despite anti-access and area-denial challenges; counter weapons of mass destruction; operate effectively in space and cyberspace; maintain a safe, secure, effective nuclear deterrent; defend the homeland and provide support to civil authorities; provide a stabilizing presence; conduct stability and counterinsurgency operations; and conduct humanitarian, disaster relief, and other operations. See DoD, 2012b, pp. 4–6.

[33] For a brief discussion of Chinese anti-access and area-denial capabilities and their implications for U.S. strategy and force planning, see Ochmanek, 2015a.

arsenals.[34] We take account of these and other particular demands of conflicts against these regional adversaries when we identify the analytical challenges on which USAF intelligence should be focused.

Of course, U.S. forces engage in a wide range of activities other than deterring and defeating aggression by state adversaries. This has certainly been true since 2001, when al Qaeda's attacks on the United States prompted U.S. leaders to send forces to Afghanistan to overturn the Taliban regime there. Given that terrorist groups, such as al Qaeda and ISIL, and insurgencies, such as that being conducted by remnants of the Taliban, are likely to continue to pose serious challenges to U.S. interests, should DoD develop scenarios depicting these challenges, which are qualitatively distinct from those that state adversaries pose? The answer is, yes and no. Without question, U.S. forces will be called on to continue combating terrorist and insurgent groups abroad. They might also be directed to undertake stability and postconflict reconstruction missions, such as those that they have conducted in Iraq and Afghanistan since 2002 and 2003. Therefore, the anticipated demands of these IW missions should help to shape the future force. But because such missions make up, and likely will continue to make up, such a large part of the day-to-day demands being placed on the armed forces of the United States, scenarios and analysis of them play a less important role in helping to shape capabilities for these missions. In a sense, the world provides a laboratory every day in which to test the capabilities of current forces and to develop new approaches to accomplishing key tasks within these missions. Other missions, such as homeland defense and defense support to civil authorities and nuclear deterrence, can be treated either as lesser-included cases of power projection or as specialized missions that call for their own force structures and support infrastructure.

Projecting Power in the 21st Century

Conducting and sustaining large-scale military operations over great distances is an inherently demanding enterprise. Simply moving the people, equipment, and supplies needed for a high-intensity military operation from one continent to another requires a massive transportation effort. Accomplishing this in the short timelines often associated with unexpected conflicts, identifying and preparing the facilities to be used, ensuring that the right things get to the right places, orchestrating their employment, and doing all of this in an environment in which the enemy is working to thwart one's efforts all add greatly to the degree of difficulty. Conducting effective operations against regional adversaries in the 1990s, such as Iraq under Saddam Hussein and Serbia under Slobodan Milosevic, might have been daunting. The challenge has intensified as China and Russia have emerged as plausible adversaries with a host of more-challenging capabilities.

[34] Note that the *Joint Comprehensive Plan of Action* on Iran's nuclear capability was signed in Vienna on July 14, 2015 (China et al., 2015). We do not mean to imply that this plan will fail.

Research Tasks for Scenario Evaluation

To generate insights about the operational challenges that U.S. forces must prepare to confront and the operating environment in which the force will be doing so, we evaluated official defense planning scenarios, as well as scenarios under development at RAND. The RAND research team obtained campaign modeling results from the USAF that provided details on joint and coalition operations that need to be conducted in those scenarios. We also leveraged details from recent wargames of similar scenarios. For instance, RAND researchers participated in the USAF Unified Engagement 2014 wargame and leveraged information on joint operations from it, including operations in the air, space, and cyberspace. We then applied our expertise and judgment to identify the intelligence-analysis capabilities that would be needed to support those operations. This included an evaluation of the intelligence-analysis capabilities needed during combat and the intelligence-analysis capabilities that would be needed during phase 0 in order to ensure an adequate intelligence foundation and to provide I&W. Note that it is not the job of the USAF ISR enterprise to "solve" these challenges on its own. We determined that the USAF (versus another member of the IC) would likely have lead responsibility for an intelligence-analysis capability if we judged that it met either of the following two criteria:

- It is a key enabler of the application of airpower.
- It builds on an inherent capability of the USAF.

Focus Areas for U.S. Air Force Intelligence Analysis in Future Conventional Warfights

Research of the future warfighting scenarios generated insights about the operational challenges that U.S. forces must prepare to confront and the operating environment in which the force will be doing so. These challenges, in turn, can be used to help focus the efforts of DoD's intelligence enterprise to support commanders and operators in peacetime ("strategic intelligence") and make preparations for support in wartime. However, intelligence plays crucial roles in the process by seeking to determine the capabilities and vulnerabilities of the adversary's weapons and related systems, as well as the concepts of operations, tactics, and training that the adversary uses in employing its forces.

We examined future warfighting challenges and used subjective evaluation to identify those that relate to mission areas that are critical to the success of the joint operations and for which the USAF would have the lead in that operation. We refer to these as "first-tier" analytical problems for the USAF. They are not intelligence problems per se but are operational challenges that USAF intelligence analysis can support. We summarize them below.

First-Tier Analytical Problems for the U.S. Air Force

Following is a list of first-tier analytical problems that we identified:

- How can joint forces gain freedom to operate in the air (primarily over China and Russia)?
  - Rapidly and reliably suppress and destroy enemy surface-based IADS.
  - Defeat enemy fighter-interceptors.
- How can joint air forces sustain high-tempo operations at forward air bases in the face of attacks by accurate ballistic and cruise missiles?
- How can joint forces sustain operations by key space-based assets (or substitute reliability for them) in the face of kinetic and nonkinetic attacks (primarily on China and Russia)?
- How can joint forces protect the U.S. homeland from conventional, nuclear, and unconventional attack during power-projection operations?
- How can joint forces rapidly neutralize and destroy enemy nuclear weapons, infrastructure, and delivery systems (primarily those of North Korea and Iran)?

We also identified second-tier problems, which are those related to mission areas in which the USAF has a supporting role.

Second-Tier Analytical Problems for the U.S. Air Force

These are the second-tier problems we identified:

- How can joint forces disrupt enemy C2 of military operations?
- How can joint forces protect critical information and communication systems from cyberattacks?
- How can joint forces rapidly delay, disrupt, and destroy enemy mechanized ground forces (primarily those of Russia and North Korea)?
- How can joint forces rapidly interdict enemy surface naval forces?

A Demanding Operating Environment

When considering one's approach to addressing these problems, it is important to keep in mind the environment in which U.S. forces are likely to be called on to operate. This, of course, will vary according to the scenario, but many challenging characteristics of the current and future operating environment are common across the scenarios. The following provides an overview of the conditions that are most relevant to the conduct of U.S. air operations:

- time urgency: Joint forces will have to quickly halt the enemy's offensive.
- Forward bases will be subject to attack.
- Control of the air could be contested for an extended period (over China and Russia).
- Joint forces will have to conduct their operations in ways that limit the adversary's incentives to escalate (all, but especially Russia and China).

- Military space and information systems will be degraded (primarily those of China and Russia).

Individually and in combination, these factors make for a daunting set of operational and analytical challenges. As noted above, projecting large-scale forces over great distances and sustaining their operations is a challenging enterprise even in the best of circumstances. When U.S. forces must fight for freedom to operate in the air, space, and cyberspace, when forward bases are exposed to enemy missile attacks, when certain classes of enemy targets are off limits because of concerns over escalation, and when the joint force is expected to turn back the enemy's offensive in a matter of just a few days because of a lack of operational depth, the magnitude of the challenge grows very substantially. These realities lead inescapably to the conclusion that power projection for the United States has entered a new era and that new platforms, weapons, munitions, and support systems are called for. Indeed, U.S. forces are now confronted with the need to rethink their entire approach to power projection.

A final factor to consider in preparing the USAF ISR enterprise to support future operations is scale: How big an operation will need to be supported? Here, it is worth looking back at recent conflicts against regional adversaries. In both Operation Desert Storm and OIF, U.S. forces generated upward of 1,500 combat sorties per day, delivering thousands of weapons against hundreds of targets. This level of effort, which should be expected in future conflicts as well, stands in contrast to the much smaller-scale operations that U.S. forces have conducted since 2003 in Iraq, Afghanistan, and elsewhere.

Two Key Future Challenges for U.S. Air Force Intelligence Analysis

Our evaluation of the first- and second-tier analytical problems in the context of demanding environments for future conventional conflicts suggest two key challenges that USAF intelligence analysts will face in the future. The first we describe in the next section.

1. The Pace of Future Conflicts Might Stress Needs for Foundational Intelligence and Challenge Readiness to Conduct Analysis During Phase 2/3 Operations

In our evaluation of lessons from past operations, we collected many observations about the agility of USAF intelligence analysts and ISR personnel in adapting to ongoing IW operations. There have also been cases of adaptation to conventional conflicts. For instance, although operations in Libya served as a wake-up call for preparedness, as discussed in Chapter One, there was adaptation, and, ultimately, those operations were deemed a military success. However, campaign analyses and wargaming of some important future scenarios suggest that the pace and intensity of those conflicts will be far less forgiving. Intelligence analysts will not have much time to adapt to a conflict that might advance from phase 0 to phase 3 operations on the terms of our adversary in a matter of days or weeks, as is suggested by wargaming and campaign simulation of future scenarios. Instead, they will need foundational intelligence to be prepared in

advance of the conflict and will need to be well versed in analysis activities that they would need to conduct during phase 2/3 operations, such as intelligence-analysis support to updating the OB, targeting, and BDA.

We describe the second key challenge in the next section.

2. Analysts Might Need More Expertise with Intelligence from and for the Space and Cyberspace Domains Because Operations in Those Domains Might Be More Prominent

Future concepts for warfighting in anti-access and area denial depend on the integration and coordination of operations across multiple domains, including space and cyberspace. Many potential competitors are developing strategies and capabilities for contesting U.S. space capabilities. Furthermore, advanced weapon systems are increasingly reliant on cybersystems and networks for operation. For these reasons, intelligence analysts will have increasing need for expertise with intelligence from the space and cyberspace domains and for supporting operations in those domains.

Implications for Shaping U.S. Air Force Intelligence

By any estimation, the power-projection missions for which the armed forces of the United States must prepare are highly demanding. In the 14 years that the United States has been preoccupied with conducting IW operations in Afghanistan, Iraq, and elsewhere, state adversaries have made major strides in fielding capabilities that are expressly aimed at raising the cost of U.S. access to and operations in their regions. Ensuring that future U.S. commanders have at their disposal the military capabilities they need to accomplish their power-projection missions will require concerted efforts across the defense enterprise for many years to come.

Our review of the future operating environment suggests that the leadership of the USAF's ISR enterprise might wish to consider the following actions as ways to contribute to the development of capabilities appropriate to this emerging and very challenging environment:

- **Review, refine, and use a list of key analytical problems in order to help focus development and training within USAF intelligence.** Given the breadth of joint missions assigned to U.S. forces and the wide range of activities that they undertake globally on a day-to-day basis, maintaining focus on operational challenges that are associated with operations that would be crucially important but that remain hypothetical (e.g., preparing for future wars) can be difficult.[35] Taskings associated with immediate demands, on the other hand, can command the attention of the enterprise even if those demands are, in the greater scheme of things, less important than preparing for a potential future conflict. Developing a finite number of key problems and getting buy-in from the

[35] Currently, USAF key intelligence problems are articulated in the program of analysis. In Chapter Six, we provide details on a recommendation that the USAF form a committee for the purpose of federating the roles and responsibilities for analysts across the USAF ISR enterprise.

enterprise that these are, in fact, worthy of sustained attention can help counter these tendencies. Indeed, a list like that provided above, once vetted throughout the organization, can be useful across the USAF in focusing scarce resources on priority challenges that joint force commanders will look to the USAF for leadership in solving.

- **USAF intelligence personnel should participate in concept-development efforts with the USAF and broader joint community.** The scope of the anti-access and area-denial and other challenges facing the U.S. armed forces today is such that simply buying new and better equipment will not suffice to overcome them. As the leaders of the USAF and the Navy recognized when they launched the Air–Sea Battle initiative, addressing these challenges will call for developing new, joint approaches to power-projection operations. It is vital that USAF intelligence be a full participant in these concept-development efforts for at least three reasons:
  - Intelligence analysis of adversary capabilities, concepts, and "patterns of life" is essential to ensuring that those devising and evaluating the new concept of operations have an accurate portrayal of the threats they are working to overcome. And as new concepts are developed, intelligence analysts will need to come up with estimates of how adversaries might adapt to them.
  - Part of any operational concept involves the collection, processing, interpretation, and dissemination of information about the adversary and the operating environment in general. Intelligence experts will be needed to inform joint concept-development efforts about what is and is not feasible in terms of intelligence support to operations.
  - By participating in the concept-development effort firsthand, USAF intelligence personnel will have an appreciation for the direction of change in the operational community and can help to shape the evolution of intelligence capabilities and training accordingly.
- **USAF intelligence leaders should seek opportunities to test the capabilities and capacity of USAF intelligence to support large-scale, joint power-projection operations in demanding future environments.** A Blue Flag exercise could provide some of the needed opportunity.[36] Joint experimentation, wargames, and command post exercises centered on future-oriented scenarios all provide opportunities to test the ability of the USAF ISR enterprise to meet emerging demands. With workloads and operating tempos at a high level and resources constrained, freeing up people and hardware to participate in nonmandatory development activities can be difficult. But well-structured events like these, particularly when they are rigorously refereed or adjudicated, can be uniquely valuable as vehicles for learning and evaluation.

[36] Blue Flag is an ACC-sponsored exercise program that trains commanders and staff of component-numbered air forces, USAF forces, joint and combined AOCs, and associated operational-level joint and coalition C2 organizations and personnel at the operational level of war. The goal is for each numbered air force to participate every two years. As far as we have been able to ascertain, this exercise has not been conducted in recent years. See 505 C2 Wing, 2013.

Chapter Four. Analysis Tools

A Third Key Future Challenge for U.S. Air Force Intelligence Analysis

In Chapter Three, we described two key challenges that USAF intelligence analysts will likely face in the future. We describe the third key challenge in the next section.

3. The Volume of Data and Limitations on Collection That Anti-Access and Area-Denial Developments Impose Will Challenge Analysts

In many ways, this is a challenge of the information age itself. It has three main parts. On the one hand, analysts will have too much data: Information will soon be collected more quickly than it can be exploited using current analysis tools and methods.[37] On the other hand, analysts will still have too little data: The most critical collection from anti-access and area-denial environments will remain elusive. And taken together, these challenges also present a daunting coordination problem: Getting the right information to the right people at the right time will become increasingly difficult.

Analysis tools and technologies provide the means of responding to all aspects of this challenge. They can sift important nuggets out of large amounts of low-content data, squeeze the most value out of small amounts of high-content data, and help get all this information to the warfighter. But current analysis tools are not sufficient to future needs. USAF analysis tools must evolve if analysts in the USAF ISR enterprise are to continue to perform their missions.

In this chapter, we first look to lessons from the past and future challenges to better understand the need for analysis tools, and we provide a research basis for the third future challenge that is stated above. We then construct a framework for understanding how analysis tools can fill these needs. Using this framework as a guide, we then prioritize investment in different classes of analysis tools. Finally, we make recommendations regarding standards, acquisition, and workflow.

Research Tasks for Tool Evaluation

We conducted an extensive review of the academic literature and reports within the IC and the private sector. To this, we added information gleaned from responses from the survey and semistructured discussions with SMEs within the USAF, the IC, and related governmental agencies and commercial entities. These multiple sources provided valuable background information and insights that helped shape these findings and recommendations.

[37] This is most important for sensor modalities that can generate high volumes of data, such as full-motion video (FMV), Already, most of the raw video data collected by wide-area motion imagery systems goes unanalyzed: Only the "chip-outs" are reviewed.

Implications of Lessons from Past Operations for Analysis Tools

Lessons identified from past operations offer a glimpse into the role of USAF analysis tools. Not every lesson described in Chapter Two is applicable here, but many have implications for the development and employment of analysis tools. Table 4.1 summarizes these connections.

Table 4.1. Lessons Identified with Implications for Analysis Tools

Lesson Identified	Implication
Processes, such as critical thinking, can be employed across different missions and levels of intelligence.	Analysis tools that support these processes can also be employed across different missions and levels of intelligence.
Knowledge required to provide context is lacking or limited to support USAF missions other than IW.	Analysis tools are not substitutes for this missing knowledge but can be complementary
Success in operations depends on analyses conducted across multiple timelines, organizations, and levels of war. They build on one another and require integration.	Wherever possible, analysis tools should be designed to remove technical barriers to collaboration and integration.
Joint, national, and partner analytic capabilities and capacities are not sufficiently leveraged.	Analysis tools are needed to integrate the active USAF with all other key intelligence organizations.
ANG and USAF Reserve contributions have been important but could be better utilized and are hindered by integration challenges.	
Integration of GPF and SOF capabilities has resulted in more successes for both forces.	
The United States has repeatedly faced unplanned security challenges.	Analysis tools must be flexible enough to enable an agile response to unplanned security challenges.

The first relevant lesson is that general processes, such as critical thinking, apply broadly to different missions and levels of intelligence—and therefore, if they are properly designed with this in mind, the tools that facilitate these general processes should also be broadly applicable. Pivoting from one conflict to another will require analysts to work with different data sets, but, because many of the underlying analytic processes will be the same, they can still use many of the same basic tools.

The context needed to understand different data sets, however, is not similarly fungible. This is the second relevant lesson identified: Some knowledge is simply lacking or limited. Tools can provide analysts access to a wealth of regional information, but the knowledge required to understand it and put it in the proper context is, at least for the foreseeable future, something that can be built up only through years of experience. Analytic tools are therefore not substitutes for experience, but rather work best when used to complement experienced analysts.

The third relevant lesson is that success in operations does not result solely from the most recent intelligence (although that is certainly important) but also depends on the depth and

breadth of analysis activities that many agencies have conducted over many years.[38] Integrating all this work is an enormous challenge requiring collaboration of many groups. Thus, where possible, analysis tools should be designed to help remove technical barriers to collaboration and integration.

The next three lessons point to the importance of integrating USAF intelligence efforts with those of others. The USAF does not sufficiently leverage joint, national, and partner analytic capabilities; neither does it do so with ANG and USAF Reserve capabilities. Survey results also highlighted the persistent challenges of stove-piped system architectures and sharing data.[39] Furthermore, the space and cyber domains present special challenges for intelligence analysis in this regard because space and cyber are inherently difficult to visualize and require greater technical capability for an analyst to make sense of this intelligence.[40]

Finally, the growing trend of unplanned security challenges implies that the USAF must be prepared to face similarly unplanned security challenges in the future. Not only are the conflicts themselves difficult to predict, however, but so are the specific, advanced analysis tasks required to support them. As mentioned before, tools that facilitate basic processes are broadly applicable, but, unfortunately, this does not prove to be the case for tools that facilitate more-advanced processes, such as complex, multi–intelligence-collection discipline (INT) analysis. This is an important distinction to which we return later when we discuss different categories of analysis tools.

Basis for the Third Future Challenge

In the introduction of this chapter, we described the "third key challenge" that future USAF intelligence analysts will have to confront: the simultaneous overabundance and scarcity of different sources of data. Here, we describe in more detail the three general trends that underlie this challenge and explain why analysis tools will be needed to address them.

The most obvious of these trends is the rise of big data. This is not a new finding. USAF leaders have been warning for at least six years that the USAF will soon be "swimming in sensors and drowning in data."[41] Likewise, a RAND report from a fiscal year (FY) 2010 project warned that, if the USAF continued to exploit FMV manually, by the end of this decade, they would need 100,000 FMV analysts. What is new, perhaps, is the recognition that this trend now extends well beyond the problem of new collection from remotely piloted aircraft.

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[38] As Isaac Newton wrote, in a different context, "If I have seen further, it is by standing on the shoulders of giants" (Newton, 1959, p. 106).

[39] And the recent Edward Snowden and Chelsea Manning information leaks have only made this worse.

[40] The cyber domain is particularly difficult to visualize because "cyberspace" is not a physical space but a metaphor for describing complex networks of computer systems.

[41] Lt Gen (ret.) David A. Deptula made this phrase famous. See Drew, 2010. We also note that concerns about the volume of USAF intelligence data are documented as far back as 1952. See Appendix A for details.

The rise new sources, such as social media and commercial satellite imagery, sources that offer massive quantities of new data available outside the traditional intelligence cycle, challenges the predominance of conventional collection systems. Additionally, the tremendous growth in the amount of information that improved sensor technologies and new sensor modalities deliver has made the problem of storing and organizing this information more critical. Automation of some kind will be necessary to address this challenge for the simple reason that sensor data will soon be collected at too great a rate for manual analysis.

At the same time, unfortunately, the second general trend is that these capabilities have also benefited our adversaries. Because of this, the most critical data will remain scarce. Near-peer competitors are increasing the pace of their own operations and can increasingly deny collection opportunities, which presents a significant challenge to the quality and timeliness of intelligence support for anti-access and area-denial operations. In other words, as the decision loop of our adversaries shrinks, so too does the window for which the data we collect are timely and relevant.

To build a more complete intelligence picture from the fragmented data available, the USAF will need to rapidly correlate and fuse all the intelligence it collects from multiple intelligence domains. Furthermore, the USAF will need to harness the creativity of its analyst workforce to extract as much intelligence out of the available data as possible.

Finally, both of these trends complicate the most basic function of any intelligence service: to get the right information to the right people at the right time. And the increasing pace of operations will only exacerbate this challenge. For USAF intelligence analysts, this fundamental "coordination problem" is not just about how to leverage data collected by non-USAF platforms but also how to leverage the knowledge and expertise available in non-USAF organizations.[42] To address this, the USAF and the IC more broadly will need to remove or find ways to work around the many technical and organization barriers that stove-piped architectures and processes impose.

Framework

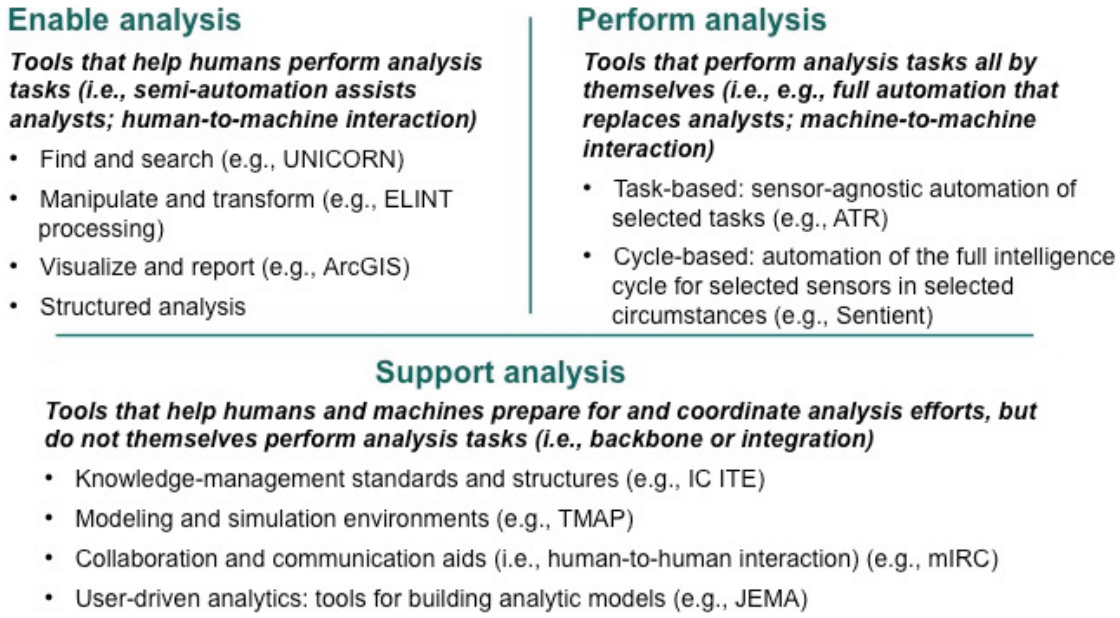
To help understand and describe the need for analysis tools in more detail, we developed a framework for categorizing analysis tools. This framework characterizes tools in terms of how they are used in the workflow to complete analysis tasks and places them along what we call a chain or spectrum of synthesis. Other frameworks have been developed that illuminate the demand for analysis tools (for example, see DCS for ISR, 2014); we developed this particular categorization scheme to highlight the particular classes of tools that are needed to meet future challenges and understand the dependencies between them.

[42] A related concern that was voiced in multiple survey responses is that more-complex weapon systems require greater technical expertise to conduct the analysis, and this expertise is in somewhat short supply in the USAF.

Categories of Tools

We first divide the ocean of possible analysis tools into three large categories based on how they are used in the analytic workflow: tools that *enable* humans to conduct analysis better, tools that can *perform* analysis all by themselves, and tools and technologies that *support* analysis activities in general (but are not tied to any specific tasks). Figure 4.1 briefly summarizes these three categories.

Figure 4.1. The Three Categories of Analysis Tools, by Their Roles in the Workflow



NOTE: UNICORN = Unified Collection Operation Reporting Network. ELINT = electronic intelligence. ArcGIS is a trademark of Environmental Systems Research Institute. ATR = automatic target recognition. Sentient is a trademark of Sentient Technologies Holdings. ITE = information technology enterprise. TMAP = Threat Modeling and Analysis Program. mIRC is a trademark of mIRC Company. JEMA = Joint Enterprise Modeling and Analytics.

The first and most commonly encountered class of tools consists of those that enable analysis: tools that help human analysts perform specific analytic tasks more quickly, more accurately, or more completely. These are also known as semi-automated tools, tools that assist analysts, or human-to-machine tools. The types of tools that fall into this category include tools for finding and searching data, manipulating and transforming data, tools to visualize and summarize data in written form, and structured analysis techniques. UNICORN is an example of a tool that fits this description.[43] SrA Zane Wright, who worked as an image analyst for

[43] Other examples include ArcGIS, and various ELINT processing tools are examples of tools that fit this description.

480 ISRW for four years, created UNICORN. At 480 ISRW, he created and developed UNICORN to share actionable intelligence with coalition forces in Afghanistan and Iraq.[44]

These tools can be considered force multipliers in the sense that they enable a single analyst to do the work of many analysts. What distinguishes these tools, however, is that they do not complete tasks all by themselves: The human analyst remains firmly in the driver's seat. For this reason, the human–computer interface is critical for these tools. A poor interface can derail acceptance of even the most powerful aid: If the tool does not communicate the important information quickly and in a palatable format, it is destined to fail. Careful consideration needs to be given to the human–computer interface and the fluidity of the information exchange across this boundary.

The second class of tools consists of those that can perform analysis all by themselves. These are also known as fully automated tools, tools that can replace analysts, or machine-to-machine tools (for example, see Atwood, 2015). There are two subcategories: tools that are task based and those that are cycle based. Task-based tools are designed to offload a specific task from human analysts and complete it autonomously. ATR is the classic example of this. Cycle-based tools attempt to perform all parts of the intelligence cycle—from tasking through exploitation to retasking again—but they usually are only for a small subset of sensors or data types.

Sentient, developed by the Advanced Systems and Technology Directorate of the National Reconnaissance Office, is the most prominent example of a cycle-based tool. The goal of Sentient is to perform automated tipping and cuing by creating machine understanding of intelligence in one sensor modality and using that information to automatically task collection from other modalities based on programmed decision thresholds (Ackerman, 2015). Although it is restricted to a narrow slice of the collection capacity, this has allowed the National Reconnaissance Office to achieve more-efficient, effective use of that capacity (Alderton, undated). This kind of automated collection allows humans to focus on the "so what?" question and leave the "what?" to machines, which ultimately they might be better suited to answer.

Although automation like this could hold the key to keeping pace with expanding sources of data and growing requirements, however, the body of literature on automation also indicates many unique challenges to developing and implementing fully automated systems. Most importantly, human distrust of automation is a barrier to adoption. Automated systems are often held to a higher standard than human analysts, and humans tend to judge failures of automated systems much more critically than they judge failures of fellow human. Furthermore, after observing a failure, or even hearing about one secondhand, they are even less likely to trust the system in the future.

Research on analytic rigor also highlights the importance of transparency in the analytic process in building confidence in analytic assessments. Although this point is often directed at

[44] Airman Wright's contribution was honored at a Heritage Awards and Dedication ceremony in 2014. Unfortunately, he lost his life battling cancer.

the work of human analysts, the same holds for machine systems (i.e., few are willing to trust a black box). Designing systems transparently so the human can see and understand the process and decision thresholds can help build trust. Just as it is in human relationships, time is an essential ingredient in building this trust and constructing a more accurate understanding of the relative strengths and weaknesses of a new system.

Finally, an important class of analysis tools consists of those that do not actually perform any analysis tasks at all. This is not an unfamiliar concept: One can acquire faster cars or develop self-driving cars, but ultimately the speed and efficiency of the transportation system depend on the roads. Tools that support analysis are those that help analysts prepare for and coordinate their efforts. As suggested by the name, these tools also provide the necessary, underlying structures to support the use of the other two classes of tools. Supporting tools include knowledge-management standards and database structures, modeling and simulation environments, interpersonal collaboration and communication aids, and tools for developing other tools (e.g., for writing scripts, macros, and adapting analytic models).

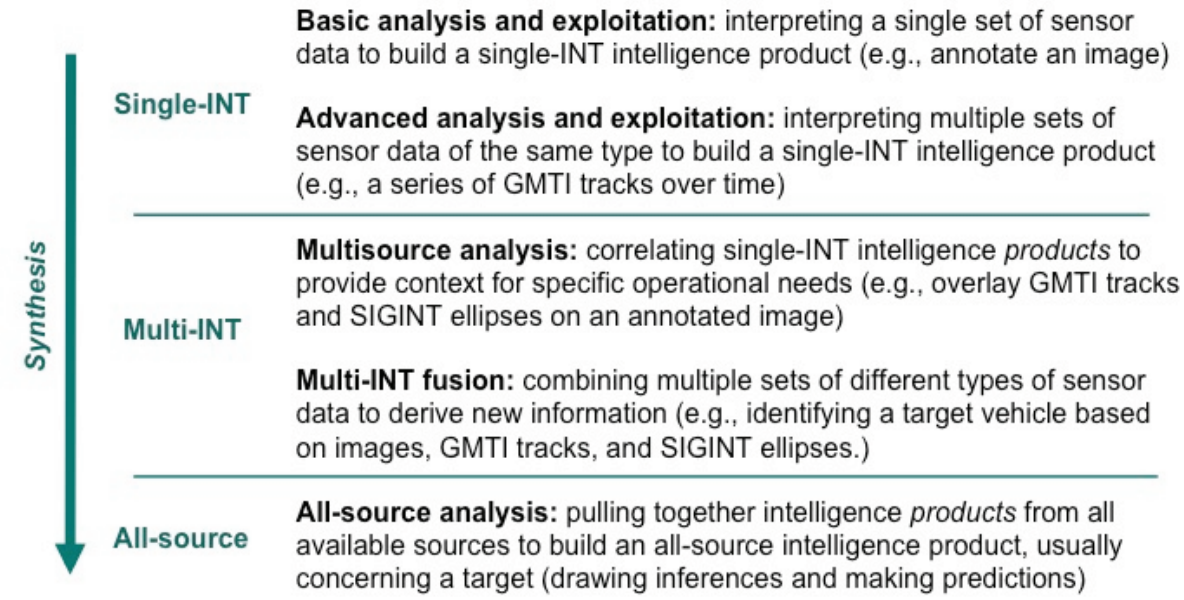
Spectrum of Synthesis

The other half of the framework is the spectrum of synthesis. This spectrum characterizes analysis tasks in terms of the complexity of bringing disparate elements together.[45] Figure 4.2 defines the levels of synthesis, from basic analysis and exploitation[46] to all-source analysis.

[45] *Synthesis* and *analysis* are often used as antonyms. Here, however, we use *analysis* in the broadest sense of deriving knowledge from data, and *synthesis*—combining data—is just one way in which that can be done.

[46] Debating the distinction between analysis and exploitation has led to many spilled pots of tea. Although we find it easiest to view *exploitation* as a just another subset of analysis, we use the formation *analysis and exploitation* in this report in the hope, perhaps in vain, that we can avoid the distinction altogether.

Figure 4.2. The Spectrum of Synthesis



NOTE: GMTI = ground moving target indicator. SIGINT = signals intelligence.

The primary level of synthesis is that of basic analysis and exploitation. This kind of analysis consists of interpreting a single set of sensor data and summarizing it in a standard single-INT intelligence product, such as an annotated image or SIGINT report. Although this work is less complicated than other forms of analysis, and the analysis tools used might be less flashy, they provide the critical foundation for everything that follows, because this is how the enterprise ingests data. If the data are not analyzed or exploited at this level, the chain of synthesis stops here.

The next level is advanced analysis and exploitation. This involves interpreting multiple sets of sensor data of the same type to build a more intricate single-INT intelligence product. Often, this involves time-sequenced data, such as a "vehicle-follow" storyboard based on a few hours of FMV, or mapping a series of GMTI tracks over the course of a day. It can also involve comparing two data sets to find the differences, such as in coherent change detection. Note, however, that, as these examples indicate, the analysis is more complicated largely because the data are more complicated. In other words, although we list basic and advanced analysis and exploitation separately in the chain, they are not usually sequential: They are rarely both performed on the same data sets.

Multisource analysis and multi-INT fusion both combine information from different intelligence domains, but they are distinguished by type of information involved. Multisource analysis works primarily to combine intelligence products—i.e., aggregating and correlating the work of other analysts—while multi-INT fusion combines the underlying sensor data to find new relationships. The goal of multi-INT fusion is to go further than merely correlating and to make a

whole that is greater than the sum of the parts, such as by using SIGINT and imagery intelligence to identify a target that neither discipline could separately identify.

Whether multisource analysis or multi-INT fusion should be considered a "deeper" level of synthesis is debatable. Because multisource analysis builds products out of products, it is more complicated in some ways. But multi-INT fusion can be more technically complex because data might need to be reprocessed or re-exploited in new contexts. We place them in the order we do because of the different kinds of experience required. A multisource analyst combining imagery intelligence and SIGINT products, for example, does not need to be an expert in both disciplines; the products with which the analyst is working will provide much of the necessary context already. However, an analyst attempting multi-INT fusion needs to be more familiar with the idiosyncrasies of these disciplines to work successfully with the raw data.

The most advanced level of synthesis is all-source analysis, which involves pulling together all available intelligence sources to draw inferences or make a prediction about a target. An analyst conducting all-source analysis makes an assessment that draws on years of experience and deep familiarity with the target set. This type of analysis contains inherent uncertainty and requires the greatest amount of context and analyst experience to make a final assessment.

Workflow/Synthesis Matrix

Placing spectrum of synthesis on one axis and workflow-related tool categories on the other axis, we can make a workflow/synthesis matrix. Figure 4.3 shows this matrix, along with just a few examples of existing tools, to illustrate how the categorization scheme can work. Note that this is *far* from being a comprehensive list: There are many other tools, some of which are really suites that cover more than one category.

Figure 4.3. The Workflow/Synthesis Matrix

Spectrum of synthesis	Enable analysis	Perform analysis	Support analysis
Basic analysis and exploitation	Geospatial Tagging and Extraction Service	CyberTrans	WRANGLER
Advanced analysis and exploitation	ArcGIS	Target Monitoring Assistant	Map of the World
Multisource analysis	WebTAS		Apps Mall
Multi-INT fusion	Palantir software	Sentient	JEMA authoring client
All-source analysis	Structured analytic techniques		TMAP

NOTE: This is not a comprehensive list; it merely illustrates the framework. WebTAS is a trademark of ISS.

Table 4.2 provides a brief explanation of some of the tools listed in Figure 4.3. Of note is the fact that we did not identify any existing tools that perform multisource or all-source analysis in

a fully automated fashion. This should not be interpreted as a capability gap, however, but rather an indication of the importance of context and experience in performing this type of analysis.

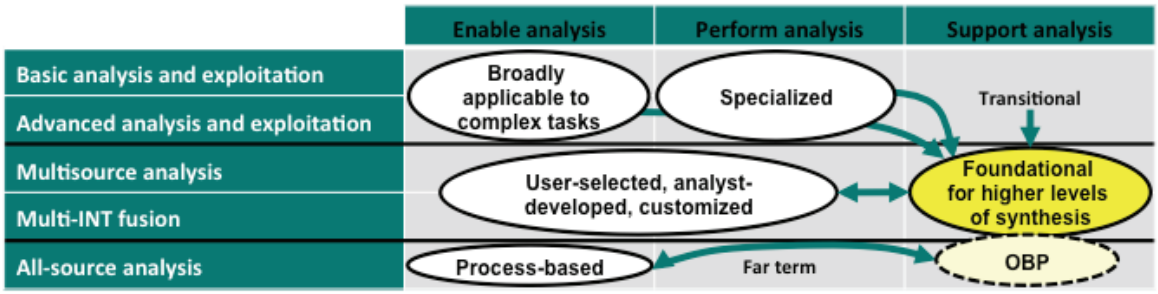
Table 4.2. Examples of Various Analysis Tools

Tool	Purpose
Geospatial Tagging and Extraction Service	Geotagging tool that extracts geographic data
CyberTrans	Machine translation tool for intelligence analysts
WRANGLER	Database of ELINT-derived information
ArcGIS	Geospatial analysis tool used to display and manipulate geographic data
Target Monitoring Assistant	Tool with automated operational target monitoring capability
Map of the World	Data storage warehouse that displays geospatial-intelligence products linked to geographic location in the world
WebTAS	Data analysis and visualization software tool kit
Apps Mall	Central source for IC-wide intelligence-analysis tools
Palantir Gotham or Palantir Metropolis	Tool kit for integrating and analyzing information from different data sources
Sentient	Program to develop automated tipping and cuing capability
JEMA authoring client	Tool that allows analysts to build new analytic models to automate workflows
Structured analytic techniques	Techniques used to structure critical thinking and improve intelligence assessments
TMAP	Common modeling and simulation environment used to standardize assessments between organizations

Priorities for Analysis Tools

We now look at each of the categories in the workflow/synthesis matrix. Figure 4.4 shows the overall results, but we walk through these cells in the groupings as shown by the bubbles. Here, at last, we pivot from discussing the problem to describing the solutions.

Figure 4.4. Dependencies in the Workflow/Synthesis Matrix



NOTE: OBP = object-based production.

Single-INT Analysis and Exploitation Tools

Although the driving force behind automation is the rise of big data, we must not forget that these single-INT or "little data" tools are ultimately what feed that pipeline. Semi-automated tools that enable basic or advanced analysis and exploitation can automate repetitive subtasks to speed overall task completion. They can also allow analysts to attempt more-complicated manipulations of data in the advanced category. Because single-INT analysis and exploitation involve the most straightforward of these analysis tasks, the first lesson identified echoes powerfully here: Analysis tools that help human analysts to conduct basic analytic processes can be broadly applicable.

It is a somewhat different story for fully automated tools that perform basic or advanced analysis and exploitation, however. Unlike enabling tools, these tend to be much more specific in application. For example, pockets of ATR tools exist throughout the IC, but they tend to focus on very specific tasks, such as identifying vessels in a maritime environment using particular sensors. Even when they are technically capable of being sensor agnostic, these tools are often, in practice, slaved to specific sensor architectures (Office of the Under Secretary of Defense for Intelligence, 2015).

The technological maturity of fully automated tools also varies. For example, the ability to automatically classify vehicles in a crowded environment is likely to be available only after 2025, but simply detecting vehicles in motion imagery is something that has become available already, at least for favorable environmental conditions (Menthe, Cordoba, Axelband, et al., 2015). Moreover, as discussed in the previous section, distrust of automation remains a barrier to wider acceptance, and decisions by automated systems often still require human review, which reduces the potential efficiency gain from employing them.

Although both of these categories of single-INT tools are important, previous RAND research found that enabling tools are the best bet for future investments. As the report stated, "Instead of trying to replicate with machines what analysts already do well, the USAF should invest in technologies that help analysts do more" (Menthe, Cordoba, Axelband, et al., 2015).

Because this particular class of tools is so broadly applicable, there is room for the USAF to leverage commercial solutions. For example, when it comes to FMV access, storage, and manipulation, the television broadcast industry faces many of the same problems with its own data. A few years ago, there were competing tools for doing this, but, over the past two years, Avid has become the industry-wide standard for both software and hardware.[47] Although Avid is likely therefore technically capable, there are other aspects to consider. The USAF should investigate whether Avid tools can be used in a secure environment, whether they can be made IC ITE compatible, and, of course, affordability. AFRL also has many automation efforts worth noting, including the Fully Automated Information Exploitation program; integrated tracking,

[47] Its family of shared storage media projects bears the unfortunate name ISIS.

analysis, and discovery; and the capability integration and demonstration of Planning and Direction, Collection, Processing and Exploitation, Analysis and Production, and Dissemination.

Finally, in Figure 4.4, we have labeled tools that support single-INT analysis as "transitional." Unfortunately, for security reasons, some single-INT repositories will likely need to be managed separately from others. However, in the long run, multilevel security systems are clearly desirable. To that end, we recommend that even these single-INT repositories be made compatible with the evolving multi-INT standards, in anticipation that, one day, we will be able to store more, if not all, of these data in a common, multimedia, cloud-enabled database. We also note here that industry uses a split-resolution approach to working with imagery—using lower resolution for most tools and higher-resolution formats only when necessary—and this can also be a helpful strategy for sharing this kind of information.

Multisource and Multi-INT Analysis Tools

For this area, we discuss the categories in reverse order. In Figure 4.4, we highlighted the area of the workflow/synthesis matrix concerning tools that *support* multi-INT analysis. These tools are foundational for the other categories, the tools that enable or perform multi-INT analysis. To press the previous analogy to the transportation system, single-INT analysis has fairly clear lanes in the road, but the multi-INT landscape is a complex, connected network with many intersections. Multi-INT standards and databases are essential.

Commercial industries are moving in this direction as well. Separate databases for audio and video, for example, which were prevalent just a decade ago, are now a thing of the past. Multimedia databases are seen as a prerequisite for the modern workflow: Work does not even begin until all pieces of the puzzle can be laid out on the same table.

Furthermore, increasing single-INT automation drives the need for multi-INT knowledge-management standards and practices. Improved knowledge-management standards and practices offer the only known flexible, scalable approach to supporting greater integration and collaboration across the enterprise. And this must be done as soon as possible, before the problem spirals out of control. The more data are collected and stored in the "wrong" format, the harder getting everyone on the same page will be. As one survey respondent explained, "Solid collection and indexing will become increasingly difficult as [the] volume of information collected will exceed capacity to triage and process it."

When it comes to tools that enable and perform multi-INT analysis, this is where the commercial world and the USAF part ways. Commercial production companies continue to rely on humans to view and annotate all of the raw footage they shoot, and they do not anticipate changes. Even as they look to employ drone cameras as well, none of the experts with whom we spoke imagined ever shooting footage that might not be watched.[48] Closed-circuit television

[48] "Who'd pay for that?" asked one executive. This highlights the difference between collecting video for a specific purpose and gathering intelligence to support potential future operations of unknown nature.

security systems, such as the network in London, are closer to this reality, but, even then, they still prefer to monitor everything in real time, even if the person charged with monitoring the systems must watch dozens of cameras at once (Menthe, Cordova, Rhodes, et al., 2012).

Unlike the USAF, commercial industry faces an environment with a relatively small number of information sources, not such sources as open-source intelligence that are growing without evident bound. One implication for this is that, when it comes to multi-INT analysis, the USAF should look to the IC rather than to commercial entities. AFRL has active programs looking at developing automated PED technologies to address this challenge. Developments in other IC organizations should also be tracked.

Even so, the biggest problem with multi-INT fusion remains the complexity of the landscape. Unlike single-INT analysis, in which the necessary work is clear (for example, imagery annotation is now almost a production line), one simply cannot prepare for all possible multi-INT analysis needs for all missions. A new mission might demand correlating sources of data that have never been brought together before or looking for new types of patterns that have not previously been sought. Unplanned contingencies, emerging data sources, and changing requirements can be equally demanding. And timeliness in providing this analysis is increasingly crucial. As one survey respondent put it, "Analysis needs to be available in hours and not months, and the community needs the tools and data connectivity to allow that to happen."

Unfortunately, anticipating all possible multi-INT tool needs is very difficult, if not impossible. Fortunately, we do not need to do that. The solution is instead to build analytic agility into the enterprise—to acquire tools that are flexible enough that analysts can adapt them to new purposes as the need arises. The most promising path to achieve this kind of analytic agility is *user-driven analytics*: model-building environments that permit analysts to develop their own tools and modify existing ones as they need.

To be clear, we are not talking about designing brand new tools from scratch in a matter of hours; that is, of course, not practical. But with the rise of graphical programming languages, it is also not necessary. Graphical programming languages now make tinkering more accessible to analysts who do not have coding backgrounds, and the transparency makes it easy for an analysts to understand what the model is doing, which could lead to greater trust in the automation. Nonexperts can now "code" simple scripts, write macros, generate "watch boxes" to monitor incoming data streams for cues, and even—depending on the language—automate more-complicated custom behaviors.

This approach is well suited for multi-INT intelligence problems because these problems are too numerous and nuanced to employ software developers to make routines for each potential problem set. From a development standpoint, shifting the tool-development engine of the workforce from a few software developers to the large workforce of intelligence analysts who are attuned to the nuances of the specific problem set unleashes the greatest resource the USAF possesses: the creative, problem-solving ability of its airmen. This has been repeated success

story over the past 15 years, and embracing user-driven analytics will allow the USAF to continue to tap this resource in the future.[49]

The JEMA tool is the most prominent example of the user-driven analytic approach in the IC today. JEMA uses graphical programming concepts to allow analysts to build models of their analytic workflows that can correlate, overlay, and visualize information from a range of data sources, structures, and formats (Brown and Vernal, 2014). Once built, these models can be replicated on similar data sets and for similar intelligence problems to enable more-rapid or more-complex analysis of larger data sets (Porche et al., 2014). Models can be shared across the IC, and developers can tweak models to make them more efficient and productive.

One feature of JEMA that makes it particularly attractive is the authoring client, which uses a graphical programming language to let analysts quickly prototype, develop, and adjust new analytic workflows. Although the traditional acquisition process will still be needed for many systems and tools, developing and implementing tools that support user-driven analytics also provide a partial solution for the overly burdensome acquisition process: When the analysis tools themselves are flexible and capable of being modified, analysts can use them to support an agile response.

All-Source Analysis Tools

All-source analysis is the highest level of synthesis, and it is quite different from the other forms. It works on integrating intelligence products from all sources, and its aim is not just to understand the "what" but the "so what." In other words, it aims to understand intent and make predictions. This is a challenging problem that requires analysts with many years of experience and specific, subject-matter knowledge. As a result, it is highly unlikely that this process can be fully automated for the foreseeable future. A recent RAND study estimated that fully automated prediction of an event, such as a terrorist attack, remains far term (2030 or beyond), and many experts doubted that it would ever be possible (Menthe, Cordova, Axelband, et al., 2015).

However, tools that can assist in predictions could be available as early as 2020, because these share some similarity to multi-INT analysis tools for gathering and sorting data. Some tools and processes can help by focusing on the cognitive process itself, e.g., structured analysis and red-teaming. Finally, the ABI methodology, which arose from IW operations in Iraq and Afghanistan, is an important part of all-source analysis that is often paired with OBP. We highlighted OBP as a subset of the foundational multi-INT tools because it is more about products than data, but clearly they should be tied together. For more on ABI, see Appendix D.[50]

[49] Additionally, it provides an interesting workaround for the lengthy acquisition process.

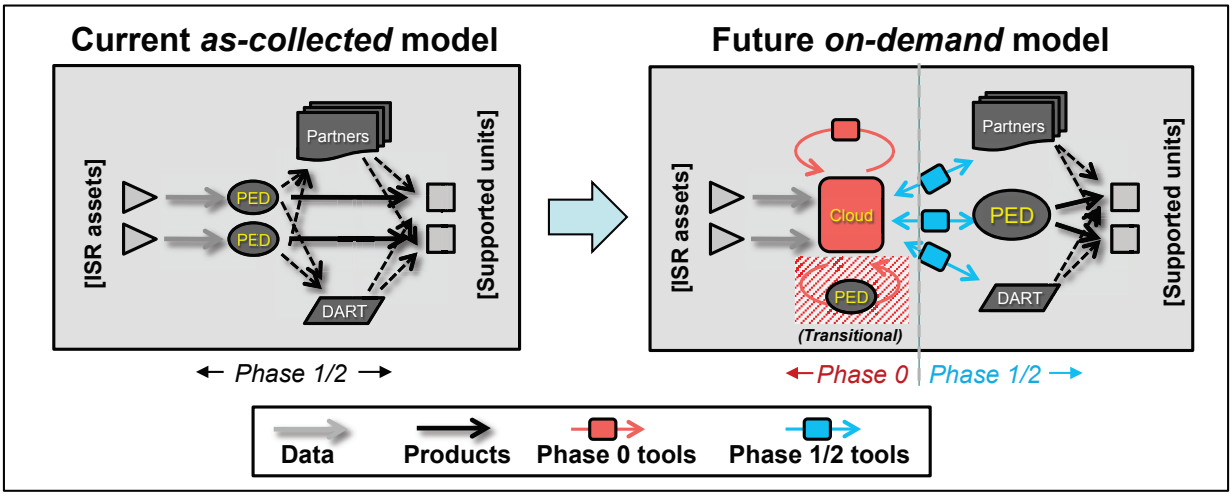
[50] This appendix is provided in Alkire et al., draft in process. It is not publicly available. Please contact us for instructions on requesting it.

Way Ahead

A New Workflow

Because growing demands will soon make it impossible to analyze every bit of data as they are collected, a new analytic workflow will be needed in which this is not necessary. The goal is to shift from a model that scales with input to one that scales with output. In earlier work, RAND researchers recommended that the USAF begin transitioning from an "as-collected" to an "on-demand" analytic workflow (Alkire et al., draft in process). Because this is discussed at length elsewhere, we summarize it only briefly here. Figure 4.5 depicts the recommended change schematically.

Figure 4.5. Transition from As-Collected to On-Demand Analysis and Exploitation



NOTE: DART = DCGS analysis and reporting team.

In this new workflow model, automated single-INT tools perform what we call "phase 0" analysis and exploitation—tagging data with as much meaningful metadata as can be derived automatically—and storing the results in the cloud.[51] Analysts can then go back and perform "phase 1/2" analysis and exploitation as needed, digging into the cloud repository to retrieve not only the most-recent data but all relevant data previously stored and appropriately tagged. As a transitional step, human analysts might be needed to facilitate the tagging and storage with semi-automated tools until fully automated tools become available. In time, more and more detection, classification, and identification processes can be shifted into the automatic phase 0 tagging done for all data.

[51] The phases in this section are the phases of analysis and exploitation, not the phases of conflict.

This older recommendation still dovetails with recommendations on IC ITE and should also result in a scalable architecture that can integrate emerging sources of intelligence into the larger picture: open-source information, social media, commercial satellite imagery, cyber-derived intelligence, and others. Analysis tools are also key enablers for this paradigm shift.

Transforming the Distributed Common Ground/Surface System Analysis and Reporting Team

The USAF DART has played a changing role in the USAF DCGS. With new tools and technologies, this role might need to change again. There is a growing need to gather, repackage, and customize *existing* single-INT and multi-INT intelligence products for the warfighter, and, as IC ITE enables greater access to data and products, this will only continue.

At present, NASIC is often tasked to perform this kind of multisource analysis. But removing this from NASIC's plate would enable NASIC to focus on higher levels of synthesis that make better use of the organization's subject-matter knowledge. Assigning this role to the DART should be considered as a possible option. In truth, the USAF DCGS already performs this kind of function on a narrower scale by providing context to the warfighter for FMV collection. As RAND researchers have argued in the past, providing this kind of context could be NASIC's greatest contribution to the warfighter, even more important than reporting the FMV collection (Menthe, Cordova, Axelband, et al., 2015).

Embracing the Intelligence Community Information Technology Enterprise

The IC ITE is an ODNI initiative that seeks to host intelligence data from all organizations in a common IC cloud, to provide the Apps Mall for analysts to access the latest tools, and to provide a common desktop environment to enable greater collaboration. Despite the fact that it will never be perfect, we recommend embracing IC ITE fully because we must not let the perfect be the enemy of the good. IC ITE is the *only* enterprise-wide initiative that can bring all partners together to use common system architectures and a widely available set of analysis tools. This is an opportunity the USAF cannot afford to waste.

Intelligence operations in the past 15 years have highlighted the importance of analytic agility but also the difficulties of the current acquisition process in providing it. With OEF, OIF, OOD/Unified Protector in Libya, and current operations against ISIL, intelligence operations have had to quickly adapt to changing "customers," geographic regions, mission sets, and collection platforms. The enduring success story of these operations is of innovative airmen who could innovate, adapt old processes to new problems, and build small tools and programs to overcome new analytic challenges.

The problem with this bottom-up approach, however, is that access to these tools usually remained localized or through peer networks, and the institutional backing was usually lacking to fully develop the innovative capability and integrate it across the enterprise. Even where resources were available to develop these tools further, stove-piped system architectures often

prevented their widespread adoption. Meanwhile, the traditional acquisition processes that had top-down support struggled to produce any systems that could manage the ballooning amounts of data and support analysis, and what they did produce were often proprietary, "black box" systems that proved inflexible, were difficult to reprogram, and required contractor support. As many survey respondents noted, the current acquisition process simply is not fast enough or responsive enough to support dynamic operations by acquiring new tools as needed.

To capitalize on the innovation of its analysts, the USAF ISR enterprise should pursue a combination strategy of adopting common standards and environments in a top-down fashion, while supporting the bottom-up development of the tools that meet these standards and live in these environments—and the best way the USAF can begin to do this is to embrace the IC ITE initiative.

Adopting IC ITE standards has many potential benefits for the USAF. First, adopting universal standards helps eliminate technical barriers to integration between stove-piped organizations within the USAF, with the ANG and USAF Reserve, with other services, and with the broader IC. Second, moving to a common desktop will make it easier for personnel to move seamlessly between intelligence organizations without a lag in productivity or additional training. Third, the Apps Mall will enable USAF analysts access to a broader tool suite that is vetted and shared with the broader IC and will tie them into the larger community of practice to share insights, develop models, and collaborate on emerging challenges, including access to such tools as JEMA and ArcGIS. Fourth, moving data and information to the IC cloud will allow the USAF expanded access to data, as well as greater contributions of intelligence value to overlapping mission areas within the IC. Finally, pooling information technology resources could lead to a cost saving for the USAF.

To derive the most benefit from IC ITE, the USAF should adopt metadata practices compatible with IC ITE standards at *all* levels of classification, not just on the high side.[52] The tools available on the Apps Mall will be that much more powerful if they can also process lower-level data resources exposed to the network, and there is no reason that analysts should have to learn more than one set of metadata standards.[53] The USAF should also develop an internal cadre of experts on tools to help improve the analytic workflow, to quickly prototype new models to

[52] Note that we refer only to adding metadata in anticipation of future needs, not to changing the underlying data structures. USAF ISR analytic products are used for many purposes, including providing Intelligence Mission Data to support mission planning systems, and DoD is currently pursuing the Joint Information Environment to address data-sharing among such systems (and others). For security reasons, Joint Information Environment and IC ITE necessarily address different parts of this process, but the Joint Enterprise Standards Committee has been established by DoD and DNI chief information officers to align information technology standards between them as needed, and current policy calls for the services ultimately to establish data-sharing in accordance with both (see Chief Information Officer, 2013, and Chairman of the Joint Chiefs of Staff, 2013b).

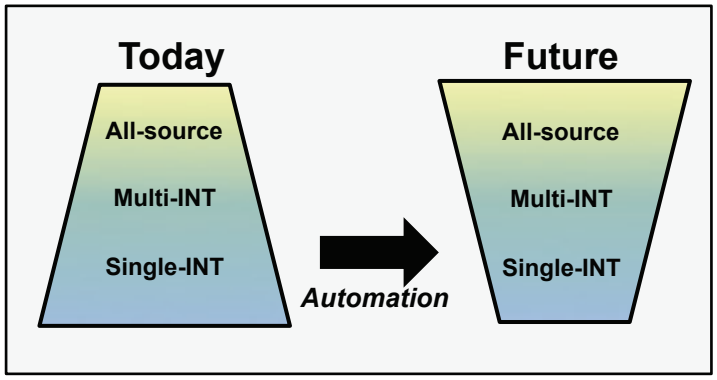
[53] Also, although IC ITE does not currently extend to systems of all security levels, if this initiative succeeds as we believe it can, it or a successor system surely will some day.

meet the needs of dynamic operations, and to network with the larger IC to stay current with the latest advancement in methodology.

Shaping the Human Analytic Effort

The bottleneck in the intelligence cycle is moving from ingesting sensor data to using those data more effectively. Analysis tools will play a key role in doing this, by shifting human effort away from more-mundane tasks toward higher levels of synthesis. Figure 4.6 illustrates the basic principle. With the right portfolio of analysis tools and technologies, the USAF can manage its growing requirements, refocus effort on making the best use of higher cognitive skills, and improve the combined effectiveness of the human–computer team.

Figure 4.6. How Automation Can Shape the Human Analytic Effort



Automation should best be understood as a means of reshaping human analytic effort, not replacing it. The most powerful analytic resource the USAF possesses is its force of trained analysts. The USAF should invest in new technologies not to divest itself of this powerful resource but to maximize its potential by empowering analysts and harnessing their creativity. To do this, we recommend investing in three types of analysis tools:

- First, the USAF must continue to invest in tools to enable single-INT analysis and exploitation, both basic and advanced. Although these might not be the flashiest of tools, they are essential: If raw sensor data are not ingested into the enterprise, the rest of the chain of synthesis does not follow. The USAF should prioritize investment in more broadly applicable, semi-automated tools that enable analysts to do more and in supporting tools that perform basic tagging and storage functions. As indicated above, shifting from an "as collected" to an "on demand" posture also requires these tools.
- Second, tools that support multi-INT analysis—the most important being knowledge management and storage solutions—are foundational to all future tool development in this area. Without a proper foundation, future development efforts for tools that enable or perform multisource analysis and multi-INT fusion are doomed to an isolated, piecemeal existence. The IC ITE model provides the necessary top-down standards to integrate with

the larger IC, enables access to the Apps Mall with latest tools, and better integrates analysts into the larger community of practice.

- Finally, the USAF should adopt the principles of user-driven analytics in the development of these multi-INT tools. Instead of attempting to anticipate all possible multi-INT analysis needs, the USAF should invest in tools that allow analysts to respond to these needs as they grow and change by building new models, processes, and automated workflows. History has shown that one cannot predict the next conflict, but one can be prepared to pivot quickly. When it comes to tools and technologies, empowering USAF analysts should be the heart of the USAF's analytic strategy.

Chapter Five. Training and Career-Field Development

Training and career-field development for USAF service members and involves the coordination of a variety of processes. Many organizations, such as AETC; AFPC; schoolhouses (including the intelligence schoolhouse at Goodfellow AFB); MAJCOMs; USAF/A2; CFMs; and USAF Manpower, Personnel and Services directorate (A1) have major responsibilities for the USAF training program described in Air Force Instruction 36-2201 (Secretary of the Air Force, 2013c). Together, these organizations execute established procedures and processes to align USAF personnel requirements and training.

To address lessons from past operations and prepare for future intelligence analysis–related challenges, we evaluated training and career-field development for USAF intelligence personnel. Our objective was to identify the changes to intelligence training programs, assignment systems, and force-management practices that can help the USAF to improve the capability to provide the all-source intelligence required to conduct full-spectrum, cross-domain operations in volatile, uncertain, complex, and ambiguous environments and to develop new capabilities required to address emerging challenges, particularly in the space and cyber domains.[54]

Information we gathered during interviews and from survey responses suggests that civilian intelligence analysts in the USAF play an important role in providing capability to support a broad range of operations. In particular, civilian analysts often provide depth of analytic expertise in a range of important contexts. They can develop that depth of expertise because of long dwells in their assignments. In contrast, balancing the development of analytic expertise with career progression milestones for military analysts can be more difficult (see lesson 9 in Chapter Two). For this reason, this chapter emphasizes the training and career development needs of military intelligence analysts.

Research Tasks for Evaluation of Training and Career-Field Development

The team performed six research tasks in its evaluation of training and career-field development:

1. We reviewed lessons from past operations that are related to training and career-field development.
2. We reviewed survey responses that had information about which forms of training and experience analysts found most necessary or beneficial for successfully performing their roles.

[54] Senior USAF leaders have expressed concern that the USAF ISR enterprise might not be adequately prepared to meet these challenges. See, for example, USAF, undated (a).

3. We conducted a literature review on current DoD and USAF guidance and policy on training and personnel assignments for select ISR AFSCs.
4. We reviewed past research on USAF intelligence training and career-field development.
5. We interviewed SMEs from the 25 AF, AETC, AFPC, the 17th Training Group, contractors who provide critical-thinking courses, contractors who provide support for exercises, and instructors, staff, and students at Goodfellow.
6. We observed the 1NX course, the Critical Thinking and Structured Analysis Course (CTSAC), the Operation Lone Star graduation exercise, and a Specialty Training Requirements Team (STRT) review.

Training and Career-Field Development in U.S. Air Force Intelligence Specialties

The USAF ISR enterprise is made up of personnel with a wide range of career specialties employed in many different units. Table 5.1 lists USAF personnel who make up the broader ISR enterprise by AFSC, component, and unit. We focused primarily on the intelligence officer career field (14N) and the enlisted operations intelligence career field (1N0) because many military analysts in the USAF belong to these Air Force specialties (AFSs).

Table 5.1. U.S. Air Force Intelligence, Surveillance, and Reconnaissance Personnel, by Air Force Specialty Code, Component, and Unit

ISR AFSC	Total	Active	USAF RC	Unit
10C: operations commander	56	43	13	9 RW, 17/55/432 WG; 70/480 ISRW, 460 Space Wing, NASIC
11B: bomber pilot; 11F: fighter pilot; 11G: generalist pilot; 11K: trainer pilot; 11M: mobility pilot; 11R: reconnaissance, surveillance, and electronic warfare pilot; 11S: special operations pilot; 11U: RPA pilot	328	269	59	
12B: bomber CSO; 12E: experimental test CSO; 12F: fighter CSO; 12G: generalist CSO; 12M: mobility CSO; 12R: reconnaissance, surveillance, and electronic warfare CSO; 12S: special operations CSO (12UX: remotely operated aircraft pilot = 0)	401	373	28	
13B: air battle manager; 13N; 13S: space and missile	135	117	18	
14N: intelligence	7,475	4,925	2,550	AD officers = 2,936; civilians = 1,989; USAF RC officers = 2,222; technicians = 328
16F: regional affairs strategist; 16G: USAF operations staff officer; 16P: political–military affairs strategist; 16R: planning and programming	318	264	54	AD civilians = 109
17D: cyberspace operations; 17S	850	795	55	AD civilians = 463
18A: attack RPA pilot; 18G; 18R	647	647	0	53 WG, 49 WG, 432 WG, 9 RW, 53 Wg, 25 AF
90G: general officer; 91C: commander; 91W: wing commander; 96: unclassified officer; 97: executive officer	78	56	22	
1A1: flight engineer; 1A3: airborne mission system; 1A8: airborne cryptologic linguist	1,632	1,558	74	
1B4: cyberspace defense operations	64	63	1	
1N: intelligence	19,223	12,942	6,281	AD airmen = 12,681; civilians = 261; USAF RC airmen = 5,687; technicians = 594
1U0: career RPA sensor operator	1,748	916[a]	832[b]	53 WG, 49 WG, 432 WG and below
8D: strategic debriefer	102	65	37	
Technical application specialist	512	480	32	
Support to ISR	13,595	11,407	2,188	
Total	47,164	34,004	11,412	

SOURCE: This table is excerpted from a PowerPoint briefing titled “ISR Enterprise Force Structure” that Maj Erik Olsen, HQ USAF ISR Strategy directorate (A2D) provided to RAND via email dated June 1, 2015.
NOTE: RPA = remotely piloted aircraft. CSO = combat systems operator. AD = air defense.

The Intelligence Officer Career Field

The intelligence officer career field (14N) is made up of a wide variety of operational functions and encompasses an incredibly diverse set of missions requiring an equally diverse breadth and depth of experience, training, and education. Appendix B of the Career Field Education and Training Plan (CFETP) for 14N includes some of the key cross-functional roles.[55]

The majority of USAF intelligence officers enter the field with nontechnical degrees in the social sciences, arts, and humanities, although technical degrees, foreign languages, and computer skills are highly desired (Brauner et al., 2009). Typically, intelligence officers must graduate from the USAF Intelligence Officer Initial Skills Course (ISR 100) at Goodfellow AFB, followed by initial qualification training (IQT) and unit mission qualification training (MQT) for at least one ISR functional competency, conducted in accordance with Air Force Instruction 14-202 (Secretary of the Air Force, 2008). IQT qualifies personnel for assignment to a specific mission design series, weapon system, or intelligence function or activity. It is usually accomplished through attendance at an Intelligence Formal Training Unit (IFTU) specific to the relevant functional community. MQT follows IQT and qualifies personnel to perform specific unit missions in assigned positions.

Thereafter, intelligence officers must complete the distance-learning ISR Intermediate Skills Course (ISR 200) and complete a minimum of 12 months performing intelligence functions. For higher skill-level qualifications, officers must complete an Advanced Skills Training (AST) course, an IQT/MQT program in a second ISR functional competency, and the ISR Master Skills Course (ISR 300), a combined distance and resident course. There is also an Intelligence Senior Skills Course (ISR 400) for officers between the 11- and 16-year points in their careers, preparing for O-5- or O-6-level duties.

AST provides advanced proficiency and expertise in ISR functional competencies, mission areas, and weapon systems. Manning requirements drive it. Positions are coded with AST requirements, which are submitted to AFPC. The Weapons Instructor Course at the USAF Weapons School is an example of AST. It is a highly competitive training program. Intelligence officers might also receive various forms of supplemental training, e.g., regional orientation courses; survival, evasion, resistance, and escape; and antiterrorism courses.

The Enlisted Operations Intelligence Career Field

The AFSC 1N0 is applied to enlisted airmen who analyze multiple sources of information to develop, evaluate, and disseminate intelligence on potential threats to U.S. and allied forces.[56] Like intelligence officers, people in this AFSC operate in a diverse and complex operational

[55] The primary source for information in this section is USAF, 2013a.

[56] The official name of this USAF specialty is IN0X1, where the X refers to the skill level and career progression, as in apprentice (X = 3), journeyman (X = 5), and craftsman (X = 7). We use 1N0 for simplicity and given that all SMEs we interviewed used this abbreviated form.

environment, supporting all aspects of USAF operations to ensure U.S. dominance in air, space, and cyberspace. Also like intelligence officers, they support joint force, DoD, and national intelligence agency operations (Department of the Air Force, 2013).[57]

USAF recruits who are assigned to AFSC 1N0 must have high school credentials. Courses in public speaking, journalism, geography, modern world history, statistics, algebra, geometry, and trigonometry are seen as desirable for entry into the career field.

For award of the 3 skill level, an airman must complete the 110-day-long, resident Intelligence Fundamentals Course (X3ABR1N031 0A4C) taught at Goodfellow AFB. The Operations Intelligence Apprentice Course is also mandatory. Airmen must complete various forms of continuing training throughout their careers, including either in-resident or exportable advanced training courses and on-the-job training. To qualify as a journeyman, an airman must complete the 1NX51 and 1N051 5-level Career Development Courses and 12 months of upgrade training (UGT).[58] To qualify as a craftsman, an airman must complete 12 months of UGT, the 1N0X1 Career Development Course, and various core and duty position tasks.

The assignment system for enlisted operations intelligence airmen is more automated than that for intelligence officers and is largely dictated by the needs of the USAF. Upon assignment to a functional community, operations intelligence airmen typically complete the same, or similar, IQT and MQT courses that intelligence officers do. For example, operations intelligence airmen and USAF officers assigned to a fighter squadron will both first attend the IFTU for the relevant fighter aircraft.

The Civilian Analysts

Government civilian positions, including those of civilians working for the USAF, are classified and coded according to the U.S. Office of Personnel Management's (OPM's) *Handbook of Occupational Groups and Families* (OPM, 2009). OPM groups related occupational specialties in "series." USAF civilians engaged in intelligence analysis belong to several of those series. We briefly describe below the education and experience standards that OPM uses to qualify people to be eligible to be hired in a specific occupation and pay grade (General Schedule [GS] level). However, it is up to the hiring authority—in this case, the USAF—to select people to hire from a list of qualified candidates. Thus, the USAF can look for and hire from the list those people who have specific experiences or training that are most relevant for the position. The USAF can offer its civilian analysts additional training that it deems relevant. In this subsection, we touch on the occupational series that are most relevant to USAF intelligence-analysis work.

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[57] The main source for the section on the 1N0 career field was this CFETP.

[58] UGT is designed to increase knowledge and skills via career development courses, formal courses, and task performance. Successful completion leads to the award of a higher skill level.

The 132 series pertains to work in the collection, analysis, evaluation, interpretation, and dissemination of political, economic, social, cultural, physical, geographic, scientific, or military information that has or could have an impact on national security. These positions require a background in social, political, physical, or military sciences and potential for learning the methods and techniques that characterize working for the IC. Foreign-language knowledge is desirable and, for some positions, essential. Analysts at the GS-5 and GS-7 levels must possess the ability to relate their field of expertise to intelligence needs. Knowledge of the basic workings and needs of the IC is also a requirement for them. Analysts at the GS-9 level must be able to work with other intelligence organizations in securing and validating information, in checking judgments and conclusions, and in resolving mutual and individual intelligence problems. The GS-11 level demands a thorough knowledge of one's field of expertise and a working knowledge of conference, briefing, and interpretive techniques. The GS-12 level further requires the ability to apply facts derived from many sources to intelligence problems. This level also requires a broad understanding of politics, the military, economic affairs, and history and needs to be able to apply that understanding to forecasting future situations. The GS-13 level further demands a comprehensive knowledge of the intelligence program of the analyst's organization and how it fits within the national intelligence framework; a broad knowledge of the relationships among geographical, political, military, economic, and industrial forces in various regions of the world; and the ability to present and argue for a position effectively, Finally, by the GS-14 level, the analyst must be able to grasp conceptual ideas and exercise original thought even in situations in which there is little time for deliberation and consultation. The GS-14 analyst must assess the importance of international situations and problems and present well-considered and sound suggestions. He or she must be also able to draw working hypotheses and test them empirically (OPM, 1960).

The 800 series covers positions in engineering or architectural projects, facilities, structures, systems, processes, equipment, devices, material, or methods. Positions in this series require knowledge of the science or art, or both, by which materials, natural resources, and powers are made useful. Numerous disciplines within the 800 engineering and architecture series play an important role in USAF intelligence analysis, including the following: 0806 (materials engineering), 0810 (civil engineering), 0830 (mechanical engineering), 0840 (nuclear engineering), 0850 (electrical engineering), 0854 (computer engineering), 0855 and 0856 (electronics engineering), 0858 (bioengineering and biomedical engineering), 0861 (aerospace engineering), 0893 (chemical engineering), and 0895 and 0896 (industrial engineering) (OPM, 2008).

Other civilian occupational series that are important for USAF analysis are the following:

- 0100, social sciences series, including 0110 (economics), 0170 (history), 0180 (psychology), and 0184 (sociology)
- 1300, physical sciences series, including 1310 (physics), 1313 (geophysics), 1320 (chemistry), 1330 (astronomy and space science), and 1350 (geology)

- 1500, mathematical sciences series
- 1515, operations research series
- 1540, cryptography series.

Conclusions from Our Evaluation

Adequate Procedures Are in Place to Define Curriculum and Align Training and Personnel Requirements

This section describes these procedures and how we evaluated them.

Air Force Manual 36-2234 describes four ways in which training needs can be identified (USAF, 1993). First, a group of experts in a democratic process, called the "democratic view," might identify a training need. Second, needs can be identified as the difference between the current state and desired future state, called the "discrepancy view." Third, they can be a result of predicting future instructional needs, called the "analytic view." Or fourth, they can result from the "diagnostic view" in which the absence of some training would hamper the students in meeting job performance. Normally, identifying training needs begins with an occupational evaluation, which identifies the duties and tasks associated with each job. Next, an education evaluation reviews education requirements and goals. As an alternative, there might be a mission evaluation, which arranges tasks needed to meet mission requirements. The RAND research team reviewed the occupational evaluation for 1N0 and 1N1 AFSs.

STRTs regularly conduct formal reviews of training and training requirements. Each STRT sets the training standards for a particular AFS. RAND analysts observed an STRT review for the 1N0 AFS.[59] The CFM, representing HQ USAF/A2, and the training pipeline manager, representing AETC, cochaired the STRT. Each MAJCOM interested in that AFS sent at least one representative (typically the functional area manager). Often, MAJCOMs send several SMEs. Other participants were the Goodfellow course training manager, the Goodfellow training and evaluation team, the AETC Occupational Measurement Squadron, and Goodfellow instructors. During the two days when this team met, participants went through each training requirement of the 1N0 AFS, line by line, and decided whether, based on the latest MAJCOMs' needs, that line item needed to be consolidated with others, deleted because it had become redundant, or assigned a higher grade. They also decided on new line-item training requirements. The final document resulting from the STRT review was the Specialty Training Standard spreadsheet, which contains all the "line item training standards" and a grade associated with each. The 1N0 STRT tries to meet every year, but that varies depending on budget constraints.[60]

There are different STRTs depending on the AFS, and not all MAJCOMs are interested in all intelligence AFSs. The STRT is the first step in the AETC "sausage factory" that generates the

[59] Visit by RAND personnel to observe the STRT for the 1N0 AFS, Goodfellow AFB, April 15–16, 2015.

[60] For security reasons, participation in STRTs is restricted.

curriculum at Goodfellow, including creating, updating, and refining courses. About 60 days after the STRT, the Utilization and Training Workshop is convened to decide on instructor authorizations; equipment and facilities to support new or revised training; which organizations will provide the funding; commitments; delivery dates; and related matters.

A Training Planning Team (TPT) fulfills the same functions as an STRT but for supplemental and advanced training. TPTs for cryptologic courses include non-USAF personnel, such as members of the national SIGINT community. Other TPTs are chaired by representatives of particular MAJCOMs, e.g., personnel from HQ USAF/A1 chair the TPT for CTSAC.

Goodfellow sends field evaluation questionnaires (FEQs) to numerous organizations employing USAF intelligence personnel about six months after graduation. FEQs are used to gather feedback from the supervisors of Goodfellow graduates. FEQ responses are used to evaluate course effectiveness and are part of the process to modify instruction (e.g., they are used as inputs during the STRT reviews).

We interviewed the members of intelligence personnel assignment teams and learned about their main criteria to allocate personnel. Their top criterion is fulfilling the personnel requirements of the MAJCOMs. Lower-priority criteria include consideration of the individuals' preferences and of the needs of the joint and intelligence communities. Recently, HQ USAF/A2 requested that 14N assignments in the areas of cyber, space, and special operations be given priority. The way the assignment team has interpreted this guidance is to prioritize assignments to cyber, space, or special operations positions if the candidate expresses such preference.[61]

Some Analysts Might Not Have Enough Opportunities to Develop Advanced Critical-Thinking and Analysis Skills Applied to Basic U.S. Air Force Functions

As discussed in Chapter Two, processes used in analytic activities can be employed across different missions, operations, and levels of war. These processes include creative thinking, critical thinking, hypothesis testing, and bias mitigation. Some SMEs also suggested that they include the fundamentals of network analysis.

The above finding prompted the research team to investigate the depth to which processes, such as critical thinking, are taught in courses and the extent to which intelligence analysts have opportunities to apply what they learned in career assignments.

When asked what form of training or experience was most necessary or beneficial for successfully performing their current jobs, survey respondents most frequently identified critical-thinking training. At Goodfellow, USAF intelligence personnel are exposed to critical thinking and analysis, as applied to basic USAF functions, such as properly assessing enemy IADS and accurately establishing enemy OB. For example, operations intelligence (1N0) airmen encounter critical-thinking training during their technical training course, block III instruction, the apex

[61] Visit of RAND personnel to Joint Base Anacostia–Bolling and interviews of CFMs and HQ USAF/A2 personnel, August 3, 2015.

training exercise, and the Lone Star graduation exercise. The RAND team interviewed instructors and students at Goodfellow; the team also observed the entry-level 1NX course and the Lone Star exercise.[62] Apex[63] and Lone Star are constructed such that students can apply their knowledge on basic USAF functions and sharpen their critical-thinking and analysis skills as applied to these functions.[64] Students do so in a realistic scenario with a realistic potential adversary. The team noticed a learning progression from introductory critical thinking and analysis during the 1NX entry-level course to Lone Star, in which students have to defend their proposed enemy COAs by responding to numerous "why" questions and by showing knowledge of the enemy's doctrine; tactics, techniques, and procedures; and military capabilities.

A small number of early- to mid-career analysts (including enlisted 1Ns, 14Ns, and civilians) are selected by their units to participate in more-advanced critical-thinking and analysis courses, such as the CTSAC taught at Goodfellow, or in courses that private contractors provide at requesting units. At the end of the CTSAC, students participate in the Trident graduation exercise in which they are required to apply their critical-thinking and analysis skills to basic USAF functions during a scenario with a near-peer adversary.

In some job assignments—for example, in assignments at NASIC—analysts receive additional training on critical thinking and analysis, with a greater focus on strategic and long-term problems. However, during the past decade of focus on IW, some analysts in other assignments[65] have had fewer opportunities to further develop their critical-thinking and analysis skills as applied to basic USAF functions. As a result, these skills might have atrophied in some organizations.

The U.S. Air Force Has Taken Initial Steps to Improve Basic Knowledge of Space and Cyber Domains, but Additional Work Is Required

As described in Chapter Three, analysts might need more expertise with intelligence from and for the space and cyberspace domains in the future because operations in those domains might be more prominent. Developing appropriate training programs quickly will be critical to enable the USAF to develop intelligence professionals equipped to address challenges in those domains and to improve integration between the IC and the space and cyber communities.

Long after intelligence formal training programs became standard in the flying community, the IC failed to build a space formal training program. As a result, intelligence professionals assigned to space units had less training and expertise than those in fighter and bomber units, and

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[62] Visits by RAND personnel to Goodfellow AFB, January 30 and April 14–16, 2015.

[63] The team did not observe apex or block III instruction but interviewed instructors about their content and received a package of block III instruction materials. We were told that apex and Lone Star address different scenarios (different potential enemies).

[64] Basic USAF functions include analysis activities related to IADS, OB, missile defense, air targeting, and others.

[65] For example, certain parts of the USAF DCGS.

the credibility of intelligence personnel within the space community suffered as a result. Although Air Force Space Command (AFSPC) operated several platforms with ISR capabilities, it devoted insufficient attention to developing the procedures to process, exploit, and disseminate that information to the IC or to warfighters. Intelligence professionals had little incentive to develop expertise in the space mission set. As a result, there was little partnership between space and intelligence operators (Flood, 2007).

Efforts have been taken to improve integration, with the establishment in 2007 of a program to train ISR personnel and provide them with space expertise. ISR personnel were encouraged to earn a basic Space Badge by completing a Space IFTU or the Space 100 course, and serving one year in a space intelligence position. They could later earn the senior Space Badge by completing Space 200 and 60 months of experience in space positions, and then the command Space Badge by completing Space 300 and 84 months in space positions. These stringent requirements led to the formation of a small, elite group of highly qualified space intelligence professionals.

The USAF has since issued new guidance on the Space Badge (AFSPC, 2013) and renamed it the Space Operations Badge, making it more focused on personnel with core 13S and 1C6 AFSCs, although nonoperators can still be awarded the badge if they meet stringent requirements. Those requirements include seven years in operation-focused duties and AFSPC vice commander approval for the senior badge and 15 years and approval for the command badge.

The development of an analogous Cyberspace Badge in 2010 is similarly allowing those rare few intelligence officers who meet all the requirements to become part of a highly qualified elite.

Further integration between intelligence operators and space or cyber operators will be necessary to increase U.S. information superiority, but it will require the expansion of space and cyber training and certification beyond this elite set of officers and enlisted personnel. Although the 35-day, in-residence Space 100 course (the USAF's keystone technical training course for space and missile operators and acquirers) and more-advanced follow-on courses are open to officer, enlisted, and civilian personnel, the duration and requirements often prevent intelligence personnel from participating. Similarly, equivalent cyber courses have stringent requirements.

The enlisted network intelligence analyst AFS, 1N4, was split in two in May 2012—the 1N4A fusion analyst, digital network analyst specialty and 1N4B fusion analyst, analysis, and production specialty (Gildea, 2012). Starting in 2014, everyone in the 1N4A specialty is required to attend 120 days of cyber course instruction at Corry Station Naval Technical Training Center in Florida. Such instruction includes the Joint Cyber Analysis Course, a rigorous cyber training course.[66]

The USAF has also developed a range of cyber training programs for cyber operators and other personnel. For example, Undergraduate Cyber Training, conducted by the 81 Training

[66] Visit of RAND personnel to Joint Base Anacostia–Bolling for interviews of CFMs and HQ USAF/A2 personnel, August 3, 2015.

Group at Keesler AFB, provides electronics training to more than 38,000 USAF members and civilians each year. The Network Warfare Bridge Course is designed to give students from specialty areas outside cyber foundational cyber skills. Intermediate Network Warfare Training is the USAF's Cyber IQT course, which prepares airmen to serve in various cyber-related functions throughout the service. In addition, the USAF has developed several advanced Cyber MQT courses, which are tailored to the network warfare units to which cyber operators or analysts will be assigned. Finally, the USAF Institute of Technology's Cyber 200 and Cyber 300 courses are professional development courses for cyberspace professionals who are preparing for leadership responsibilities.

The USAF is currently assessing how to better employ 1N0 operations intelligence personnel in the cyber-ISR and space-ISR domains. Personnel within this enlisted AFS, as well as officers within the intelligence career field (14Ns), do not need as much in-depth training on space and cyber as the specialists—namely, 13Cs and 1C6s (for space, officers and enlisted, respectively) and 17Ds, 17S, 1B4s, and 1N4As (for cyber, officers and enlisted, respectively). A frequent SME complaint about many of the existing courses was that they were predominantly designed for these specialists, not for ISR personnel or analysts. Many have restrictive participation requirements and lengthy waitlists. Others cover material that is not relevant for intelligence analysts. Developing greater, more-targeted space and cyber expertise among the USAF ISR personnel will require the development of space and cyber courses with curricula that are tailored toward and accessible to intelligence personnel. A method of course delivery that is particularly attractive due to its lower costs is the use of mobile training teams (MTTs). Expanding the number of space and cyber courses delivered by MTTs could support the delivery of more-accessible, flexible, tailored training to requesting units, training that can be provided far more widely, when and where it is needed.

Training- and Career Field–Related Recommendations

Several training- and career field–related recommendations for ways in which the USAF could address the key lessons from the past, or prepare for future challenges, emerged from our research.

Create a Training and Career Force Development Program for Analysts Spanning Multiple Air Force Specialties

During the 2000s, the USAF conducted a major push to identify space professionals; develop, mentor, credential, and educate them; and align their job assignments with their training, experience, and certification. AFSPC led the ambitious program, the Space Professional Development Program (Schmalz, 2006). Today, there is a need for a similar USAF-wide analyst professional development program to ensure that analysts receive the appropriate analytical

training and development. ACC's Analysis Capability Working Group in close coordination with HQ USAF/A2 could be the focal point to launch this effort.

The USAF must begin by identifying which tasks and experiences constitute analysis. The detailed tasks described in occupational analyses and in the CFETPs could be used as a starting point for discussion and evaluation of existing tasks. SMEs should also determine what kinds of analytical skills will be needed in the future. The USAF should then identify the personnel who contribute to USAF intelligence analysis, define their analytic roles more formally, and track these personnel. Options for tracking these personnel include using Special Experience Identifiers (SEIs),[67] Airmen Capability Management, or Individual Capability Management codes.

The program should include formal training on critical thinking and structured analysis methodologies applied to basic USAF functions that is accessible to the wider USAF ISR workforce. The 2014 DCS for ISR white paper on intelligence analysis acknowledges that, although the USAF has had some success in developing analysis courses for airmen going into analysis-dominant positions, it has been less successful in providing analysis training across the whole USAF ISR workforce (DCS for ISR, 2014). Because analysis and critical thinking enhance collection, targeting, and operation support, the expansion of analysis training beyond the select few airmen in analysis-dominant assignments has become a critical need. To meet this need quickly and cost-effectively, the USAF should invest in creating critical-thinking and analysis courses that MTTs deliver to personnel in locations around the world, as well as more online courses and self-paced certifications. These could complement formal schoolhouse analysis courses and be used as refreshers. More details on these courses are provided when discussing our next recommendation.

In addition to expanding analytical training, the Intelligence Analyst Professional Development Program should include two other key components: (1) a more formalized mentorship program that incentivizes more-experienced analysts to mentor less experienced personnel and (2) modifications to the assignment system that better align assignments with analysis training, education, experience, and certifications.

NASIC has started a prototype program for select 14N officers who have been assigned to NASIC for three years. The program involves coursework—namely, the six-week NASIC Analyst Training, as well as job rotations and mentorship by experienced NASIC analysts. Personnel who successfully complete the program are expected to be later assigned to jobs that require advanced analytical skills. The NASIC program involves analytical career paths tailored to individual analysts and structured to follow assignments to three selected NASIC squadrons (one per year of the program). As notional examples of these analytical paths, path A (air analysis specialization) would involve aircraft analysis followed by IADS and command,

[67] The SEIs are used to identify and track special experience and training not otherwise identified within the Military Personnel Data System, the USAF's primary database for personnel actions.

control, communications, computers, and intelligence; path B (space analysis specialization) would require assignments to NASIC's Space, Counter Space, and Future Threat Analysis squadrons; and path C (force analysis specialization) would result in work experience and expertise on ballistic missiles, IADS, and force tactics, techniques, and procedures (NASIC, 2014b). The program also intends to provide each student an area of expertise, such as China, North Korea, Russia, or Iran (NASIC, 2014a). This program is small—it aims at preparing two to three select officers per year—but could be used as a model for an expanded, USAF-wide program.

There are several requirements for program success. A process must be in place to identify the best candidates to join the program. The analysis areas of specialization must be well defined. There must be effective interaction with the USAF personnel assignment system so that assignments after program completion can maximize expertise acquired during the program. If these requirements are met, this program has great potential to develop analytic leaders and the USAF intelligence analysts needed today and in the future.

Develop Requirements for New Mobile Training Team Courses on Cyber and Space Intelligence, Surveillance, and Reconnaissance and an Analysis Refresher, and Modify Existing Critical-Thinking Courses

All USAF ISR personnel are exposed to basic USAF functions, but some never review them again in their careers (e.g., personnel assigned to some parts of DCGS). During the past decade of IW conducted in relatively permissive environments, many personnel have received little exposure to these basic USAF functions as applied to operations in an anti-access and area-denial environment in their jobs. Reestablishing USAF prominence in the skill sets needed to meet intelligence requirements across the range of military operations will require increased training and reestablished expertise in these areas.

We also noted that a good portion of the USAF ISR enterprise might not have had opportunities to receive advanced critical-thinking and structured analysis training. These are among the key components of analytical training. The USAF should modify existing critical-thinking and analysis courses to focus application of these skills to basic USAF functions and should make these courses more widely available, e.g., by using MTTs to make them more accessible. The MTT-delivered critical-thinking and analysis classroom instruction should be complemented by prior online, personal study on basic USAF functions including (red) countries of interest and on blue systems. The course graduation exercise should be a realistic scenario at the proper security level. The USAF should consider three graduation exercises initially, each one adapted to specific AOR: Europe (for U.S. Air Forces in Europe), Middle East (for U.S. Air Forces Central) and Pacific AOR (for Pacific Air Forces).

We recommend that the USAF employ MTTs to deliver this training. MTTs are currently used to provide core skill training, supplemental training, instructor training, and just-in-time training, with many benefits. Sending few instructors to multiple sites where they are needed is

more cost-effective than sending many students to a schoolhouse. MTT courses can also be relatively short (two weeks or less) and provided conveniently at MAJCOM locations or at AOCs.

They can be used to provide not only individual training but also unit training and can therefore provide entire units with knowledge of key concepts and processes or with specialized knowledge required in a particular context or theater, exactly when they need it. Because MTT courses are relatively short and flexible, the USAF might have greater ability to recruit the most qualified and experienced instructors from a range of sources (from within the active-duty USAF, the RC, national elements of the IC, the government's civilian workforce, or private-sector contractors).

The USAF should also consider expanding the use of MTTs to address training gaps it has already identified—such as more courses on space and cyber tailored to intelligence personnel. Lengthy in-residence courses that are currently only offered to a select few but that are widely viewed as necessary or beneficial for a range of jobs could be adapted for MTT delivery. MTTs could repackage and deliver material used in the Cyber 100 and Space 100 courses, as well as elements of the IFTU, to make those courses more accessible across the USAF ISR enterprise. 14Ns and 1N0s in cyber or space assignments, respectively (e.g., personnel assigned to 624 OC or JSPOC) should receive this training. A modified version of Goodfellow's CTSAC, which survey respondents described as highly valuable, could also be provided via MTT to analysts in the field.

Institutionalize Mentorship and Exchange of Knowledge Between Analysts

The USAF has established voluntary mentorship programs and issued guidance on how to develop effective mentorship programs for airmen at various stages in their careers. Air Force Manual 36-2643, *Air Force Mentoring Program*, notes that mentoring is an essential ingredient in developing well-rounded, professional, competent future leaders; enhancing professionalism; enhancing morale; preparing personnel for increased responsibilities; promoting professional development at every echelon and activity; and improving organizational effectiveness by fostering relationships and communication (Secretary of the Air Force, 2013b).

Furthermore, knowledge and expertise on basic USAF functions, including AD systems, missile defense, enemy air power, OB, and blue weapons, as well as their application to denied environments resides inside the USAF but are widely distributed among many USAF organizations, wings, and squadrons located both in the continental United States and in other countries. Unfortunately, knowledge transfer from some of the best senior SMEs to junior analysts who need it could be hindered by the lack of colocation and the lack of an established USAF initiative to incentivize such transfer.

We propose that senior intelligence analysts become the mentors of junior intelligence analysts in a mentorship program. Ideally, there would be one mentor per mentee working together on a similar problem. However, mentorship can occur between one mentor and many

mentees, or a mentee can have many mentors. In areas in which there are few experts and a need for knowledge transfer to meet increasing demands, the USAF might consider a one mentor–to–many mentees arrangement. In areas in which a mentee is pursuing an interdisciplinary course of research, the mentee might benefit from mentors with a variety of expertise. Interaction can be infrequent (as needed) or occur on a regular basis. The mentees can be colocated or reside in different locations. To facilitate mentorship across geographic sites, the USAF should consider use of a USAF-wide portal to which mentors and mentees can subscribe in order to facilitate virtual mentor–mentee interaction. The portal could be modeled after Facebook or LinkedIn social networks. The social network could facilitate virtual collaboration, archive information, and host a directory of mentors and their areas of expertise.

HQ USAF/A2, interacting with the MAJCOMs, will need to identify the potential mentors and mentees. Interacting with AETC can work to generate incentives for mentors' and mentees' participation and develop mechanisms for mentor–mentee matching and on-the-job training. Mentors might include experts having experience performing basic airman functions prior to 9/11. They could also include the USAF's top analysts in AOR-specific red and blue capabilities or functional areas.

Increase Priority of Some Assignments Within Joint and National Elements of the Intelligence Community

Just as the Space Professional Development Program sought to improve the alignment of space-related training, experience, certifications, and assignments, so too should an intelligence-analyst professional development program include modifications to the assignments of analysts to support their professional development, incentivize the development of analytical skills, and ensure that analysts with the correct skills are sent to the right jobs in the right places at the right times. The USAF should consider increasing the priority of assignments to locations currently conducting more major combat operation–like activities (such as South Korea) and to anti-access and area-denial environments.

Survey respondents and SMEs alike stressed the value of assignments within other elements of the IC (i.e., at the NSA, the Defense Intelligence Agency, JIOCs, and JACs). These assignments should also be prioritized because they promote the development of advanced analytical skills and support improved cross-service and cross-agency integration.

The assignment process has to balance many (sometimes, competing) objectives. We recognize the challenges involved and recommend that due consideration for the trade-offs between prioritizing different assignments and the sensitivity to the effects on promotions and career development be given to any of these suggested changes.

Chapter Six. Findings and Recommendations

Summary of Findings

As described in Chapter Two, we gleaned nine lessons from past operations. They include four lessons on building analytic foundations, three lessons about partnerships, and two lessons about development and employment of skills. Table 6.1 summarizes the lessons.

Table 6.1. There Are Nine Lessons from Past Operations

Category	Lesson
Lessons on building analytic foundations	1. Many processes, such as critical thinking, can be employed across different missions and levels of intelligence.
	2. Knowledge required to provide context is lacking or limited to support USAF missions other than IW.
	3. Success in operations depends on analyses conducted across multiple timelines, organizations, and levels of war. They build on one another and require integration.
	4. Roles and responsibilities for analysis activities to support phase 2/3 operations in air, space, and cyberspace are not well defined or practiced.
Lessons about partnerships	5. Joint, national, and partner analytic capabilities and capacities are not sufficiently leveraged.
	6. ANG and USAF Reserve contributions have been important but could be better utilized and are hindered by integration challenges.
	7. Integration of GPF and SOF capabilities has resulted in more successes for both forces.
Lessons about development and employment of skills	8. The United States has repeatedly faced unplanned security challenges.
	9. It has been difficult to balance development of analytic expertise with career progression milestones.

NOTE: The numbering does not imply priority.

USAF intelligence analysts are likely to face three new challenges in the future:

- The pace of future conflicts could stress needs for foundational intelligence and challenge readiness to conduct analysis during phase 2/3 operations.
- Analysts might need more expertise with intelligence from and for the space and cyberspace domains because operations in those domains might be more prominent.
- The volume of data and limitations on collection that anti-access and area-denial developments will challenge analysts.

We describe the first two in Chapter Three and the third in Chapter Four.

Steps the U.S. Air Force Is Already Taking That Help Address the Lessons of the Past and to Prepare for the Future

As described in Chapter Two, processes, such as critical thinking, can be employed across different missions and levels of intelligence (see lesson 1). This makes it useful to provide training in critical thinking to all USAF intelligence analysts. And as described in Chapter Five, the USAF is already taking a step in this direction by offering the CTSAC critical-thinking course at Goodfellow. This should help to address this important lesson from the past.

Also, another lesson from past operations is that balancing development of analytic expertise with career progression milestones is difficult (see lesson 9 in Chapter Two). However, during the course of our research, we learned that the DCS for ISR recently issued guidance that ISR personnel in assignments related to SOF, cyber, and space should "retouch" those areas in subsequent assignments in order to develop analytic depth of expertise. This is another example of a step the USAF is already taking to help address a lesson from past operations.

In Chapter Five, we discussed some of the steps the USAF is already taking to provide training in the areas of space and cyber, which will help intelligence analysts meet the associated future challenge.

In the next section, we recommend additional steps the USAF can take to address lessons of the past and prepare for the future.

Recommendations

We carefully considered each lesson from the past and challenge for the future and worked to develop recommendations for addressing them. For inspiration, we drew on the observations we collected from the survey, from semistructured discussions with SMEs, and from our literature review. In many cases, the observations provided clear avenues for recommendations; in other cases, we reengaged with USAF organizations for help in developing and fine-tuning recommendations.

The result was eight recommendations, involving changes to doctrine, training, materiel, leadership, or personnel. They fall into the categories of defining the roles and responsibilities for analyst airmen, training and developing those analysts, equipping them with tools, and investing in the readiness of the analyst force. We describe the recommendations in the context of these categories.

Define the Roles and Responsibilities of Analyst Airmen

Form a Committee to Federate the Roles and Responsibilities for Analysts Across the U.S. Air Force Intelligence, Surveillance, and Reconnaissance Enterprise

The committee would have representation from across the enterprise and would be formed to advise and assist the DCS for ISR to assess, prioritize, and execute the full array of intelligence-

analysis requirements. The committee would provide oversight and strategic guidance and facilitate addressing current and future analytical gaps in intelligence planning and programmatic initiatives, as well as overseeing USAF-unique intelligence-analysis and production requirements. This would improve the integration of analysis activities that are conducted across multiple timelines, organizations, and levels of war by federating the responsibilities for those activities. This has contributed to success in past operations, which is one of the lessons on building analytic foundations (see lesson 3, Chapter Two).

To implement this recommendation, the DCS for ISR should designate a committee chair and form an executive committee with O-5-level representatives from other parts of the USAF ISR enterprise (e.g., 25 AF HQ, NASIC, the ISR wings, representatives from the ISR division of each AOC, unit-level support). Also, ANG and USAF Reserve components should be part of the executive committee, which could help to improve the utilization of ANG and USAF Reserve, which is related to a lesson about partnerships (see lesson 6, Chapter Two). An associate-level committee could be formed with important customers of USAF intelligence analysis, if desired. We recommend that the program of analysis (POA) or a similar document linked to the POA be used to document the roles and responsibilities. We suggest updating the document annually.

Update Doctrine to Better Reflect Analysis Needs for Operations in Addition to Irregular Warfare

Several SMEs we interviewed noted that OPLANs are developed with the assumption that the intelligence-analysis capabilities and capacities needed to support them will be in place. We recommend that the USAF develop and document detailed assessments of the analysis needs to support OPLANs. These assessments can provide useful input for development of the Global Integrated ISR Core Function Support Plan (CFSP). The FY 2018 Global Integrated ISR CFSP provides useful narratives for intelligence analysis, but a formal process to develop assessments will help in future updates. Furthermore, the assessments could help to communicate the importance of intelligence-analysis capability and capacity to other key USAF core functions, including air superiority. The FY 2017 air superiority CFSP makes no linkage between intelligence-analysis capability and risk, and nearly all references to intelligence in that CFSP are with regard to platforms.

The tactical employment doctrine for USAF DCGS (USAF, 2011b) is primarily focused on the role of DCGS in IW. For instance, §4.3.12 describes DCGS support to strike operations. But as mentioned in that section, it is "focused on [US]CENTCOM AOR." We suggest revising this document to describe the role of DCGS to operations in addition to IW. Also, the document is not clear about the role of the DCGS DART in supporting operations other than "ISR Operations." For instance, §5.3.12.2.7 indicates that the DCGS is "not authorized to perform BDA." Future conflicts might require significant capability and capacity for BDA in support of combat air operations. We recommend that the USAF decide whether the DCGS DART should have an analytical role in supporting a broader range of operations and update this document to reflect those roles.

We recommend updating doctrine for the AOC (USAF, 2012b) in order to describe the coordination of intelligence-analysis activities of the ISR division and senior intelligence duty officer with those of other parts of the USAF ISR enterprise, including the DCGS, MAJCOM/A2, and unit-level intelligence support. This could help to define the roles and responsibilities for analysis activities to support phase 2/3 operations in air, space, and cyberspace. A lesson from past operations is that these roles and responsibilities are not well defined or practiced (see lesson 3, Chapter Two). They should also help to prepare analysts for the pace of future operations (see challenge 1, Chapter Three).

Train and Develop Analyst Airmen

Create an Intelligence-Analyst Professional Development Program Spanning Multiple Air Force Specialties

As discussed in Chapter Five, the USAF will first have to determine which tasks and experiences constitute intelligence analysis. We recommend using an SEI, Airmen Capability Management, or Individual Capability Management to track intelligence analysts. The sponsor should coordinate with AETC, CFMs, and assignment teams to oversee training and assignments for intelligence analysts in the both the Active and Reserve Components. This will provide the oversight needed to balance development of analytic expertise with career progression milestones (see lesson 9, Chapter Two). It can also aid in ensuring that intelligence analysts with assignments related to SOF, space, and cyber have opportunities to retouch those areas and build analytic depth in those areas. As a result, it helps to ensure that the USAF can integrate intelligence-analysis capabilities of SOF and GPF (see lesson 6, Chapter Two), aids in providing analysts with more experience in space- and cyber-related assignments (see challenge 2, Chapter Three), and in general helps to build the context needed to support a broad range of missions (see lesson 2, Chapter Two).

Develop Requirements for New Mobile Training Team Courses on Cyber and Space Intelligence, Surveillance, and Reconnaissance and an Analysis Refresher, and Modify the Existing Critical-Thinking Course

The MTTs for cyber and space should be tailored for intelligence professionals and include elements of the IFTU and 100-level courses. They would be offered to 14N and 1N0 personnel in cyber or space assignments, respectively (e.g., assignments at 624 OC or JSPOC, respectively). This will help provide USAF intelligence analysts with more expertise in space and cyber (see future challenge 2 in Chapter Three).

The refresher should cover intelligence-analysis support to basic USAF functions that are not regularly practiced when supporting IW. The critical-thinking course should be modified to have a graduation exercise tailored to an AOR or functional area. These steps will help provide USAF intelligence analysts with the context they need to support a broader range of missions (see

lesson 2, Chapter Two) and provide analysts with common processes that are broadly applicable (see lesson 1, Chapter Two).

HQ USAF/A2 can set these as training priorities and then work with AETC and other MAJCOMs to develop the requirements.

Institutionalize Mentorship and Exchange of Knowledge Between Analysts

HQ USAF/A2 should coordinate with AETC and other MAJCOMs to identify participants and incentives for a mentorship program. Social networking could be used to provide a directory, facilitate virtual collaboration, and archive information. This will help provide USAF intelligence analysts to build the context they need to support a broader range of missions (see lesson 2, Chapter Two). Having a mentor directory could enable the USAF to quickly find niche analytic capability in response to unplanned security challenges (see lesson 8, Chapter Two).

Increase Priority of Some Assignments Within Joint and National Elements of the Intelligence Community

USAF personnel with experience in the joint and national elements of the IC will benefit from the training they receive in those assignments and have a better understanding of the capabilities of those elements and how they can be leveraged to support USAF missions. This recommendation will help the USAF to improve leverage of joint and national capabilities (see lesson 4, Chapter Two). To implement this recommendation, HQ USAF/A2 would need to elevate and articulate this priority to the assignment teams.

We realize that this will involve some trade-offs and could affect other priorities, such as the priorities given to MAJCOMs. As a result, the USAF might have to selectively implement this recommendation. We suggest a few assignments or functional areas in which this could be most useful.

One area in which increased priority could be particular useful is in cyber-related assignments. Research revealed that software reverse-engineering is an intelligence-analysis skill that should be of particular importance to the USAF because it could help in developing offensive cyberoperation effects that would enable or enhance air operations in contested environments. There are few opportunities to acquire this skill. For instance, only one in 25 schools randomly selected from the 181 NSA/U.S. Department of Homeland Security National Centers of Academic Excellence lists a software reverse-engineering course in its computer science catalog (Interim Review Task Force, 2008; Joint Task Force on Computing Curricula, 2013). Therefore, we recommend high priority for assignments in the IC that would allow ISR personnel to hone software reverse-engineering skills. This would apply to ISR personnel in the 17S, 1B4, and 3D0 AFSCs.

We also suggest that assignments for USAF ISR personnel in cryptologic centers (including for positions of leadership), COCOM intelligence directorates, and JIOCs will be particularly useful. The former is mostly valuable for breaking into a community that is not necessarily easy

to understand and work within when one is "outside the fence." The latter is more about developing context needed to support phase 2/3 operations.

Equip Analyst Airmen with Tools

Fully Support the Intelligence Community Information Technology Enterprise, Increase Investments in Single-Intelligence Tools, and Foster User-Driven Analytics for Multi-Intelligence Tools

Specifically, we recommend that HQ USAF/A2 champion participation in IC ITE development, both as a provider and as a user of data and services. We recommend adopting metadata practices compatible with IC ITE standards at all levels of security (not just on the Joint Worldwide Intelligence Communications System). We also recommend prioritizing investment in single-INT tools to meet near-term needs and help cope with the volume of data, and we recommend supporting user-driven analytics for multi-INT tool development, which will help shift the focus of analysts toward higher levels of synthesis. These recommendations will help analysts to meet the future challenge created by the volume of data and limitations on collection that anti-access and area-denial developments impose (see challenge 3, Chapter Four).

Invest in Readiness of the Analyst Force

Expand Scope of Existing or Develop New Exercises in Order to Practice Analytic Activities for Operations Other Than Irregular Warfare

This will provide USAF intelligence analysts with opportunities to practice roles and responsibilities for analysis activities that are conducted in phase 2/3 operations and hence helps address a key lesson from past operations (see lesson 4, Chapter Two). This practice will also help USAF intelligence analysts to be prepared for the pace and intensity of future operations, which is a key future challenge (see challenge 1, Chapter Three). Exercises should be designed to emphasize intelligence-analysis support to emerging concepts for future warfighting and should focus on more than just support to "ISR operations." They should be designed to stress the needs for foundational intelligence and for coordination and integration of intelligence across the strategic, operational, and tactical levels. This will help to practice integration (see lesson 3, Chapter Two). To practice coordination, all the cells that would participate in intelligence-analysis activities conducted during phase 2/3 operations should be represented in exercises. This includes the AOC, MAJCOM/A2, unit-level intelligence support, DCGS, and 363 ISRW. Several existing exercises could be leveraged for these purposes, including Unified Engagement, Future Capabilities Game, Red Flag, and Cyber Flag.

Summary of Recommendations

We summarize our recommendations in Table 6.2.

Table 6.2. Recommendations

Category	Recommendation
Define the roles and responsibilities of analyst airmen	Form a committee to federate roles and responsibilities for analysis across the enterprise and use POA or similar to document them.
	Update doctrine to better reflect analysis for operations in addition to IW.
Train and develop analyst airmen	Create an intelligence-analyst professional development program spanning multiple AFSCs.
	Develop requirements for new MTT courses on cyber and space ISR and an analysis refresher, and modify existing critical thinking course.
	Institutionalize mentorship and exchange of knowledge between analysts.
	Increase priority of select assignments within joint and national elements.
Equip analyst airmen with tools	Fully support IC ITE, increase investments in single-INT tools, and foster user-driven analytics for multi-INT tools.
Invest in readiness of the analyst force	Expand the scope of existing or develop new exercises in order to practice analytic activities for operations other than IW.

Closing Remarks

The impetus for this project is that U.S. forces must prepare for a wide range of contingencies. Some of these contingencies could put considerable stress on U.S. forces and might evolve at a rapid pace. Joint forces—including USAF intelligence analysts—will need to be ready to execute when the balloon goes up (i.e., when trouble begins), or a lack of readiness could have high stakes for the United States. Defining the roles of U.S. analyst airmen, training and developing their capability, equipping them with tools, and investing in their readiness will help them to address the lessons of the past and prepare to meet the challenges of the future.

Appendix A. A Perspective on the Relationship of National Security Strategy and Intelligence—An Air University Paper

In 2013, the sponsor of this project published a strategic vision for the USAF ISR enterprise. In the opening paragraph, he characterizes the challenge for USAF ISR in the context of defense strategic guidance as follows (USAF, undated [a]):

> The President's 2012 Defense Strategic Guidance directs the US military to begin the transition from today's wars and to prepare for future challenges including a rebalance toward the Asia–Pacific region. The challenge for [US]AF ISR is to maintain the impressive tactical competencies developed and sustained over the past 12 years, while rebuilding the capability and capacity to provide the air component commander and subordinate forces with the all-source intelligence required to conduct full-spectrum cross-domain operations in volatile, uncertain, complex, and ambiguous environments around the globe. (p. 2)

During initial meetings to scope the RAND research project, the sponsoring office indicated that it wanted a retrospective look at lessons from past operations to guide the USAF as it develops intelligence-analysis capabilities needed to support national security strategy. That is, there was a close link between USAF intelligence-analysis capability needs and national security strategy. In this appendix, coauthor Colonel Fry further explores this connection by providing a historical perspective on the relationship of national security strategy and intelligence. The material in this appendix also satisfies an Officer Senior Development Education requirement for Air University. We have lightly edited the text.

Transitions

The United States has entered a period in its history that is uncomfortable, at least from a national security strategy standpoint. No longer do we have the "luxury" of a peer competitor or major military operation that drives our national decisionmaking. Arguably, we do not even have a regional threat on which we can focus all of our energy, although ISIL is doing very well in its audition for next bad guy up and China's competitive nature in the Pacific is causing concern within portions of the government. As a result of the drawdown from major operations in Iraq and Afghanistan, the defense budget, and with it a large portion of the intelligence budget, is shrinking. This must be countered by an effective national security strategy that provides direction to the Intelligence Community. At any given time, a strong intelligence capability is required to support policymaking and a strong national security apparatus is required to guide the intelligence community. This is especially true during periods of transition between major international events when it is important for the intelligence community to remain focused on critical issues and actors. In a world in which knowledge of future adversaries and their

intentions is unclear and American security concerns are transitioning, intelligence and national policymakers must work together to effectively navigate the international arena.

Historically speaking, the United States has faced three major transition periods in national security policy since World War II and is currently entering a fourth. During the transition from war to peace in the late 1940s and early 1950s, the United States learned how to deal with the international arena at a level previously unseen. Then, during the time frame around the Vietnam War, America sought to regain international respect and improve its standing throughout the world. The next major transition occurred after the Cold War when the United States, and the rest of the world, learned to operate in an environment with only one superpower, and, consequently, regional conflict became the focus. The final transition is the current time frame, in which two major regional conflicts are drawing to a close and the United States is regrouping on the international stage. This policy "regroup" is occurring within an environment in which the world seeks U.S. leadership in dealing with such issues as the fight against ISIL and radical Islam, Iranian nuclear capabilities, a resurgent Russia, and a growing China. This paper looks at these four major transition periods to identify key lessons about intelligence support to the nation's security strategy during periods of changing threats. These lessons can then be used to inform intelligence community policymakers as they seek to anticipate the next conflict while maintaining focus on key historical hotspots.

Background: Intelligence and National Security

Intelligence and policymaking should be intrinsically tied together to ensure a nation's security. National leadership and decisionmakers should demand the best available information from all sources before making significant moves within the international community. This interaction should be a continuous process, in which the policymaker provides a basic direction for the nation, based on its security interests, and the intelligence process supports that decision. At the same time, the intelligence community must feel empowered to inform the policymakers of potential areas of concern that might not be obvious. Ideally, this interaction repeats itself, thus ensuring that the intelligence community is aware of the needs of the policymaker while at the same time making the policymaker aware of the status of international events. This idea is encapsulated by Roger Z. George in his chapter of *Analyzing Intelligence* when he states,

> The intelligence analyst, however, also has a key role in enabling the national security strategist to accomplish critical objectives. Though the analyst does not presume to define a national security strategy, he or she must be cognizant of what that national security strategy is, how the current set of decision makers are defining American interests and thus threats to it (as well as opportunities), and the key policy objectives of those decision makers. (George and Bruce, 2014, p. 182)

Occasionally, the intelligence that policymakers receive can be dated or focused in the wrong area. An analyst might spend days to weeks working on a product only to have it overcome by

circumstances such that, when the product finally reaches the user, it is not helpful. Often, this can be a result of too many decisionmakers and not enough analysts or perhaps disengaged policymakers not being responsive to the intelligence community. It is also possible that the intelligence analyst was too focused on the task at hand and missed the changing tides of international policy. The Commission on the Roles and Capabilities of the U.S. Intelligence Community in 1996 stated,

> where policy makers are concerned, however, consumers more often take a jaundiced view of the analytical support they receive. The President and senior cabinet officials appear to be relatively well served, but many decision makers at lower levels find that intelligence analysis comes up short . . . [However] the Intelligence Community is not entirely to blame. Consumers have a responsibility not only to engage in the process but, more important, to drive it. Often they are uncooperative or too busy to engage at all. (Commission on the Roles and Capabilities of the United States Intelligence Community, 1996, p. 83)

One area identified by the commission where intelligence analysts and consumers work well together is within the military.

> The Commission found especially close ties between the producers and users of military intelligence. Within the military there is a long history of respect for, and reliance upon, intelligence. Intelligence is factored into strategic and tactical planning, is exercised in war gaming, and is integral to operations. As a result, military requirements are better defined, in large part, because of the close and continuing dialogue between intelligence analysts and the military commands they support. (Commission on the Roles and Capabilities of the United States Intelligence Community, 1996, p. 83)

The bottom line to this discussion is that policymakers and the intelligence community *must* work together to further national strategy. If either side of the equation is working within a vacuum, problems will arise and decisions will be affected either by inaccurate intelligence or no intelligence at all. To be successful in an ever-changing world, such as the one we are experiencing today,

> Each administration should set the guidelines for intelligence activities and, within these guidelines, establish in a timely fashion specific requirements and priorities for the conduct of those activities. These will fluctuate according to the world situation, the availability of resources, and the needs of the Government. (Commission on the Roles and Capabilities of the United States Intelligence Community, 1996, p. 15)

This relationship is never more important and challenging than in periods of transition, which can be clearly seen at the beginning of the Cold War.

Early Cold War

Intelligence within the U.S. government can trace its origins back to the Revolutionary War with the establishment of a “spy ring” by General George Washington to supply his army with

information on British activities. “Records show that shortly after taking command of the Continental Army in 1775, Washington paid an unidentified agent to live in Boston and surreptitiously report . . . on the movements of British forces” (L. K. Johnson and Wirtz, 2004, p. 5). Efforts were even made to develop intelligence on foreign activities. “In November of 1775, the Continental Congress created the Committee of Secret Correspondence to gather foreign intelligence from people in England, Ireland, and elsewhere on the European continent to help in the prosecution of the war” (L. K. Johnson and Wirtz, 2004, p. 5). However, a significant national intelligence capability never manifested itself and strategic foreign intelligence remained mostly limited by design. During the early periods of this nation’s history, two vast oceans separated the country from both friend and foe, and the focus of the American people was on conquest of the continent and the development of the union, not on international activities. According to Mark Lowenthal, former assistant director of central intelligence for analysis and production and vice chairman for evaluation on the National Intelligence Council,

> For most of its history, the U.S. did not have strong foreign policy interests beyond its immediate borders. The success of the Monroe Doctrine . . . abetted by the acquiescence and tacit support of Britain, solved the basic security interests of the U.S. and its broader foreign policy interests. (Lowenthal, 2011, p. 12)

A national intelligence capability simply was not required.

It was not until the Japanese attack on Pearl Harbor in 1941, and America’s subsequent entry into World War II, that the United States realized that it needed an intelligence organization capable of supporting policymakers with an international view. During the war, the United States and Britain worked together to develop intelligence capabilities and overall assessments of enemy operational and even strategic actions. Once the war ended, however, the United States found itself in an unfamiliar position as a power player within world affairs with a strong competitor on the international scene: communism. As General Hoyt S. Vandenberg, then Director of Central Intelligence, stated during his testimony before the Senate Armed Services Committee in 1947 on the development of the Central Intelligence Agency,

> In my opinion, a strong intelligence system is equally if not more essential in peace than in war. Upon us has fallen leadership in world affairs. The oceans have shrunk, until today both Europe and Asia border the U.S. almost as do Canada and Mexico. The interests, intentions and capabilities of the various nations on these land masses must be fully known to our national policy makers. (Vandenberg, undated, p. 1)

U.S. government policymakers, such as George Kennan and Dean Acheson, believed that the United States could no longer maintain isolationism and had to take the lead to deal with the communist threat. With this new responsibility came a need for intelligence to inform policymakers throughout all levels of the U.S. government:

> [The United States] would have to create and lead an international anti-Communist alliance and maintain a larger standing army. And, because of the

> peculiar nature of the Cold War, American leaders would have to learn the skills necessary for protecting U.S. interests in situations short of war but also short of true peace. (Berkowitz and Goodman, 1989, p. 3)

This change from war to "peace" and then to a Cold war in the late 1940s and early 1950s is the first major transition period in which a strong national security strategy both informed and was informed by a strong intelligence community during a period of changing threats. The United States realized early on during this transition that its relatively immature intelligence community needed to rethink how it defined intelligence in order to support not only the defense establishment but the national government as a whole:

> Pearl Harbor and the dawning of the Cold War propelled a change in America's understanding of intelligence and of national security as a term encompassing the complex mix of diplomacy, military strength, and intelligence that now would frame and equip America's central role in international affairs. Global threats to U.S. national security would require global information. Intelligence, heretofore thought of essentially in terms of military operations during war, would need to cover not just enemy military forces but also political and economic developments worldwide. (George and Bruce, 2014, p. 23)

Policymakers during the early Cold War had the benefit of an obvious competitor and enemy within the global arena. Communism, led by the Soviet Union and supported later by China, was a clear threat to the Western world in the view of the nation, and this was reflected in the public record through speeches and documents from this time period. While the nation did not have a published National Security Strategy, which was not required by law until the Goldwater-Nichols Department of Defense Reorganization Act of 1986 (Public Law 99-433, October 1, 1986), America's foreign policy can be found through inaugural addresses and state-of-the-union speeches throughout this period. As President Harry S. Truman described in his state-of-the-union address in 1951,

> The threat of world conquest by Soviet Russia endangers our liberty and endangers the kind of world in which the free spirit of man can survive. This threat is aimed at all peoples who strive to win or defend their own freedom and national independence. (Truman, 1951)

Interestingly, this is the first specific mention of a hostile Soviet Russia in a state-of-the-union address. However, it is not the last time that Russia and communism were pointed out as threats to America and our security interests. President Dwight D. Eisenhower consistently spoke of the threat of communism to the United States and its allies:

> American freedom is threatened so long as the world Communist conspiracy exists in its present scope, power and hostility. More closely than ever before, American freedom is interlocked with the freedom of other people. In the unity of the free world lies our best chance to reduce the Communist threat without war. (Eisenhower, 1953)

More dramatically, when giving the nation direction during his inauguration address for his second term as president, he predicted,

> The divisive force [in the world] is International Communism and the power that it controls. The designs of that power, dark in purpose, are clear in practice. It strives to seal forever the fate of those it has enslaved. It strives to break the ties that unite the free. And it strives to capture—to exploit for its own greater power—all forces of change in the world, especially the needs of the hungry and the hopes of the oppressed. (Eisenhower, 1957)

To combat this threat diplomatically, politically, and militarily, the United States developed an intelligence community with not only breadth of expertise but also depth of knowledge on the Soviet Union. A singular threat, as much as one can say that communism was singular at the time, enabled intelligence analysts throughout the government to focus their efforts on, and to develop capabilities against, the Soviet Union and its satellite states. Different agencies, such as the Department of Defense and the State Department, developed their own intelligence capabilities focused on their areas of interest, but ultimately all pointed toward the Soviet Union. The USAF, with the predominance of weapons that could strike Soviet Russia at this time, commissioned the Massachusetts Institute of Technology to study how it could better manage it intelligence and reconnaissance capability in order to focus on the threat at hand. The results were published as the Beacon Hill Report and point out the importance of a robust intelligence capability, not just for the USAF but for the nation as a whole:

> In the post-war world, intelligence and reconnaissance are more important to the U.S. by several orders of magnitude than ever before. They are crucial to some of the most fundamental aims in our national policy: our ability to keep the American economy solvent and sustain the cold war; the ability of our armed force to discourage aggression and thereby to keep the peace; our capacity, if war comes, to outmatch the enemy and carry the war to the Soviet Union; our capacity, in the face of a Soviet intercontinental striking force with atomic weapons, to seek out and master that force—and thereby to safeguard our people and our economic and military resources from atomic destruction. All these tasks depend to a wholly unprecedented degree on intelligence. (Project Lincoln, 1952, p. 1)

Intelligence needs across all aspects of the government were becoming apparent to the intelligence community, and it needed to step up its efforts in order to provide this support. Technological advancements in aircraft (the joint CIA/USAF U-2) and satellites (the Corona program) that could collect information on Soviet capabilities became the focus of the intelligence community. The value of reconnaissance via aircraft and satellites was recognized early on.

> According to a 1955 Technical Capabilities Panel, established to report to President Eisenhower on how to deal with the increasing capabilities of the Soviet Union, "If intelligence can uncover a new military threat, we may take steps to meet it. If intelligence can reveal an opponent's specific weakness, we may prepare to exploit it. With good intelligence we can avoid wasting our

> resources by arming for the wrong danger at the wrong time. Beyond this, in the broadest sense, intelligence underlies our estimate of the enemy and thus helps to guide our political strategy." (Office of Air Force History, 2015, p. 234)

Eventually, collection platforms and opportunities provided a large amount of data, which required exploitation and analysis. According to the Beacon Hill Report,

> In the familiar but devastating phrase, everyone wants to know everything about everything, all the time. The result is a collection of an indigestible mass of raw information which even the best system could not wholly convert into useful finished intelligence . . . Collectors and evaluators are swamped. Instead of being free to do a sharply analytical job, going after what is most needed and making sense out of what they get, the physical pressure of handling so much material tends to absorb their energy. (Project Lincoln, 1952, p. 3)

While the intelligence community largely managed to deal with the various issues that arose during this time frame, from the lack of a capability at the start to too much information at the end, there are two historical points that emerge that should inform both the intelligence community and the national policy enterprise as a whole. First, the singular focus on Soviet Russia led to two "surprise" hot wars during this time frame, first in Korea and then in Vietnam. In both cases, there is historical evidence that suggests a lack of preparation, not only within the intelligence community but throughout the defense and state departments as well, that can be attributed to this singular focus. An intelligence capability focused across an array of threat nations might have provided more intelligence to inform tactical operations during the Korean War, as well as shown that the U.S. government was approaching the Vietnam War from too conventional of a direction and should have been more focused on a counterinsurgency all along.

The second point that should strike intelligence and policy professionals today is the large amount of information that was flowing in on the Soviet Union and, to a lesser extent, the rest of the world, leading to the overwhelming of analytical professionals within the intelligence community. It is no secret that today's intelligence professionals are dealing with an excess of data provided by all collection platforms. In response, the intelligence community is developing automated processes and tools that will help analyze the information available across the various disciplines, including full-motion video, signals intelligence, and even social media. These data and their subsequent analysis can help inform policymakers and provide insight into future potential adversaries.

Overall, during the early years of the Cold War, the national security enterprise and intelligence community were largely in sync. An identified enemy, the Soviet Union and its satellite states, provided justification for a strong intelligence capability, as well as a target on which the community could focus. This situation changed as the Cold War waxed and waned. U.S. foreign policy, and therefore intelligence direction and capability, took a hit during the Vietnam War and the years following it as the United States tried to recover the prestige and respect that it had previously enjoyed.

1960s–1980s

The 1960s through the early 1980s was a significant time in U.S. foreign policy. Multiple transitions occurred during this time frame that greatly affected intelligence capabilities and focus. Not only did the intelligence community have to provide support to the military fighting in Vietnam, it also had to keep its ever-present focus on the Soviet Union and its actions. At the same time, developing countries gained importance as decisionmakers saw them as the next battleground in the fight between communism and the West. President John F. Kennedy's words in his inaugural address in 1961 reflected the tone of the entire time frame when he said,

> Let every nation know, whether it wishes us well or ill, that we shall pay any price, bear any burden, meet any hardship, support any friend, oppose any foe, in order to assure the survival and the success of liberty. (Kennedy, 1961a)

The broad and aggressive national strategy of this and subsequent presidential administrations drove intelligence requirements across all levels of government. The wide range of intelligence requirements to support this strategy eventually stressed the intelligence community, as noted by GEN Maxwell D. Taylor, the chairman of the Foreign Intelligence Advisory Board in 1966,

> There are many trouble-makers creating for us many trouble spots around the world. We need built into our executive organization a system which will assure us of watchful eyes looking constantly in all directions and giving warning before we are surprised. Uncle Sam can no longer afford to be a one-eyed Cyclops able to focus attention in only one direction but must have an Argus-eyed capacity to survey the entire international scene. (Taylor, 1966)

In order to fulfill these increasing requirements, the size of the intelligence community, as well as its capabilities, grew accordingly. Agencies, such as the Defense Intelligence Agency and the National Reconnaissance Office, were created to coordinate and consolidate analytic and collection efforts across the Defense Department. These efforts included U-2 operations, which helped identify the Soviet missile components being emplaced in Cuba, leading to the Cuban missile crisis and ultimately to the stemming of Soviet efforts to develop a strong foothold in the Western Hemisphere. Advances in technology also fulfilled some of the needs identified by General Taylor. The creation of the SR-71 was driven by the desire for information on the Soviet Union, which was improving its defensive capabilities through the development of advanced aircraft and surface-to-air missiles. Overall, strategic intelligence collection effectively kept policymakers informed, whereas, at the operational and tactical levels outside of the Soviet Union, intelligence was lacking.

The obvious focal point for national strategy during this time frame was the Vietnam War. U.S. involvement in this conflict stretched varyingly across four different presidential administrations and thus was very important to American foreign policy. President Kennedy first discussed Vietnam during his state-of-the-union addresses, but it was mentioned more as a small fight among many in the overall battle against communism. As noted in his 1961 address, "In

Asia, the relentless pressures of the Chinese Communists menace the security of the entire area—from the borders of India and South Viet Nam to the jungles of Laos, struggling to protect its newly-won independence" (Kennedy, 1961b). It was not until President Lyndon Johnson's state of the union in 1966 that the Vietnam War became a major point of concern for the country: "Our Nation tonight is engaged in a brutal and bitter conflict in Vietnam . . . It just must be the center of our concerns" (L. B. Johnson, 1966).

Despite Vietnam being the center of concern for the president, the intelligence community struggled for two main reasons. First, each distinct portion of the intelligence community worked on its own, and there was no overriding leadership:

> The Intelligence Community had no formal, standing coordinating mechanism on Vietnam. As a result, each agency and intelligence service at every level tended to go its own way, engaging or withholding its resources in accordance with its own perceptions of priorities and requirements . . . The ensuing duplication of effort and competition in the field were lamentable. (Allen, 1991, p. 22)

Secondly, the intelligence community was unable to devote enough assets to the fight because of overall concerns of nuclear conflict with the Soviet Union. Finally, when intelligence assets were used, the character of the conflict required a blending of conventional and unconventional warfare skills that further challenged the community.

On operational and tactical levels, the Vietnam War provided an early glimpse into what is now commonly referred to as hybrid warfare. Not only did U.S. ground forces have to deal with the conventional North Vietnamese forces, against which they were largely effective; they also had to deal with an insurgency led by the Viet Cong, ultimately with mixed results. This multilevel enemy taxed the capabilities of the intelligence community, which was familiar with the requirements needed to deal with a very conventional enemy, the Soviet Union, but unprepared for a large counterinsurgency campaign. Unfortunately, such systems as the U-2, SR-71, and satellites were not designed to find individual Viet Cong soldiers moving along the Ho Chi Minh trail. Further, an overall reliance on technical capabilities limited collection in other areas, such as human intelligence, which is extremely important in low-intensity conflict and counterinsurgency.

The end of U.S. involvement in Vietnam and the overall appearance of calm within the world in the early 1970s seemed to provide a bright spot in foreign policy. As William Bundy, the former presidential adviser on foreign affairs noted, things were starting to improve for the United States. Loosely summarized, his *Foreign Affairs* article in 1984 stated that the Paris Peace Accords started to bring U.S. troops home from Vietnam (North Vietnam, South Vietnam, and the United States, "Agreement on Ending the War and Restoring Peace in Viet-Nam," Paris, 1973), U.S.-Chinese relations improved and established a more tenable world balance of power, détente and the Strategic Arms Limitation Talks (SALT) I agreements provided hope that further breakthroughs in relations with the Soviet Union were possible, and the Nixon doctrine called for

a more limited U.S. role in support of threatened nations while relying more heavily on strong regional partners (Bundy, 1984, p. 1212).

Unfortunately, this easing of tensions in foreign policy did not translate to an easier job for the intelligence community. In fact, intelligence has to work even harder during times of lower tensions as budgets typically decline, the focus of the nation changes, and the interests of the government begin to expand into other areas. As Bundy noted,

> Finally, an important sector of informed opinion thought that, with the opening to China and détente, much more attention could and should be directed to wider global problems. In particular, there was new international cooperation and concern over the environment and an accompanying international focus on problems of food, population and the Law of the Sea. (Bundy, 1984, p. 1212)

A lower budget, paired with an expansion of requirements into nontypical areas, such as the environment, has a negative effect on intelligence and affects the quantity and quality of information provided to decisionmakers throughout the government.

The time frame between the end of U.S. involvement in Vietnam and the 1980s involved another dramatic shift in U.S. foreign policy. Daniel Yankelovich and Larry Kaagan went so far as to call it a watershed time frame in *Foreign Affairs*:

> In 1976 the nation was still in the aftershock of Watergate and Vietnam—unsure of its limits as a superpower, agonizing over the moral rightness of the Vietnam War, dreading involvement in foreign commitments that in any way resembled Vietnam, preoccupied with domestic economic problems . . . and dependent on détente with the Soviet Union to lighten both the defense budget and the tensions of international relations. (Yankelovich and Kaagan, 1980, p. 696)

Opinion of the United States throughout the world, even within its own borders, was low, and the country was not interested in maintaining a strong foreign policy. However, world events would soon force a change in both attitude and policy. The seizure of the American Embassy in Tehran and the fall of the Shah, Russian boldness in its invasion of Afghanistan, a Soviet Combat brigade in Cuba and the arrival of 100,000 Cuban refugees in a freedom flotilla, economic issues at home, military tragedy with the failure of Operation Eagle Claw; all of these and more led to a public outcry that the United States needed to step up its game and return to the foreign policy arena:

> As [1980] began, a 42 percent plurality of Americans named foreign policy as "the most important problem facing the country today"—ahead of the economy and substantially ahead of energy concerns. Not since 1972 had foreign affairs been so prominent; just seven months earlier in 1979, before the hostage seizure and the Soviet move into Afghanistan, foreign affairs had been named by only three percent as the national most important concern. (Yankelovich and Kaagan, 1980, p. 701)

This perception of U.S. weakness in worldwide events ultimately led not only to Ronald Reagan winning the 1980 presidential election and the revitalization of U.S. foreign policy and a stronger stance against the Soviet Union but to increased spending within the military as well.

Despite eventually ending on a high note, this era in U.S. foreign policy history was a troublesome one with many ups and downs. Throughout it, the intelligence community learned many lessons, but two stand out as important when considering today's environment. First, the emergence of hybrid warfare during the Vietnam War teaches that the intelligence community must work on multiple levels to ensure that the right information is being provided to the right consumer. Focusing solely on the conventional threat posed by the North Vietnamese Army prevented the collection and analysis of information needed to fight a counterinsurgency and led to an embarrassing U.S. withdrawal and the eventual collapse of the South Vietnamese government. Secondly, policymakers must ensure that the intelligence community is collecting on requirements that are truly important to the security of the United States. The extreme shifts in U.S. foreign policy and the introduction of intelligence requirements outside of normal areas spread limited intelligence assets thin while stressing the ability to continue to collect on the existential threat of the Soviet Union. By losing focus on the threat at hand and instead collecting on information, such as food and population issues, the intelligence community was caught off guard when the Shah fell and the Soviet Union invaded Afghanistan.

After the Cold War

The revitalization of U.S. foreign policy and the stronger stance against threats to the Western world ultimately led to the downfall of the Soviet Union and the end of the Cold War. The result of this extreme event within world affairs and the period of transition that it began directly affected American foreign policy and the intelligence operations that support it today. Conventional thinking at the time followed the line that the absence of a major opponent in the world enabled the United States and the West to cash in on a peace dividend. Ultimately, this peace dividend led to smaller budgets while the unknown threats and competitors throughout the world increased requirements for intelligence collection outside of the traditional roles and targets.

Surprisingly, America's security strategy did not significantly change after the Cold War. As President George H. W. Bush stated in the March 1990 National Security Strategy,

> Throughout our history, our national security strategy has pursued broad, consistent goals. We have always sought to protect the safety of the nation, its citizens, and its way of life. We have also worked to advance the welfare of our people by contributing to an international environment of peace, freedom, and progress within which our democracy—and other free nations—can flourish. (G. H. W. Bush, 1990)

In the post–Cold War arena, these national interests remained the same, all that changed was the threat. No longer was there an obvious enemy; instead, policymakers had to deal with a lot more unknowns throughout the world. The United States would still seek security for its people and way of life through a strong economy, strong military, and cooperation with like-minded nations. The Soviet Union was no longer strong enough to challenge the Western world in international

affairs. However, it still maintained significant military power, especially in the nuclear regime, in which it could match the United States weapon for weapon. Added to the threat that remained from the Soviet Union was the emergence of regional powers and conflicts, which stretched intelligence capabilities.

The intelligence budget shrunk in the early 1990s because of a desire for a peace dividend following the collapse of the Soviet Union. In retrospect, this might have been a dangerous move given the uncertainties that followed in the wake of the collapse of a superpower. As Joseph Nye, the chairman of the National Intelligence Council pointed out in 1994,

> Even though there is no longer one overriding threat, the need for estimative intelligence continues. In a world where rapid change has become the norm, uncertainties abound. The current threats to American security are not entirely new, but they are more diverse. And they are complicated by the "return of history", the thawing of ethnic and religious conflicts that had been partly frozen by Cold War blocs. (Nye, 1994, p. 86)

During this uncertain period in which an enemy was not entirely obvious, the intelligence community took drastic cuts in funding and personnel. While the cuts were not as steep as overall defense budget cuts, they still affected the ability for intelligence to effectively watch all players at all times:

> The civilian personnel workforce of the Intelligence Community has already been subjected to large-scale reductions in recent years. In 1992, the Congress mandated a reduction of 17.5 percent in Intelligence Community civilian personnel, to be achieved by the end of FY97. The Executive Branch subsequently extended this approximately three percent per year reduction to FY99, which will result in a 23 percent cut to Intelligence Community civilian personnel as compared to the FY91 baseline. (Commission on the Roles and Capabilities of the United States Intelligence Community, 1996, pp. 149–150)

No longer could the intelligence community afford to focus just on one international player; unfortunately, however, it also could not afford the cost of this collection throughout the world. This was spelled out in the National Security Strategy in 1991:

> The unprecedented scope and pace of change in today's world—and the increasing number of actors now able to threaten global peace—highlight the need for reliable information and a sophisticated understanding of events and trends. The global reach of American intelligence capabilities is a unique national asset, crucial not only to our own security, but also to our leadership role in responding to international challenges. (G. H. W. Bush, 1991a, p. 16)

As a result, the intelligence community focused its efforts on technical means of collection, mostly signals and imagery intelligence, while being more selective about when and where to use human intelligence.

The justification behind this reliance on technical collection is actually very indicative of the world environment that the United States was facing. Many of the targets on which the

intelligence community had to collect were potentially friendly countries, as well as traditional adversaries. ADM Stansfield Turner, director of the CIA, stated,

> Nevertheless, as we increase emphasis on securing economic intelligence, we will have to spy on the more developed countries—our allies and friends whom we compete economically . . . This means that rather than instinctively reaching for human, on-site spying, the U.S. will want to look to those impersonal technical systems, primarily satellite photography and intercepts. (Turner, 1991, p. 154)

He also discussed that the cost of this technical capability was extreme but that "at twice [the cost,] it would be a bargain because the ability to peer anywhere, anytime, is bound to be of great value in the uncertain new world ahead" (Turner, 1991, p. 151).

The ultimate cost of this reliance on technology however, was the inability of the intelligence community to recover some of the nontechnical means it had spent years building. It traded in the money "saved" by the peace dividend for the ability to see anywhere anytime and did significant damage to the human intelligence collection capabilities of the United States, which had long-ranging effects throughout the end of the 20th century and into the 21st. This risk was identified by the Aspin–Brown Commission (Commission on the Roles and Capabilities of the U.S. Intelligence Community), which was established to study the intelligence community in 1995. The commission stated in its report that, despite the perceived strength of the United States in the post–Cold War environment, intelligence capabilities must be maintained:

> Precisely because of this position of strength, however, some believe that the U.S. can afford to cut back its intelligence capabilities, at least until the next war or crisis comes along. But these are not capabilities that, if abandoned or allowed to wither, can easily or quickly be resuscitated. (Commission on the Roles and Capabilities of the United States Intelligence Community, 1996, p. 11)

Intelligence capabilities were further stretched in the 1990s when American foreign policy began to drift into nontraditional areas. These areas included collection on such topics as ozone-layer monitoring, environmental concerns, and studies on aging populations. While these are important concerns in their own right, it is questionable whether spending limited intelligence resources on these topics was justified. President Bill Clinton drove the intelligence community toward these topics in his National Security Strategy in 1994, stating, "Finally to enhance the study and support of worldwide environmental, humanitarian, and disaster relief activities, technical intelligence assets (primarily imagery) must be directed to a greater degree towards collection of data on these subjects" (Clinton, 1994, p. 14). This statement was made one paragraph after stating, "Only a strong intelligence effort can provide adequate warning of threats to U.S. national security and identify opportunities for advancing our interests" (Clinton, 1994, p. 14). It was challenging for the intelligence community to achieve both. Spreading limited resources into questionable areas of collection can serve only to diminish the chances of intelligence collectors to find the next threat in an unstable and uncertain world.

Fortunately, the intelligence community did an acceptable job for the initial decade after the Cold War. The Aspin–Brown Commission lists a significant amount of intelligence successes in the early 1990s. This list includes topics spanning from U.S. intelligence uncovering evidence to suggest that North Korea was developing nuclear weapons to intelligence support to the Colombian government to break up the Cali drug cartel. Between these two extremes, there was support to combat operations, peacekeeping operations, support to diplomatic efforts to avoid conflict, uncovering of human rights abuses, and support to civil authorities (Commission on the Roles and Capabilities of the United States Intelligence Community, 1996, pp. 11–13). Honestly, the number of things intelligence did well was nearly impossible to quantify. This commission statement summarizes it well, "Clearly, however, over the last five years conflicts have been avoided, wars shortened, agreements reached, costs reduced, and lives saved as a result of the information produced by U.S. intelligence" (Commission on the Roles and Capabilities of the United States Intelligence Community, 1996, p. 13).

The intelligence community did a successful job overcoming the multiple challenges it faced during the years immediately following the Cold War. The causes of these challenges and the resulting effects on the intelligence community are valuable insight into the environment we face today. The first challenge was the perceived peace dividend. America was just coming out of its longest conflict, albeit a conflict mostly in words and less in deed. The amount of resources expended on defense and intelligence during the Cold War is impossible to quantify, but it is safe to say it is significant. After the Cold War, it was inevitable for the defense and therefore intelligence budgets to decline. A peace dividend, whether actual or not, was needed by the nation as it took a collective breath after the tension of the Cold War. Unfortunately for intelligence, massive cuts in budgets and personnel make it challenging, if not impossible, to recover capabilities and experience that are required during conflict. As Maj Gen James R. Clapper, Jr., former assistant chief of staff for intelligence, stated in his 1995 testimony to the U.S. House of Representatives Permanent Select Committee on Intelligence,

> I was the Chief of Air Force Intelligence during Desert Storm, I know how thinly stretched we were then to support one major regional conflict. The notion of having two conflicts, however near simultaneous they are, given the considerable resource reductions, (notably people) . . . I think makes the notion of surging to support two such conflicts very, very problematic. (U.S. House of Representatives Permanent Select Committee on Intelligence, 1996, pp. 318–319)

The second challenge for the intelligence community that can be used as a lesson today was its foray into a broad set of collection targets that was well outside the traditional norms. After years of intelligence resources being used on the Soviet Union, the end of the Cold War provided opportunities for other areas of the government to direct collection into such areas as the environment, counternarcotics, and the status of the ozone layer. Added to this is the fact that there was no easily identified challenge to U.S. power, so intelligence collection had to span the earth to find information on foe and friend alike. Strong direction from the policymaking

community would have helped direct and optimize intelligence efforts. President George Bush tried to provide some of this direction in National Security Review 29:

> The Intelligence Community today is being asked to cope with issues ranging from traditional Soviet military forces to the environment, from economic competitiveness to [acquired immunodeficiency syndrome]. We must establish the proper role, mission, and priorities for U.S. intelligence in this changed and changing world. Otherwise, our capabilities will spread too thin to satisfy even the highest priorities and our inability to plan and invest long-term will leave us with inadequate intelligence assets to protect our vital interests and our security. (G. H. W. Bush, 1991c)

Despite the direction provided in this document and further attempts by subsequent presidents to direct and steer the intelligence community, one of the largest failures of intelligence occurred on September 11, 2001, when al Qaeda managed to pull off a shocking attack on the United States. These attacks led to 14 years of conflict that are still ongoing. A second intelligence failure, this time when the intelligence community convinced itself and policymakers that Iraq was developing nuclear weapons, led the United States and its allies into a second conflict in Iraq. While combat forces were withdrawn from Iraq in 2010, several hundred advisers were left in Baghdad to help the Iraqi government to train and equip its army, and now efforts are ongoing to further support the Iraqi government in its battles against ISIL. In both of these instances, an intelligence community that was stretched thin by a broad range of targets and decreased budgets failed to appropriately inform national decisionmakers of the validity of the threats. As we exit this current time of conflict in the years to come, policymakers and the intelligence community alike must learn from the mistakes made during the Cold War.

Lessons for Today

Is the United States truly in a transitional period in national security policy? One could effectively argue that the entire time frame after the Cold War is a transition period fluctuating between tenuous peace and limited conflict, but there are enough similarities between today and the three transition periods discussed earlier to assume that the world is transitioning once again. During World War II, the Axis countries posed an existential threat to the United States and the world. The existential threat to the West during the Cold War was the Soviet Union and its communist allies. Realistically, Iraq and Afghanistan did not and do not pose an existential threat to America. However, these two adversaries monopolized the focus of American foreign policy during the past 15–20 years much like Germany, Japan, and the Soviet Union did in the decades prior. World War II and the Cold War were both global conflicts, and few countries were unaffected by them. While not to the same extent, the conflicts in Iraq and Afghanistan have also involved the world, whether discussing countries that are part of a coalition or the global effects of these conflicts. Finally, from an American perspective, there is no easily identified current threat to U.S. national security, much like the situation immediately after World War II and the

Cold War. This lack of an identified threat led to budget cuts throughout the government, specifically the Department of Defense, after World War II and the Cold War, a consequence we are once again experiencing as we disengage from Iraq and Afghanistan. America's security strategy, whether documented in official National Security Strategies or solely derived from policy speeches and decision documents drives intelligence collection and analysis. When there is a strong national strategy against an identified threat, the intelligence community is able to effectively support policymakers and decisionmakers.

The environment today is filled with unknowns that will once again force the intelligence community to attempt to look in all directions at once while maintaining focus on traditional hot spots, such as the Middle East, the Pacific, and a resurgent Russia. Defense budgets are shrinking thanks to budget caps and sequestration, and there appears to be no relief on the way. The increasing prominence of cyber networks and devices to all aspects of modern life could have profound implications for national security policy, and the intelligence that supports it. Offensive cyber operations can be used by state and nonstate actors alike to rapidly deliver attacks from afar, and often these attacks are difficult to attribute. These factors, and others, will stretch the intelligence community and the decisionmakers that it supports. However, a look at previous transitions provides us with three major lessons that can help inform policymakers today.

First, as intelligence collection capabilities grow and enter new arenas, such as the cyber world, the amount of information available can be overwhelming. As early as the late 1940s, USAF intelligence analysts were struggling with what they considered a relatively overwhelming amount of information. While what they were dealing with then would be a simple problem today, it still posed a significant hurdle and needed to be dealt with. The solution posed by the Beacon Hill Commission was to focus collection and requirements based on what was essential:

> We have come to the conclusion, therefore, that we must go back to the concept of the "essential elements of information". With basic intelligence needs more clearly defined at the top, information priorities can be set up for the whole system. Intelligence can then be collected and evaluated more in terms of what it will be used for. (Project Lincoln, 1952, p. 3)

This is not different from what needs to happen today with the massive amount of data and information available. The value in these data and their manipulation is high, but if analysts are not pointed in the right direction by policymakers, time will be lost seeking the wrong answers. To get around this problem, intelligence professionals and the decisionmakers they support must work together to identify their intelligence collection priorities, informed not only by a National Security Strategy but also the interests of the government agency for which they work. This objective was a foundational intelligence concept laid out by Sherman Kent in his pivotal 1949 work, *Strategic Intelligence for American World Policy*. In it, he has an entire chapter titled "Producers and Consumers of Intelligence" that begins, "There is no phase of the intelligence business which is more important than the proper relationship between intelligence itself and the people who use its product" (Kent, 1949, p. 180).

These focus areas are a second lesson that the intelligence community needs to learn in today's environment. During a period of transition, national interests can often stray into areas typically not targeted by intelligence collection. This occurred not only at the end of the Cold War but also during the 1960s and 1970s as American interests in Vietnam dwindled. Targets that previously were not important enough to be at the top of the collection deck suddenly became priorities, and eventually the intelligence community had to stretch to satisfy requirements that were no longer of the traditional variety. After the Cold War, the environment and acquired immunodeficiency syndrome became intelligence targets. After Vietnam, it was food resources and population growth. This type of distraction is already occurring today as noted in a *New York Times* article in February 2015 where the current administration has introduced "an aggressive plan for taking on traffickers [of wildlife] that will include using American intelligence agencies to track and target those who benefit from the estimated $20-billion-a-year market" (Nixon, 2015). The key to preventing this kind of distraction is a strong national strategy that matches changing intelligence community resources. The release of the 2015 National Security Strategy in February would be of limited help because it did little to prevent this drift into nontypical intelligence targets. While traditional strategic risks are highlighted within the strategy, there are also those that might be of limited strategic value. These include such areas as infectious diseases, economic crises, and global climate change (Obama, 2015, p. 2).

While monitoring the areas of strategic risk identified within the National Security Strategy, the intelligence community must also observe traditional adversaries, such as China, North Korea, and a resurgent Russia, and how they might employ forces against U.S. interests. This is the third significant lesson that should be noted by policymakers and the intelligence community: how wars will be fought in the future. Nation-states and nonstate actors alike have observed how America operates militarily and diplomatically since World War II. More importantly, they have learned how the United States employs power throughout the world and have taken away that the only way to be successful against U.S. might is through asymmetric means. This is currently manifesting itself in two ways. The first is called hybrid warfare and is not significantly different from what U.S. forces faced in Vietnam. Conventional and nonconventional forces working together and utilizing both traditional and nontraditional means can pose quite a dilemma for operational forces and the intelligence capabilities that support them. This technique has been recently employed by Russian forces in Crimea and Ukraine. The second method for employing asymmetric means against a superior force has gathered the moniker anti-access and area denial, and it is a combination of conventional forces and a specific targeting of perceived weaknesses through such advanced techniques as cyberattack or electronic warfare. China and, to a lesser extent, Iran are developing capabilities to operate in this manner against U.S. forces.

No matter which version of asymmetric warfare the United States might face, the intelligence community must be prepared to support forces at all levels. Recent conflicts have driven the focus of intelligence into the counterinsurgency and counterterrorism realms. However, the

intelligence community must not neglect the collection and analysis of information at the high end of the military spectrum, which includes the cyber and space domains. By remaining focused in one area, there is a distinct possibility that analysts will miss a significant threat at a different level that can have devastating effects on military forces. Only by maintaining capabilities across the entire range of military operations can the intelligence community effectively support American foreign policy during a significant transition period in a complex environment, such as the one the United States is experiencing right now.

In 1994, during the last significant transition period, Joseph Nye described the structure of world politics as a three-dimensional chess game. This game consisted of a unipolar military board on which the United States was king; a multipolar economic board with the United States, Japan, and European Union being the power players; and finally a nonpolar bottom board on which relationships outside of government control, such as terrorism and drug trafficking, ruled the day (Nye, 1994, p. 87). Today's structure is not significantly different and is arguably more complex. Foreign policy experts must be able to play the game at all levels against both traditional and nontraditional enemies. In an environment with an unidentified enemy, whose intentions and techniques are unclear, the nation must have a broad intelligence capability to succeed. This can be accomplished only by a well-resourced intelligence community that is directed by a strong National Security Strategy.

Appendix B. Analyst Survey

As described in Chapter One, the research methodology relied on information from a survey of USAF ISR professionals. The USAF issued the call for voluntary participation in February 2015. We protected participant names and affiliations and did not make them known to the USAF. The survey response rate was 22 percent (52 out of 250). We reproduce the survey questionnaire in this appendix.

(U) Survey: Leveraging the Past and Preparing for the Future of AF ISR Analysis

Prepared by

The RAND Corporation

2015

(U) Instructions

(U) RAND is conducting a research project entitled *Air Force ISR Enterprise: Leveraging the Past to Prepare for the Future*. This RAND Project AIR FORCE project is sponsored by Lt Gen Robert Otto, AF/A2. The objective of this survey is to collect Subject Matter Expert (SME) opinions from across the USAF ISR and operational community about the nature of future threats and how ***analysis*** of ISR can help planning for and execution of future operations. Your participation in this fifteen-minute survey will greatly assist RAND in developing recommendations related to which capabilities and skills the USAF ISR community will need to conduct effective ISR analysis in the future. Although you may not directly benefit from participating, your answers will assist RAND in helping the Air Force as a whole prepare for future operations. If you do chose to participate, your responses will be confidential and will not be attributed to you in any publications of this research.

(U) Please accurately mark the classification of your responses and return your survey to RAND's point of contact (below) via SIPRNet or JWICS (whichever is appropriate to the classification level of your responses) no later than March XX 2015:

(U) Lt Timothy Smith
(U) NIPR: tsmith@rand.org
(U) SIPR: tsmith@sm.rand.pentagon.smil.mil
(U) JWICS: timothy.smith@la.ic.gov

(U) If you have any questions or problems regarding the study, please contact the project's principal investigator:

(U) Dr. Brien Alkire
(U) NIPR: brien@rand.org
(U) SIPR: brien@sm.rand.pentagon.smil.mil
(U) JWICS: Brien.Alkire@LA.ic.gov

(U) (310) 393-0411 x6050

(U) If you have any questions or concerns about your rights as a participant in the research study, please contact Dr. Jim Tebow, tebow@rand.org, 310-393-0411 x7173.

UNCLASSIFIED

CONSENT TO PARTICIPATE

I have read this statement, and I understand what it says. I agree to participate in this study under the conditions outlined above. I also acknowledge that I have received a copy of this form.

Signature_____
Date_____

Printed Name_____

UNCLASSIFIED

(U) Survey Questions

(U) Please provide your answers with the appropriate classification markings.

1. (U) Please provide the following background information:

- (U) Organization:

- (U) Rank or grade:

- (U) Total years of experience in the USAF:

- (U) Identify, and indicate total years of experience within, your current ISR focus area (e.g., airborne SIGINT, FMV operations) and/or Area of Responsibility (AOR) (e.g., in a particular COCOM):

- (U) What other areas do you have experience in?

2. (U) What are the ***key ISR contributions by your organization*** (e.g., through analysis products and services) if you are primarily an analysis producer? What are the ***key ISR contributions to your organization*** if you are primarily an analysis consumer?

(U) How might the ***ISR contributions*** identified above have to ***evolve*** in the ***next five to ten years*** to meet the challenges of new operating environments?

3. (U) If you work within an organization focused on generating analysis products and services, what are the ***most significant challenges experienced*** in performing analysis and production?

(U) What will be the ***most significant challenges*** for performing analysis and production ***in the next five to ten years***?

4. (U) Are there ***aspects of ISR support to operations*** developed over the past thirteen (or so) years that should be ***formally institutionalized*** so that they can be effectively employed in the future – if yes, what are they?

5. (U) Are there any ***areas*** in which the ***ISR Enterprise needs to be more agile (able to move quickly and easily)*** in the way its members develop new analytical capabilities or shift analytical focus? If yes, how and why?

UNCLASSIFIED
[Please mark appropriate classification]

6. (U) Considering ISR operations in current and future environments:

(U) What are the ***top three types of training or education*** that are beneficial or necessary for you to complete your current job/position requirements?

(U) What are the ***top three experiences and skills*** that are beneficial or necessary for you to complete your current job/position requirements?

7. (U) Is there ***anything else*** you would like to tell us related to USAF ISR analysis and support to operations?

(U) Thank you for participating in this survey. Please ensure that your answers include the proper classification markings.

UNCLASSIFIED
[Please mark appropriate classification]

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This report describes steps the U.S. Air Force can take to help ensure that it has the capability needed to provide intelligence analysis support to a broad range of service and combatant commander needs, including support to ongoing irregular warfare operations, and to conventional warfare with a near-peer competitor. It describes lessons from past operations that have direct implications for Air Force intelligence analysis or that Air Force intelligence analysis could help to address. It also describes future challenges for Air Force intelligence analysis. It makes recommendations related to doctrine, training and career field development, analysis tools, and processes that can help to address the lessons from the past and prepare Air Force intelligence analysts for the challenges of the future.

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