



Calhoun: The NPS Institutional Archive
DSpace Repository

Reports and Technical Reports

Faculty and Researchers' Publications

2012-04

The NATO special operations headquarters air warfare center: A smart defense approach

Davis, Arthur; Yoho, Keenan

Monterey, California. Naval Postgraduate School

<https://hdl.handle.net/10945/7008>

This publication is a work of the U.S. Government as defined in Title 17, United States Code, Section 101. Copyright protection is not available for this work in the United States.

Downloaded from NPS Archive: Calhoun



<http://www.nps.edu/library>

Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

NPS-DA-12-001



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

**THE NATO SPECIAL OPERATIONS HEADQUARTERS AIR
WARFARE CENTER:
A SMART DEFENSE APPROACH**

Edited by

Lt Col Arthur D. Davis & Dr. Keenan D. Yoho

April 2012

Approved for public release; distribution is unlimited

Prepared for: NATO Special Operations Headquarters
Avenue de Tirana, Bldg 208
B-7010 SHAPE, Belgium

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			<i>Form Approved</i> OMB No. 0704-0188		
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE 15-04-2012		2. REPORT TYPE Technical Report		3. DATES COVERED (From - To) Oct 2011 – Apr 2012	
4. TITLE AND SUBTITLE The NATO Special Operations Headquarters Air Warfare Center: A Smart Defense Approach			5a. CONTRACT NUMBER		
			5b. GRANT NUMBER		
			5c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S) Lt Col Davis, Arthur, D. and Dr. Yoho, Keenan, D., Editors			5d. PROJECT NUMBER		
			5e. TASK NUMBER		
			5f. WORK UNIT NUMBER		
7. PERFORMING ORGANIZATION NAME AND ADDRESS Department of Defense Analysis, Naval Postgraduate School 589 Dyer Rd Monterey, CA 93943			8. PERFORMING ORGANIZATION REPORT NUMBER NPS-DA-12-001		
9. SPONSORING / MONITORING AGENCY NAME AND ADDRESS Lt Col Michael Maksimowicz NATO Special Operations Headquarters Avenue de Tirana Bldg 208 B-7010 SHAPE, Belgium			10. SPONSOR/MONITOR'S ACRONYM(S) NSHQ		
			11. SPONSOR/MONITOR'S REPORT NUMBER(S)		
12. DISTRIBUTION / AVAILABILITY STATEMENT Distribution A. Approved for public release; distribution is unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT This report was prepared for NATO Special Operations Headquarters to assist with the organizational design, resourcing and selection of air assets to enable the creation of an Air Warfare Center (AWC). This report represents a collaborative effort between the Defense Analysis Department and the Graduate School for Business and Public Policy conducted with the support of both NATO and the US Special Operations Command. Areas of research emphasis include the justification for an organic special operations air capability within NATO, proposed organizational structure for the AWC, procurement and sustainment of excess defense articles and possible near and long term solutions for rotary and fixed wing aviation assets.					
15. SUBJECT TERMS NATO SOF, Excess Defense Articles, Smart Defense, Rotary Wing Aviation, Fixed Wing Aviation					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF	18. NUMBER OF	19a. NAME OF RESPONSIBLE PERSON
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (include area code) 831-656-2440

THIS PAGE INTENTIONALLY LEFT BLANK

**NAVAL POSTGRADUATE SCHOOL
Monterey, California 93943-5000**

Daniel T. Oliver
President

Leonard A. Ferrari
Executive Vice President and
Provost

The report entitled “*The NATO Special Operations Headquarters Air Warfare Center: A Smart Defense Approach*” was prepared for NATO Special Operations Headquarters, Future SOF Air/Aviation Concepts.

Further distribution of all or part of this report is authorized.

This report was prepared by:

Dr. Keenan D. Yoho
Editor
Graduate School of Business and
Public Policy

Lt Col Arthur D. Davis
Editor
National Defense Fellow

Reviewed by:

John Arquilla, Chairman
Department of Defense Analysis

Released by:

Douglas Fouts
Interim Vice President and
Dean of Research

THIS PAGE INTENTIONALLY LEFT BLANK

Contributors

Dr. Keenan Yoho, Professor, Graduate School of Business and Public Policy

Mr. Brian Greenshields, Senior Lecturer, Department of Defense Analysis

Lt Col Arthur Davis, National Defense Fellow, Air University

Lt Col Thomas Brand, German Army, Student, Department of Defense Analysis

Major Steven Ayre, USAF, Student, Department of Defense Analysis

Maj Eric Carrano, USAF, Student, Department of Defense Analysis

MAJ Marcos Cervantes, USA, Student, Graduate School for Business and Public Policy

Capt James Cox, USAF, Student, Department of Defense Analysis

LT Anthony DiCola, USN, Student, Graduate School for Business and Public Policy

MAJ Christopher Enderton, USA, Student, Graduate School for Business and Public Policy

Maj Jeremy Hough, USAF, Student, Department of Defense Analysis

Maj Andrew Jett, USAF, Student, Department of Defense Analysis

LCDR Stephen Jones, USNR, Student, Graduate School for Business and Public Policy

Maj Andy Kraag, Royal Netherlands Marine Corps, Student, Department of Defense Analysis

Maj Brage Larssen, Norwegian Army, Student, Department of Defense Analysis

LCDR Philip Lowrey, USN, Student, Graduate School for Business and Public Policy

MAJ Joshua Powers, USA, Student, Graduate School for Business and Public Policy

Maj Shamsul Rahman, Malaysian Air Force, Student, Department of Defense Analysis

Maj Andrew Sheehan, USAF, Student, Department of Defense Analysis

Maj Martin Weeks, USAF, Student, Department of Defense Analysis

Maj Walter Winter, USAF, Student, Department of Defense Analysis

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Preface <i>Lt Col Arthur Davis</i> _____	1
Justifying the Need	
Why NATO Needs Special Operations Aviation <i>Maj Steven Ayre and Maj Jeremy Hough</i> _____	2
How Can a NATO SOF Air Wing Best Support NATO Special Operations <i>Lt Col Thomas Brand, Maj Andy Kraag, Major Brage Larssen and Maj Shamsul Rahman</i> ____	12
Organizational Alternatives	
The NATO SOF Air Wing: Organizing for Uncertainty <i>Maj Eric Carrano, Maj Shamsul Rahman and Maj Andrew Sheehan</i> _____	21
The NATO SOF Air Wing: A Basing Strategy <i>Maj Andrew Sheehan and Capt James Cox</i> _____	39
Rotary Wing Aviation	
Near Term Rotary Wing Aviation Needs: Acquisition and Program Management of Excess Defense Articles <i>MAJ Marcos Cervantes, MAJ Christopher Enderton and MAJ Joshua Powers</i> _____	52
Analysis of Alternatives for Rotary Wing Aviation: SH-60F vs. UH-72A <i>LCDR Stephen Jones, LCDR Philip Lowrey and LT Anthony DiCola</i> _____	67
Fixed Wing Aviation	
A Light Aircraft for Lean Times: Options for NATO SOF <i>Maj Marty Weeks</i> _____	88
A Medium-Sized Airlift Analysis for NATO SOF <i>Maj Walter Winter</i> _____	103
Summary <i>Dr. Keenan D. Yoho</i> _____	121

THIS PAGE INTENTIONALLY LEFT BLANK

Preface

Lieutenant Colonel Arthur D. Davis, National Defense Fellow, Naval Postgraduate School

In the summer of 2011, the commander of NATO's Special Operations Headquarters asked a friend and former Air Commando serving on the faculty of the Naval Postgraduate School what a special operations aviation capability should look like and inquired whether he had any students interested in this line of research for their graduate thesis work. The commander was preparing to unveil his vision for a Special Operations Air Warfare Center, and though staff officers were at work answering this question, help from academia would be welcome. From those early email exchanges emerged a collaborative effort wholly different from the department's traditional practice of producing individual research projects along an 18-month graduation timeline. In collaboration with the Graduate School of Business and Public Policy, the Defense Analysis Department formed a multi-disciplinary team of 18 US and international officers from several military specialties to address several important questions related to the formation of a NATO SOF air capability.

Our mini "think tank" approach involved collaboration across academic departments and was enabled by support from NATO, US Special Operations Command and various service departments. All data used in this research is open source and derived from industry and military acquisition and program management channels. By combining this data with the resources and faculty from a world class academic institution, the team was able to fully realize the tremendous potential evident in such a pairing. The potential for other such collaborative projects should not be ignored.

The eight sections contained in this report provide possible solutions to questions ranging from training, organization, basing and rotary/fixed wing aircraft selection. This work is the culmination of six months of research by a team of dedicated military professionals and epitomizes the synergy between operational experience and academic endeavor. While several of these projects will continue and become more in-depth stand-alone theses, the research contained in this report provides an excellent justification and point of departure for the development of a much needed combined SOF air capability for NATO.

Why NATO Needs Special Operations Aviation

Major Steve Ayre, USAF and Major Jeremy Hough, USAF

In November of 2006, the North Atlantic Treaty Organization (NATO) convened the Riga Summit where “heads of State and Government of NATO’s 26 member countries gathered for [only] the eighth time since the end of the Cold War.”¹ The summit was historically meaningful based solely on its location in a now democratic Latvia. Of equal significance, however, was the summit’s establishment of a NATO Special Operations Forces (SOF) component. In Riga, the Alliance “launched a special operations forces transformation initiative to increase joint training and doctrine development, improve equipment, and enhance interoperability.”²

“Much has changed in the short time since the NATO Special Operations Forces Transformation Initiative (NSTI) was launched at Riga in 2006.”³ These significant changes have transpired against the backdrop of the largest NATO mission ever attempted, as the International Security Assistance Force in Afghanistan.⁴

We have seen the establishment of the NATO Special Operations Forces Coordination Centre, and its maturation into the NATO Special Operations Headquarters (NSHQ). At the same time, we have seen a growing level of capability and effectiveness of NATO Special Operations Forces (SOF) in NATO’s ongoing operations, and a measureable increase in advanced skill-sets and interoperable processes.⁵ – Lt Gen Frank J. Kisner, Commander NSHQ

Combined with universally shrinking budgets, the all too current and potent lessons from Afghanistan are shaping the force structures of tomorrow not only for NATO member and partner nations individually, but for the Alliance itself.

The Alliance is committed to the creation of an Afghanistan that is stable and that does not serve as a platform for international terrorist activity; it should continue working with its partners to achieve this strategically important objective.

¹*Riga Summit Reader’s Guide* (Brussels: NATO Public Diplomacy Division, 2007), accessed March 21, http://www.nato.int/nato_static/assets/pdf/pdf_publications/20120117_rdr-gde-riga-e.pdf, 4.

²*Ibid.*, 41.

³LtGen Frank J. Kisner, NATO Special Operations Forces CPM Forum, no. 2, 5.

⁴North Atlantic Treaty Organization, *NATO 2020: Assured Security; Dynamic Engagement* (Brussels: NATO Public Policy Division, 17 May 2010), 9.

⁵Kisner, 5.

Looking to the future, the Allied experience in Afghanistan is a rich source of lessons to be learned.⁶

In September 2006, NATO assumed overall responsibility for all military operations in Afghanistan. Later when NATO employed Alliance SOF in combat missions, it became clear that a major constraint limiting SOF effectiveness was the absence of an organic NATO SOF Air Component. The resulting problem lies in the inability of NATO SOF “to support NATO’s level of ambition due to the lack of dedicated air assets.”⁷

What is SOF?

To properly define SOF, not only must we focus on the mission, but also the strategic value of the mission. Perhaps one of the most widely referenced definitions of a special operations mission is given by Dr. John Arquilla. He broadly defines special operations “as that class of military (or paramilitary) actions that fall outside the realm of conventional warfare during their respective time periods.”⁸ Similarly, Arquilla also correctly notes that “this places significant emphasis on the *coup de main* by small forces whose aim is to achieve very substantial effects upon the course of a war of international crisis.”⁹

Typically special operations missions operate at different levels of risk than conventional operations, but for good reason, since “tactical mission failure can have strategic consequences. . . . SOF missions may be high risk in general, but they are lower risk when conducted by SOF instead of conventional forces.”¹⁰

The strategic effects achieved by properly utilized special operations forces provide a valuable asset to their respective beneficiary. These forces are able to defy “conventional wisdom by using a small force to defeat a much larger or well-entrenched opponent.”¹¹ In a time of

⁶North Atlantic Treaty Organization, *NATO 2020*, 9.

⁷ Manuel Diwa, “NATO SOF Air Enabler Study” (briefing, Naval Postgraduate School, Monterey, CA, July 23, 2011).

⁸ John Arquilla, ed., *From Troy to Entebbe: Special Operations in Ancient and Modern Times* (Lanham, NY: University Press of America, 1996), xvi.

⁹ *Ibid.*

¹⁰ David Tucker and Christopher J. Lamb, *United States Special Operations Forces* (New York: Columbia University Press, 2007), 151.

¹¹ William H. McRaven, *Spec Ops: Case Studies in Special Operations Warfare* (New York: Presidio Press, 1995), 1.

shrinking budgets and reductions in military spending, “SOF can provide a hedge against strategic surprise by identifying and working preemptively to address problems before they become conflicts.”¹² In the United States specifically, SOF are continually viewed “as the nation’s highest return-on-investment military force.”¹³

NATO SOF Ambitions

NATO continues to develop an autonomous SOF capability in support of NATO’s bedrock principle of collective security. An organic and interoperable NATO SOF capability will not only enhance mutual security but individual security of member nations as well. The inclusion of the SOF air capability in future NATO forces, as well as individual member and partner nations will increase the security of the alliance against future threats because “the most probable threats to Allies in the coming decade are unconventional.”¹⁴

[T]he danger posed by unconventional threats has obvious implications for NATO preparedness, including its definition of security, its conception of what constitutes an Article 5 attack, its strategy for deterrence, its need for military transformation, its ability to make decisions rapidly, and its reliance for help on countries and organizations from outside the Alliance.¹⁵

SOF Air

As NATO continues combat operations in Afghanistan, the principal lesson to be learned is that “NATO SOF is [currently] unable to support the NATO level of ambition due to the lack of dedicated air assets.”¹⁶

While 25 NATO nations possess standing Special Operations Forces, very few have the ability to tactically project their SOF through organic air mobility. Even fewer have the ability to support SOF with airborne Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR). Relying upon the few NATO Special Air capable nations to fill collective special operations aviation needs has not proven feasible. Reliance on non-dedicated air support, through conventional

¹²Admiral William H. McRaven, Statement to the Senate, Armed Service Committee, SOCOM Posture Statement, Hearing, March 6, 2012.

¹³Admiral William H. McRaven, Statement to the House, Armed Services Committee, Emerging Threats and Capabilities Subcommittee, Hearing, September 22, 2011.

¹⁴*NATO 2020*, 17.

¹⁵*NATO 2020*, 17.

¹⁶Diwa.

tasking authority, is equally disadvantageous due to scarcity of resources, lack of a habitual training relationship, and unfamiliarity with the SOF mission.¹⁷

During 2008 and 2009 in Afghanistan, NATO SOF missions were often unable to be executed due to a lack of aviation support. Simply a lack of airframes made it impossible to action targets. In some instances promised and planned lift assets were shifted to another NATO SOF or conventional unit based on commander's priorities. In other situations the aviation unit was unable to provide anticipated lift due to unforeseen late-emerging requirements of their own, which took precedence. Regardless of the reason, *the effect was NATO SOF being unable to execute a mission when they were otherwise capable and ready to do so.*¹⁸

This is not to say that NATO SOF requires its own fleet of MC-130s. While the AFSOC MC-130 Combat Talon/Shadow platform is most often chosen to conduct every type of airlift mission in support of SOF, not all missions require such a technically advanced aircraft. The reality is, while "AFSOC is 'flying the wings off' it's Combat Talons," many missions could be accomplished by a simpler, more cost effective airframe.¹⁹ A similar low cost, low technology airframe could also fulfill the needs of NATO SOF Air Component.

According to Joint Special Operations University Report 06-9, *Special Operations Aviation in NATO*, "to qualify as NATO SOF aviation, the recommendation is to require the ability to fly fixed- and rotary-wing aircraft, low level, in formation, to a precise location, meeting strict time-on-target criteria, using night vision devices. In addition, fixed-wing special operations aircraft must be capable of landing and taking off from austere airfields with minimum runway lighting using night vision devices."²⁰

"The likely future operating environment, characterized by a distributed, non-contiguous battlespace, will not require every special operations aircraft to possess the full suite of defensive

¹⁷ North Atlantic Treaty Organization Special Operations Headquarters, *Special Operations Air Group: Concept for Development & Organization* (Brussels, BE: NATO Public Policy Division, April 22, 2010), 1.

¹⁸ *Special Operations Air Group*, 8.

¹⁹ Richard D. Newton, *JSOU Report 06-8: Special Operations Aviation in NATO* (Hurlburt Field, FL: The JSOU Press, 2006), accessed March 21, 2012, http://usacac.army.mil/cac2/cgsc/carl/docrepository/JSOU_Report_06_8.pdf, 6.

²⁰ Newton, 8.

systems and airspace penetration aids.”²¹ If NATO SOF does find itself in need of such an aircraft, at that time NATO can call on the United States to support via the Theater Special Operations Command. Until then, NATO SOF would be able to support itself with its own organic air, freeing US assets for other missions.

To the extent that NATO SOF have to rely on non-organic lift to support them, they are limited and are unable to fully utilize inherent capabilities. Relying on borrowed lift frequently means that the lift is available at a time of convenience to the providing unit, and it is only by chance when that time happens to be advantageous to the requesting unit. . . . Similarly, missions are cancelled due to rehearsal time requirements imposed by the aviation unit based on the riskiness of the mission profile which the SOF unit was unable to meet.²² The bottom line is that fielded NATO SOF cannot consistently count on non-organic aviation to fill air requirements. This arrangement becomes problematic when coupled with the no-fail missions Alliance members are counting on NATO to execute. *This undermines the fundamental existence of NATO SOF.*

For SOF units that train together habitually with the aviation unit supporting them, the rehearsal time for similar mission profiles was cut to several hours because both the crews and the operators had trained and executed that mission profile.²³

While the principal need of SOF forces in Afghanistan is mobility, a SOF air capability must be able to support the full spectrum of SOF operations: Direct Action (DA), Special Reconnaissance and Surveillance (SR&S), and Military Assistance (MA). Due to mission complexity, aviation enablers are integrated into and operate as part of a Special Operations Task Group.²⁴ The fundamental requirement for SOF to be organic to NATO provides the level of integrated planning and training essential for successful special operations.

²¹Ibid., 9.

²²*Special Operations Air Group*, 8.

²³Ibid., 9.

²⁴Ibid., 7.

The NATO SOF Air Component could also serve as a logical extension of aviation foreign internal defense (AvFID) by enabling several of the key duties which, according to AFDD 3-05, combat aviation advisors perform and include:

- Conduct local or regional assessments of foreign aviation forces' capabilities to employ and sustain aviation resources.
- Working through the special operations liaison element (SOLE), CAAs make recommendations to the JFACC regarding capability of foreign aviation units to support combined air operations plan objectives.
- Promote safety and interoperability between US forces and coalition partners.
- Act as an air and space power force multiplier by developing and executing tailored training programs to increase the tactical effectiveness of HN aviation resources in support of the combatant commander's objectives.
- Provide assistance to aviation forces in direct participation of FID, CS, UW, humanitarian relief/assistance, and disaster relief.²⁵

Perhaps most importantly, a NATO SOF Air Component can perform these duties without drawing from other theater assets.

Alternatives

The primary alternative to having an organic NATO SOF Air Component would be to create an *ad hoc* organization each time a NATO SOF mission requiring air support arises. Historically, an *ad hoc* organizational structure has not proven to be successful, except in cases where such organizations are given adequate time to train/rehearse prior to mission execution. In these cases, during the course of constant rehearsals, relationships are formed amongst the team and the organization becomes almost organic. Despite this ability to become pseudo-organic units over time, *ad hoc* organizations still have several disadvantages. Because, "it makes it harder for those entrusted with the mission to enlist the assistance of other organizational units, both within and outside the military because *ad hoc* task forces lack regular, long-standing ties to these

²⁵AFDD 3-05: *Special Operations* (Washington, D.C.: United States Air Force, 2011), accessed March 20, 2012, <http://www.e-publishing.af.mil/shared/media/epubs/AFDD3-05.pdf>, 11.

organizations.”²⁶ Furthermore, *ad hoc* organizations and forces are also typically plagued by various differing operating procedures.²⁷ This hurdle can also be overcome with rehearsals and training, but again, this may take time not available in the course of a crisis. Even if forces are drawn from the same service, “it takes more to achieve teamwork than familiarizing each element with the routines and procedures of the others. A combat force truly functions as a team only when each member knows the strengths and weaknesses of the others, understands their thinking, reacts as they do in similar situations, and fully trusts them.”²⁸ These elements are essential in forming a cohesive unit which can function as a team under the high odds and significant pressure present in special operations and “anything less than a totally cohesive force is courting disaster.”²⁹

Assembling a standing organization has several advantages. The first is the ability to create and nurture relationships with other organizations, especially in the critical area of intelligence.³⁰ Second, is the natural but crucial cohesion and teamwork which will result from constantly training together.³¹ Finally, and perhaps most important, “a standing special operations organization, with a permanent cadre of specially trained forces also makes it possible, in a crisis, to devise more quickly an effective special operations response.”³²

“Rigorous training and rehearsals of the mission are integral to the conduct of all operations because of the inherent complexity and high risk associated with these missions.”³³ The demands of special operations are extraordinary on personnel and “demanding tasks require knowledgeable, trained individuals.”³⁴ A NATO SOF Air Component would create a habitual relationship with NATO SOF ground forces beyond that seen today within the Theater SOC. There is a significant difference between knowing that a NATO SOF team trained with an AFSOC unit sometime in the recent past and actually being the aircrew which trains with the

²⁶ Lucien S. Vandenbroucke, *Perilous Options: Special Operations as an Instrument of U.S. Foreign Policy* (New York: Oxford University Press, 1993), 158.

²⁷ *Ibid.*

²⁸ *Ibid.*, 159.

²⁹ *Ibid.*

³⁰ *Ibid.*, 171.

³¹ *Ibid.*

³² *Ibid.*

³³ *AFDD 3-05*, 27.

³⁴ *Ibid.*, 31.

NATO SOF team on a daily basis. While not eliminating the need for repeated and realistic rehearsals and training, this relationship would maximize the synergistic tenet of air power as well as increase relative superiority and thereby increasing the overall effectiveness and success rate of NATO SOF.

Another possible alternative to an organic NATO SOF Air Component would be to utilize conventional forces to support NATO SOF. This is a logical choice for large scale mobilizations requiring intra-theater airlift and the NATO Mobility Air Wing is quite suitable for this task. However, the accepted doctrine simply does not allow such a solution for actual complex special operations.

Risk

The current Special Operations community in the United States was largely designed in response to the failed rescue of the hostages in Iran in March of 1980. In the years that followed the debacle in Iran, the US formed both the Joint Special Operations Command (JSOC) and the US Special Operations Command (SOCOM). JSOC and SOCOM were formed in hopes that we could avoid Iran-like mistakes in the future. According to William McRaven in his book *Spec Ops: Case Studies in Special Operations Warfare*, “. . . special operations forces succeed, in spite of their numerical inferiority, when they are able to gain relative superiority through the use of a simple plan, carefully concealed, repeatedly and realistically rehearsed, and executed with surprise, speed, and purpose.”³⁵ Many of pitfalls detailed by McRaven would be avoided by developing an organic SOF air capability. The obvious risk of failure is another Iran type mistake only this time at the multinational NATO level. At a time when NATO is busier than it has ever been since inception in 1949, a failed operation could result in a failure to “retain the public backing and financial support it must have to perform critical tasks well.”³⁶

US Support

Admiral McRaven highlights the United States’ responsibility in his Statement to the Senate, Armed Services Committee:

³⁵McRaven, *Spec Ops: Case Studies in Special Operations Warfare*, 11.

³⁶NATO 2020, 5.

USSOCOM is also the lead component with executive agent-like responsibilities for the North Atlantic Treaty Organization SOF Headquarters responsible for strengthening the role of and fostering special operations capabilities within NATO. This includes advocacy for resources, personnel, and funding within DoD; sharing best practices and lessons learned; and providing the latest releasable U.S. policy, strategy, operations, tactics, and training for NSHQ-supported SOF. This advances a worldwide network of SOF professionals conducting operations to increase, return, or develop peace and stability in support of U.S. national interests.³⁷

As a framework nation, the US holds a responsibility to prepare NATO for success. As the owner of one of the world's most experienced and effective SOF forces it is an American responsibility to pass the capability to NATO, in terms of knowledge, equipment, and training. This SOF partnership will not only benefit the collective security of NATO, but also the security of the US at home and abroad.

Conclusions and Recommendations

It is important to note that all of these conclusions are firmly based on current United States Air Force and Joint doctrine. The NATO SOF Air Component concept is also further supported by the irregular warfare truths for airmen, specifically that “effective working relationships between people and organizations are key to success in IW. Coordinated effort across the spectrum of operations is vital and success often hinges on effective interpersonal relationships.”³⁸ These relationships are not just important amongst operator to operator, but also both up and down the chain of command.

JP 3-05 *Special Operations* highlights the importance of command and control (C2) of SOF. When conducting combined operations within the NATO construct, the importance of C2 is even more significant. In particular, JP 3-05 instructs commanders to:

1. Provide for a clear and unambiguous chain of command.
2. Avoid frequent transfer of SOF between commanders.
3. Provide for sufficient staff experience and expertise to plan, conduct, and support the operations.

³⁷McRaven, Statement to the Senate, Armed Service Committee, March 6, 2012.

³⁸*AFDD 3-24: Irregular Warfare* (Washington, D.C.: United States Air Force, 2011), accessed March 20, 2012, <http://www.e-publishing.af.mil/shared/media/epubs/AFDD3-24.pdf>, 9.

4. Integrate SOF early in the planning process.
5. Match unit capabilities with the mission requirements.³⁹

An *ad hoc* relationship based on support from Special Operations Command – Europe aviation assets or even other SOF assets within US Central Command or other Combatant Commands simply will not provide the foundation which NATO SOF requires. Only an organic organization with a regular working relationship with the unit will enable NATO SOF to succeed at the level of expectation member nations have set. All of these goals could be met by creating a NATO SOF Air Component within NSHQ. This arrangement will eliminate or reduce the transfer of aviation assets from the US Theater Special Operations Component to NATO on a mission to mission basis. Unit members would have a clear and static chain of command through NSHQ as well as opportunities for staff and other support functions within the NATO structure. Since the air component would train on a daily basis with ground SOF, unit members would be integrated in the planning process from the onset.

In order to provide a framework for these relationships to develop and grow, NATO SOF needs to move beyond random and disparate bilateral relationships and large choreographed exercises. . . . *Ad hoc* random partnerships cannot build the level of mutual trust and confidence needed for better interoperability on the battlefield. . . . [Rather,] the optimal arrangement is dedicated SOF air platforms under the command of a SOF air component that specializes in providing the required capabilities to support special operations. . . . *Ad hoc* arrangements with rotational supporting aircrews and airframes are simply contrary to effective special operations and greatly increase the likelihood of catastrophic mission failure.^{40,41}

³⁹ *Joint Publication 3-05: Special Operations* (MacDill Air Force Base, FL: United States Special Operations Command, 2011), accessed March 20, 2012), http://www.dtic.mil/doctrine/new_pubs/jp3_05.pdf, III-1.

⁴⁰ *North Atlantic Treaty Organization Special Operations Forces Study* (North Atlantic Treaty Organization Special Operations Coordination Centre, 2008), accessed March 20, 2012, http://www.nshq.nato.int/NSHQ/GetFile/?File_ID=29, 34.

⁴¹ *Ibid.*, A2.

How Can a NATO SOF Air Wing Best Support NATO Special Operations? A Ground Operator's Perspective

Lt Col Thomas Brand, German Army, Major Andy Kraag, Royal Netherlands Marine Corps, Major Brage Larssen, Norwegian Army and Major Shamsul Rahman, Malaysian Air Force

It's April 2020. Terrorists in an unnamed desolate rough country have taken 53 European citizens hostage during a violent raid at a European Union (EU) facility. The hostages are from seven different NATO countries. Over the past few weeks, all diplomatic means to free these hostages have been exhausted, and the European community is considering taking multinational military action to resolve the situation. NATO Special Operations Forces Headquarters (NATO SOF HQ) is asked to present viable hostage rescue options. Sound familiar?

This hypothetical scenario is similar to the challenge that US Special Operations Forces faced in April of 1980 when 53 US citizens were taken hostage in the American Embassy in Tehran, Iran. That infamous rescue operation ended in disaster when a helicopter collided with a C-130 Hercules transport aircraft on the *DESERT ONE* landing site in a remote area of the Iranian desert, resulting in the death of eight US servicemen and considerable political backlash. The lack of training, coordination and interoperability between the various air and ground units all contributed to this debacle.⁴² From then on, the name *DESERT ONE* has been used as a warning to never again underestimate the complexity in using air assets in special operations. The near future creation of a NATO SOF Air Wing would present an organizational vehicle to prevent a future proverbial *DESERT ONE* scenario for NATO Special Operations Forces. Considering the valuable lessons from history, NATO now has the opportunity to set this new air wing up for operational success.

The idea of a NATO SOF Air Wing emerged from lessons learned in recent deployments (e.g., Afghanistan) where NATO SOF hasn't been able to fully exploit its capabilities due to scarce

⁴² Joint Chief of Staff Commissioned Special Operations Review Group, *The Holloway Commission Report* (Washington, DC: Joint Chiefs of Staff, 1980).

SOF air assets.⁴³ In fact, this shortfall has been detrimental to its overall mission success. Complex questions of organizational design, infrastructure, costs, sustainment, etc. all need to be explored in order to build this new air wing. However, equally important at this stage is not to overlook the human (i.e., soft aspects) that contribute to organizational success. From a ground operator perspective, how can the new NATO SOF Air Wing become a force multiplier? In other words, how does the NATO SOF Air Wing become the number-one air asset contributing to optimizing the employment of NATO SOF maritime and ground forces?

Trustbuilding

Technical skills. According to its mission statement, the NATO SOF HQ is aiming to optimize the employment of SOF by the alliance. This goal is further described as “the intention to make the employment of SOF as perfect, efficient, and effective as possible, so as to deliver to the Alliance a highly agile Special Operations capability across the range of military operations.”⁴⁴ NATO defines special air warfare as “those activities conducted by air/aviation forces using tactics, techniques, and modes of employment not standard to conventional forces. Special air warfare is normally conducted in support of land, maritime, or air SOF across the entire spectrum of conflict.”⁴⁵

Special operations are frequently conducted on the margins of what is possible. When it comes to successful cooperation between the NATO SOF Air Wing and NATO SOF ground and maritime units, a key issue will be trust. Trust is based on expectations about how others are likely to behave in the future. Competence and a common culture among air, ground and maritime SOF components are both necessary conditions for trust.⁴⁶ Imperatively, the required aviation and ground skill sets (i.e., technical skills) of the designated SOF pilots and aircrews have to be aligned with the NATO SOF HQ mission statement and the NATO definition of special air warfare (mentioned above).

⁴³ NATO Special Operations Headquarters (NSHQ), *Special Operation Air Group: Concepts for Development and Organization* (draft) (Mons, Belgium: NATO Special Operations Headquarters, 2010).

⁴⁴ NATO Special Operations Headquarters, Biennial Review, January 2010, 1.

⁴⁵ NATO Special Operations Headquarters, “Special Air Warfare Manual,” Version 1.0 2010, (Mons, Belgium: NATO Special Operations Headquarters, 2010), 3.

⁴⁶ Barbara D. Adams and Robert D.G. Webb, “Trust in Small Military Teams,” 2002, http://www.dodccrp.org/events/7th_ICCRTS/Tracks/pdf/006.PDF (accessed March 16, 2012).

The new SOF Air Wing must prepare its aircrews to execute unorthodox air support tasks that exceed the capabilities of conventional air forces in a medium to high threat environments, located deep inside the enemy's territory.⁴⁷ These requirements introduce a need for additional rigorous and specialized aircrew training in special operations technique, tactics, and procedures. In order to attain the basic special operation level, these additional training elements include: advanced night vision goggles (NVG) flying over land and water, day and night insertion/extraction techniques, tactical approaches/departures, deck landings, multi-story building landings, moving land/maritime vehicles interdiction, specialized personnel recovery techniques, coordinating and directing fires, aerial refueling and many others.⁴⁸ These specific skills sets require finely tuned proficiency that is only built through repetitive joint training between SOF aircrews and operators.⁴⁹ This will not only increase trust and confidence among the aircrews but also between the aircrews and ground forces.

It is also astute to supplement SOF's aircrews in ground training such as advanced survival, escape/evasion, resistance to interrogation and extraction (SERE) and weapons handling in order to ensure their survival in hostile situations. Given the high level of risk during flying, situations may occur where aircrews could be forced to land in enemy territory for reasons such as technical problems, enemy fire or adverse weather conditions. Therefore, these pilots must have the ability to defend themselves from the enemy. If captured, in-depth knowledge of SERE techniques could better prepare the aircrews for those kinds of situations.⁵⁰ More importantly, ground training will also help the aircrews to have a "mental picture" and a better understanding of the objective. That way, they can offer valuable support during planning and the mission phases. It is not surprising that one of the world's most experienced SOF air units, the 160th

47 NSHQ, Special Operation Air Group, 9.

48 NATO, "Criteria for NATO Special Air Operations Capabilities" in the NATO Special Operation Forces Study, (Belgium: NSHQ, 2008), C9-C18; NSHQ, Guidelines for NATO SOF Helicopter Operations (Belgium: NSHQ), 9-10.

49 William H. McRaven, *Spec Ops Case Studies in Special Operation Warfare: Theory and Practice*, (Novato: Presidio Press, 1995), 8-23. Also enhanced by Richard D. Newton, *Special Operations Aviation in NATO: A Vector to the Future*, JSOU Report 06-8 (Hulburt: Joint Special Operations University, 2006), 11. "...it will be the specially selected, trained, and sustained airmen who train extensively and realistically, rehearse repeatedly, and thus fly their equipment better than anyone else to execute their task with surprise, speed, and purpose. Those dedicated and committed special operators (who happen to be airmen) then achieve extraordinary results when less capable airmen would have failed."

50 Michael J. Durant and Steven Hartov, *The Night Stalkers* (New York: NAL Caliber, 2006), 118.

Special Operations Air Regiment (SOAR or Night Stalkers), is taking this kind of ground training very seriously. Its Special Operation Aviation Training Company conducts various courses like entry level and refresher training, which focus on skill development, self-confidence building and teamwork. These courses last five weeks for the enlisted soldiers and up to 24 weeks for rated aviators.⁵¹ With this dedicated and professional ground training, the 160th SOAR is an example for other SOF air units around the world.⁵²

Like the Night Stalkers (i.e., 160th SOAR), the NATO SOF Air Wing will have special requirements when it comes to initial and advanced training. It is important that the leadership is granted the opportunity to investigate and determine which level of achievement the unit should perform at and is given the resources in to meet this level. The needed professionalism and capabilities of the NATO SOF Air Wing should be developed through a “train as you fight” mentality with repetitive joint training between its aircrews and maritime and ground SOF units.⁵³ After all, the first truth in SOF remains that “humans are more important than hardware.”⁵⁴ Thus, not the airplane or helicopter, but the pilot makes the difference in effective mission support for ground and maritime SOF.

Fostering a common culture. Technical skills are a necessary condition in order to fulfil the mission statement of the NATO SOF HQ, optimizing the employment of SOF. However, they are not sufficient without a common culture. Shared values, goals, norms, policies and similarities characterize a common culture. In the *Special Air Warfare Manual*, NATO SOF HQ refers to common culture as the special operations mindset.⁵⁵ The mindset of the pilot is 51 percent of the equation to achieve mission success. The U.S. Air force Special Operations Command (AFSOC) leadership has listed 13 critical attributes that distinguish an elite AFSOC

51 “Green Platoon,” <http://www.globalsecurity.org/military/agency/army/160soar-soatc.htm> (accessed March 15, 2012).

52 Sidney J. Gray and Charles W., Weigandt, “The 160th SOAR: 20 Years of Army Special Operation Aviation,” *Special Warfare*, Vol. 14, No. 3 (Spring 2001).

53 McRaven, *Spec Ops Case Studies in Special Operation Warfare*, 8–23. Also enhanced by Richard D. Newton in *Special Operations Aviation in NATO: A Vector to the Future*, JSOU Report 06-8, (Hulburt: JSOU, 2006), 11.

54 Marshall Billingslea and Charles R. Holland, *United States Special Operations Forces Posture Statement 2003–2004: Transforming the Force at the Forefront of the War on Terrorism* (Washington, DC: Special Operations Command, 2003), 30.

55 NATO Special Operations Headquarters, *Special Air Warfare Manual*, Version 1.0 (Belgium: NATO Special Operations Headquarters, 2010), 3.

Air Commando.⁵⁶ However, according to senior Air force Special Operations Training Center (AFSOTC) personnel, three key attributes are vital for mission success in special operations: drive to succeed (i.e., motivation to get the “job” done), adaptability and flexibility.⁵⁷

SOF pilots need to analyze the crew and leverage their abilities to best meet the needs of the SOF operators on the ground. Furthermore, they need to be able to think unconventionally and divert from standard military conventions when required. The bottom line is that pilots and aircrew can learn to fly planes and perform missions and even develop advanced skills. However, if pilots and aircrew don't have the unconventional mindset represented by the key attributes of adaptability, flexibility and motivation, they will not be able to carry out special operations aviation missions adequately.⁵⁸ These “soft” attributes are needed to develop the SOF community's common culture and tight esprit de corps, which is crucial to the success of a NATO SOF aviation element.

Special Operations Forces possess three unique characteristics: special purpose, special attributes, and special requirements. In addition to special training and uniquely modified equipment, the special requirements of the SOF community include the assessment and selection of their personnel.⁵⁹ The second SOF truth is that “quality is better than quantity.” A small number of people, carefully selected, well trained, and well led, are preferable to larger numbers of troops, some of whom may not be up to the task.⁶⁰ Consequently, the NATO SOF Air Wing should acknowledge this SOF requirement with a rigorous assessment and screening process in order to identify unfit personnel who just want to “wear the unit patch” (be associated with a specialized unit without the necessary mindset/qualifications) and who could become a liability during a mission. When deciding how to best assess and select future aircrews, it will be beneficial to look at how established U.S. special operations aviation units select their personnel to ensure they possess the right skill set and mindset. The U.S. Army's 160th Special Operations

56 “Air Force Special Operations Command,” <http://www.afsoc.af.mil/library/criticalattributes.asp> (accessed February 16, 2012).

57 Senior AFSOTC personnel discussion with NPS NATO Air Study Group, February, 2011.

58 Senior AFSOTC personnel discussion with NPS NATO Air Study Group, February, 2011.

59 Justin Hoffman, “To Hell with the Paperwork:” Deciphering the Culture of the Air Commandos. (master's thesis, Naval Postgraduate School, 2008), 7.

60 Billingslea and Holland. United States Special Operations Forces Posture Statement, 30.

Air Regiment (SOAR) has a fairly rigorous screening process in place. “They actively seek and assess the best-qualified aviators, crew members and support personnel in the Army. Upon selection, commissioned officers, warrant officers and enlisted Soldiers complete respective Basic Mission Qualification courses, known as Green Platoon.”⁶¹ AFSOC also has a screening and selection process called Commando Look, for which a pilot can’t apply without certain experience qualifications.⁶²

Relationships in the SOF community are based primarily on face-to-face contact, which is more information-rich and more likely to inspire trust. Collaborative professional training and education programs, as well as shared experiences in general, stimulate a common culture that builds trust.⁶³ Because the NATO SOF community is fairly small in comparison to any country’s total military apparatus, SOF personnel tend to encounter each other frequently. During these encounters, they develop close personal ties, which promotes rapid trust building. Over the last few years, NATO SOF personnel have established trusted networks through continuous multinational training exercises (e.g., Cold Response and Flintlock)⁶⁴ and operational commitments (e.g., Balkans, Iraq and Afghanistan).

Within a coalition, trust develops through a persistent presence. Persistent presence creates the opportunity for units to interact professionally and socially. It is most effective when units train and base within close proximity. In order to sustain these interactions in the NATO SOF community, the NATO SOF Air Wing should be stationed on a central location in close proximity to all the participating NATO SOF members.

To foster this process of trust development, the NATO SOF HQ relies on a robust program of standardization, training and education: the NATO SOF Training and Education Program (NSTEP). A key piece of the NSTEP is building personal relationships. The NSTEP spends 75

61 U.S. Army Special Operations Command, 160th SOAR Overview, <http://www.soc.mil/160th/160th%20Overview.html>, (accessed February 15, 2012).

62 Senior AFSOTC personnel discussion with NPS NATO Air Study Group, February, 2011 .

63 Martin J. Ara, Thomas Brand and Brage A. Larssen, *Help a Brother Out: A Case Study in Multinational Intelligence Sharing*, NATO SOF (Monterey, CA: Naval Postgraduate School, 2011), 28.

64 Cold Response is an annual joint exercise in Norway with a robust multinational SOF element. Flintlock is an annual multinational SOF exercise in Africa.

percent of the time on coursework, but the remaining 25 percent of the time is spent developing relationships and learning how to operate in a multinational SOF environment.⁶⁵ To be present is the most important prerequisite to take part in a relationship-development process. The NSTEP location is therefore centrally located in Europe to provide easy access to all its SOF partners.

“Competent Special Operations Forces cannot be created after emergencies occur.”⁶⁶ Trust building depends inevitably on time and, therefore, must be developed before a crisis emerges. Shared training and education will lay the groundwork for operational interactions, which will foster this building of trust. With relationships thus established, NATO Special Operations Forces will deploy into theatres of operations more effectively.

Marketing

As a newly established unit, the NATO SOF Air Wing will face challenges recruiting and retaining the right personnel for the unit. According to Dr. Dawn Johansen from the NATO Research and Technology Organization, marketing plays a very important role in recruitment and retention. It has an impact on a potential recruit’s perception, knowledge and understanding of the job and attributes. This perception influences an individual’s decision whether or not to join or, ultimately, stay with an organization.⁶⁷ Potential applicants for the NATO SOF Air Wing must first be made aware of the existence of the organization. Secondly, they need to be made aware of what role of the organization is supposed to play within NATO SOF; thus, they know how they can contribute to its success. This will give applicants the sense of purpose that is considered crucial to the success of special operations.⁶⁸

Air special operations are ground-centric. Therefore, in addition to establishing itself as a preferred employer, the NATO SOF Air Wing must establish itself as the partner of choice for ground troops, rather than the only dedicated air support available. This process could be described as establishing the NATO SOF Air Wing as a popular brand or branding. Branding is

65 Ara, Brand and Larssen, *Help a Brother Out*, 38.

66 Billingslea and Holland, *United States Special Operations Forces Posture Statement*, 30.

67 Dawn Johansen, NATO Research and Technology Section, TR-HFM-107, “Recruitment and Retention of Military Personnel, October 2007. Chapter 3A, 11.

68 McRaven, *Spec Ops Case Studies in Special Operation Warfare*, 8–23. Also enhanced by Richard D. Newton in *Special Operations Aviation in NATO: A Vector to the Future*, JSOU Report 06-8, (Hulburt: JSOU, 2006), 11.

defined as “a process, an ongoing practice where all the tangible and intangible elements that constitute a company’s image and reputation are organized and communicated.”⁶⁹

Not so long ago, the NATO SOF Headquarters found itself in a similar situation as the NATO SOF Air Wing is now. It was established as the NATO SOF Coordination Center (NSCC) under the command of Admiral McRaven in 2006 and restructured itself from a coordination center (NSCC) to a three-star headquarters in a period of just three years. It quickly built a solid reputation and image and became well known in a short period of time. The experiences of the NATO SOF Headquarters can be used as a guideline for the NATO SOF Air Wing in this process of branding.

The key to the success of the NATO SOF Headquarters was rapid participation with its personnel in joint exercises and deployments. To facilitate a successful establishment of the NATO SOF Air Wing within the NATO SOF community, the Air Wing should strive to do the same. Deployments entail risks when a unit is not ready to meet the mission (or carry out task). In order to avoid exposing this new air wing or the NATO ground and maritime operators to unnecessary risk, the NATO SOF Air Wing leadership could send personnel as special operation air liaison officers before the wing is fully operational capable, so it doesn’t expose this new air wing or the NATO ground and maritime operators to unnecessary risk. This will give NATO SOF Air Wing personnel immediate and valuable experience in support to special operations, and it will make the NATO SOF Air Wing instantly visible throughout the NATO SOF community. Becoming known and establishing a reputation is an important step towards branding. The potential risks of a rapid deployment of components of the NATO SOF Air Wing to operations before it is fully ready should be carefully weighed against the benefits of experience and visibility. As John Arquilla and David Ronfeldt have remarked, “the strongest networks will be those in which the organizational design is sustained by a winning story....”⁷⁰ Now, the NATO SOF Air Wing needs to rapidly build its own winning story, while avoiding underprepared deployment.

69 Dawn Johansen, NATO Research and Technology Section, TR-HFM-107, “Recruitment and Retention of Military Personnel, October 2007. Chapter 3A, 4.

70 John Arquilla and David Ronfeldt, *Networks and Netwars: The Future of Terror, Crime and Militancy* (Santa Monica, CA: Defense Research Institute RAND, 2001), 330.

Concluding thoughts

The time is right to build a NATO SOF Air Wing. Nearly all NATO nations have prioritized Special Operations Forces in the last few years, recognizing it as an exceptionally cost effective instrument of military action and national strategy.⁷¹ However, the expected decrease in military budgets as a result of the globally strained economy makes burden sharing in SOF capability necessary. The NATO SOF Air Wing is a potential, cost effective SOF capability, the burden of which will ultimately be shared equally among NATO countries. The United States Special Operations Command (USSOCOM) is currently the leading agent for strengthening the capabilities of the NATO SOF Headquarters.⁷² The USSOCOM Commander, Admiral McRaven, has committed financial and human resources to jump start this NATO SOF aviation element. Over the next few years, the rest of the contributing NATO SOF nations need to be prepared to take over this responsibility gradually.

Returning to the hypothetical hostage scenario described in the introduction, the NATO SOF Air Wing would be a viable, cost effective tool to mitigate a possible future DESERT ONE scenario. The NATO SOF Air Wing future leadership must incorporate selection and training strategies as well as facilitate opportunities for repetitive interaction with ground and maritime SOF units to promote the “SOF-mindset” and culture. To successfully establish itself as a force multiplier for NATO SOF employment, the NATO SOF Air Wing must become much more than the only available dedicated air support. Extensive joint exercises with ground units and successful (limited) deployments will help establish the NATO SOF Air Wing as a strong brand within the NATO SOF community. To be successful, the NATO SOF Air Wing needs this strong brand and accompanying winning story. After all, nobody argues with success!

71 Military Education Research Network, “White Papers on Defense,” <http://merln.ndu.edu/whitepapers.html>, (accessed March 14, 2012).

72 William H. McRaven, “Posture Statement of Commander USSOCOM before the 112th Congress,” March 6, 2012, 2, http://www.fas.org/irp/congress/2012_hr/030612mcraven.pdf, (accessed March 7, 2012).

The NATO SOF Air Wing: Organizing for Uncertainty

Major Eric Carrano, USAF, Major Shamsul Rahman, Malaysian Air Force and Major Andrew Sheehan, USAF

Since World War II, the NATO alliance has anchored a stable security environment in Europe and provided a means for global security as desired by member nations. While NATO's military capabilities are robust, the alliance endeavors to maintain a force posture and capability set consistent with current and emerging threats. One shortfall identified during operations in Afghanistan is in the area of Special Operations Forces (SOF) aviation. Few member nations possess the air mobility or airborne Intelligence, Surveillance, Target Acquisition and Reconnaissance (ISTAR) capability required to support SOF ground forces. Reliance on the few member nations with these SOF aviation capabilities has proven inadequate as not all nations are interoperable both in terms of equipment or training. Similarly, reliance on conventional forces air support to perform these missions has failed due to scarcity of resources, lack of training, and unfamiliarity with the SOF mission.⁷³

In April 2010, NATO Special Operations Headquarters (NSHQ) published a draft concept to develop a NATO Special Operations Air Wing (NSAW). This concept (still in draft form as of this writing) draws a vision for the organization to deploy and maintain dedicated NATO SOF Aviation support. This paper analyzes the organizational design concept authored by NSHQ and offers recommendations to enhance the effectiveness of the organization. The authors drew on ideas from current experts in the field of organizational design--Henry Mintzberg, Richard Daft, David Hanna, and Steven Kerr--to evaluate the current proposal and used the McCaskey model (Figure 1) as a framework for analysis. The analysis is focused on the environment, tasks and work to be accomplished. The authors conclude with a recommended organizational structure.

⁷³ North Atlantic Treaty Organization Special Operations Headquarters, "NATO Special Operations Air Group—Concept for Development and Organization (DRAFT)" April 22, 2010).

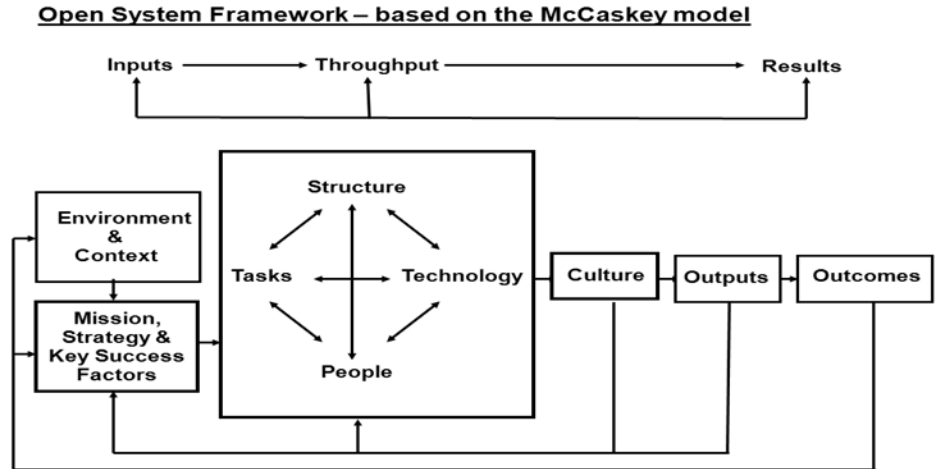


Figure 1: Open System Model of the Organization⁷⁴

Goals, Objectives, Capabilities

The purpose of the NSAW is: (1) to maximize the benefit of NATO’s current SOF investment and; (2) to enable emerging SOF member nations to participate in NATO operations with a similar level of augmenting capabilities as those with full spectrum SOF aviation organizations.⁷⁵

In support of these goals, the NSAW must support SOF forces in “three principle missions: Direct Attack (DA), Special Reconnaissance and Surveillance (SR&S), and Military Assistance (MA).”⁷⁶ These capabilities include: Special Operations Air-Land Integration (SOALI), forward air controllers, combat control, personnel recovery, rotary and fixed wing insertion and extraction, and ISTAR. Each of these mission sets requires dedicated aircraft and SOF airmen with habitual training and operational relationships to SOF ground forces.

Environment

Given the aforementioned purpose and objectives of the NSAW, let us understand the environment within which this organization must operate. First, we will define the organizational environment as Richard Daft defines it: “all elements outside the boundary of the

⁷⁴ Erik Jansen, “Introduction to Organizations” (lecture, Naval Postgraduate School, Monterey, CA, January 10, 2012).

⁷⁵ Ibid, 4.

⁷⁶ Ibid, 7.

organization and have the potential to affect all or part of the organization.”⁷⁷ This environment can be better understood as a group of sectors or subdivisions of the external environment within which the NSAW operates. Figure 2 illustrates these sub-divisions or sectors. The NSAW will be both directly and indirectly affected by these sectors.

We present an environmental context and identified organizational design strategies to improve the wing’s ability to achieve its objectives. First, we present the task environment that includes the sectors in which the organization directly operates and impacts. These sectors include the political, military and threat sector. Second, we discuss the broader general environmental sectors including the economic sector, technology sector and social sector. Third, we characterize the relative uncertainty and complexity of the environment. Finally, we offer a few recommendations to tailor the organizational structure to operate effectively within this environment.



Figure 2: Environmental Sectors

⁷⁷ Richard Daft, *Essentials of Organization Theory & Design*, University of New Hampshire, Southwestern Thompson Learning, 2003, 48.

The Political Sector:

“NATO’s new Strategic Concept, adopted at the Lisbon Summit in November 2010, identifies ‘cooperative security’ as one of NATO’s three essential core tasks. It states that the promotion of Euro-Atlantic security is best assured through a wide network of partner relationships with countries and organizations around the globe. No one country or organization can deal with the complex and unpredictable challenges of the evolving security environment on its own: coordinated multilateral action is required.”⁷⁸ First and foremost, this organization is a political tool through which NATO will seek to achieve political objectives. Thus, the political sector is part of the organization’s task environment and directly affects the unit. The direction, leadership, and missions of this unit will advance the agreed policy of 28 member nations.



The near-term future holds a tremendous uncertainty within the political sector. As the number of NATO member states expands, more cooperation and collaboration of military training will be required. Meanwhile, NATO is utilizing military forces to exert influence in regions within Europe and as far away as Libya and the Horn of Africa. NATO continues to support the operations in Afghanistan and will maintain an interest in the security of that region long after coalition forces depart. In the longer term, nuclear non-proliferation remains a NATO priority, Africa remains unstable and the conflict between Palestine and Israel shows no signs of abating.

The Military Sector:

NATO is currently engaged in Kosovo, Horn of Africa, Afghanistan, Northern Africa, and the Mediterranean. In addition to these current operations, NATO recently completed humanitarian

⁷⁸ North Atlantic Treaty Organization, “Partnerships: a cooperative approach to security,” http://www.nato.int/cps/en/SID-E16E7099-8EF8C4AB/natolive/topics_84336.htm

assistance operations to the victims of the earthquakes and floods in Pakistan. Similar operations are expected both in the short and long term. These operations are part of the task environment of this organization. The NSAW will likely support all of these missions.

The NSAW will have several fundamental recurring issues in the military sector to ensure its survival. First, NSAW will be competing against NATO conventional forces for funds and equipment. Better understood, more traditional, conventional forces will remain a priority for member nations. Second, NSAW will have a multinational staff of officers, NCOs, contractors and civilians. Given the unique mission sets, stability in the force structure and persistent training will be critical to success. One of the primary reasons to establish the unit is to build a habitual training relationship with ground SOF forces. These relationships must not be undermined by premature personnel rotations. Third, NSAW must remain focused on SOF missions only. If NSAW performs non-SOF missions, the unit's unique capabilities and strategic impact will be marginalized. Fourth, the unit must maintain a high pace of training with alliance and partner ground SOF forces. These training exercises build the interoperability required for successful SOF employment during operations.

Fifth, NSAW must prepare for a broad spectrum of operations in all types of terrain and weather. The physical geography of Europe includes the arctic tundra, deserts, high altitude mountains and vast oceans. The NSAW must prepare both its people and equipment to operate in all of these environments. Thus, a focused element on training, a robust technostructure⁷⁹ of planners and tactics specialists must be developed to keep the unit sharp.

⁷⁹ Henry Mintzberg, "Organization Design: Fashion or Fit," *Harvard Business Review*, Jan-Feb 1981. The technostructure of the organization establishes the procedures and processes that the operating core follows. For NSAW, the technostructure is the NATO SOF Training Center, the Readiness directorate within NSHQ and the unit level tactics instructors who keep the unit current with training.

The Threat Sector:

The NATO Strategic Concept⁸⁰ adopted at Lisbon in 2010 outlines the threat environment to the alliance. While NATO currently faces a low threat of a traditional conventional attack against its territory, the alliance perceives a growing ballistic missile threat. Further, proliferation of nuclear weapons, other weapons of mass destruction, terrorism and “trans-national illegal activities such as trafficking in arms, narcotics and people” remain a threat to alliance security.⁸¹

The NSAW was conceived to directly meet these threats and shape the security environment. Counter-terror operations often require actions against hard targets in urban areas where drone strikes or other standoff weapons are inappropriate. The unique ability of SOF aviation to enable long-range SOF counter-terror strike missions will enable the Alliance to respond quickly and decisively with maximum precision. The NSAW also adds a SOF strike and ISTAR capability to NATO’s anti-piracy operations off the Horn of Africa and throughout the Mediterranean.

The Economic Sector:

Defense budgets are limited across the alliance. NATO must find new ways to meet the security challenges of the future with fewer resources. NATO’s lead initiative to this end is called “Smart Defense.”

“In these times of austerity, each euro, dollar or pound sterling counts. Smart Defense is a concept that encourages Allies to cooperate in developing, acquiring and maintaining military capabilities to meet current security problems in accordance with the new NATO strategic concept. That means pooling and sharing capabilities, setting priorities and coordinating efforts better.”⁸²

Partnerships and cooperation are needed to achieve economies of scale with the resources available. The NSAW is a prime example of one of these smart defense efforts and will act as a

⁸⁰ NATO Strategic Concept for the Defense and Security of the Members of the North Atlantic Treaty Organization, “Active Engagement, Modern Defense,” NATO Summit in Lisbon 19-20 November 2010, http://www.nato.int/strategic-concept/pdf/Strat_Concept_web_en.pdf , 10-13.

⁸¹ Ibid.,11.

⁸² NATO Smart Defense, http://www.nato.int/cps/en/SID-C9CD0B89-BAD55F91/natolive/topics_84268.htm?selectedLocale=en

force multiplier to every ground SOF unit in the Alliance. Even better, the NSAW will have a training and partnership mission to build the organic SOF air capabilities of alliance and partner nations. While the economic environment of Europe may not have a direct effect on the NSAW, the economic sector is part of the general environment that indirectly impacts the unit.

The Technology Sector:

Even with lower defense budgets, military technology continues to advance. NATO's strategic concept recognizes several "technology related trends—including laser weapons, electronic warfare, and technologies that impede access to space—appear poised to have major global effects that will impact on NATO military planning and operations."⁸³ Operations in Afghanistan for the last ten years have shown that terrorist organizations, regardless of financial means, have proven adept at utilizing commercial technology in new ways against NATO forces. Cyber attacks are expected to increase in volume and sophistication.

Hence, the technology sector will have an indirect impact on the function and operations of the NSAW. NSAW forces must maintain currency in the latest technology and tactics of enemy forces and maximize the use of new technology available within the Alliance. The NSAW should foster a culture of experimentation to capture new ideas and test them in the field. This culture will leverage the innovation of NSAW unit personnel and technology to achieve greater impact on behalf of the alliance.

The Social Sector:

NATO continues to evolve and expand in this sector through the Partnership for Peace and other regional partnerships in the Middle East. The advancement of "globalization" is flattening the world and brings cultures in closer contact. The Arab Spring demonstrates a new vigor for self-governance not seen before in the Arab world. The uprising in Syria demonstrates the instability these social movements may cause.

The public expectations of NATO forces are also changing. Civilian casualties are less acceptable as operations in Afghanistan drag on and our technology proves more capable of pinpointing a target. Meanwhile, drone strikes have received no shortage of public criticism as a

⁸³ NATO Strategic Concept, 2010, 12

source of civilian casualties. The social sector is part of the general environment that has an indirect impact on the NSAW.

Environmental Uncertainty:

Given the above analysis of environmental sectors, the NSAW will operate in a complex and unstable environment. From year to year, this unit will be called upon to perform operations around the globe, with minimal notice, and great uncertainty about the circumstances in which they execute the operation.

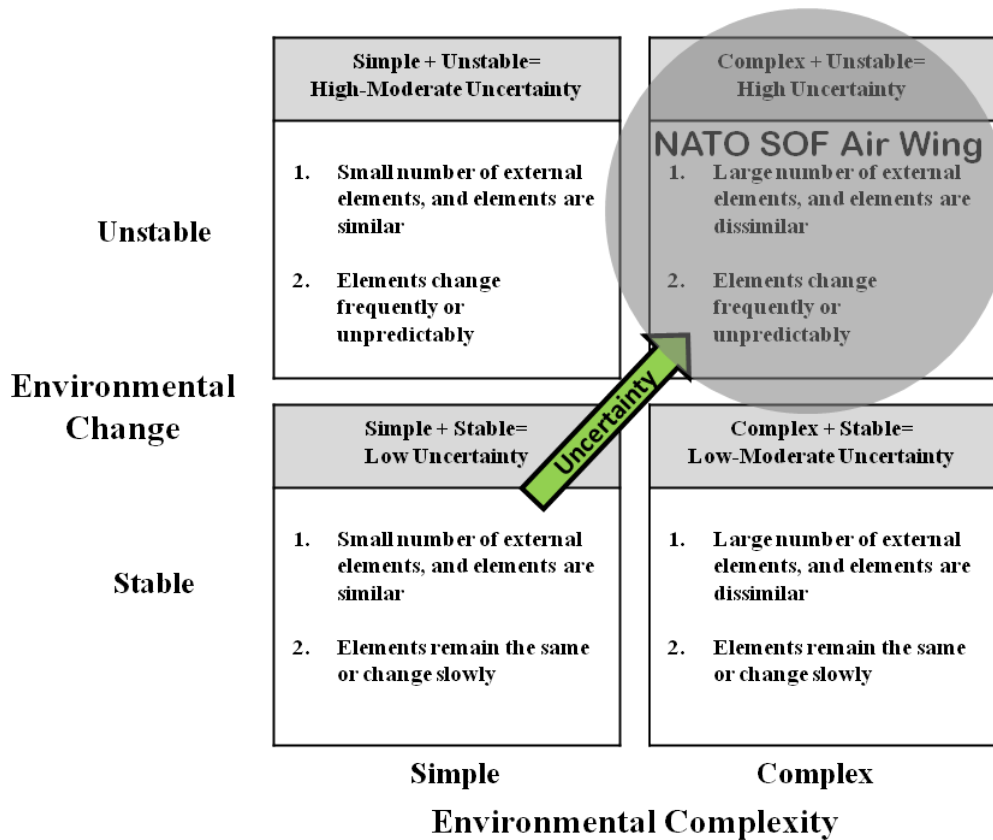


Figure 3: Environmental Uncertainty

Given a high level of uncertainty in the environment, Daft offers a framework to organize for this uncertainty (See Figure 3). His guidance would suggest that the NSAW should:

- 1) be as organic as possible (i.e. minimize the number of contracted matrixed personnel from outside units)

- 2) differentiate between functions as much as possible (i.e. keep the core training separate from the Operations because they deal with different sources of uncertainty)
- 3) assign personnel to ensure training and operations are in synchronization
- 4) rapidly imitate the tactics and methods of similar units that prove effective in the field. Maintain a robust dialogue with units who perform similar missions. (i.e. other Alliance SOF Aviation units)
- 5) Plan extensively. Maintain a cadre of personnel dedicated to planning for contingency operations.

These recommendations are incorporated into the structure of the NSAW proposal below.

Tasks

NSAW must support SOF in three principle missions—SR, DA and MA. NSAW will conduct operations across the spectrum of conflict, deep inside the enemy territory (100 miles), under low to medium threats, in politically sensitive or denied areas, and precisely within a minute of the given time-on-target. In addition, a special operations unit requires a habitual training relationship and the establishment of tactics, techniques, and procedures that guide the integration of air, land and maritime NATO SOF units.⁸⁴ The NSAW will fundamentally perform two tasks to execute its mission—training and operations.

Training Flow:

Figure 4 illustrates a notional training process to be conducted by the NATO SOF Air Warfare Training Center (NSAWTC). The products are the work force (pilots, crew chiefs and mission support technicians (i.e. logisticians, cyber, personnel, etc.)) for the air wing. Within this structure, the training flow is a sequential form of interdependence. The training flow requires planning, scheduling and feedback from each subunit in order to continuously improve its future performances. According to James Thompson, this will require medium communication between the subtask units.⁸⁵

⁸⁴ NSHQ, “Special Operations Air Group,” 7-9.

⁸⁵ Daft, “Org Design and Technology.”

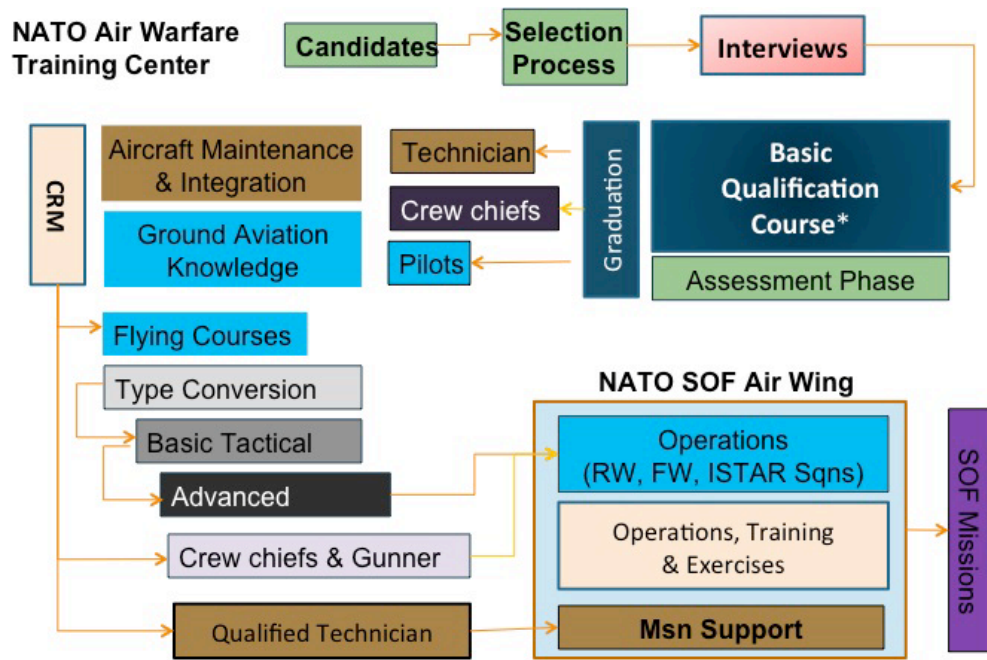


Figure 4: Training Flow

The first few tasks in the training flow chart are to conduct selection, assessment, and training of the new NSAW candidates. These tasks will be designed to ensure the NSAW receives qualified aircrews with a SOF mindset. The NSAWTC will carry out the recruiting campaign by advertising its existence to all the NATO partners. Qualified and command recommended candidates will need to volunteer in order to be considered. He or she then will go through an interview and numerous assessments (i.e. physical, psychological, and flying assessments) based on their specialty code. Candidates who pass this phase will then go through a basic qualification course. This will be the first instance where candidates will get the chance to work together as a team. Following the basic qualification course, candidates will then proceed to their respective specialization courses either for the pilots, crew chiefs or mission support technicians. We recommend that a Crew Resource Management (CRM) course be introduced in order for the candidates to focus on interpersonal communication, leadership, and decision making.⁸⁶ This will be extremely beneficial for a multinational organization. Furthermore, a CRM course will promote safety across all the units.

⁸⁶ Air Force Instruction 11-290, 1 April 2001, *Flying Operations Cockpit/Crew Resource Management Training Program*, www.e-publishing.af.mil/shared/media/epubs/AFI11-290.pdf

After graduating the specialization course, personnel will be accepted into the NSAW. Various units within the air wing will be required to frequently conduct joint and combined exercises as well as real missions. The in-house training will allow personnel to gain more experience and enhance their special operations tactics, techniques, and procedures. For the aircrews, with more flying hours, their competency as a SOF aircrew will only increase. These tasks will further enhance the relationship, trust, and mutual understanding that is absolutely needed within SOF units. This structure also caters to an aircrew's career progression. As experience is gained a pilot could easily progress to the next level of competency (i.e. from copilot to aircraft commander, to flight lead, and instructor).

Operations Flow:

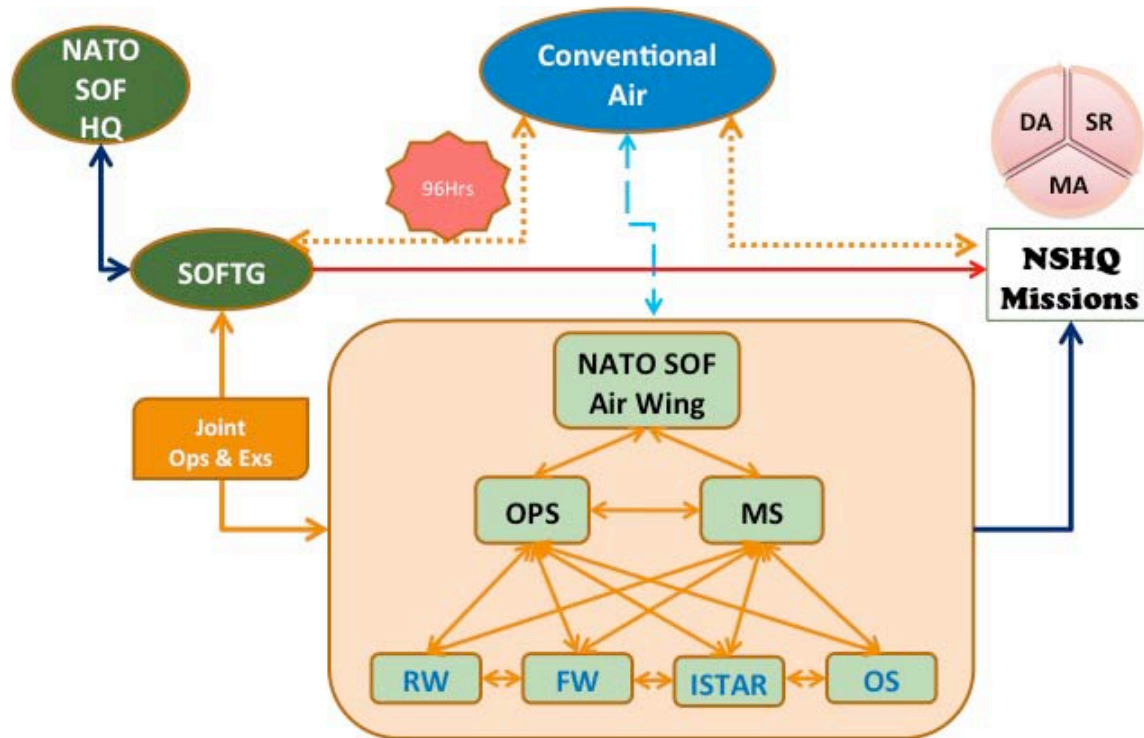


Figure 5: Operations Flow

With qualified and trained airmen, the NSAW will be able to conduct operations. Figure 5 illustrates the expected work flow to execute NSAW missions. Upon direction from higher headquarters (NSHQ or NATO commander), the NSAW and NATO ground SOF unit will begin mission planning. This will take place in the form of a Special Operations Task Force or Task Group. As the ground SOF unit develops actions on the objective (e.g. infiltration and

exfiltration plans, medical evacuation plans, coordination of friendly fires, reconnaissance, etc.) an organic aviation unit will identify and plan the necessary aviation support requirements. The direct aviation support for the operation will be provided by the NSAW. Units within the NSAW will coordinate between each other to meet all mission requirements. For example, units within the mission support (MS) unit (i.e. cyber, logistics, etc.) will have to make sure they provide the necessary support that meets the requirements of the operators within the operations unit. The air wing will also need to plan and coordinate for different types of combat support such as aerial refueling, airborne warning and control, combat air patrols, suppression of enemy air defenses, etc. This type of support is outside the mission set of NSHQ and will have to come from the conventional air forces.

Structure Analysis

As described earlier, the environment is predominantly complex and unstable. From a strategic perspective, we can expect a great deal of change in the environment. It is reasonable to expect many different types of threats (i.e. terrorism, organized crime, drug trafficking, etc.). As a result, the air wing will need to be ready to participate in a wide range of engagements (i.e. from humanitarian to counterterrorism operations) and will need to have a high degree of flexibility. However, some portions of the environment will be simple and stable. From an air wing operations perspective, personnel will rely on what they are trained for to successfully execute the mission. When air wing personnel encounter situations that they have been adequately trained for, it can be concluded that the environment is simple and stable. However, when the unexpected occurs on a mission, the operators begin to encounter a complex and unstable environment. Consequently, the operators need to be prepared to function in the environment as it ranges from simple and stable to complex and unstable. The work needs to be highly coordinated, primarily between the air and ground elements. The work also needs to be coordinated within the different organizations of the NSAW as well as between the NSAW and its parent organization, NSHQ.

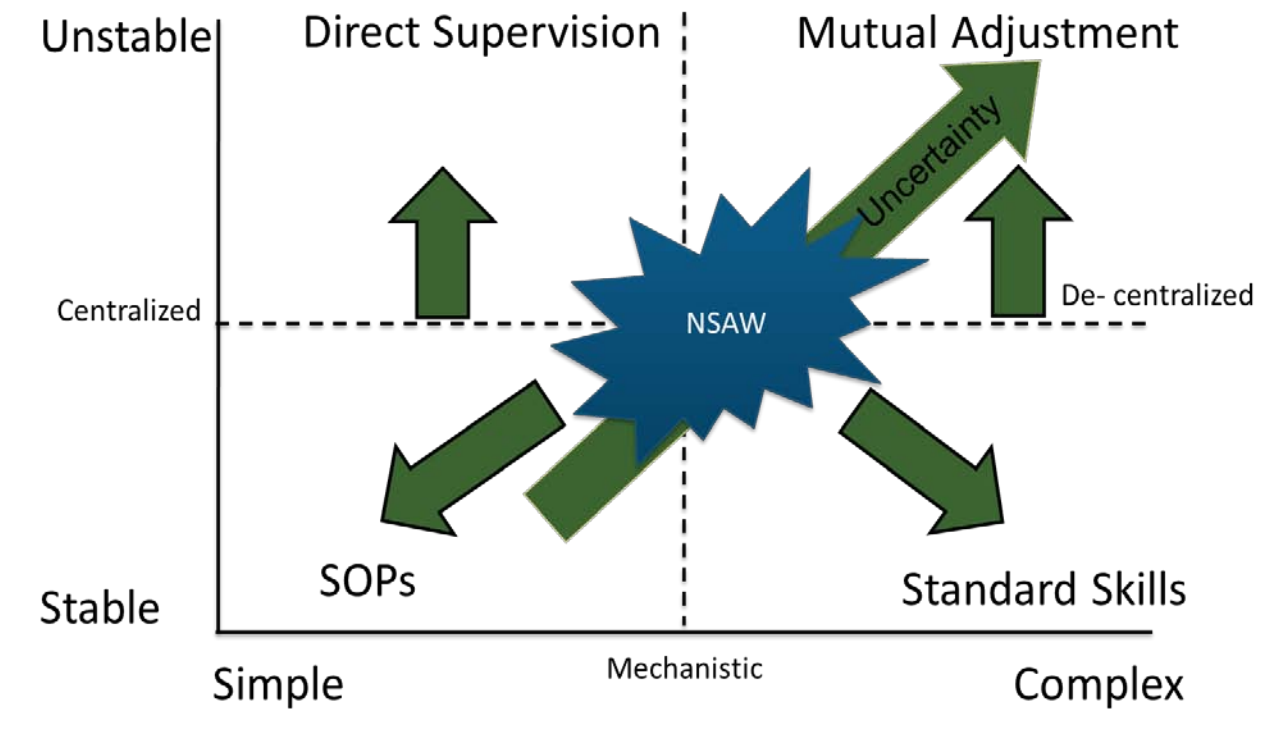


Figure 6: Mintzberg's Model Applied to NSAW

As can be seen in Figure 6, an adaptation of Mintzberg's model⁸⁷, the NSAW's work will need to be largely coordinated through the standardization of skills and standard operating procedures. This implies the key parts of the organization will be the operating core (i.e. aircrew) and the technostructure. Relying on the technostructure implies there will be a high degree of formalization (i.e. written rules). However, this organization will also rely on direct supervision and mutual adjustment. Direct supervision is inherent in any military environment. Meanwhile, mutual adjustment will need to occur during operations and exercises when events do not go as planned. Furthermore, this organization will need to operate with centralized control and decentralized execution. Training and launch authority is centralized while operations execution is decentralized. This organization will need to be primarily mechanistic, but organic when the

⁸⁷ Erik Jansen, "Coordination and Configuration" (lecture, Naval Postgraduate School, Monterey, CA, February 2, 2012).

environment becomes complex and unstable. In essence, the organization will need to be a hybrid of a machine and a professional bureaucracy with ad hoc tendencies.⁸⁸

Reciprocal interdependence will exist within the air wing. James Thompson defines reciprocal interdependence as “the output of operation A is the input to operation B, and the output of operation B is the input back again to operation A. The outputs of departments influence those departments in reciprocal fashion.”⁸⁹ This relationship is distinguished in the unit’s intelligence chain. The intelligence collected by the ISTAR unit will lead to an operation. On that operation, the operators will gather more intelligence. The intelligence gathered during the operation feeds back into the originating ISTAR intelligence chain which will eventually lead to another operation. As a result of reciprocal interdependence within the air wing, there will need to be high levels of mutual adjustment and teamwork among the different units. Thompson also points out that organizations with reciprocal interdependence should place a high priority for locating units close together.⁹⁰ This should be taken into consideration when NSHQ formalizes the details on the units (both air and ground units as well).

Current Organizational Charts and Command Relationships

NSHQ reports directly to the Supreme Allied Commander, Europe (SACEUR) and is one of four Allied Command Operations which include Joint Force Headquarters Naples, Joint Force Headquarters Lisbon, and Joint Force Headquarters Brunssom (Figure 7). At the direction of SACEUR, NSHQ (Figure 8) will provide special operations forces to the three Joint Force Headquarters.⁹¹

⁸⁸ For details on machine and professional bureaucracies see Henry Mintzberg, “Organization Design: Fashion or Fit,” *Harvard Business Review*, Jan-Feb 1981.

⁸⁹ Daft, “Org Design and Technology.”

⁹⁰ Ibid.

⁹¹ Andrew Jett, “Out of the Blue: NATO SOF Air Wing” (master’s thesis, Naval Postgraduate School, 2012), 45-46.

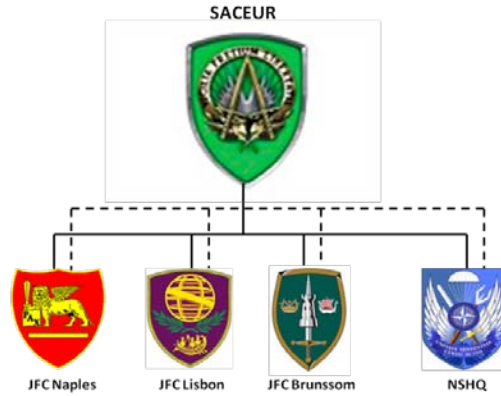


Figure 7: NATO Allied Combat Operations

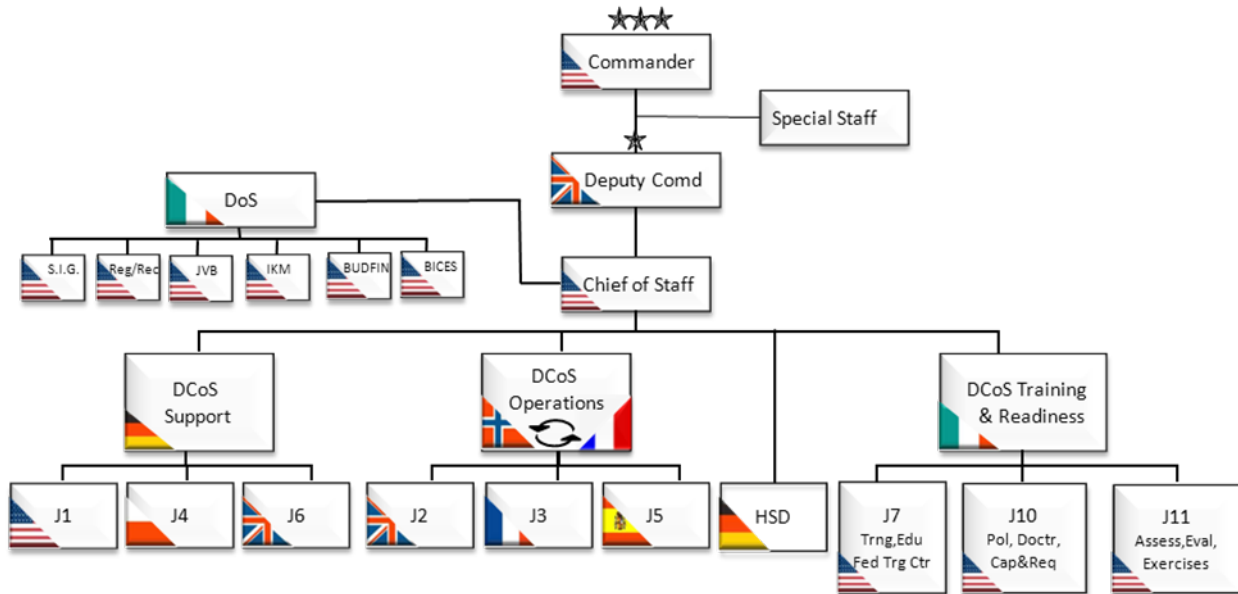


Figure 8: Current Organizational Structure of NSHQ

Proposed Changes to the Organizational Structure

The training function within the NSHQ should be pulled out of the J7 branch (Figure 8) and established as a separate organization. In his thesis, *Out of the Blue: NATO SOF Air Wing*, Major Andrew Jett proposes to move the training from underneath the NSHQ staff into a separate organization called the NATO Special Warfare Center (Figure 9). His analysis is based on interviews conducted with current staff members on NSHQ as well as the Air Force Special

Operations Training Center’s proof of concept. The analysis of the environment and tasks for the NSAW supports Major Jett’s recommendations. It is critical to separate the initial core special operations training from the units and the headquarters’ staff. The operational units need to concentrate on operations and the headquarters’ staff needs to focus on their core responsibilities.

In addition to Major Jett’s recommended changes, we propose to create a NSAW Liaison element within the Readiness directorate (Figure 9). The purpose of this liaison element is for the air element to coordinate the policy, doctrine, and exercise training with the ground element. The liaison element will be the source of when, where, and to what extent the ground and air will be integrated. This position within the organization ensures necessary emphasis is placed on integrating the ground and air components—a primary reason to establish the NSAW.

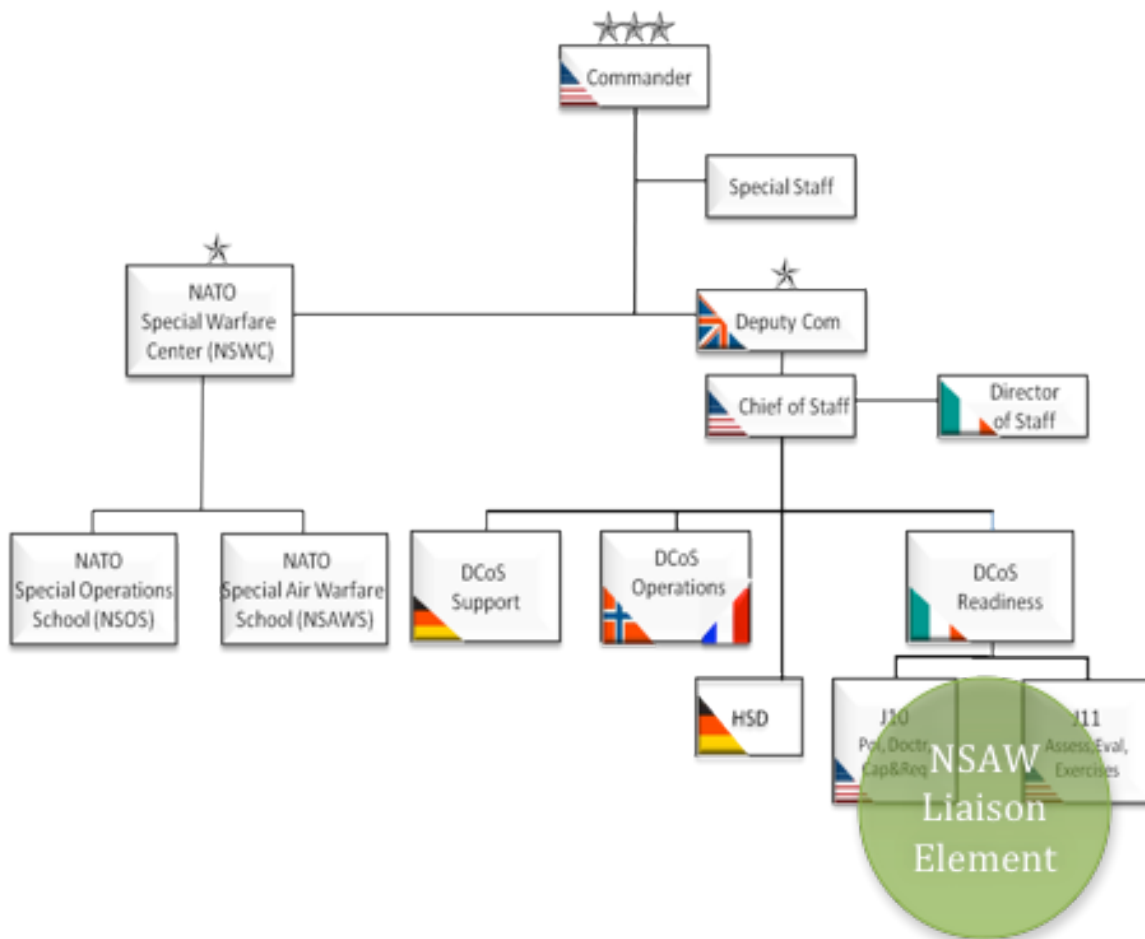


Figure 9: Proposed Changes to NATO SOF Headquarters

Proposed Air Wing Organizational Structure

The proposed NSAW organizational structure is represented in Figure 10. Analyzing the proposal through Mintzberg’s model, the strategic apex is clearly delineated at the top of the organization along with the support staff. The middle management is represented by the two primary units, operations and mission support. With the NSAW operating primarily between a professional and machine bureaucracy, the two main parts of this organization are the operating core and the technostructure. The operating core is primarily represented in the fixed wing, ISTAR, and the two rotary wing units. The technostructure is in a few different places to include the training center, the Readiness directorate within NSHQ, and the training cadre within the operational units.

Since the air wing will be an operational unit, we recommend that the air wing report directly to the NSHQ commander, and at the direction of SACEUR, project forces to the three Joint Force Headquarters. Operations and maintenance are placed together because the prioritization of work is driven by operations, and this structure is conducive to increasing the level of coordination between these two units. NSAW training unit personnel will assist the proposed liaison element to coordinate the exercises, policy, and doctrine.

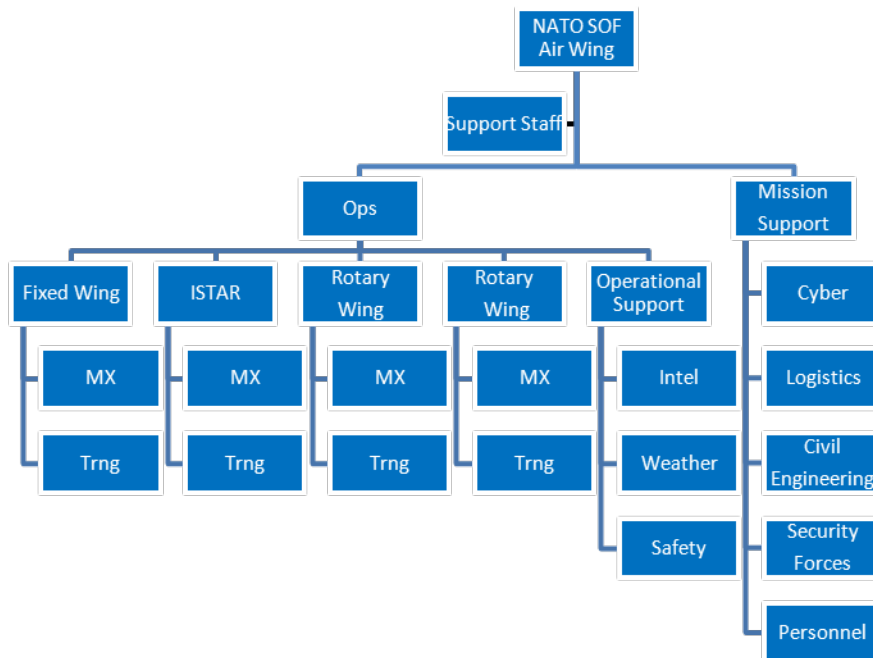


Figure 10: Proposed Organizational Structure for NSAW

Summary and Conclusion

Based on the above analysis, NSAW will operate primarily as a professional and machine bureaucracy. NSAW enables the alliance to share the security burden. The key to success for NSHQ and the NSAW will be coordination of work between the air and ground elements. A large amount of coordination for both exercises and missions is required through a liaison element located in the Readiness directorate of NSHQ. Finally, reciprocal interdependence exists not only within the NSAW, but between NSAW and the NATO SOF ground forces. Consequently, when NSHQ considers the basing of ground and air forces, the existence of reciprocal interdependence places a high priority on locating the units close together.

The NATO SOF Air Wing: A Basing Strategy

Major Andrew Sheehan, USAF and Captain James Cox, USAF

This study broadly explores the requirements for establishing a NATO SOF Air Wing (NSAW) to fill the shortfall in NATO SOF Aviation. At the time of this writing, NATO SOF Headquarters (NSHQ) is standing up an initial unit with some rotary wing lift capability. The long range vision for this project is a robust NSAW including a training center, fixed and rotary wing airlift squadrons, ISTAR platforms, appropriate support units, airframes, facilities, logistics and C2 operations.

Of course, this unit will be primarily a training unit. The unit will emphasize training NATO alliance members and key partners to enhance security operations capabilities. Ninety percent of the time, the unit will be training Alliance SOF Aviation personnel and training with alliance SOF ground forces. Ten percent of the time, the unit will be operational in the field conducting counter terror strikes, ISTAR missions in support of SOF ground forces, or simply resupplying SOF forces in remote areas of operations.

This chapter focuses on the long-range basing requirements of the NSAW. Since every defense dollar and euro is precious to the NATO taxpayer, every effort must be made to maximize the resources allocated to the unit. It can be difficult to compare the operational and cost criteria of the various installations over the long term. Given the inherent and dominant nature of the training side of this unit's mission, the basing location of the unit could have a tremendous impact on the success of the mission and the cost to operate the unit. The authors present a decision making process, known as Analytical Hierarchy Process (AHP), in which NSHQ can quantitatively compare the features and conditions at several candidate installations and develop supportable recommendations based on all data available.

NATO Basing Process

NATO has no formal written process for basing new missions within the alliance. Once the NATO Military Committee (NMC) approves a new capability requirement or "Level of

Ambition,” a nation or group of nations must volunteer to take on responsibility as the framework nation for the new capability. The framework nation is responsible for the stand up of the new organization, its equipment, vehicles, aircraft, facilities, etc. The framework nation has tremendous influence in directing the basing decision because they pay the bills. Usually, though not always, the basing decision for the unit is formalized in the Memorandum of Understanding (MOU) between the NMC, the framework nation and the nation partners contributing to the unit. The participating nations, especially the framework nation, make the final basing decision.

Politics notwithstanding, this analysis is designed to inform the NMC and participating nations of the basing options and each option’s relative value to the alliance. While this analysis tool could be used to solicit support for basing the new unit in one country versus another, the primary goal of this paper is to inform the committee of the units’ needs prior to any basing decision. In this way, the authors hope to reduce the long-term cost of operations and improve the operational success of the unit.

Methodology

Base Requirements. The first step in making a basing decision is to determine the needs of the unit. Based upon similar SOF Aviation units in the US Air Force, the authors developed a list of criteria and a rough grading scale to analyze the benefits of each installation considered for hosting this unit. This list of criteria is presented in Table 1.

Five main criteria were selected to compare candidate bases in this study. The first criterion is base location. Proximity to flight, terrain and joint training should be heavily weighted in the base selection methodology. Flight training should be focused on the different missions dictated by the air unit. The optimal location should also have access to a variety of terrains such as mountain, desert, sea, and forest to prepare for deployment to a wide envelope of locations. Finally, the base should be located as close to ground SOF forces as possible to enhance joint training. This last objective should easily be met due to the inherent joint nature of NATO. There are many sub-criteria to address for the base location criteria. These include: proximity to training (live fire, dry fire, ground force ingress/egress, sea, desert, mountain, urban, and electronic warfare), proximity to SOF ground forces, and weather permissible for training.

The second criterion is flight restrictions and allowances by the host country. Sub-criteria include any limitations to flying and training as described in the base location criteria, and weapon storage. As a SOF unit, many non-typical flight profiles will be required. Night-flying, low-level flying, and ingress/egress training will have to be accommodated at the base or at a near-by training location. Allowances for launching operations may be a factor if the training base will also serve as the forward deployed operations post for future missions.

Table 1: Basing

Criteria

Criterion	Criteria Weight	Green	Yellow	Red
Base Location				
Air Wing location supports mission training and operations	15	NATO SOF Air Wing located with formal training unit (15 pts)		Aircraft not co-located; separate training Det required (0 pts)
Base Co-located with NATO SOF forces	15	Aircraft co-located with NATO SOF forces (15 pts)	Aircraft not co-located, but within 50nm of NATO SOF forces (7.5 pts)	Aircraft not co-located (0 pts)
Live Fire Training Area	15	Co-located air-ground range used by SOF teams capable of supporting 30mm and Stand Off Precision Guided Munitions (SOPGM) for orbital live fire training (15 pts)	Limited or not co-located air-ground range used by SOF teams capable of supporting 30mm and SOPGM for orbital live fire training (7.5 pts)	No air-ground range used by SOF teams capable of supporting 30mm and SOPGM for orbital live fire training (0 pts)
Dry Fire Training Area	10	Diverse urban/rural road network capable of providing realistic combat scenario within 100NM of the installation (5 pts)	Limited urban/rural road network capable of providing realistic combat scenario within 100NM of the installation (2.5 pts)	Sparse urban/rural road network capable of providing realistic combat scenario within 100NM of the installation (0 pts)
Weather	10	> 250 days of flight training weather (10 pts)	> 150 days of flight training weather (5 pts)	>75 days of flight training weather (0 pts)
SOF Ground Force Trng Areas	15	Within 50NM to MOUT Infil/exfil. Assault Landing Zones, Drop Zones (15 pts)	Within 100NM to MOUT Infil/exfil. Assault Landing Zones, Drop Zones (7.5 pts)	Over 100NM to MOUT Infil/exfil. Assault Landing Zones, Drop Zones (0 pts)
Sea Terrain Training	10	Within 50NM (10 pts)	Within 100NM (5 pts)	Over 100NM (0 pts)
Desert Terrain Training	10	Within 50NM (10 pts)	Within 100NM (5 pts)	Over 100NM (0 pts)
Mountainous Terrain Training	10	Within 50NM (10 pts)	Within 100NM (5 pts)	Over 100NM (0 pts)
Urban Terrain Training	10	Within 50NM (10 pts)	Within 100NM (5 pts)	Over 100NM (0 pts)
Electronic Warfare Training Range	5	AF Primary EW Training Range or equivalent co-located with live fire range (5 pts)	AF Primary EW Training Range or equivalent within 100NM but not located with live fire range for co-use (2.5 pts)	No Primary EW Training Range or equivalent within 100NM (0 pts)
Proximity to Logistical Support				
Sea	10	Within 50 miles (10 pts)	Within 100 miles (5 pts)	Over 100 miles (0 pts)
Air	10	Within 50 miles (10 pts)	Within 100 miles (5 pts)	Over 100 miles (0 pts)
Rail	10	Within 50 miles (10 pts)	Within 100 miles (5 pts)	Over 100 miles (0 pts)
Host Nation Support				
Day Flight Ops	15	Host Nation Allowance (15 pts)	Host Nation Limits (7.5 pts)	Host Nation Denies (0 pts)
Night Flight Ops	15	Host Nation Allowance (15 pts)	Host Nation Limits (7.5 pts)	Host Nation Denies (0 pts)
Ammunition Approval	15	Host Nation Allowance (15 pts)	Host Nation Limits (7.5 pts)	Host Nation Denies (0 pts)
Launch Authority	10	Host Nation Allowance (10 pts)	Host Nation Limits (5 pts)	Host Nation Denies (0 pts)
Existing NATO Forces stationed in country	5	NATO Base in Country (5 pts)	NATO Forces in Country (2.5 pts)	No NATO forces in Country (0 pts)
Existing US Forces stationed in country	5	US Base in Country (5 pts)	US Forces in Country (2.5 pts)	No US forces in Country (0 pts)
Flightline Support				
Fuel Cell Hangar	3	= or > C-130 size with capacity to service 8 additional aircraft (3 pts)	= or > C-130 size but will exceed base maintenance capacity and will require a second facility (1.5 pts)	< C-130 size or not available and no acreage available for addition (0 pts)
Corrosion Control Hangar	3	= or > C-130 size with capacity to service 8 additional aircraft (3 pts)	= or > C-130 size but will exceed base maintenance capacity and will require a second facility (1.5 pts)	< C-130 size or not available and no acreage available for addition (0 pts)
Dedicated Hangar/AMU	3	= or > C-130 size, min 33 SF; dedicated to new unit; not a shared facility (3 pts)	= or > C-130 size but > 33 SF and/or requires addition or split ops and sharing of facility with another unit (1.5 pts)	< C-130 size or not available and no acreage available for addition (0 pts)
AGE MX/Storage	3	Existing facility will support maintenance and storage of additional 100 pieces of equipment (3 pts)	Existing facility will exceed maintenance and storage of additional 100 pieces of AGE; addition required (1.5 pts)	AGE Complex not available and no acreage available for addition (0 pts)

Table 1: Basing Criteria (cont)

Criterion	Criteria Weight	Green	Yellow	Red
Ammunition Storage Facility	3	10K facility licensed for Class 1.1 munitions w/ approx 50K lbs NEW (3 pts)	10K facility requires MILCON/ADAL or licensing questionable (1.5 pts)	Storage facility does not exist and licensing not possible (0 pts)
MRSP/Aircraft Parts Storage	3	> or = 25K SF of available storage space (3 pts)	< 25K SF of available storage space and requires an addition (1.5 pts)	Not available and no acreage available for addition (0 pts)
Dedicated Squadron Ops	3	> or = 36K SF of available dedicated and co-located squadron operations space (3 pts)	< 36K SF of available space and requires an addition (1.5 pts)	Not available and no acreage available (0 pts)
Runway 6000FT	5	> or = 6000 FT length available (5 pts)	> or = 6000 FT length available but requires modification or addition (2.5 pts)	Runway < 6000 FT minimum available (0 pts)
Parking Apron for 6 rotary wing Aircraft	5	> or = 6 aircraft spots (3 pts)	< 6 aircraft spots & requires either repair or additional pavement (1.5 pts)	Not available and no acreage available for addition (0 pts)
Parking Apron for 6 fixed wing Aircraft	5	> or = 6 aircraft spots (3 pts)	< 6 aircraft spots & requires either repair or additional pavement (1.5 pts)	Not available and no acreage available for addition (0 pts)
Hot Gun Parking 1 Aircraft Note: CAPA, Hot Cargo, and Hot Gun can be single spot	3	Parking with adjacent berm to support aircraft with a hot gun (2.5 pts)	Parking that requires repair or additional pavement and/or berm (1.25 pts)	Not available and no acreage available for addition (0 pts)
Hot Refueling Pad	3	Hot Refueling Pad on base (3 pts)	Ability to build Hot Refueling Pad on base (1.5 pts)	No ability for hot pad (0 pts)
Future Expansion Capability	5	Runway, Facility and Room to expand 4 fold (5 pts)	Runway, Facility and Room to Expand 2 fold (2.5 pts)	No room for expansion (0 pts)
Crash/Fire/Rescue	5	European Standard Fire/Crash/Rescue on site (5 pts)		None on site (0 pts)
Base Support				
Medical/Dental, On/Off Base Housing, 96 Man Dormitory, Child Development Center, Gymnasium, Dining Facility	15	Adequate medical/dental on/off base housing, child development, dormitory, & dining facility for a population increase of approx XXX? (5 pts)	Limited BOS facilities (0.5 - 4.5 pts)	Inadequate medical/dental on/off base housing, child development, dormitory, & dining facility for a population increase of approx XXX? Personnel (0 pts)
Security	10	Existing secure perimeter w/ dedicated military security (10 pts)	Shared with commercial airport (5 pts)	open airfield (0 pts)
Environmental Impact (1.25) Noise (1.25) Encroachment (1.25) Land Use (1.25)	5	Environmental analysis yields full gunship training co-located to proposed operational base (5 pts)	Environmental analysis resulting in a range not co-located with proposed operational base and/or limited gunship training (0.5 - 4.5 pts)	Environmental analysis that would result in no gunship training (0 pts)
Communication	5	Installation has existing NATO specific communication & information capability (5 pts)	Installation has means for NATO specific communication & information capability (2.5 pts)	Installation has no infrastructure for NATO specific communication & information capability (0 pts)
Area construction cost factor for NATO	5	Area construction cost factor less than 0.83 (5 pts)	Area construction cost factor from 0.83 to 1.36 (2.5 pts)	Area construction cost factor greater than (0 pts)

Logistical support is the third criterion to evaluate. The sub-criteria in this section include proximity to major seaports, airports and rail yards. This criterion measures the units' rapid deployability and sustainability at low cost. Close proximity to major transportation hubs will reduce operating costs and improve mission effectiveness.

Flight line capability is the fourth criteria to address. The sub-criteria for the flight line include aircraft and helicopter parking apron availability, a runway long enough for aircraft to meet mission requirements, support structures (fuel cell, corrosion control, maintenance, supporting ground equipment hangars), ammunition storage, and an operations center for the air unit.

The final criterion to consider is base support. Base support includes medical and dental facilities, contracting, religious support, housing, schools, and dining facilities. Other considerations include European environmental impacts along with the ability for communications with NATO's BICES. While this criterion is minor relative to some of the other base requirements, the NSAW must have a certain minimum level of support for unit members. In the absence of such support, the NSAW must provide the support organically.

Candidate Bases. Initially, the NATO SOF Air Unit will be based at Chièvres AB, Belgium. With the expected addition of fixed wing-aircraft to the NSAW and a very short runway at Chièvres,⁹² NATO must identify a better alternative for NSAW's home. As such, NATO SOF HQ should consider multiple basing options. An ideal candidate base currently features NATO personnel already attached and allows for the multitude of SOF Air specific training environments needed to properly train the future air unit.

Currently, NATO air bases are in Geilenkirchen and Ramstein, Germany; Sigonella, Naples and Aviano, Italy; Pápa, Hungary; Izmir, Turkey; and Chièvres, Belgium. To simplify this analysis, the authors selected one base from each country—Geilenkirchen, Naples, Pápa, Izmir, and Chièvres. The reduced number of installations highlights greater contrasts in the criteria and illustrates the AHP process with more relief.

⁹² Worldaerodata.com for Chièvres shows the runway is only 5400 feet and is closed to all fixed-wing aircraft.

Analysis Methods

The authors have looked at two methods to compare candidate bases: one is a point value comparison of criteria, and the other is a business approach called the Analytical Hierarchy Process.

The point value comparison is a traditional analysis tool of the military. Each criterion was assigned a point value to estimate the relative importance of one criterion to another. This point value is referred to as the criteria weight. Then these points are distributed between the potential grades for each criteria “green”, “yellow” or “red”. In this way, NSHQ or other HQ, can predetermine the relative importance of criteria before beginning analysis of any locations. After each base is scored according to this grading system, the points are added up and presented to leadership. This analysis tool provides an efficient and consistent strategy to ensure all candidate bases meet minimum established standards.

The deficiency in this process is that it fails to directly measure (or estimate) the relative quality of one installation versus another. For example, if two installations are graded as “yellow” under the weather criterion, this process considers them equal. In fact, they may not be equal and one installation may offer a clear advantage over the other that is not distinguishable through the spotlight chart system of evaluation.

The Analytical Hierarchy Process (AHP) is a mathematically more rigorous process. AHP is a three-step process for solving complicated problems with dissimilar criteria. The first step is problem decomposition. This step has two parts; stating the problem and identifying solution factors or criteria. The second step is a comparative analysis in which evaluators develop criterion weights, collect data on each option and rank each option. Lastly, the synthesis of results and recommendation is presented to the decision authority. The Analytical Hierarchy Process has shown its military utility in the past. Otto F. Sieber III used this process to analyze the decision to base AFRICOM HQ in Stuttgart, Germany. For this study, the authors illustrate the AHP to build a basing recommendation for the new NATO SOF Air Wing.

Analysis

Step one: create the main decision variables to analyze. The variables are the criteria previously identified as: Base Location, Host Nation Allowances/Restrictions, Logistical Support, Flight Line Capability, and Base Support.

Step two: pairwise compare each decision variable against one another. Figure 1 shows the basic ranking structure for proper pairwise comparisons.

The Fundamental Scale for Pairwise Comparisons		
Intensity of Importance	Definition	Explanation
1	Equal importance	Two elements contribute equally to the objective
3	Moderate importance	Experience and judgment moderately favor one element over another
5	Strong importance	Experience and judgment strongly favor one element over another
7	Very strong importance	One element is favored very strongly over another; its dominance is demonstrated in practice
9	Extreme importance	The evidence favoring one element over another is of the highest possible order of affirmation

Intensities of 2, 4, 6, and 8 can be used to express intermediate values. Intensities of 1.1, 1.2, 1.3, etc. can be used for elements that are very close in importance.

Fig 1. Fundamental Scale for Pairwise Comparisons

After the pairwise comparison is complete, a table should reflect the differences between the decision variables.⁹³ Figure 2 shows what a decision variable pairwise comparison looks like.

Notice that the factors are inversed along the axis.

Decision Variables Pairwise Comparison	Base Location	HN Allowances	Logistics	Flight line	Base Support	Factor Weight
Base Location	1.0000	3.0000	7.0000	1.0000	5.0000	0.3766
Host Nation Allowances/Restrictions	0.3333	1.0000	5.0000	0.5000	3.0000	0.1783
Proximity to Logistics	0.1429	0.2000	1.0000	0.2000	0.3333	0.0424
Flight line Support	1.0000	2.0000	5.0000	1.0000	5.0000	0.3247
Base Support	0.2000	0.3333	3.0000	0.2000	1.0000	0.0780

Fig 2. Pairwise Comparison of Decision Variables

⁹³ Factor weight is determined by multiplying each number in a row, then finding the Nth root (the 5th root in this scenario). Once all roots are found, sum them together. Finally, take the initial root and divide it by the sum of all roots. Do this for all rows. This number is the factor weight for each decision variable.

Step three: With the decision variable weighing complete, compare the five bases against each other in the each of the decision variables. This evaluation will be done using the same pairwise comparison as the decision variables. The bases chosen were Izmir, Turkey; Geilenkirchen, Germany; Naples, Italy; Pápa, Hungary; and Chièvres, Belgium. These bases do not represent the entire spectrum of possibilities, but were used to demonstrate the capabilities of AHP.

Base Location

In the scenario, the bases were judged by proximity to training (live fire, dry fire, ground force ingress/egress, sea, desert, mountain, urban, and electronic warfare), proximity to SOF ground forces, and weather permissible for training.

Base Location Pairwise Comparison	Chièvres	Geilen- kirchen	Naples	Izmir	Pápa	<u>Weight</u>
Chièvres	1.0000	2.0000	9.0000	7.0000	5.0000	0.4828
Geilenkirchen	0.5000	1.0000	7.0000	5.0000	3.0000	0.2937
Naples	0.1111	0.1429	1.0000	0.3333	0.2500	0.0353
Izmir	0.1429	0.2000	3.0000	1.0000	0.5000	0.0708
Pápa	0.2000	0.3333	4.0000	2.0000	1.0000	0.1173

Fig 3. Base Location Pairwise Comparison

Since NATO’s SOF Headquarters is in Mons, Belgium and Air Warfare Center will be located in Belgium, Chièvres was the leading candidate base for this variable. Geilenkirchen is very close to Chièvres, so it was measured as the second best location. Naples was scored worst due to lack of low-level training ranges in country.⁹⁴

Host Nation Allowances and Restrictions

HN Allowance Pairwise Comparison	Chièvres	Geilen- kirchen	Naples	Izmir	Pápa	Weight
Chièvres	1.0000	2.0000	0.3333	3.0000	0.3333	0.1409
Geilenkirchen	0.5000	1.0000	0.2000	1.0000	0.2000	0.0699
Naples	3.0000	5.0000	1.0000	5.0000	1.0000	0.3624
Izmir	0.3333	1.0000	0.2000	1.0000	0.2000	0.0644
Pápa	3.0000	5.0000	1.0000	5.0000	1.0000	0.3624

Fig 4. Host Nation Allowance Pairwise Comparison

⁹⁴ *Jane’s World Air Forces*, “Belgium-Air Force,” <http://www2.janes.com.libproxy.nps.edu/client/nps/> (accessed 5 March 5, 2012).

For the Host Nation Allowances comparison, any limitations to flying and training as described in the base location criteria would lessen the chance for selection. Other factors included weapon storage and allowances for launching operations. This was only a factor in Turkey since that location might also serve as the operations post for future missions. Germany was graded worst due to restricted flying hours imposed by the German community. Belgium had better allowances, and both Italy and Hungary permit all types of flying for the air unit.⁹⁵

Proximity to Logistics

Logistical Pairwise Comparison	Chièvres	Geilen- kirchen	Naples	Izmir	Pápa	<u>Weight</u>
Chièvres	1.0000	0.5000	0.2000	0.2500	3.0000	0.0855
Geilenkirchen	2.0000	1.0000	0.3333	0.5000	5.0000	0.1589
Naples	5.0000	3.0000	1.0000	2.0000	9.0000	0.4397
Izmir	4.0000	2.0000	0.5000	1.0000	7.0000	0.2794
Pápa	0.3333	0.2000	0.1111	0.1429	1.0000	0.0365

Fig 5. Proximity to Civilian Logistical Support Pairwise Comparison

The NSAW will provide maintenance of aircraft and helicopters by contract. The contractors will rely on commercial lines of logistics to effectively maintain the air unit’s equipment. Thus connections to commercial lines of communication are key features to the NSAW’s location. Naples and Izmir get the best scores due to their closeness to major logistical hubs. Papa, Hungary is worst due to its limited commercial logistical capability.

Flight Line Availability and Capability

The factors for comparing flight line availability and capability include aircraft and helicopter room for parking on the apron, a runway long enough for aircraft to meet mission requirements, support structures (fuel cell, corrosion control, maintenance,

⁹⁵ Mentioned earlier in the paper was Italy’s limited low-level air training capabilities. If a full analysis was performed, Italy’s weight in the Host Nation Allowances would probably go down.

Flight Line Pairwise comparison	Chièvres	Geilenkirchen	Naples	Izmir	Pápa	<u>Weight</u>
Chièvres	1.0000	0.2000	0.2000	0.3333	0.3333	0.0544
Geilenkirchen	5.0000	1.0000	1.0000	3.0000	3.0000	0.3439
Naples	5.0000	1.0000	1.0000	3.0000	3.0000	0.3439
Izmir	3.0000	0.3333	0.3333	1.0000	1.0000	0.1289
Pápa	3.0000	0.3333	0.3333	1.0000	1.0000	0.1289

Fig 6. Flight Line Capability Pairwise Comparison

supporting ground equipment hangars), ammunition storage, and an operations center for the air unit. Since Chièvres cannot support fixed wing aircraft currently, it was graded worst. Geilenkirchen and Naples were presumed best due to their current NATO missions.

Base Support

Base Support Pairwise comparison	Chièvres	Geilen- kirchen	Naples	Izmir	Pápa	<u>Weight</u>
Chièvres	1.0000	0.5000	0.3333	4.0000	5.0000	0.1748
Geilenkirchen	2.0000	1.0000	0.5000	6.0000	7.0000	0.2901
Naples	3.0000	2.0000	1.0000	7.0000	8.0000	0.4397
Izmir	0.2500	0.1667	0.1429	1.0000	2.0000	0.0566
Pápa	0.2000	0.1429	0.1250	0.5000	1.0000	0.0388

Fig 7. Base Support Pairwise Comparison

The base support comparison includes on or off-base medical and dental facilities, contracting, religious support, housing, schools, and dining facilities. Other considerations include possible environmental impact along with the ability to support NATO's BICES communications. Geilenkirchen and Naples ranked best due to the vast support network in the surrounding communities.

Synthesis of Results

	Location	Allowances	Logistics	Flight Line	Base Support	Final Result
Factor Weights	0.3766	0.1783	0.0424	0.3247	0.0780	
Chièvres	0.181821	0.025128	0.003626	0.017651	0.013631	0.241858
Geilenkirchen	0.110613	0.012462	0.006743	0.111647	0.022626	0.264092
Naples	0.013307	0.064623	0.018653	0.111647	0.034295	0.242525
Izmir	0.026680	0.011491	0.011855	0.041858	0.004417	0.096301
Pápa	0.044175	0.064623	0.001547	0.041858	0.003022	0.155225

Fig 8. Synthesis of all Pairwise Comparisons

The final step brings all the numbers back together. For this the analyst takes the five Decision Variable pairwise comparison weights for each individual base and multiplies them by the factor weights found in Figure 2. Then add them across to get the final result as shown in Figure 8. In this demonstrative scenario, Geilenkirchen is declared the best location. However, both Chièvres and Naples are very close. The highlighted blocks in Figure 8 show the weaknesses of the three top choices. Chièvres has the worst flight line, Geilenkirchen has the least allowances, and Naples is the worst location. No matter what, there is no perfect solution.

One item not discussed was that of verifying the rankings and weights of the pairwise comparisons were consistent. AHP does account for that with a Consistency Index and Consistency Ratio. Geoff Coyle describes how to determine if the rankings are truly consistent in his paper, “The Analytic Hierarchy Process (AHP).”⁹⁶

Conclusions/Recommendations

A key element of NATO’s new Strategic Concept, signed in Lisbon 2010, is partnerships. “No one country or organization can deal with the complex and unpredictable challenges of the security environment on its own: coordinated multilateral action is required.”⁹⁷). The proposed NATO SOF Air Wing meets NATO’s mission needs and limited budget. SOF forces have historically proven highly efficient for the dollars committed and the addition of a SOF Air

⁹⁶ Geoff Coyle, The Analytic Hierarchy Process (AHP), http://www.booksites.net/download/coyle/student_files/AHP_Technique.pdf, (accessed March 5, 2012).

⁹⁷ North Atlantic Treaty Organization “Partnerships: a cooperative approach to security,” http://www.nato.int/cps/en/SID-E16E7099-8EF8C4AB/natolive/topics_84336.htm.

capability will generate further return on the initial investments in ground SOF forces with minimal additional cost to maintain establish the Air Wing. Most importantly, the NATO SOF Air Wing delivers a security and strike capability far cheaper and more efficient than competing defense strategies such as drones, stand-off attack weapons, or other alternatives. SOF delivers precision strike and counter terror options. The NATO SOF Air Wing extends the range and capabilities of these forces.

In this study, the authors have described how to determine the best location for the new air unit using the Analytic Hierarchy Process. The process divided the decision into five main criteria, compared the criteria in pairwise fashion to determine weights, compared each base according to the criteria, and synthesized the results to determine an optimal solution. In the short term, the unit will be based at Chièvres. However due to the limited runway, Chièvres will not be a suitable location for the unit after fixed-wing aircraft are assigned. In this sample scenario, Geilenkirchen was deemed the best location for the new NATO SOF Air Unit, but not by a significant margin.

All of the above analysis assumes the host nation for each candidate base is equally willing to host the NSAW. Recognizing that this condition may not be tenable, this analysis may best serve the Alliance to narrow the list of candidate installations based on the above operations, training and cost criteria. This paper demonstrates a means to quantifiably compare the relative value of each candidate base. If desired, a more in-depth study could be accomplished to further compare sub-criterion and additional installations.

Near-Term Rotary Wing Aviation Needs: Acquisition and Program Management of Excess Defense Articles

*Major Marco Cervantes, USA, Major Christopher Enderton, USA
and Major Joshua Powers, USA*

In March of 2011, 30 representatives from 16 nations met to discuss NATO SOF air enabler shortfalls. The decision was made to provide the Military Committee with options to ameliorate these shortfalls.⁹⁸ The recommendation adopted by the committee was to establish a NSHQ air capability responsible for conducting air warfare training and eventually field a Special Operations Air Task Group when directed. This proposed Air Warfare Center will, when realized, fill a considerable gap by providing interoperability training between partner nations' ground and maritime SOF and their necessary air enablers.

NATO has developed requirements for its special air warfare capability that are specified in the Strategic Concept of "Modern Defense" and the Comprehensive Political Guidance. The Strategic Concept outlines its need to develop expeditionary capabilities to detect and defend against international terrorism. The Comprehensive Political Guidance drives the planning process to work with other nations to generate forces to conduct simulations operations (2 Major and 6 Small Joint). All requirements translate to SOFs need to operate in a variety of environments with the use of a versatile aerial capability. Listed below are the minimum requirements required for NSHQs SOF Aviation as outlined by the NSHQ SOF Aviation Commander:

⁹⁸ Lieutenant Colonel Manny Diwa, United States Army, "NATO SOF Headquarters" (briefing, Naval Postgraduate School, Monterey, CA, 23 July 2011).

Minimum Requirements for NSHQ SOF Aviation

Support at least one of the three, and strive to support all of the three principal tasks of NATO SOF (SR, DA, and MA) across the spectrum of conflict.
Maintain a habitual relationship with national special operations ground and maritime units for training and operations.
Support special operations principal tasks in multiple environments, e.g., mountain, desert, jungle, urban, or maritime.
Insert or extract up to 16 special operations personnel and their equipment in a low to medium threat environment, to a precise location at least 100 nautical miles or 160 kilometers from the starting point, using low prominence flight techniques, at day or night, using night vision devices, to a precise location, with a time-on-target within ± 1 minute.
Fixed-wing SOATUs will also be qualified to conduct landings and takeoffs from short, unimproved airfields, at night, using night vision devices.

Possible Acquisitions / Platform / Organizational solutions to meet capability gaps

In order to meet the NATO SOF Commanders minimum requirements intent and reach a fully operational posture within the next two years, three Courses of Action (COA) can have been analyzed to fulfill the rapid fielding initiative. The three COAs listed below are in order of precedence (U.S. Excess Defense Articles, Operational Tasking of U.S. Aviation Units and Leasing) and further analysis of the recommended COA has been presented.

COA 1- Excess Defense Articles (Recommended)

Excess Defense Articles (EDA) provide NSHQ with a rapid and proven capability to stand up NSHQs air capability. Three rotary wing aircraft have been identified as suitable platforms based on the minimum requirements:

Navy SH-60F



Army UH-60L



Army CH-47



These three proven aerial capabilities will come at a large cost that could outweigh the benefit of other material solutions. However, the supportability package to sustain anyone of the three EDA choices is significantly reduced given the supportability infrastructures that is currently in place (Maintenance, Training, etc) both in the United States and in Europe.

COA 2- Tasking

NSHQ seeks consistent operational support from U.S. aviation units on a rotational basis until a material solution has been identified. This operational construct would be similar to the way the U.S. Joint Task Forces tasks for support from all U.S. Military Services. The U.S. Special Operations Aviation unit 160th SOAR, would be the most likely choice, but given limited resources and high OPTEMP, conventional army aviation units would be the next target solution. This construct would be followed with other nations that have suitable aviation capabilities and meet the minimum requirements set by NHSQ SOF Aviation.

COA 3 – Leasing

NATO is currently is facing a large problem in Afghanistan due to the lack of helicopters. It does not have the ability to conduct operations without the extensive support of other countries. "It's not that NATO nations don't have helicopters. The problem is that they're very expensive to ship to Afghanistan and to operate/maintain them there...." Said Maj. Gen. Ton van Loon, Commander NATO Regional Command South.⁹⁹ A leasing option would serve as a stopgap and does come at a significant cost. This option will enable NHSQ SOF consistent aerial support, despite ongoing concerns over fiscal austerity measures and the expense of purchasing new equipment.

Analysis – Acquisition and Support of Excess Defense Articles

It is important for the United States to deliver a flyable product quickly to its allied NATO partners. If we wait for the normal acquisition process to work and turn out an optimal solution for NATO SOF, then the buy in period of member nations will expire. A short-term solution to the overall problem is needed in order to show resolve and commitment as the framework nation for NSHQ. The need to fill the five-year gap between the now and the optimal solution is vital to establishing an air capability for NATO SOF. Finding a solution now and empowering our allied partners to take a larger role in global security is “*Smart Defense*”.

⁹⁹ Joris Janssen Lok, *Aviation Week & Space Technology*, “NATO Short of Helicopters for Afghanistan” (November 27, 2007).

Using EDA to equip NATO is a solution to fill the operational need immediately. The Foreign Assistance Act of 1961, the Arms Export Control Act, and 22 USC § 2321J govern and authorize the use of EDA. Defense articles declared excess by DOD are authorized for use by allied partners in support to US national security objectives.¹⁰⁰ The USC authorizes the President of the United States to transfer excess DOD equipment to foreign countries with NATO being the priority.¹⁰¹

The use of EDA to support NSHQ will not have to conform to some of the rules regulating foreign military sales. Instead, the US is the framework nation, meaning the US will still own and maintain the equipment given to NSHQ. Aircraft that are currently destined for the “boneyard” at the Aerospace Maintenance and Regeneration Center (AMARC) can answer the need for NSHQ now.

Currently, the US Navy has enough SH-60F scheduled to retire through about 2015 to satisfy the full NSHQ requirement of 24 aircraft. These “free” aircraft were offered to meet this mission. In order for these aircraft to fill this need, more analysis on how much these will cost is needed. The cost for phase maintenance, modifications, and sustainment are important to the discussion of which airframe to use. Cost data was obtained for the first 6 deliverable SH60s.¹⁰²

SH60F



¹⁰⁰ “Excess Defense Articles,” Accessed on 22 March 2012, <http://www.dsca.mil/programs/eda/edamain.html>

¹⁰¹ “Authority to Transfer Excess Defense Articles,” Accessed on 22 March 2012, 22USC 232J, <http://www.law.cornell.edu/uscode/text/22/2321j>

¹⁰² SH60 EDA data, LCDR Matthew Horr , PMA-299

Six (6) SH-60F Multi-Mission Naval Helicopters. These helicopters are being offered as Excess Defense Articles (EDA) at no cost under Section 516 of the Foreign Assistance Act (FAA) of 1961, as amended. The helicopters will be delivered in "as is, where is" condition. Line item 001 does not include T700-401C engines. Condition code A-4 (serviceable, used - good) applies

<u>Item</u>	<u>Quantity</u>
SH-60F Helicopters	6

Estimated Delivery Schedule:

Calendar Year	2012	2013
Quarter	2-3-4	2-3-4
SH-60F (#)	0-0-2	1-1-2

Estimated Cost Summary:

Net Estimated Cost	\$98,581,268
Packing, Crating, and Handling	\$0
Administrative Charge	\$3,746,089
Transportation	\$0
Other	\$0
Total Estimated Cost	\$102,327,357

NOTE: Cost for bringing SH-60F out of mothballs:

Labor - \$682,271 (7,826 hours @ \$87.18/hr)

Material - \$151,000

Additional labor - \$65,000

Transportation - \$30,000

Total - \$928,271

The "additional labor" costs are related to organizational level maintenance hours (~750) normally performed by Sailors, including engine run ups, blade removals/reinstallation, servicing, special inspections, etc.

Material cost listed above DOES NOT include aviation depot-level repairable components that will most likely be required to make the aircraft flight-ready, such as engines, main gearbox,

blades, avionics, actuators, etc. This could be a considerable additional expense. (For example, replacement cost for a T700 engine is ~\$690K)¹⁰³

The SH60 presents a good option because they are available now. Transferring these aircraft to NSHQs property book is not a difficult task. However, bringing these aircraft to a mission capable status may be a considerable task and poses the question of who will manage these aircraft and support them?

Another possibility for a rapid EDA strategy is to look at the US Army rotary wing fleet. Currently, the Army is in the middle of fielding UH60M Blackhawk and CH47F Chinook aircraft to the Combat Aviation Brigades (CABs). This leaves a question of what is the Army doing with the older UH60L, and CH47D platforms? Both these platforms are proven in combat environments and the supply chain is already in place to equip and maintain them. A standard Combat Aviation Brigade has 38 UH60L aircraft currently and 12 CH47 aircraft. Moving 24 of these airframes to NSHQ would not be a difficult or time consuming task. The aircraft are already Fully Mission Capable (FMC), and would not need extensive modifications or maintenance. A cost analysis is needed for the transfer and long term maintenance required to give NSHQ fully operational aircraft. This again asks the question of who will be responsible to maintain and support them.

UH60L



¹⁰³ SH60 data provided by Production Office, FRC Southwest

CH47



The following information was requested from Corpus Christi Army Depot (CCAD). This data will give us a good cost comparison for the SH60 and UH60/ CH47 EDA options.

1. How many UH-60 MDS and CH-47 MDS aircraft have been overhauled at CCAD in past 2 FY?

UH-60 AIRCRAFT		FY10	FY11
	A1-Overhaul	0	1
	A2-Battle Damage	3	3
	A3-Recapitalization	36	48
	B0-Prog Maintenance	0	4
	G0-Analy Rework	0	0
	IO-Repair	4	0
	Total Aircraft	43	56

CH-47 AIRCRAFT		FY10	FY11
	A1-Overhaul	0	0
	A2-Battle Damage	0	0
	A3-Recapitalization	5	3
	B0-Prog Maintenance	0	0
	G0-Analy Rework	0	0
	IO-Repair	1	1
	Total Aircraft	6	4

2. Average (High, Moderate, Low) Turnaround Time for Overhauls of UH-60 MDS and CH-47 MDS.

System		Year	Average	Low	High
UH-60 Aircraft	A3	2010	328.6	273	496
	Other		273.1	60	479
	A3	2011	362.6	285	535
	Other		298.3	27	475

CH-47 Aircraft	A3	2010	443.4	392	542
	IO		99	99	99
	A3	2011	496.7	478	530
	IO		280	280	280

For the WPC (Work Performance Codes) or WAC (Work Accomplishment Code - pre-LMP terminology) it is acquired from AMC regulation 750-1, table E-9 Work accomplishment codes. The definitions are as follows:

A1 Cyclic/normal overhaul/rebuild
 A2 Battle/crash damage overhaul/rebuild
 A3 Recapitalization maintenance work
 BO Progressive maintenance
 GO Analytical rework
 IO Repair

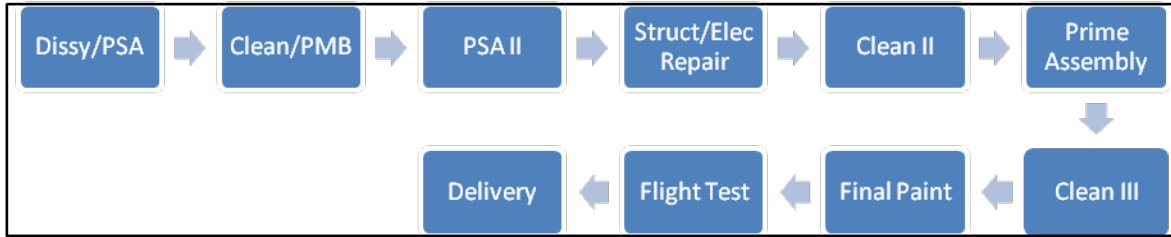
Each program will be negotiation with a narrative of work (statement of work).

Here are the nominal average costs:

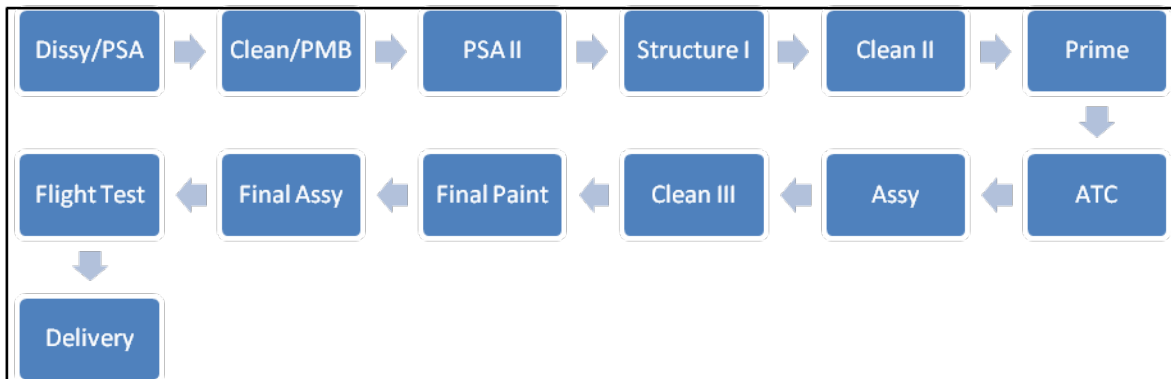
	UH-60	CH-47
A2	\$4,419,000	\$6,096,000
A3	\$4,823,000	\$7,189,000
IO	\$124,000	\$1,954,000
B0	\$2,317,000	\$359,500

3. A process flow chart for the above aircraft MDS (overhauls and perhaps most common MWOs applied at CCAD); any P4T3 data you wish to share.

Process Flow Chart for UH-60



Process Flow Chart for CH-47



4. List of depot partnering vendors at CCAD and what services offered or functions performed?

TELSS – Technical Engineering Logistics Services

General Electric (GE): This contract is to support Corpus Christi Army Depot in Technical, Engineering and Logistical Services and Supplies (TELSS), and to provide 100% parts, in the overhaul and repair of the T700 Family of Engines.

Honeywell: Provides technical, engineering, and logistic services and supplies to CCAD in support of CCAD's maintenance and overhaul workload on the T55 Family of Engines (712 and 714A).

Sikorsky Aircraft Corp: To obtain material and technical engineering and logistical services to support the overhaul, repair and recapitalization of the H-60 production. 2nd source testing of Blades and Transmissions

The Boeing Company: To obtain 100% parts and OEM technical engineering and logistical services to support reengineer industrial processes of the CH-47 and AH-64 production

5. Overall capacity (facilities, labor, parts) for the above aircraft MDS in a given year, month; any surge capacity? For example if NATO/NSHQ/SOCOM dropped 6 SH-60s off at CCAD this summer for overhaul, what is possible? Assume fiscal resources are in place.

Currently the UH-60 A3 CCAD is producing 48 aircraft for the year and CH-47 A3 is producing four. The overall capacity for one MDS is not available at this time due to the constraints of working various aircraft along with numerous components throughout our facility.

Programmatic: From Acquisition to Life-Cycle Management

The EDA aircraft solutions provide perhaps the most efficient means to achieve objective ends, certainly in the near-term. Acquiring aircraft that would have otherwise become EDA or demilitarized may have an attractive price tag at first. Similar to procuring new aircraft, what is purchased or acquired is a basic airframe. Mission equipment such as avionics, hoists, weapons mounts commonly referred to as “B kit” items, must be procured separately. Additional cost of procurement of engines per airframe plus a few spares must be considered, especially for EDA. Further costs may include rotor-blades and possibly transmissions or gearboxes. The requirements vary predicated on condition of the EDA aircraft offered.

Determining the cost of “free” requires systematic inquiry into initial procurement of spares, sustainment, and logistic support. This goes beyond simply inspecting airframes. The strategy for initial maintenance must include discussion on whether to pursue complete overhaul or repair and return. A complete overhaul has merit in best offering close to a zero-time aircraft. However, the price is at a premium over repair and return and requires the most time to complete service, potentially up to 350 days. A repair and return decision offers the customer to choose the depth of maintenance and which components to repair or replace. Doing such shall reduce considerably the time to complete service, possibly 180 days or less. Therefore, if the goal is

have aircraft available sooner, then a repair and return strategy is likely best. Plan accordingly for replacement of critical components and inspections along the way, where in some cases would not have come due as quickly had a complete overhaul been pursued up front.

Life-cycle management begins really before the “buy” or initial issue. Procurement follows the planning, provisioning, and determination of stock levels. Determinations are difficult without knowing aircraft disposition and fiscal resources. Base the decision of where to conduct overhauls and repair and returns on the capacity and capability. The choice of venue may be initially in the United States, such as Corpus Christi Army Depot (CCAD) or maybe Fleet Readiness Center Southwest (FRC Southwest) at Naval Air Station North Island, Coronado. The latter would be a good choice based on an SH-60, the former perhaps better suited for UH-60 and or CH-47. However, CCAD would be capable of servicing the SH-60.

Once aircraft are accepted and relocated to Europe, maintenance service at the organizational (field) and intermediate to depot (support) conducted in region becomes desirable or preferable to retrograde back to CONUS. The Theater Aviation Sustainment Manager-Europe or TASM-E is a US Army Aviation and Missile Command (AMCOM) activity based in Mannheim, Germany. TASM-E could provide a viable solution to intermediate to depot level (support) maintenance. Potential contract vehicles may exist for TASM-E to provide Contract Logistic Support (CLS) for NSHQ Aviation organizational maintenance. Or other contract vehicles may exist under US Army Europe (USAREUR) for these services. Similar to those services supporting the CINCHAWKs (UH-60) at Supreme Headquarters Allied Powers Europe (SHAPE) / Supreme Allied Commander Europe (SACEUR). Pursuing CLS solutions is consistent with intent that NSHQ SOATU and SOATG being manned with aviators and aircrew only.

Considerations for CLS include cost, scope, and resource planning. Clearly defining requirements is paramount to success. Employ the best practices developing performance work statements (PWS). Many fine examples exist in DoD, particularly in Europe. Part of resource planning includes determining how much Government Furnished Equipment (GFE) or Government Furnished Property (GFP) a CLS venture may require. GFE is typically tools and

aviation ground support equipment (AGSE). GFP is typically facilities, such as hangar or ramp space, and buildings. CLS contracts without any GFE or GFP command higher prices. Additional considerations for CLS are manpower/hiring laws in host country and any SOFA, standard agreements or treaties.

Life-Cycle Management

Planning for life-cycle management is likely beyond the scope of the current organizational structure of NSHQ. Planning and execution of training, operations of core SOF missions (DA, SR, and MA) are core competencies. Program management does not fit the structure of this organization; rather this would become burdensome if faced with the additional task. Instead, professionals of other organizations, appropriately structured and resourced should do the program management for NSHQ.

There is precedent to handle program management from within NATO. The NATO A&EWC Program Management Agency (NAPMA)¹⁰⁴ and NATO Airlift Management Agency (NAMA)¹⁰⁵ are such examples. However, these programs and assets represent collaborative efforts and resources of alliance members and partners for peace. Whereas, NSHQ is a framework organization where the establishment of structure and resources are likely required upfront before real collaboration begins. Additionally, should the preponderance of assets be gifted EDA, new procurement or lease from the United States, then program management of these assets is perhaps best suited for a United States Program Management Office (PMO) within the Department of Defense. Especially, considering that airworthiness directives (AD) and FAA certification is typically more stringent than any regulatory standards world-wide.

Which service should provide the PMO? DoD program management is disaggregated by design. Aircraft and or aviation system determine organization of a PMO. Specifically a PMO is established to support a given aircraft or system. While some PMOs are established for a family of vehicles or aircraft, seldom would these offices have such a diverse portfolio of aircraft. Nor

¹⁰⁴ NATO, "NATO A&EWC Programme Management Agency", accessed on 20 March 2012, <http://www.napma.nato.int/>

¹⁰⁵ NATO, "NATO Airlift Management Agency", accessed on 20 March 2012, <http://www.nama.nato.int/Press-01-04-2011.html>

would aircraft PMOs manage the bevy of mission equipment suites, along with AGSE, tools, and avionics to name a few. These systems are typically managed by separate PMOs specializing in this equipment. Therefore, program management of NSHQ aircraft by a singular agency is likely preferable.

To understand the benefits of dedicated PMO for NSHQ aircraft, first understand the great disincentive for program management to be performed by the existing PMOs for SH-60, UH-60, and CH-47 for rotary wing or any fixed wing aircraft PMO. The disincentive for those entities first and foremost is the lack of configuration management. If a PMO is to be burdened with supporting aircraft for spares, life-cycle logistics, and providing technical data, then they will want to manage, if not control, the configuration. Configuration of most aircraft, as specified by the technical data package (TDP) is predicated on the original aircraft and mission profile. Special operations organizations almost always drift from the standard mission profile. Such organizations typically modify structures and surfaces to suit the mission. Or use aircraft seemingly beyond the performance envelope. More troubling for engineers managing the technical data package is all the non-standard mission equipment that special operations aviation organizations employ. Therefore, PMOs will have difficulty providing adequate technical support to their special operations customers since the aircraft would differ greatly from the standard configuration employed by the majority of customers.

This great disincentive is ameliorated by having a dedicated PMO for NSHQ. This PMO can be an especially established PMO (purpose built) or an existing one that currently services special and non-standard aircraft. Perhaps the foremost example of an especially established PMO is Office of the Program Manager, Saudi Arabia National Guard Modernization Program (OPM-SANG)¹⁰⁶. This organization functions as a total acquisition program executive office (PEO) that handles all aspects of providing materiel solutions to the Kingdom of Saudi Arabia; to include life-cycle management thereof.

¹⁰⁶ Global Security.org, “Office of the Program Manager, Saudi Arabia National Guard Modernization Program”, assessed 20 March 2012, <http://www.globalsecurity.org/military/agency/dod/opm-sang.htm>

The non-standard aircraft PMO model would be USSOCOM SORDAC PEO-Rotary Wing. Perhaps program management for NSHQ by this organization is the most sensible solution. USSOCOM is set to take over executive agent responsibilities from the US Army within the next FY and handle framework functions and funding for NSHQ. This organization is clearly agile and adaptive in its acquisition practices, along with being greatly capable of contending with non-standard aircraft and configurations of such aircraft.

The synergy between combat developer/requiring activity and materiel developer would proliferate with NSHQ and SORDAC. This arrangement could potentially streamline the planning and programming of fiscal resources. A greater link between materiel solutions, manning, and strategy would exist. Additionally, this organization is chartered (authorized) to manage above aircraft requirements and also manage the mission equipment, “B kit” items, AGSE and more. While many PMOs are resourced and capable of performing these functions, few (if any) are chartered to do so.

The final program management solution and life-cycle planning for NSHQ is far from decided. Further research will best determine if any of these ideas are sound and credible as specified and written here. Having a PMO that is chartered and capable of supporting aircraft, mission equipment, AGSE, and other associated “B kit” items should enhance efficiency, leading to successful life-cycle management. Ultimately, fiscal and policy constraints, participation by the alliance, and other factors apply weight to such decisions.

NOTE: The US Army’s Non-Standard Rotary Wing Aircraft PMO is not considered here, with the focus on EDA SH-60, UH-60 and CH-47. However, should a decision be made to pursue non-standard aircraft (non-Army or DoD), then perhaps that PMO could be considered. Again, the configuration management disincentive may remain.

Conclusions and Recommendation

USSOCOM remains committed to the viability of NATO SOF and its necessary enablers as a means to ensure that this tremendous capability is not challenged in this time of austere defense budgets. As the framework nation for NSHQ, the US will continue to provide material and manpower to the organization in an effort to ensure interoperability and enhanced capability to

the NATO Alliance as it “pivots” to Asia and continues to “hold” in the Middle East. We have demonstrated that an initial rotary wing capability can be realized to provide training and standardization by providing legacy EDA aircraft to NSHQ as a near term solution. But, regardless of the airframe chosen, program management will be a challenge that should be addressed before any acquisition is undertaken. We recommend that the initial aerial platform materiel solution come from the transfer of EDA aircraft and that its programmatic lifecycle be managed by USSOCOM SORDAC PEO-Rotary Wing. If NATO SOF Aviation is to sustain itself as a fully-mission capable organization for the future it will have to keep the “Smart Defense” principle in the forefront and will have to be understood, accepted and executed by all NATO SOF nations.

Analysis of Alternatives for Rotary-Wing Aviation: SH-60F vs. UH-72A

Lieutenant Commander Stephen Jones, USNR, Lieutenant Commander Philip Lowrey, USN and Lieutenant Anthony DiCola, USN

Organic air capability for NATO SOF will require some investment. However, the size of the investment is small, scalable, and offers a strong return on investment when compared to other defense articles. The Group of Experts stresses that military transformation and the development of new capabilities are necessary. These capabilities should enable a “flexible, mobile, and versatile” posture that maximizes financial efficiency in light of NATO member nation’s fiscal constraints. Richard Newton, an instructor at Joint Special Operations University (JSOU) notes that NATO has made significant gains in the areas of ground and maritime SOF, but that aviation SOF has not kept pace. This limits the efficacy of their SOF, since the capability to transport personnel for their unique mission sets frequently is not available, or has never been developed.¹⁰⁷

SOF Air Missions and Required Skill Sets

SOF air shares the common missions of Direct Action (DA), Special Reconnaissance and Surveillance (SR&S), and Military Assistance (MA) with all SOF forces.¹⁰⁸ However, as delineated in the *Special Air Warfare Manual*, “The *primary mission* of special operations air forces is enhanced air mobility – specialized air transport (AT) activities via fixed-wing, rotary-wing, or tilt rotor aircraft”.¹⁰⁹ As explained in the *Initial Capabilities Document* published by the United States Special Operation Command (USSOCOM), the initial capability required for rotary wing (RW) SOF operations can be accomplished by establishing a NSHQ Air Warfare Center focused on training.

The Air Warfare Center will develop common NATO SOF aviation policy standards, doctrine, training, and education assessments for the Alliance. As a part of its doctrine, the Air Warfare

¹⁰⁷ R. D. Newton, (2006, September). *Special Operations Aviation in NATO A Vector to the Future*. Retrieved November 30, 2011, from http://www.cgsc.edu/carl/docrepository/JSOU_Report_06_8.pdf

¹⁰⁸ Special Operations Headquarters. (2010). *DRAFT Special Operations Air Group Concept for Development & Organisation*. North Atlantic treaty Organization.

¹⁰⁹ NATO Special Operations Headquarters. (2010 1-March). *Special Air Warfare Manual Version 1.0*.

Center will require its RW aircraft to be able to provide reliable and sustainable training and administrative support in permissive environments at reduced acquisition, operating and sustainment costs.¹¹⁰ Following the near-term goal of the successful implementation of a training focused mission, the NSHQ Air Warfare Center will build the long-term capability of being an expeditionary Special Operations Air Task Unit (SOATU) capable of conducting the full spectrum of NSHQ tasked RW missions.¹¹¹

Near-term solution--RW training aircraft requirement:

- Fielding in calendar year 2012
- Sufficient cabin area to support the training of flight crew and ground SOF personnel.
- Sufficient lift and cargo capacity to conduct air movement of supplies (internal and external), critical parts, etc. during general support and training missions.
- Ability to conduct Day/Night/NVD/Adverse weather operations.
- Crew Served Weapons.
- GPS capable.
- Instrument Flight Rules (IFR) capable that meets Federal International Civil Aviation Organization (ICAO)/European standards.

Long Term solution--Expeditionary RW aircraft requirement:

- All capabilities listed in the Near-term solution
- Capable of performing alternate (non-landing) infiltration and exfiltration methods to include fast rope, repelling and hoist (winch) operations.
- Capable of providing precision close fire support ($\geq 7.62\text{MM}$) for the platform or supported troops.
- Capable of employing specialized TIPs or equipment to avoid enemy detection, defeat threat systems, improve situational awareness and enhance mission management.
- Capable of operating with increased survivability; ensuring maximum use of aircraft countermeasures, aircrew survivability equipment, appropriate techniques, evasive maneuvers, and discipline.
- High/Hot/Heavy/Dust Out capable.
- Aircraft Survivability Equipment (ASE).
- Multiple Secure UHF/NHF/SATCOM radios (HAVEQUICK/SINCGARS capable).
- Modes 1-5/IFF.

¹¹⁰ United States Special Operations Command. (2012, February 16). Initial Capabilities Document For North Atlantic Treaty Organization Special Operations Air Warfare Center. Tampa, FL: United States Special Operations Command.

¹¹¹ Ibid.

Airframe selection

Cost, as previously stated is an obvious and central consideration for selection. If a general purpose rather than a high-end/specialty aircraft is desired, what should the other criteria for selection include? The NSHQ draft *Special Operations Air Group Concept* (2010) study used the following minimum requirements to narrow the selection:

- (1) Currently in Production (major platform model, not specific variant)
- (2) Available for Purchase
- (3) Replacement and Repair Parts in production
- (4) Sufficient numbers in existence for “normalizing” data
- (5) Availability of reliable third-party specifications and performance data
- (6) In use by the armed services of two or more NATO member nations
- (7) Minimum Surface Ceiling (1,364 kg load) 3,658 meters
- (8) Internal Payload of 6 Fully Equipped PAX
- (9) Wire Strike Protective System
- (10) Armored Crew Seats
- (11) Active and Passive Countermeasures (*Long term requirement*)
- (12) Weather Radar
- (13) Night Vision Equipped/Capable
- (14) Cargo Hook with Rescue Hoist Capable
- (15) Range of 400KM +
- (16) Minimum Useful Load 1,364kg
- (17) Minimum 2 Heavy Machine Gun (NATO 7.62 or 12.7) (*Long term requirement*)

These requirements reduced the original list of more than one-hundred RW variants to just eight possible airframe alternatives. With “heavy weighting... placed on a platform’s past history, NATO member nation usage, and production availability,” along with price, performance, analysis of NSHQ missions and interviews with operators, the NSHQ draft *Special Operations Air Group Concept* (2010) study suggested a few platforms that stood out from the rest.¹¹² These aircraft were: the UH-72A/ EC-145, NH-90, and MI-17/8MT, though no quantitative analysis or suggestion beyond this was offered. However, the tendency to move rapidly when initiating new start programs tends to accelerate initial capability requirements and staffing, which can lead to “Gold Plate” requirements. Commonality of systems must be integrated into the process by integrating SOF capabilities and lessons learned. A focus on commercial-off-the-shelf (COTS)/ good enough solutions are warranted to increase affordability, acquisition

¹¹² Special Operations Headquarters. (2010). *DRAFT Special Operations Air Group Concept for Development & Organization*. North Atlantic Treaty Organization.

efficiencies, and reducing logistical footprints. As a result, the UH-72A LAKOTA is the best COTS fit for further quantitative analysis to compare life cycle cost estimates (LCCE) against legacy airframes such as the SH-60.

Ultimately, the report strongly suggested using loaned/donated SH-60 aircraft from the U.S. in the near term allowing for a low-cost initial capability and was considered cost-effective since it deferred procurement costs.¹¹³ The SH-60 and its variants are ubiquitous aircraft in the United States military with easy availability and a ready supply of excess defense articles (EDAs). Under section 516 of the Foreign Assistance Act of 1961 (P.L. 87-195), as amended, the U.S. government has the authority to transfer surplus military equipment to foreign security forces.¹¹⁴ The Department of State in their FY2008 Congressional Budget Justification for Foreign Assistance states that:

EDA articles are transferred in an "as is, where is" condition to the recipient and are only offered in response to a demonstrated requirement. The grant EDA program operates at essentially no cost to the United States, with the recipient responsible for any required refurbishment and repair of the items as well as any associated transportation costs (U.S. Department of State Bureau of Political-Military Affairs, 2007).

The statement that EDAs are “as is, where is,” at “essentially no cost” to the U.S., and that the recipient is liable for refurbishment, repair, and transportation is notable. This means that there can be significant costs for the recipient of EDAs. In fact, the analysis of this alternative will include a detailed estimate of costs from a 2009 proposed transfer of six EDA SH-60s from U.S. Navy stocks that includes the costs mentioned above.

Analysis of air frame Alternatives

UH-72A LAKOTA. The UH-72 LAKOTA is a militarized version of the Eurocopter EC-145 built by the American Eurocopter division of European Aeronautic Defense and Space Company

¹¹³ Ibid.

¹¹⁴ Committee on International Relations and Committee on Foreign Relations. (2003, July). *Legislation on Foreign Relations Through 2002*. Retrieved March 25, 2012, from USAID Web site: <http://www.usaid.gov/policy/ads/faa.pdf>

N.V. (EADS) and is readily available as a COTS item. The Eurocopter EC-145 was identified in the NSHQ air study as one of the air frames that stood out from the rest.¹¹⁵ The U.S. Army currently uses the LAKOTA as its Light Utility Helicopter (LUH).

The UH-72A is unique in that it uses contractor logistic support (CLS) for its maintenance. Active Army units receive full CLS, while the Army National Guard (ARNG) has implemented a hybrid form that allows Guard members to conduct field-level maintenance. The UH-72A program has benefited from this construct in that it has allowed the aircraft to quickly enter service with major success, meeting all its cost, schedule, and performance goals.

Program Highlights

- Delivered to Army with a valid FAA Airworthiness Certificate
- Operated and maintained in accordance with FAA regulations and Original Equipment Manufacturer (OEM) procedures
 - FAA approved Rotorcraft Flight Manual
 - FAA approved Maintenance Manuals
 - FAA Memorandum of Agreement authorizing Parts Pooling between Commercial and Military aircraft
 - Formal Memorandum of Agreement (MOA) between Army and FAA
 - Maintenance Compliance and Inspection Plan (MCI)
 - Continued Airworthiness Maintenance Plan (CAMP)
 - Any and All aircraft modifications will be via an FAA Supplemental Type Certificate (STC) or amended Type Certificate (TC)
- Initial Pilot and Maintainer training managed by UH-72 PM and conducted by OEM
- Flight Hour Program Dollars managed by UH-72 PM
 - Unit manages POL Dollars received from ACOM NGB
- Benefits
 - Commercial Non-Developmental Item
 - Rapid Acquisition
 - Reduced Force Structure
 - No Capital Investment in Logistical Sustainment Structure
 - Leverage of Commercial Parts Pool
 - High Operational Availability Rates
 - Quick divestment
 - Commercial Training

¹¹⁵ Special Operations Headquarters. (2010). *DRAFT Special Operations Air Group Concept for Development & Organization*. North Atlantic Treaty Organization.

SH-60F SEAHAWK. After the SH-60B entered service, the Navy began development of the SH-60F variant to replace the SH-3 Sea King. Development of this variant began with the award of a contract to Sikorsky in March 1985. An early SH-60B was modified to serve as a SH-60F prototype. The company was contracted to produce seven SH-60Fs in January 1986 and the first example flew on 19 March 1987.

The SH-60F serves as the carrier battle group's primary anti-submarine warfare (ASW) and search and rescue (SAR) aircraft. It hunts submarines with the AN/AQS-13F dipping sonar, and carries 14 sonobuoys. The SH-60F is unofficially called the "Oceanhawk." The SH-60F can carry the Mk 46, MK 50, or MK 54 torpedo and a choice of cabin-mounted machine guns, including the M60D, M240D, and GAU-16 (50 CAL) for defense. Standard crew complement is one pilot, one copilot, one enlisted tactical sensor operator (TSO), and one enlisted acoustic sensor operator (ASO).

Table 1. Comparative Aircraft Performance Data (NAVAIR, 2012)

	UH-72A	SH-60F
Length	42 feet, 7 inches	64 feet, 10 inches
Height	11 feet, 9 inches	17 feet
Rotor Diameter	36 Feet	53 feet 8 inches
Max Take-off Weight	7,903 lbs	23,500 lbs
Range	370 nautical miles	245 nautical miles
Airspeed	145 knots	183 mph
Ceiling	18,000 feet	12,000 feet
Propulsion	(2) Turbomecca Arriel 1E2 turboshafts	(2) General Electric GE- T700-401C
Thrust (per engine)	738 SHP	1,890 SHP
Rate of Climb (FPM)	1,600	1,650
Crew	2	3-4
Capacity	8 Troops or 2 Stretchers	8-10 Troops

METHODOLOGY

Data Assessed and Selected for Use

Naval Air Systems Command (NAVAIR) provided a line item summary of a letter of agreement (LOA) for an EDA transfer of six SH-60 aircraft from 2009. This LOA includes all of the costs of refurbishment, repair and transportation so serves as a useful basis of estimate for those. Additionally, it includes costs for initial spares and logistics support for a two year startup period. It also includes expenses for U.S. assistance in standing up organic logistics support capabilities for the recipient nation in a model similar to that used by the U.S. Navy. The LOA is used in the quantitative analysis of the EDA procurement option since it so closely mirrors the requirements of the desired initial NATO rotary wing capability. It has the added benefit of being divided into discrete and easily separable charges that can be used for estimates under various assumptions of which costs NATO will be responsible for covering.

From the brief assessment of the advantages of using EDA SH-60s in the NSHQ Air Study, and from discussions with NSHQ personnel, it appears that the costs delineated in the NAVAIR estimate are significantly higher than NATO is anticipating. NATO personnel discussed these SH-60s as being free or nearly free, and an inexpensive way to initiate the program. This assumption might be justified if U.S. funding was made available to cover the costs associated with a traditional EDA grant. NATO has been in discussion with USSOCOM regarding funding, and it is expected that USSOCOM will pay some of the costs of the program. Since the U.S. may therefore pay the initial costs of the SH-60s, a “SH-60 Free” calculation is included in the analysis. This reflects the financial requirement of fielding the SH-60 aircraft if all of the refurbishment, repair, and transportation costs are defrayed by the U.S., and NATO is delivered free, fully operational helicopters.

Procurement costs of the EC-145 LAKOTA variant were taken from the Defense Acquisition Management Information Retrieval (DAMIR) Selected Acquisition Report (SAR). The number used for analysis of procurement costs is the Average Procurement Unit Cost (APUC) of the 345

LAKOTAs acquired by the U.S. Army at the time of the report. The possibility that economies of scale might make the Army's APUC lower than what NATO could expect was considered, and an additional source of data sought. The U.S. Navy operates just five LAKOTAs, offering the opportunity to analyze the effects of quantity on procurement cost. The procurement cost to the Navy was found to be within 5% of the Army's. This alleviated the concerns of small batch procurement driving up costs for the LAKOTA. With costs almost equal, the decision was made to use the Army data for analysis, since the Army's cost data came from a formal report, while the Navy's cost data came from a technician's spreadsheet.

Operation and Support (O&S) cost estimates are based upon the Assistant Secretary of the Army for Financial Management and Comptroller published reimbursable rates from FY2011. These numbers include fuel, depot level repairables (DLRs), consumables, depot costs, and CLS costs for the SH-60. For the LAKOTA, they include just fuel, CLS, and a small portion of depot costs (from the hybrid CLS contracts) since the other maintenance costs (DLRs and consumables) are included under the CLS contract. Therefore, the comparisons made in O&S are between an organic maintenance capability for the SH-60 and a CLS (i.e., contractor provided logistics) package for the LAKOTA. The comparison of these disparate support options for the two airframes will be considered both quantitatively (cost per flight hour) and qualitatively (ease of use/ management for the operator). Personnel costs for the pilots and aircrew are not included in this analysis, since NATO manning decisions are being made independently of the platform selection decision. However, when NATO is determining total program costs, the personnel costs will need to be included.

Quantitative (i.e., Cost) Analysis

All costs were normalized to BY2011 using GDP deflator calculations based upon the most recent published OMB tables. Acquisition costs and the O&S costs mentioned above were combined to determine annual costs (not including personnel costs, as discussed), and extended to determine lifecycle costs. The amount of funding available to NSHQ for program initiation and sustainment has not yet been determined. Therefore, a variety of scenarios are outlined and

costed to illustrate a representative range of options. All costs are represented in FY2011 dollars. The duration of the SOF rotary wing program has also not been determined. The possibility of a 2019 end date has been mentioned, but the potential for extended operations should also be considered. Therefore, this analysis presents estimates for both a 2019 end-date, and twenty-year program duration. Twenty years was selected since it is the estimated operational life of many helicopters. The three estimates analyzed and compared are:

1. The Full NAVAIR EDA Program Startup Estimate: The costs from the NAVAIR provided LOA for six EDA SH-60s was analyzed by line item. The analysis accounts for both the full-cost estimate including all elements for a full program startup, and for a zero-cost estimate assuming that all associated costs of bringing the EDAs to full operational capability will be paid by another agency. An analysis of partial costs may be warranted if NATO is ultimately expected to pay only certain portions of the startup costs. In that instance, the same methodology used in this research could be applied. However, since no basis for such a partial estimate was available, it was not included in this analysis. The O&S estimates were then added to these acquisition estimates, and extended to the year 2019. The twenty year estimate was not made for the full-cost scenario. Since EDA helicopters are already well into their operational life, the expense of repurchasing additional helicopters at this high cost prior to the end of the 20 year period was considered prohibitive.
2. Comparison of “Free” SH-60s to EC-145 LAKOTA variants over a twenty year period: Free SH-60s (all startup costs paid by another agency) are less expensive in the short-term due to their zero procurement costs, but remain more expensive in the long-term because of their greater O&S costs. However, the initial expense of procuring six LAKOTAs at once may be prohibitive; therefore scenarios are considered for beginning the program using EDA SH-60s and replacing them with LAKOTAs in subsequent years, as funds become available. Four different representative estimates are compared:
 - Accepting six free EDA SH-60s and maintaining them, with additional free EDA SH-60 replacements as necessary. This option therefore accrues only the O&S costs of the six aircraft for the twenty year period.

- Purchasing six LAKOTAs in the initial year and maintaining them for the twenty year period (foregoing the use of EDA SH-60s altogether).
- Accepting six free EDA SH-60 aircraft to initiate the program, and then replacing them with LAKOTAs at a rate of two aircraft per year beginning in the second year of the program. Assuming program initiation in 2013, the resulting aircraft inventory under this “Rapid Replacement” schedule is depicted in Table 3.

Table 2. Aircraft Inventory Using the Rapid Replacement Schedule

Year	2013	2014	2015	2016 and After
SH-60s	6	4	2	0
LAKOTAs	0	2	4	6

- Accepting six free EDA SH-60 aircraft to initiate the program, and then replacing them with LAKOTAs at a rate of one aircraft per year beginning in the third year of the program. Assuming a program initiation in 2013, the resulting aircraft inventory of this “Gradual Replacement” schedule is depicted in Table 4.

Table 3. Aircraft Inventory Using the Gradual Replacement Schedule

Year	2013	2014	2015	2016	2017	2018	2019	2020 and After
SH-60s	6	6	5	4	3	2	1	0
LAKOTA	0	0	1	2	3	4	5	6

The comparison of these four options illustrates the tradeoffs available to NSHQ between startup costs, life cycle costs, and annual costs of the program.

3. Analysis of the potential 2019 end date: SH-60 and LAKOTA costs are reconsidered with an assumed program start in 2013 and an end in 2019 to determine the impact of short program duration on platform selection.

MONETIZED IMPACTS

There are three primary sources of cost data used in this analysis. Purchase price for the Excess Defense Article (EDA) SH-60s were taken from a 2009 NAVAIR estimate prepared for a grant of six EDA SH-60s. The cost breakdown is presented in Table 4.

Table 4. NAVAIR Costs for Grant of Six EDA SH-60s (2009 \$s)

CATEGORY	PER UNIT	QUANTITY	TOTAL
PLATFORM COST	\$0.00	6	\$0.00
ENGINES	\$803,665.00	14	\$11,251,310.00
TECH ASSIST	\$176,175.00	1	\$176,175.00
SUPPORT EQUIPMENT	\$7,191,881.00	1	\$7,191,881.00
SPARES	\$29,417,966.00	1	\$29,417,966.00
TRANSPORT	\$647,863.00	1	\$647,863.00
OVERHAUL	\$5,325,529.50	6	\$31,953,177.00
TRAINING	\$4,650,785.00	1	\$4,650,785.00
PUBLICATIONS	\$3,393,117.00	1	\$3,393,117.00
LOG TECH ASSIST	\$1,357,977.00	1	\$1,357,977.00
OTHER TECH ASSIST	\$3,505,855.00	1	\$3,505,855.00
ENG. TECH ASSIST	\$2,599,162.00	1	\$2,599,162.00
ENG. TECH SERVICES	\$2,436,000.00	1	\$2,436,000.00
ADMIN CHARGE	\$3,746,089.00	1	\$3,746,089.00
		TOTAL	\$102,327,357.00
		Per helicopter	\$17,054,559.50

The helicopters were offered at no cost under section 516 of the Foreign Assistance Act of 1961, and “as is, where is.” The condition of these aircraft was described in the LOA as “serviceable, used – good.” While the platforms themselves were no cost, the associated costs to return the aircraft to fully operational condition, transport them to the purchasing country, and implement a

U.S. style logistics support program were considerable. The line items cover materiel and support costs as follows:

- Engines: Two new engines per helicopter were required, and two additional engines were procured as spares.
- Tech Assist: An assessment of the receiving buyers existing logistics support system and the development of a subsequent plan of action enabling them to develop their logistics support capabilities to support the SH-60s.
- Support Equipment: New-condition support equipment and calibration gear for one land-based (as opposed to sea-based) organizational level maintenance site.
- Spares: Sufficient aircraft spares and repair parts to meet anticipated requirements for organizational level maintenance at one main base and one detachment for a period of two years.
- Transport: The movement of the helicopters to the purchasing nation. Does not include any import duties or fees nor any enroute maintenance requirements.
- Overhaul: The costs of new engine installation, other necessary new equipment procurement and installation, software installation, and follow-on testing as required. This includes check flights.
- Training: For six pilots and ten organizational level maintainers at a location in the United States. Does not include room, board, or travel expenses for students.
- Publications: All references required to conduct organizational level maintenance, including required publication updates for two years.
- Logistics Technical Assist: Integrated logistics support and interim contractor support for the establishment of logistics programmatic.
- Engineering Technical Assistance: One engineer and two contractor support personnel for five years.
- Engineering Technical Services: One airframe/ engine representative and one avionics/electrical representative for two years.
- Other Technical Assistance: unexplained
- Administrative Charge: unexplained.

\$17,054,560 (in BY2009 dollars) per helicopter therefore covered initial overhaul, a significant portion of operation and support costs for the first two years, and the startup requirements for a US Navy style logistics support program.

The purchase price of the LAKOTA comes from the Defense Acquisition Management Information Retrieval (DAMIR) Selected Acquisition Report (SAR) for the LUH and uses the average procurement unit cost. None of the above mentioned program costs are included, but they are also not required if a CLS package comparable to that purchased by the U.S. Army is

implemented. In that case, NATO would not need to establish an organic maintenance capability.

Operation and Support (O&S) costs are taken from the Assistant Secretary of the Army for Financial Management and Comptroller published reimbursable rates for FY2011. For the purpose of this analysis O&S costs include fuel, depot level repairables (i.e., parts), depot maintenance costs, consumable item usage, and associated contract logistics support costs. Notably, it does not include crew pay.

Costs used in the following analysis have all been converted to BY 2011 dollars using Gross Domestic Product (GDP) deflator calculations based upon figures reported by the Office of Management and Budget (OMB) located at the White house web site at <http://www.whitehouse.gov/omb/budget/Historicals>. Acquisition and O&S costs are presented in Table 5.

Table 5. Summary of Cost Data

PLATFORM	PURCHASE PRICE	Fuel/ FH	DLR/ FH	Consumables/ FH	Depot/ FH	CLS/ FH
LAKOTA	\$5,758,500	\$348	\$0	\$0	\$192	\$2,249
SH60 COSTED	\$17,549,142	\$354	\$2,151	\$586	\$1,655	\$962
SH60 FREE	\$0	\$354	\$2,151	\$586	\$1,655	\$962

Table 5 clearly illustrates that the majority of the maintenance and support costs of the SH-60 are included in the CLS line item for the LAKOTA. Additionally, the O&S cost for the LAKOTA (\$2,789/flight hour) is significantly less than for the SH-60 (\$5,708/flight hour).

The SH-60 Costed model assumes NATO pays the full costs associated with an EDA grant (overhaul, transport, etc.) and program startup delineated in the NAVAIR LOA. The SH-60 Free category assumes that some other agency pays these costs on NATO's behalf resulting in zero initial cost to NATO for the acceptance of fully operational SH-60s. If another arrangement were made wherein NATO was responsible for a portion of the startup costs, then the same methodology should be used with the SH-60 purchase price adjusted as appropriate to reflect NATO's initial costs.

Purchase Price, Annual Cost, and Life Cycle Cost Overview

The initial purchase price, annual costs, and life cycle costs of the various options differ significantly. To date, the focus of NATO stakeholders appears to be in keeping the initial procurement cost near zero. This would enable a more rapid acquisition of helicopters, thereby expediting the process of standing up the SOF rotary air capability. However, the SH-60 has significantly higher O&S costs per flight hour than the LAKOTA. Therefore, even with potentially zero procurement cost for the SH-60s, they may still be more expensive depending upon how long the program lasts. Three scenarios will be discussed to illustrate the range of financial options. First, NATO could acquire EDA SH-60s from the U.S., and maintain them for the duration of the program. Second, NATO could forego the EDA SH-60s and procure and operate LAKOTAs at the outset. Third, NATO could initially acquire EDA SH-60s to get the program started, and then replace them with LAKOTAs as funds become available. Since the lump-sum procurement costs (i.e., single-year cost) of new helicopters would be the primary obstacle in this scenario, the new helicopters could be phased in over a few years to minimize costs in any one year. Program duration has not yet been determined. Some at NATO have suggested the program may only last until 2019. Therefore, this analysis will consider a potential 2019 end date, and a twenty-year cost determination. Operation and Support costs per annum are based upon an assumption of 250 flight hours per platform per year.

SH-60 Costed Option

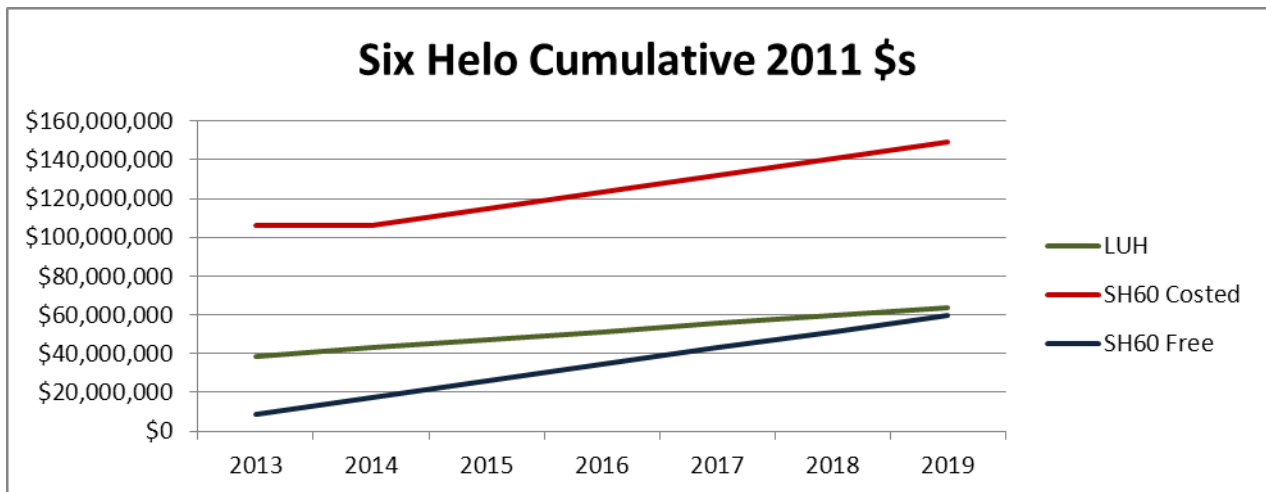
With the high O&S costs of the SH60, any significant initial costs of procurement make the SH-60s much more expensive in the long term. The SH-60 costed model, based upon the full program start-up estimate delineated in the NAVAIR LOA has extremely high costs as presented in Table 6. Significant amounts of the O&S costs for the first two years are included in the LOA bottom line price. Therefore, this estimate uses the bottom-line price (adjusted for inflation) from the NAVAIR LOA, adds only fuel costs for the first two years O&S, and uses full O&S estimates for the following years.

Table 6. Annual Cost of Full Program Startup using EDA SH60s (BY2011)

SH60 FULL COST MODEL	
Year 1	\$105,825,852
Year 2	\$531,000
Year 3 and After	\$8,562,000

These are used airframes, and are not expected to have twenty years of service life left. Therefore, the cumulative acquisition and O&S costs will only be projected to 2019. The price of acquiring replacement EDA SH-60s at the price level of the Costed model would be prohibitive. Also, estimation of this seven year period will suffice to illustrate the high costs of this option as presented in Figure 1.

Figure 1. Comparison of Cumulative Costs



Accepting that price is the primary consideration in determining which alternative to pursue, the Costed model for EDA SH60s is not recommended. It is far more expensive initially and cumulatively than the procurement of COTS LAKOTA aircraft. Having shown the prohibitive costs of this option, no further analysis of it will be made. The following analysis will compare only the potential zero-cost SH-60 option with the COTS LAKOTA.

SH-60 Free and LAKOTA 20 year cost comparison

Extending costs over a twenty year period for free SH-60s and LAKOTAs using the dollar values in Table 6, we arrive at the annual costs listed in Table 7 and cumulative costs presented in Figure 2.

Table 7. Annual Costs

	LAKOTA	SH-60 Free
Year 1	\$38,734,500	\$8,562,000
Year 2 and After	\$4,183,500	\$8,562,000

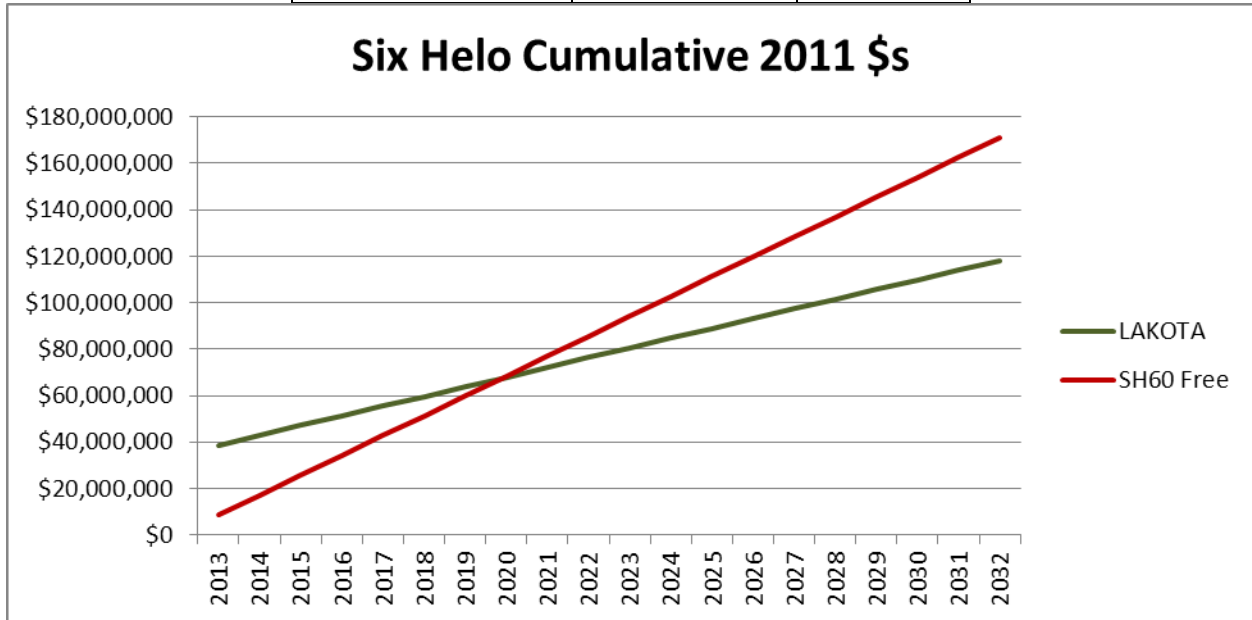


Figure 2

The cumulative costs are significantly less for the LAKOTA than the SH-60 because of the different O&S costs. However, the initial procurement costs of the LAKOTAs in year one are considerable. If start-up funds are not available in sufficient quantities to purchase six LAKOTAs in year one, then the best way forward may be acceptance of the free SH-60's with subsequent replacement by LAKOTAs as funds become available. Two illustrative options for such phased replacement are presented below and compared to the options of either maintaining only the free SH-60s or purchasing six LAKOTAs in year one. They are:

- Rapid Replacement: Acceptance of 6 free SH-60s in 2013 with replacement by 2 LAKOTAs per year beginning in 2014; Annual Costs are presented in Table 8 and cumulative costs are presented in Figure 3
- Gradual Replacement: Acceptance of 6 free SH-60s in 2013 with replacement by 1 LAKOTA per year beginning in 2015; Annual Costs are presented in Table 9 and cumulative costs are presented in Figure 4

Table 8. Rapid Replacement: 2 LAKOTAs/year beginning 2014

Year	2/yr. begin 2014	LAKOTA Only	SH60 Free Only
2013	\$8,562,000	\$38,734,500	\$8,562,000
2014	\$18,619,500	\$4,183,500	\$8,562,000
2015	\$17,160,000	\$4,183,500	\$8,562,000
2016	\$15,700,500	\$4,183,500	\$8,562,000
2017 and After	\$4,183,500	\$4,183,500	\$8,562,000

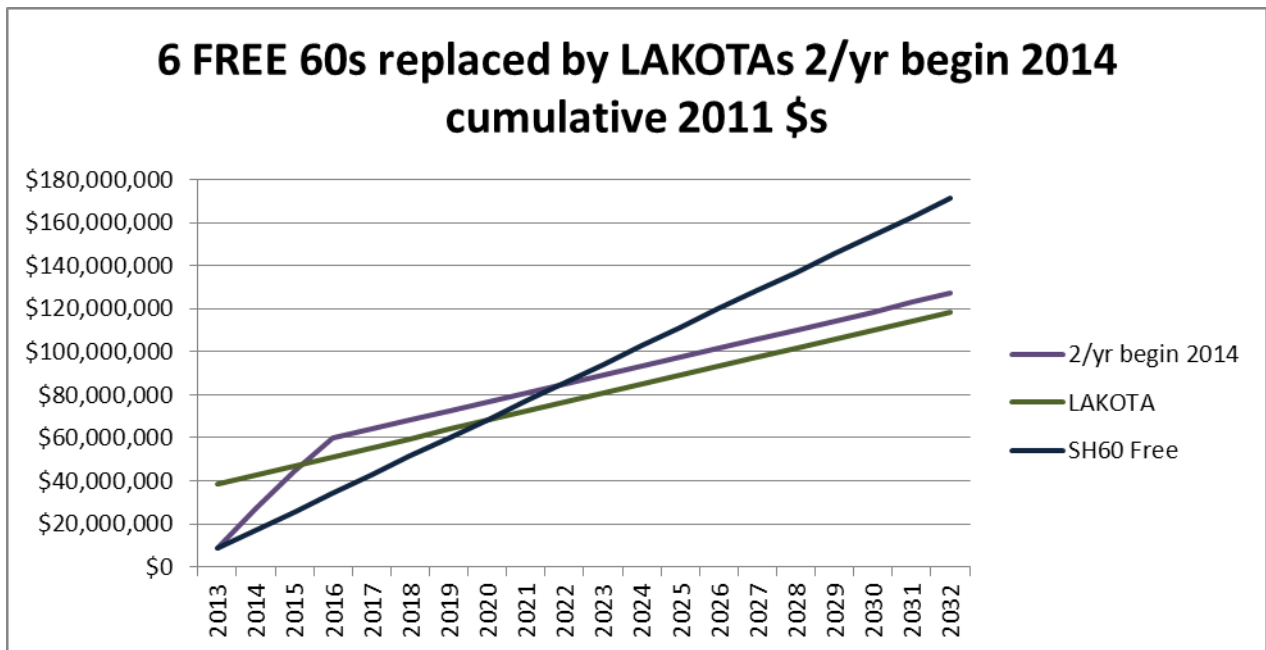


Figure 3.

The Rapid Replacement schedule has a cumulative twenty year cost of \$126,978,000 versus \$118,221,000 for the LAKOTA only option and \$171,240,000 for the SH60 free only option. Though more expensive cumulatively than the LAKOTA only option, its highest cost in any one year is just \$18,619,500, less than half of the \$38,734,500 first year cost of the LAKOTA only option.

Table 9. Gradual Replacement: 1 LAKOTA/year beginning 2015

Year	1/yr. begin 2015	Only LAKOTA	Only SH60 Free
2013	\$8,562,000	\$38,734,500	\$8,562,000
2014	\$8,562,000	\$4,183,500	\$8,562,000
2015	\$13,590,750	\$4,183,500	\$8,562,000
2016	\$12,861,000	\$4,183,500	\$8,562,000
2017	\$12,131,250	\$4,183,500	\$8,562,000
2018	\$11,401,500	\$4,183,500	\$8,562,000
2019	\$10,671,750	\$4,183,500	\$8,562,000
2020	\$9,942,000	\$4,183,500	\$8,562,000
2021 and After	\$4,183,500	\$4,183,500	\$8,562,000

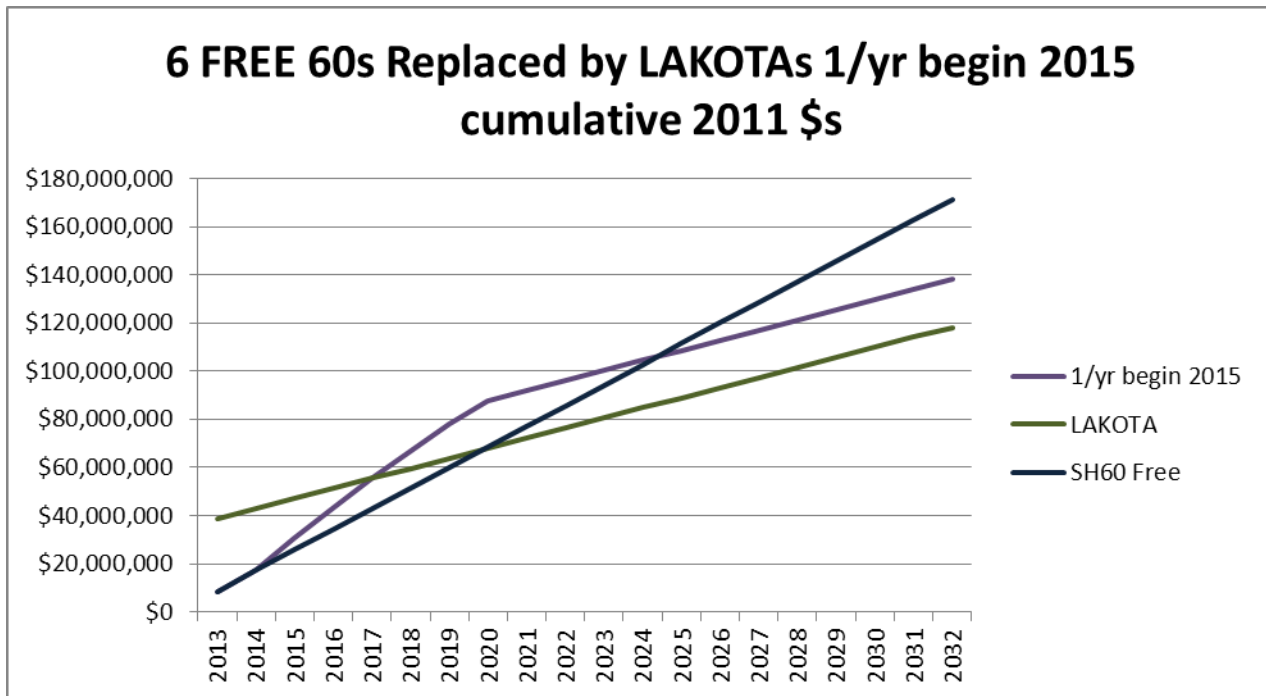


Figure 4.

The gradual replacement schedule delays procurement expenses and flattens annual costs by spreading purchases out even further. It does so at the expense of higher cumulative costs (since more SH-60s would be operated for a longer duration). The gradual replacement schedule has a cumulative 20 year cost of \$137,924,250 versus \$118,221,000 for the LAKOTA only option, \$171,240,000 for the SH-60 free only option, and \$126,978,000 for the rapid replacement option. Its highest cost in any one year is only \$13,590,750 versus \$18,619,500 for the rapid replacement option and the \$38,734,500 first year cost of the LAKOTA only option.

Costs Considered With a Program End Date of 2019

As illustrated in Figure 1, with a program start date of 2013, the cumulative costs of the SH-60 free only option would be less than the LAKOTA only option until 2020, at which point the higher O&S costs of the SH-60 offset their zero procurement costs. Estimates of cumulative costs through 2019 are \$63,835,500 for the LAKOTA only option and \$59,934,000 for free SH-60s, a difference of \$3,901,500. LAKOTAs maintained under the CLS contract would have residual commercial sale value which would adjust these figures moderately. If the seven-year-old LAKOTA could be resold for just \$650,250 each, the total costs of the LAKOTA only and SH-60 Free only options would be identical. This seems a reasonable estimate of the LAKOTA's residual value, so 2019 is the estimated break-even year for the LAKOTA only and SH-60 free only options. The break-even year for phased replacement options would be even later, so replacing SH-60s with LAKOTAs is not a recommended option if a firm program end date of 2019 is likely.

CONCLUSION

NATO SOF Challenges under the Current Structure.....

The NATO *Special Operations Forces Study* proffers that SOF operates under a “No Fail” mandate. As small-unit, highly trained forces operating in complex environments on irregular and critically important tasks, a level of perfection is called for that is unparalleled. The high level of proficiency and performance required necessitates lengthy training and rehearsal, and as a result SOF forces and capabilities cannot be generated on short notice.¹¹⁶ To enable NATO SOF to conduct short-notice missions with critical aviation elements (e.g., low level insertion/extraction perhaps at night, perhaps using unconventional methods), it is imperative that the SOF aviators train extensively with the SOF ground operators to hone their skills. Currently, that is not always an option, and capability is lessened as a result.

In the absence of well-integrated SOF with extensive experience working together, ad hoc arrangements of forces and support must be utilized. NATO SOF forces have been called upon to conduct numerous recent missions out of area in the Balkans, Africa, Afghanistan, Iraq, and beyond.¹¹⁷ However, experience has shown that deficiencies in organization, interoperability and resourcing have limited the efficacy of these forces in many cases. As the NSCC (2008) study recounts, “Historically, ad hoc temporary arrangements cobbled together to perform these operations prove incapable of fulfilling the challenges inherent to special operations and result in disastrous consequences.”¹¹⁸

Even without “disastrous consequences,” the reliance upon ad hoc arrangements may result in the inability to perform missions or acceptance of less preferred tactics and reduced objectives. As noted by Richard Newton, “conducting air transportation operations to meet the Special Forces’ primary needs of insertion, extraction, and resupply... has proven to be a daunting environmental challenge and has highlighted severe shortfalls in current and projected special

¹¹⁶ NATO Special Operations Coordination Centre. (2008, December 4). *The North Atlantic Treaty Organization Special Operations Forces Study*. Retrieved November 30, 2011, from http://www.nshq.nato.int/NSHQ/GetFile/?File_ID=29

¹¹⁷ Ibid.

¹¹⁸ Ibid.

operations aircraft.”¹¹⁹ Since NATO SOF frequently doesn’t have dedicated air platforms they must rely on ad hoc arrangements for air mobility support. According to the draft NSHQ Special Operations Air Group (2010) report, in Afghanistan numerous NATO SOF missions haven’t been executed because of air mobility shortfalls. In some cases no aircraft were available at all. In other cases aircraft were available but were assigned to other emergent missions for their parent organizations. Even when aircraft are available, it may not be possible to execute missions due to the longer mission planning, rehearsal and execution cycle required by non-SOF aviation. As a result of these circumstances, NATO SOF sometimes found themselves “unable to execute a mission when they were otherwise capable and ready to do so.”¹²⁰ Organic aviation capability would have tremendously mitigated, if not eliminated, these situations. Organic air provides improved availability, response time, reliability, and performance, all of which results in a significantly more capable force and improved options for commanders.

¹¹⁹ Newton, p. 12.

¹²⁰ Special Operations Headquarters. (2010). *DRAFT Special Operations Air Group Concept for Development & Organization*. North Atlantic treaty Organization.

A Light Aircraft for Lean Times: Select Options for NATO SOF

Major Marty Weeks, USAF

“Although a target may be vulnerable to SOF, mission support deficiencies may affect the likelihood for success or may entirely invalidate the feasibility of employing SOF.”¹²¹

In the previous two sections of this study, the authors examined near and long term alternatives for procuring and sustaining rotary wing aviation to support NATO SOF. This section will provide an analysis of the costs and benefits associated with procuring, developing, and employing light-fixed wing aircraft. The current economically constrained environment justifies exploring the worth of cost-effective platforms that can efficiently support the NATO SOF Principal Tasks of direct action, special reconnaissance, and military assistance. In addition, this analysis will examine whether or not a multi-mission light aircraft is a good fit to support NATO SOF’s Principal Tasks in lieu of fielding multiple single-role aircraft.

Light-Fixed Wing Aircraft for NATO SOF’s Principle Tasks

The three Principle Tasks with which NATO SOF is charged are direct action, special reconnaissance, and military assistance. In order to determine how airpower can enable greater mission success rates for NATO, this section dissects each of these tasks. According to *Joint Publication 3-05: Special Operations*, the following missions are considered “Special Operations Core Activities”:¹²²

- Direct Action
- Special Reconnaissance
- Counterproliferation of Weapons of Mass Destruction
- Counterterrorism
- Unconventional Warfare
- Foreign Internal Defense
- Security Force Assistance
- Counterinsurgency
- Information Operations

¹²¹ United States Joint Chiefs of Staff, *Joint Publication 3-05: Special Operations*, II-4, retrieved 22 March 2012, <http://www.fas.org/irp/doddir/dod/jp3-05.pdf>.

¹²² *Ibid*, II-6.

- Military Information Support Operations
- Civil Affairs Operations

The first two of NATO SOF's Principal Tasks (Direct Action and Special Reconnaissance) are direct descendants of *Joint Publication 3-05*. The third, Military Assistance, however is not represented in the above Core Activities. A description of each mission set follows, as well as rationale for dedicated SOF airpower support. Specifically, this study focuses on three major areas that enable successful SOF activities:

- 1) Airlift
- 2) Airstrike
- 3) Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR)

Before covering the Principal Tasks, a pause to define two terms is necessary. The category of aircraft referred to herein as "Light-Fixed Wing" includes platforms that weigh no more than 12,500 pounds at Max Gross Takeoff Weight (MGTOW).¹²³ The Federal Aviation Administration (FAA) classifies aircraft by weight, but does not make a distinction for aircraft weighing less than 41,000 pounds. Any platform that has a MGTOW of less than 41,000 pounds is considered "small." For reference, the other weight classes are "large" (41,000-300,000 pounds MGTOW) and "heavy" (greater than 300,000 MGTOW).¹²⁴ On the other hand, the International Civil Aviation Organization (ICAO) classifies aircraft in the following manner. Aircraft weighing less than 15,000 pounds at MGTOW are designated "light." Those with MGTOW between 15,000 pounds and 300,000 pounds are considered "medium." Finally, ICAO's weight structure aligns with the FAA for "heavy" aircraft. A delineation of how the two aviation oversight organizations classify aircraft is below.¹²⁵

¹²³ This weight was chosen because aircraft weighing no more than 12,500 pounds do not require a type rating for the pilot in command. This has the potential for a high cost savings for NATO in aircrew training and certification.

¹²⁴ U.S. Department of Transportation, "Appendix A, Aircraft Information Fixed-Wing Aircraft," *FAA Air Traffic Organization Policy*, Order JO 7110.65U effective 9 February 2012, retrieved 25 March 2012, <http://www.faa.gov/documentLibrary/media/Notice/N7110.525.pdf>.

¹²⁵ EuroControl, "Revising wake turbulence categories to gain capacity," retrieved 25 March 2012, http://www.eurocontrol.int/eec/public/standard_page/EEC_News_2008_3_RECACAT.html

Aircraft Weight Classification

MGTOW (lbs)	FAA	ICAO
< 15,000	-	Light
< 41,000	Small	-
41,000 - 300,000	Large	Medium
> 300,000	Heavy	Heavy

The second term used throughout the study is “Short Takeoff and Landing (STOL),” which has two widely-accepted definitions:

1. The ability of an aircraft to clear a 50-foot (15 meters) obstacle within 1,500 feet (450 meters) of commencing takeoff or in landing, to stop within 1,500 feet (450 meters) after passing over a 50-foot (15 meters) obstacle.¹²⁶
2. A STOL aircraft is an aircraft with a certified performance capability to execute approaches along a glideslope of 6 degrees or steeper and to execute missed approaches at a climb gradient sufficient to clear a 15:1 missed approach surface at sea level... A STOL runway is one which [sic] is specifically designated and marked for STOL aircraft operations, and designed and maintained to specified standards.¹²⁷

Direct Action

Direct action entails short-duration strikes and other small-scale offensive actions conducted as special operations in hostile, denied, or diplomatically sensitive environments. These operations employ specialized military capabilities to seize, destroy, capture, exploit, recover, or damage designated targets. Normally limited in scope and duration, Direct Action usually incorporates an immediate withdrawal from the planned objective area. Although classically considered close combat, Direct Action also includes sniping and other standoff attacks by fire delivered or directed by SOF. Standoff attacks are preferred when the target can be damaged or destroyed without close combat. Direct action missions may also involve locating, recovering, and

¹²⁶ United States Joint Chiefs of Staff, *Joint Publication 1-02: Department of Defense Dictionary of Military and Associated Terms*, 298, retrieved 23 March 2012, http://www.dtic.mil/doctrine/new_pubs/jp1_02.pdf.

¹²⁷ *United States House of Representatives Committee of Science and Technology*, 2 (1984) (Statement of John Kern, Deputy Director of Flight Operations, Federal Aviation Administration), retrieved 23 March 2012, <http://testimony.ost.dot.gov/test/pasttest/84test/kern1.PDF>.

restoring to friendly control selected persons or materiel that are isolated and threatened in sensitive, denied, or contested areas.¹²⁸

The diverse requirements of Direct Actions are greatly enhanced by all three competencies of dedicated light-fixed wing air support.

Lift:

While assault forces are traditionally inserted by helicopter or make their approach to the objective by vehicle or foot patrol, the correct STOL aircraft could fill this void for NATO. The same holds true for exfiltration of the ground force. As shown above, STOL aircraft require less than 1,500 feet of landing area, and in reality, many aircraft reviewed herein need substantially less. Beyond support of ground operations in Direct Action, aircraft with lift capability can also assist in reconstituting personnel to friendly control after recovery.

Strike:

A light-fixed wing aircraft with strike capability is also useful in Direct Action. During the infiltration phase of the operation, assaulters can be provided an armed escort, regardless of their mode of transportation (helicopter, vehicle, foot patrol). Additionally, target preparation/softening the target area can be accomplished with a light-strike platform. While on the objective, close air support is often required to subdue enemy hostility. Finally, clearing an exfiltration route with preemptive strikes and/or suppression fire is a valid means of paving the way for the ground force's safe return to base.

ISTAR:

Direct action missions attempted without the support of ISTAR are virtually unheard of in today's conflicts. In fact, ISTAR assets normally accomplish the "find and fix" task that precedes any Direct Action, often providing the "trigger" that launches an assault. During the planning and rehearsal process, ISTAR aircraft are utilized to corroborate satellite imagery or national intelligence. This information is frequently difficult for analysts to decipher, and putting "eyes" overhead in real time assists in putting the puzzle pieces together. In addition to further resolution on the target objective, aircrew can use their subject matter expertise to help devise infiltration and exfiltration routes for the assault team. Then, on infiltration, the ISTAR aircrew is prepared to perform escort duty, advising of any potential threats. During actions on the

¹²⁸ United States Joint Chiefs of Staff, *Joint Publication 3-05: Special Operations*, II-6, retrieved 22 March 2012, <http://www.fas.org/irp/doddir/dod/jp3-05.pdf>.

objective, ISTAR is invaluable. At the moment of breach, containing fleeing enemies is a great concern. If positive identification of inhabitants of a compound, for example, is lost, well being of the ground party is at stake. Additionally, over watch, or general cordon-search of the area, allows the commandos to focus on their immediate threat without concern for a potential ambush. If a “stack” of aircraft is in support of a Direct Action, the ISTAR platform is frequently assigned Tactical Air Controller duties, especially if the ground-to-air liaison element is too absorbed to control the air assets.

An ISTAR aircraft can also enable effective command and control, both for the Ground Force Commander (GFC) and Higher Headquarters (HHQ). With their “big picture” of what is unfolding during a Direct Action and a direct communications link with multiple parties on the ground, the ISTAR aircrew can keep the GFC’s situation awareness high as well as keep HHQ informed of developments and results of the assault. In preparation for exfiltration, ISTAR aircrew can select a rally point for the ground party and suitable helicopter-landing zone (HLZ) if the commandos are to be lifted off target. Furthermore, if the ISTAR platform is so equipped, infrared illumination of the HLZ allows for a blacked-out arrival, pickup, and departure of the assault force, further facilitating security of the friendly force. Once the ground team is off-target, ISTAR aircraft can lead the recovery asset(s) out of the non-permissive area. Finally, following many Direct Actions, intelligence analysts are interested in post-operation reflections at the target site. Again, ISTAR platforms perform this important task.

Special Reconnaissance

Special Reconnaissance entails missions conducted as special operations in hostile, denied, or diplomatically sensitive environments to collect or verify information of strategic or operational significance, employing military capabilities not normally found in conventional forces. These actions provide an additive collection capability for commanders and supplement other conventional reconnaissance and surveillance actions. Special Reconnaissance includes target acquisition, area assessment, and post-strike reconnaissance, and may be accomplished by air, land, or maritime assets.¹²⁹

¹²⁹ United States Joint Chiefs of Staff, *Joint Publication 3-05: Special Operations*, II-7, retrieved 22 March 2012, <http://www.fas.org/irp/doddir/dod/jp3-05.pdf>.

Strike:

Strike platforms can be useful in Special Reconnaissance missions, as they provide for armed escort of either ground forces executing a mission or ISTAR aircraft enroute to/from an objective as well as while on target.

ISTAR:

Special reconnaissance missions employ the most fundamental capabilities of ISTAR aircraft. Intelligence, Surveillance, Target Acquisition, and Reconnaissance platforms that are dedicated to SOF can offer unique and specialized capabilities not available to conventional forces. These capabilities are afforded by SOF's exclusive relationship with interagency partners and the technology these organizations bring to the fight. This collaborative effort across the spectrum of defense and security agencies acts as a force multiplier not realized at the General Purpose level. Light-fixed wing aircraft, in particular, possess unique characteristics rarely enjoyed by other military assets. A few examples include civilian paint schemes, low noise and visual signature, and widely proliferated aircraft types. These traits, along with a typically small aircrew requirement and logistics trail make the small footprint of light-fixed wing aircraft ideal for providing dedicated and tailored ISTAR support to SOF. These attributes are especially pivotal when operating in denied or diplomatically sensitive areas of responsibility.

Military Assistance

The *Initial Capabilities Document for NATO Special Operations Air Warfare Center*, published by USSOCOM, is very compelling in specifying that, "Military Assistance is a broad SOF Principal Task which [sic] goes well beyond training and advising and involves combined combat operations."¹³⁰ While this is a valid assessment, the document goes into no further detail on what precisely Military Assistance encompasses. For the purposes of this study, Military Assistance is defined as a combination of Foreign Internal Defense (FID) and Security Force Assistance (SFA). The primary roles in FID are to assess, train, advise, and assist host nation military and paramilitary forces with activities that require the unique capabilities of SOF.¹³¹ The goal is to enable host nation forces to maintain internal stability, to counter subversion and

¹³⁰ United States Special Operations Command, *Initial Capabilities Document for NATO Special Operations Air Warfare Center*, i, 16 February 2012.

¹³¹ United States Joint Chiefs of Staff, *Joint Publication 3-22: Foreign Internal Defense*, GL-7, retrieved 23 March 2012, http://www.dtic.mil/doctrine/new_pubs/jp3_22.pdf.

violence in their country, and to address the causes of instability. Similarly, SFA consists of organizing, training, equipping, rebuilding, and advising various components of foreign security forces.¹³² The main difference between FID and SFA is that the latter helps prepare foreign security forces to defend against *external* threats.

Much like direct attack missions, all three competencies of light-fixed wing aircraft (lift, strike, ISTAR) provide support to the requirements of Military Assistance. The capabilities with which a partner nation requires assistance will dictate the type of light-fixed wing aircraft to be employed. Any of the unique mission sets described above could be offered “a la carte” and packaged together for the partner nation of interest. While a multi-mission platform would be a good fit for any of NATO’s Principal Tasks, the requirements of military assistance cry out for this capability.

Multi-Mission Light-Fixed Wing Aircraft

A dedicated SOF Air Wing for NATO will likely resemble the U.S. Air Force Special Operations Command (AFSOC) in some of its aircraft requirements. Currently, AFSOC is in the process of determining what type of FID aircraft to field in order to answer the demand signal of worldwide partner nations. Desired mission set configurations include:¹³³

- 1) STOL, day/night low level infiltration/exfiltration (personnel and cargo)
- 2) Airdrop of personnel and small pallets/bundles
- 3) ISTAR/over watch/Command and Control
- 4) Casualty Evacuation, Medical Evacuation
- 5) Counter-Narcotics
- 6) Border patrol/maritime operations
- 7) Humanitarian Assistance and Disaster Relief

Clearly, the list of requirements for this aircraft is vast. It will be the quintessential multi-mission platform. In fact, the *U.S. Air Force Force Structure Changes: Sustaining Readiness and Modernizing the Total Force* document addresses pending force structure changes and calls for an increased emphasis on multi-mission platforms as a cost saving tool. The document states, “... multi-role platforms provide more utility across the range of the potential missions for which we are directed” while we look to “retire all aircraft of a specific type, allowing us to also divest

¹³² United States Joint Chiefs of Staff, *Joint Publication 3-22: Foreign Internal Defense*, I-16, retrieved 23 March 2012, http://www.dtic.mil/doctrine/new_pubs/jp3_22.pdf.

¹³³ U.S. Air Force Special Operations Command, *Capability Production Document for Light Twin-Engine Aircraft to Support Aviation Foreign Internal Defense*, November 2011, 16.

the unique training and logistic support structure for that aircraft.¹³⁴ The fact that AFSOC is seeking to field a platform with such robust capabilities is no coincidence. Likewise, in adhering to the directive of smart defense, this is the type of initiative that will gain efficiencies and pay huge dividends for NATO SOF.

Light-Fixed Wing Aircraft Options

There is a vast amount of literature on the benefits of light-fixed wing aircraft (e.g. cost, simplicity, efficiency). There are also many manufacturers worldwide that supply light-fixed wing aircraft to individuals, businesses, and militaries. While some small aircraft builders provide excellent products, NATO will likely favor a larger aircraft manufacturer. An organization that demands a SOF Air Wing will require aircraft that can be produced rapidly and in mass, readily available replacement parts, and technicians who are familiar with the aircraft systems. For this reason, the focus of this study and platforms for examination has been narrowed down in scope.

The light-fixed wing aircraft herein represent a small sampling of the viable options on today's market. They have a few traits in common, all of which are important considerations for NATO. Each of these platforms has proven itself worthy, both in the private sector as well as in military/security operations. In fact, the U.S. Air Force either currently or has in its history operated three of the four platforms as utility aircraft in combat (AU-23A, aka Porter; U-27, aka Caravan; UV-18B, aka Twin Otter).¹³⁵ The only platform not employed by the U.S. is the Defender, which is operated by over thirty other countries worldwide. Included in this extensive list is the U.K., whose Army Air Corps has combat employed the Defender with great success in Northern Ireland and Iraq.¹³⁶ All of these aircraft are prevalent across the globe, and do not overtly suggest a military presence. In fact, each aircraft was initially manufactured for the civilian sector, and all four continue to be marketed to the general public.

In brief, the following comparison offers four impressive light-fixed wing aircraft options, ranging from the 6,173-pound Pilatus PC-6 Porter to the top of the light-fixed wing weight

¹³⁴ United States Department of the Air Force, *USAF Force Structure Changes: Sustaining Readiness and Modernizing the Total Force* (February, 2012): 3.

¹³⁵ <http://www.globalsecurity.org/military/systems/aircraft/u-27.htm>

¹³⁶ Army Technology, "Britten-Norman BN-2T-4S Defender 4000 Surveillance Aircraft, United Kingdom," *Key Data*, retrieved 28 March 2011, <http://www.army-technology.com/projects/defender-4000/>

threshold Viking Air DHC-6 Twin Otter. There are many specifications and data in these tables, ranging from interior dimensions to takeoff and landing distances.

Select Light-Fixed Wing Aircraft Comparison¹³⁷

Aircraft	Seats (executive)	Cabin Vol (cu.ft)	Cabin Heigh t (ft)	Cargo (interior) (cu.ft)	Cargo (exterior) (cu.ft)	Max Useful Load (lbs)
Cessna 208 Caravan (w/ Cargo Pod) ¹³⁸	9	254	4.5	33	84	4105
Britten-Norman BN2T-4S Defender ¹³⁹	9	327	4.2	105	-	1598
Pilatus PC-6 ¹⁴⁰	7	117	3.9	-	-	2381
Viking Air DHC 6-300 Twin Otter ¹⁴¹	10	384	4.9	88	38	2500

Select Light-Fixed Wing Aircraft Comparison (cont'd)

Aircraft	MGTO W (lbs)	Max Cruise (ktas)	Max Range @ MGTO W (nm)	Takeoff/ Landing Distance (ft)¹⁴²	Takeoff/Ldg Ground Roll (ft)¹⁴³
Cessna 208 Caravan (w/ Cargo Pod)	8750	175	871	2500/1740	1405/915
Britten-Norman BN2T-4S Defender	8500	176	861	1855/1934	1167/1012
Pilatus PC-6	6173	125	500	1444/1043	646/417
Viking Air DHC 6-300 Twin Otter	12500	182	700	1940/1500	700/515

Like all procurements, for each benefit of a platform's capabilities, there is a cost. For instance, along with the Porter's outstanding landing ground roll of merely 417 feet comes a dismal cruise airspeed of 125 knots and a range of only 500 nautical miles. Likewise, the Twin Otter's

¹³⁷ www.jet-exchange.com/Files/XL/TurbopropGeneralComparison.xls

¹³⁸ Cessna Aircraft Company, Pilot Information Manual, retrieved 25 March 2012, http://textron.vo.llnwd.net/o25/CES/cessna_aircraft_docs/caravan/grandcaravan/grandcaravan_pim.pdf

¹³⁹ Britten-Norman Aircraft Limited, *Defender: More Than Meets the Eye*, retrieved 25 March 2012, <http://www.britten-norman.com/brochures/defender.pdf>

¹⁴⁰ Pilatus Aircraft Limited, *PC-6 Turbo Porter: Anywhere, Anytime, in Any Environment*, retrieved 24 March 2012, <http://www.pc-6.com/vPilatus-ProductBrochure.pdf>

¹⁴¹ Viking Aircraft DHC-6/300 Specifications, *DHC-6/300 Twin Otter Performance at Maximum Weight*, retrieved 25 March 2012, <http://weppi.gtk.fi/aerogeog/en/equipment/dhc6.pdf>

¹⁴² This figure represents the total field length required to takeoff or land and clear a fifty-foot obstacle.

¹⁴³ This figure represents distance over the ground required to accelerate to takeoff airspeed (or distance to stop) in order to meet STOL criteria.

impressive maximum useful load of 4,105 pounds buys it a takeoff ground roll of 1,405 feet, twice as much as two of the other aircraft analyzed. A simple way to thin the herd of choices is to decide whether or not a single-engine aircraft is acceptable to NATO. While there is a lot to be said for the redundancy of a multi-engine aircraft, especially considering the austere terrain in which NATO SOF will likely be operating, single-engine aircraft provide an incredible amount of “bang for your buck” and today’s single-engine powerplants boast a top-notch record of safety.



Figure 1. Cessna 208 Caravan



Figure 2. Britten-Norman BN2 Defender



Figure 3. Pilatus PC-6



Figure 4. DHC-6 Twin Otter

As mentioned above, all of these aircraft (and many other similarly capable platforms) are widely proliferated across the globe, both in the general aviation sector as well as in military/security organizations. This readily available aspect is important for NATO SOF’s aggressive level of ambition in fielding aircraft. Additionally, there are many companies that

specialize in modifying and militarizing aircraft (e.g. Alliant Techsystems, Sierra Nevada Corporation). Businesses like this utilize both commercial off-the-shelf and proprietary products for modification, and often outfit aircraft with carry-on/carry-off systems (COCO). A light fixed-wing aircraft with COCO capabilities that can be appropriately outfitted to suit its user would be a remarkable force multiplier for NATO SOF – a multi-role aircraft with multiple configurations. One area that this study does not cover is the alternative of acquiring excess defense articles rather than new acquisitions to fill the void of organic air support for NATO SOF.

Further research is required to exhaust all efforts of this prospect. However, there are literally thousands of aircraft in preservation at the 309th Aerospace Maintenance and Regeneration Group (AMARG), located at Davis-Monthan Air Force Base, AZ. For example, as of December 2011, the U.S. Department of State had fleet of at least four Beechcraft C-12B King Airs in storage at AMARG.¹⁴⁴ A procurement such as this, while small in numbers, could pacify NATO SOF's immediate need for air support and buy it time to fully assess the long term requirements. Furthermore, the projected mothballing of U.S. military aircraft over the next several years is a promising acquisition option for NATO SOF. Finally, a survey of all NATO Partner Nations could reveal additional light-fixed wing aircraft in the category of excess defense articles.

Cost Per Flying Hour

The intent of this study was to simply lay out various aircraft options that would help enable mission success in NATO SOF's Principle Tasks. However, the reality of the current and projected lean financial times demands at least a summary glance at cost data. A brief outline of how the U.S. Air Force calculates Cost Per Flying Hour (CPFH) will set the stage. The CPFH program is standardized across the U.S. Air Force, and the approval authority is the Office of the Secretary of Defense. There are four categories upon which CPFH is based: Material Support Division (MSD); General Support Division (GSD); Flying Hour (FH) Government Purchase Card (GPC); and Aviation, Petroleum, Oils and Lubrications (AVPOL). For each aircraft, CPFH is updated every program objective memorandum cycle.

¹⁴⁴ U.S. Department of State, "Department of State Aircraft Stored at the 309th Aerospace Maintenance and Regeneration Group," 9 December 2011 Briefing.

MSD: Material Support Division consists of repairable items (e.g. radios, avionics, landing gear). To build the MSD factor, eight quarters (two years) of historical data and flying hours are analyzed in order to calculate a mean time between failures. This figure is used to model future consumption requirements based on projected flying hours and cost inflation.

GSD: General Support Division consists of “throw away” bench stock items (e.g. nuts, bolts, o-rings, screws). The GSD factor is calculated in the same way as the MSD factor – two-year review, determine mean time between failures, etc.

FH GPC: The Flying Hour Government Purchase Card is used for items costing less than \$3,000 that are no longer supported by base supply (e.g. rags, metal brushes, tools). There is an exception to this standard, where an item costing up to \$25,000 can be purchased with Air Logistics Center equipment specialist/item manager approval. This exception is rarely exercised, but is available for situations when maintenance personnel are unable to acquire an aircraft part in a reasonable timeframe, and the part is required to repair a grounded aircraft. A three-year average is used to project future funding requirements in building the GPC factor. This three-year averaging process was incorporated within the last ten years following lessons learned and in an effort to smooth out anomalies.

AVPOL: Aviation Petroleum, Oils, and Lubrications are resources used for aircraft servicing. Building the AVPOL factor is conducted using a five-year average to project future requirements and funding. As in FH GPC calculations, lessons learned within the last ten years led planners to use a five-year average to smooth out anomalies.¹⁴⁵

These are the four ingredients that build the U.S. Air Force CPFH budgetary calculations.

However, this is merely one of seven elements in the U.S. Air Force Cost Analysis Improvement Group (CAIG). The Office of the Secretary of Defense allows each service to either use six or seven elements for its service-specific CAIG. Much more complicated than CPFH, the CAIG deals with elements such as manpower, base operating support, aircraft modifications, etc.¹⁴⁶

With the above prelude in mind, a glance at aircraft-specific CPFH figures follows. For reference, the U.S. Air Force CV-22 Osprey costs \$13,840 per hour to operate. That is the costliest aircraft in AFSOC’s inventory. At a fraction of the CV-22’s cost, the UH-1N Huey

¹⁴⁵ Richard Jones, e-mail communication to author, 23 March 2012.

¹⁴⁶ Edward G. Keating and Frank Camm, “How Should The U.S. Air Force Depot Maintenance Activity Group be Funded?: Insights from Expenditure and Flying Hour Data,” 5, The RAND Corporation, retrieved 25 March 2012, <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA408964>.

costs just \$2,509 per hour to operate.¹⁴⁷ The CPFH numbers presented below are *Contracted* CPFH, or CCPFH. They must not be confused with that of the CV-22, a traditional “blue suit” maintained platform. There are many different factors considered when aircraft maintenance contracts are introduced. For example, the CCPFH is dependent on numerous issues not included in standard U.S. Air Force CPFH calculations, such as the number of operating locations, the degree of contract maintenance and supply management services required, personnel costs, etc. The following AFSOC aircraft are serviced and maintained by Contract Logistics Support (CLS), rather than “blue suit” technicians. In the case of these programs, the contractors are required to provide for an eighty percent mission-capable rate. The costs associated with aircraft upkeep do not include aircraft acquisition costs or aircrew expenses. The figures do, however, include:¹⁴⁸

- Fuel cost
- Aircraft parts
- Maintenance labor
- Miscellaneous expenses

AFSOC Light-Fixed Wing **ANNUAL CLS** Cost Per Flying Hour

Aircraft	Hours	CLS Cost	Contract Cost Per Flying Hour
U-28	73,200	\$112.8M	\$1,540
PC-12	11,300	\$16.4M	\$1,558
M-28	7,700	\$20.8M	\$2,549

In order to provide a more realistic cost of ownership, aircraft unit price and projected lifespan need to be considered. The following table accounts for these factors:

AFSOC Light-Fixed Wing **AIRCRAFT** Cost Per Flying Hour

Aircraft	A/C Price	Lifespan	Cost per Year per A/C	A/C Cost Per Flying Hour
U-28	\$15M	15 Years	\$1.0M	\$355
PC-12	\$6M	15 Years	\$0.4M	\$354
M-28	\$10M	15 Years	\$0.67M	\$571

¹⁴⁷ Evans Glausier, e-mail communication to author 22 March 2012.

¹⁴⁸ All of the figures listed are notional, and are based on the U.S. Special Operations Command “FY11 Contract Cost Per Flying Hour Data” briefing dated 27 February 2012.

Finally, combining the two previous tables paints a complete picture of the realistic cost of operating these light-fixed wing aircraft:

AFSOC Light-Fixed Wing **TOTAL** Cost Per Flying Hour

Aircraft	CLS	Aircraft	Total Cost per Flying Hour
U-28	\$1,540	\$355	\$1,895
PC-12	\$1,558	\$354	\$1,912
M-28	\$2,549	\$571	\$3,120

While these particular AFSOC aircraft may or may not be a good fit for NATO SOF, the cost data presented above represent the approximate price range to be expected.

Yet another model for determining CPFH is one developed by Conklin and de Decker, a U.S. based general aviation consulting firm. The cost information below is the total aircraft variable cost an operator can expect to incur per hour during aircraft operation. Variable costs include the following:¹⁴⁹

- Fuel cost
- Fuel burn
- Fuel additives
- Aircraft parts
- Maintenance labor
- Landing and parking fees
- Crew expenses

General Aviation Variable Cost Per Flying Hour

<u>Aircraft Name</u>	<u>Variable Cost Per Hour</u>
<u>Cessna 208 Caravan</u>	<u>\$614</u>
<u>Pilatus PC-6 Porter</u>	<u>\$557</u>
<u>Britten-Norman BN2T-4S Defender</u>	<u>\$805</u>
<u>Viking Air DHC 6-400 Twin Otter</u>	<u>\$1,151</u>

¹⁴⁹ Conklin and de Decker, "Aircraft Cost Summary," accessed 22 March 2012, <http://www.conklindd.com/CDALibrary/ACCostSummary.aspx>.

There is a wide variance of CPFH rates presented above, from the seemingly inexpensive Porter (\$557/hour) to the more costly Skytruck (\$3,120/hour). Further analysis is recommended to determine the most appropriate costing model, based upon NATO's specific requirements.

Conclusion

The goal of this study was to provide a survey of the costs and benefits associated with procuring, developing, and employing light-fixed wing aircraft in support of NATO SOF in today's constrained fiscal environment. It was made clear that the employment of SOF, by definition, is the discerning way ahead in the lean times with which NATO is faced. When appropriately fielded and tasked, an organic light-fixed wing capability would serve as a force multiplier in support of all three of NATO SOF's Principle Tasks. Furthermore, there are efficiencies to be gained by procuring a multirole platform in lieu of fielding multiple single-role aircraft.

Various capabilities were examined, providing a wide range of alternatives from which to choose. A deliberate analysis of precisely the amount of capabilities desired versus required for NATO's level of ambition will assist in determining which aircraft(s) to acquire. As further resolution is gained with respect to the necessary capabilities for a light-fixed wing platform(s), the vast array of alternatives will taper. If an aircraft with said capabilities happens to be inventoried by one of the NATO alliance members or is in excess defense article supply, pursuing one of these options would clearly be the recommendation of this research. That said, leaders should resist the temptation to accept readily available aircraft that fail to meet the agreed upon capabilities that will support the demands of Direct Action, Special Reconnaissance, and Military Assistance. To settle for lackluster aircraft capabilities would not only hinder NATO SOF's charter, but would also do a disservice to the aircrew, the special operations users, and the strategic objectives of NATO Partner Nations writ large.

A Medium-Sized Airlift Analysis for NATO Special Operations

Major Walter Winter, USAF

In establishing a SOF aviation group, NATO SOF Headquarters, should undoubtedly consider the utility and requirement for a Medium-Sized Fixed Wing (MSFW) aircraft to perform SOF airlift. As the importance of SOF operations continues to grow, and NATO shifts the way it goes to combat a capable and cost effective medium-sized SOF aircraft will prove invaluable to NSHQ and its member nations. Irrespective of if the NSHQ aviation group actually becomes operational or is only utilized in a training capacity, it is undeniable that the benefits of having such a platform will build a solid foundation for a long term SOF framework in NATO.

In evaluating NSHQ's need for a MSFW aircraft I will begin by advocating that procurement of MSFW aircraft should be among the first initiatives of an NSHQ's SOF air group. I then present four viable platform alternatives to fill this role: the C-27A, C-27J, CN235, and the C295. I will evaluate each of the three alternatives through a specifications and capabilities analysis, an aircraft availability analysis, and a cost comparison. I will also discuss other aircraft considerations, such as possible alternatives for aircraft program management and potential future modifications to enhance the capabilities of a MSFW aircraft and a NSHQ air group. Finally, I will make summarize my findings and make a recommendation on which aircraft NSHQ should pursue.

Why Medium Airlift?

Of the twenty-six NATO nations possessing a dedicated SOF ground force, only six are able to provide SOF air support in any capacity (U.S., Italy, Canada, United Kingdom, Turkey, and France).¹⁵⁰ This presents a large problem when considering NATO's new emphasis on addressing, "instability or conflict beyond NATO borders [that] can directly threaten Alliance security, including by fostering extremism, terrorism, and trans-national illegal activities such as

¹⁵⁰ Lt. Col. Mike Maksimowicz, email message to author, March 12, 2012.

trafficking in arms, narcotics and people.”¹⁵¹ Without proper SOF mobility probability of success in these emerging environments is extremely low. As the *North Atlantic Treaty Organization Special Operations Forces Study* point out, “SOF mobility needs are diverse and essential to mission success.”¹⁵² Furthermore, the study highlights the fact that, “when considering mobility requirements, nations should do so taking into account the pragmatic declaration from the NATO [*Comprehensive Political Guidance*] CPG that attacks may increasingly originate from outside the Euro-Atlantic area.”¹⁵³

As the *North Atlantic Treaty Organization Special Operations Forces Study* further discusses, while being the most resource intensive, air assets are the most flexible and essential means of SOF mobility.¹⁵⁴ A May 2011 *NATO SOF Air Mobility Study* found:

*“[H]istorical SOF air enabler shortfalls negatively impact current NATO SOF operations and severely restrict NATO SOF’s ability to support future operations. Furthermore, a conclusion of the study was that shortfalls within many individual NATO member nations were of such magnitude that in addition to the NSHQ’s efforts to build and enhance national SOF aviation capabilities through common doctrine, standards, and tactics/techniques/procedures, the establishment of a pooled NATO SOF operational aviation capability would further help mitigate the SOF air enabler shortfall.”*¹⁵⁵

In addition, a Special Operation Air Group Concept Study, commissioned by NSHQ in 2010, found that a “capability shortfall in the area of medium-range fixed wing transport capabilities to support ongoing NATO MA and SR activities” exists.¹⁵⁶

Given the above findings, and the recognition that NATO SOF must be able to rapidly generate and project scalable force packages with organic assets, it is essential that a MSFW capability be included in the establishment of the proposed NSHQ air group. In the NSHQ *Special Air Warfare Manual* it is clearly laid out that “the primary mission of special operations air forces is

¹⁵¹ North Atlantic Treaty Organization, “Active Engagement, Modern Defense,” November 19, 2010, http://www.nato.int/cps/en/natolive/official_texts_68580.htm.

¹⁵² North Atlantic Treaty Organization Special Operations Coordination Centre, *The North Atlantic Treaty Organization Special Operations Forces Study*, (December 4, 2008): A1.

¹⁵³ Ibid.

¹⁵⁴ Ibid., A2.

¹⁵⁵ Lt. Gen. Frank Kisner, “Special Air Warfare and a Coherent Framework for NATO SOF Aviation,” (Speech to XXI Seminario Internacional Cátedra Alfredo Kindelán, Madrid, Spain, November 14, 2011).

¹⁵⁶ North Atlantic Treaty Organization Special Operations Headquarters, *Special Operations Air Group: Concept for Development & Organization*, (April 22, 2010): 9.

enhanced air mobility –specialized air transport (AT) activities via fixed-wing, rotary-wing, or tilt-rotor aircraft.”¹⁵⁷ After all, what good are ground SOF forces if they have no means of transport to the area of operation? Of the three principle tasks assigned to NATO SOF, special reconnaissance and surveillance (SR), direct action (DA), and military assistance (MA), specialized air transport is of the utmost importance to the first two. In addition, AT clearly plays an assisting role in MA and other special air warfare activities such as air-land integration, personnel recovery (PR), and forward arming and refueling point operations (FARP).¹⁵⁸

As previously mentioned, fixed wing aircraft can prove to be quite cost prohibitive to operate. NSHQ’s *Special Air Warfare Manual*, explains that “while specialized aircraft have an important niche in extending the capabilities of special air warfare forces, such high-end capabilities are costly to procure and to sustain in terms of equipment/logistics and aircrew training. Combat experience has demonstrated that technologically sophisticated aircraft are not required for every special air warfare mission.”¹⁵⁹ For precisely these reasons, I am suggesting NSHQ consider a crawl, walk, run approach when considering fixed wing assets for their proposed SOF air group. Before investing large amounts of money in expensive “niche” aircraft, such as Intelligence, Surveillance, Target acquisition, and Reconnaissance (ISTAR) and close air support (CAS), NSHQ should first strive to master SOF air mobility.

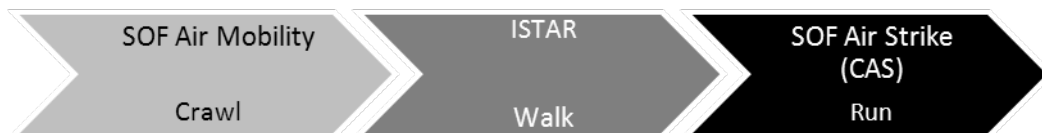


Figure 2: SOF Air Capabilities Trail

Medium-Sized Aircraft Options

When considering MSFW aircraft to utilize for SOF air mobility, there are two primary families of military aircraft which bear examination and comparison. First is that of the Alenia C-27 family. The C-27J and its predecessor the C-27A are both “multi-functional, military aircraft designed and built for tactical transport and to support combat operations. [They can] operate

¹⁵⁷ Ibid., 5-6.

¹⁵⁸ Ibid., 6-11.

¹⁵⁹ North Atlantic Treaty Organization Special Operations Headquarters, *Special Air Warfare Manual*, (March 2010): 3.

autonomously in remote and austere environments and can take off and land from unprepared surfaces and airstrips.”¹⁶⁰ The second family worth examining is Airbus Military’s CN235 and its stretched fuselage version the C295. Both aircraft are “highly versatile tactical airlifters ... capable of short take-off & landing (STOL) performance from unprepared short, soft and rough airstrips, as well as low level flight characteristics.”¹⁶¹ These two families of aircraft were chosen due to their proven combat successes, their large proliferation around the world and in NATO, and their production ties to NSHQ member nations. Currently, over 345 of the CN235 and C295 have been delivered to nations around the world and another 16 are on order.¹⁶² In addition, approximately 50 C-27Js have been delivered and approximately 30 G-222 and C-27As are still in service.¹⁶³ As shown in figure 2, all four aircraft are currently in operation by NSHQ member nations.

Aircraft	NSHQ Member Nations That Operate
NATO Nations flying C-27A	U.S., Italy (retired)
NATO Nations flying C-27J	Bulgaria, U.S., Italy, Greece, Lithuania,
NATO Nations flying CN235	France, U.S., Spain, Turkey
NATO Nations flying C295	Czech Republic, Poland, Portugal, Spain

Table 1: NSHQ Member Nations Operating C-27A, C-27J, CN235, and C295

In order to evaluate which of the above mentioned aircraft would be the best fit I will analyze them according to satisfaction of aircraft performance capabilities as outlined in the NATO Special Operations Forces Study, aircraft availability and timeline, and cost to acquire and operate.

¹⁶⁰ Alenia Aermacchi North America, “C-27J Spartan Tactical Transport Aircraft,” 2010, <http://www.aleniana.com/c-27j-spartan-tactical-transport-aircraft>.

¹⁶¹ Airbus Military, “C295 The Tactical Workhorse,” <http://www.airbusmilitary.com/Aircraft/C295/C295About.aspx> and Airbus Military, “CN235 The Lower Cost Tactical Airlifter,” <http://www.airbusmilitary.com/Aircraft/CN235/CN235About.aspx>.

¹⁶² Ibid.

¹⁶³ Jane’s All The World’s Aircraft, “Alenia C-27J Spartan,” February 15, 2012, [http://www4.janes.com.libproxy.nps.edu/subscribe/jawa/doc_view.jsp?K2DocKey=/content1/janesdata/yb/jawa/jaw_a0544.htm@current&Prod_Name=JAWA&QueryText=%3CAND%3E%28%3COR%3E%28%28\[80\]c-27j+%3CIN%3E+body%29%2C+%28\[100\]+%28\[100\]c-27j+%3CIN%3E+title%29+%3CAND%3E+%28\[100\]c-27j+%3CIN%3E+body%29%29%29](http://www4.janes.com.libproxy.nps.edu/subscribe/jawa/doc_view.jsp?K2DocKey=/content1/janesdata/yb/jawa/jaw_a0544.htm@current&Prod_Name=JAWA&QueryText=%3CAND%3E%28%3COR%3E%28%28[80]c-27j+%3CIN%3E+body%29%2C+%28[100]+%28[100]c-27j+%3CIN%3E+title%29+%3CAND%3E+%28[100]c-27j+%3CIN%3E+body%29%29%29).

Specifications and Capabilities Analysis

C-27A. The C-27A is an Alenia G222 aircraft which was modified by Chrysler during the early 1990s. Ten C-27As were procured and operated by the USAF in support of U.S. Southern Command (USSOUTHCOM) until their retirement in 1999.¹⁶⁴ The C-27A is for the most part the same as the G222. Major modifications completed by Chrysler include a reinforced landing gear system and enhanced avionics.¹⁶⁵ The C-27A was tasked to provide support for U.S. interests in Central and South American theatre. The C-27A proved instrumental through its ability to land on unprepared short airstrip throughout the region.¹⁶⁶ In 1999 the C-27A's were transferred ownership to the U.S. Department of State (DoS) for operations in support of their Bureau of International Narcotics and Law Enforcement Affairs (INL).¹⁶⁷ Having been de-scoped from all South American INL contracts, the C-27A aircraft were returned to, and subsequently placed in storage at, the INL Air Wing (INL/A) at Patrick Air Force Base in November 2009.¹⁶⁸ In 2011 the aircraft were returned to flight status as part of the joint USAF/DoS Afghan National Air Force Air Advisor training mission. Currently, only four of the original ten C-27A aircraft are in a flyable condition. In general C-27A characteristics include: a maximum takeoff weight of nearly 57,000 pounds; an aircraft length of approximately 74 feet; and a wingspan of approximately 94 feet. The C-27A has a maximum payload range in excess of 700 miles.

C-27J. The C-27J Joint Cargo Aircraft (JCA) is designed to access a wide range of airfields including short unprepared strips in hot and high altitude conditions while transporting heavy loads. Development for the C-27J aircraft is complete and aircraft are in production. The C-27J is modified by L-3 Communications of Waco, TX from the C-27 airframe manufactured in

¹⁶⁴ Jane's, "Raytheon E-Systems (Alenia) C-27A Spartan Upgrade," June 13, 2005, http://search.janes.com.libproxy.nps.edu/Search/documentView.do?docId=/content1/janesdata/yb/jau/jau_1748.htm@current&pageSelected=allJanes&keyword=c-27a&backPath=http://search.janes.com/Search&Prod_Name=JAU&

¹⁶⁵ Eric Wilhelm DoS contractor, email message to author, March 19, 2012.

¹⁶⁶ Jane's, "Raytheon E-Systems C-27A."

¹⁶⁷ C-27J Spartan, "Did You Know—The True Story of the C-27A," November 27, 2006, http://www.c27j.com/files/9_Publication.pdf

¹⁶⁸ U.S. Department of State, *2009 End-Use Monitoring Report*, (n.d.): 22, <http://www.state.gov/documents/organization/147481.pdf>

Naples, Italy, by Alenia, S.P.A. The C-27J is currently operated by the USAF Air National Guard. In general, C-27J characteristics include: a maximum takeoff weight of almost 70,000 pounds; an aircraft length of approximately 74 feet; and a wingspan of approximately 94 feet. The C-27J has the option of being equipped for probe/drogue refueling and it has a maximum payload range in excess of 1,000 miles.¹⁶⁹

CN235. The Airbus Military CASA/IPTN CN235 is a twin turbo-prop plane with STOL performance that is capable of operating from unpaved runways and has excellent low level flying characteristics for tactical penetration. Development is complete and the current model, the CN235-300, has been in production since 1998. The CN235 is currently operated by the U.S. Coast Guard as the HC-144 Ocean Sentry. With over 270 sold to over 40 operators worldwide, the CN235 is the best-selling airlifter in the light/medium segment. In general, CN235 characteristics include: a maximum takeoff weight of almost 35,000 pounds; an aircraft length of approximately 70 feet; and a wingspan of approximately 84 feet. The CN235 has a maximum payload range of nearly 400 miles.

C295. The EADS-NA/CASA C295 aircraft development is complete and aircraft are in production for primarily non-US and commercial customers. The C295 is a further developed version of the CN235, but with a stretched fuselage, 50% greater payload capacity and upgraded engines. The C295 can receive fuel in flight via optional probe and has a maximum payload range in excess of 700 miles. Additionally, the C295 has been modified as a maritime patrol and Antisubmarine Warfare (ASW) platform. In general, C295 characteristics include: a maximum takeoff weight of approximately 51,100 pounds; an aircraft length of approximately 80 feet; and a wingspan of approximately 84 feet.¹⁷⁰

¹⁶⁹ United States Air Force Special Operations Command, *AC-XX Analysis of Alternatives*, (June 2, 2008): 22-23.

¹⁷⁰ United States Air Force Special Operations Command, *AC-XX Analysis*, 24.



Figure 3: Photo of C-27A



Figure 4: Photo of C-27J¹⁷¹



Figure 5: Photo of CN235¹⁷²



Figure 6: Photo of C295¹⁷³

Aircraft Specifications					
Specification	DoS C-27A	C-27J	CN235	C295	Notes
Operating weight (empty)	35,500 lbs	37,478 lbs	20,850 lbs	30,000 lbs	C-27J weight approx
Max Takeoff weight	56,878 lbs	67,241 lbs	36,380 lbs	51,000 lbs	CN-295 at overload
Max Fuel weight	21,612 lbs	21,459 lbs	9,150 lbs	13,600 lbs	
Max Cargo weight	19,840 lbs	25,353 lbs	13,120 lbs	20,400 lbs	
Range (Ferry)	1500 nm	3,200 nm	2,730 nm	2,900 nm	
Range (Max payload)	740 nm	1,000nm	390 nm	700 nm	*C-27J at 22,046 lbs cargo
Range (13,200 lbs)	1,100 nm	2,300 nm	390 nm	2,000 nm	* C-27J at 13,227 lbs, CN-235 at 13,120 lbs
Max Cruise Speed	291 KTAS	315 KTAS	245 KTAS	260 KTAS	
Max Altitude	22,000 ft	30,000 ft	30,000 ft	29,000 ft	
Takeoff field Length (Max GW, STD @SL)	3,281 ft	2,100 ft	2,077 ft	3,619 ft	
Landing field Length (at normal MTOW)	2,543 ft	2,264 ft	2,025 ft	2,392 ft	
External Length	74 ft 5 in	74 ft 7 in	70.2 ft	80 ft 2 in	
Length (Cargo)	28 ft 1 in	28 ft 1 in	31 ft 8 in	41 ft 8 in	
Height (Cargo)	8 ft 1 in	8 ft 4 in	6 ft 3 in	6 ft 3 in	
Pallet Positions (88x108)	3	3	4	5	
Troops	34	68	51	71	
Paratroops	24	46	36	50	
Medivac	24 stretchers	36 stretchers	21 stretchers	24 stretchers	
APU in flight operable	Yes	Yes	No	No	

Table 2: Aircraft Specification Analysis

¹⁷¹ C-27J Spartan, "Photo of C-27J," <http://www.c27j.com/image-galleries/image-galleries/c-27j-spartan-flying>.

¹⁷² Airbus Military, "Photo of CN235," <http://www.airbusmilitary.com/Aircraft/CN235/CN235About.aspx#content03>

¹⁷³ Airbus Military, "Photo of C295," <http://www.airbusmilitary.com/Aircraft/C295/C295About.aspx#content01>

Table 2 shows that the CN235 is a smaller aircraft, and as such has a smaller cargo capacity and reduced flight range when compared to the other aircraft. Of note, the C-27J is able to transport over 5000 pounds more cargo than the C295 at a 30% increased range. In addition, while the CN235 and C295 are able to transport more standard military pallets, both aircraft are over 2 feet shorter in cargo compartment height allowances than the C-27 variants. This reduced height allowance significantly would most likely cause a problem when transporting larger military cargo such as hard top HMMWVs and small helicopter. Figure 6 shows a graphical depiction of the cargo height differences between the aircraft. Given the above specifications it is clear to see that the C-27J is a standout in many categories of comparison. The only major category where the C-27J is outperformed is in the number of pallets it can accommodate.

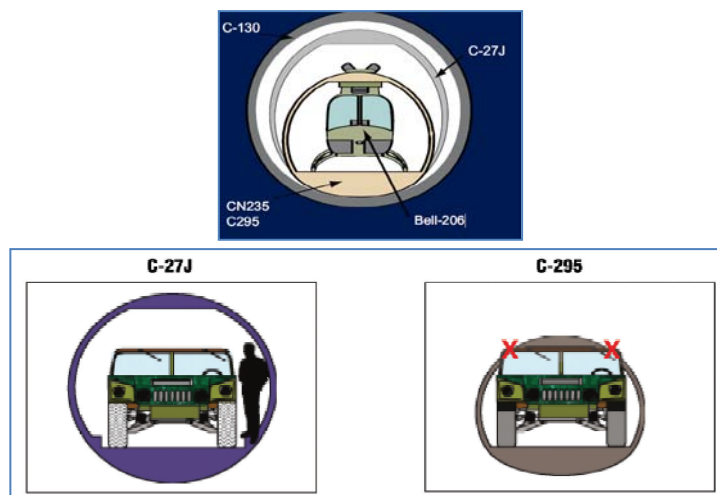


Figure 6: Images Comparing C-27, CN-235, C295 Cargo Compartment Size¹⁷⁴

In my analysis of aircraft capabilities, grading criteria were pulled directly from Annex C of the 2008 *NATO Special Operations Forces Study*. All four aircraft variants were evaluated against minimum and desired capabilities and characteristics for a SOF air mobility platform. Table 3 shows the SOF mobility minimum requirements and table 4 shows the SOF mobility desired requirements. Each aircraft is assigned a numerical score for both tables based on 2 points for satisfying a requirement, 1 point for being able to satisfy a requirement with optional equipment, and 0 points for not being able to satisfy a requirement. Capabilities were all weighted of equal value for this simple analysis.

¹⁷⁴ C-27J Spartan, "C-27J Specs," <http://www.c27j.com/files/File/specs.pdf>.

SOF Mobility Minimum Requirements					
Capability	DoS C-27A	C-27J	CN235	C295	Notes
Low Light Ops	Yes	Yes	Yes	Yes	
NVG Ops (compatible lighting)	Yes	Yes	Yes	Yes	C-27A modified by Southeast Aerospace
Visual Low alt nav/terrain avoidance	Yes	Yes	Yes	Yes	
Precise Nav (<75 meters <2 min time accuracy) redundant nav system (i.e. dual INS, INS/GPS)	No	Yes	Yes	Yes	C-27A INS not currently operational due to TCAS modification not being certified
Secure Comms	No	Yes	Optional	Optional	
IR countermeasures and electronic countermeasures. IR missile warning system	No	Yes	Optional	Optional	
Operate in Austere locations	Yes	Yes	Yes	Yes	
FARP capable (receiver or tanker)	Yes	Yes	Yes	Yes	
Helo air-air refueling	No	No	No	No	
Reduced Visibility landings	Yes	Yes	Yes	Yes	C-27A ILS
Conduct IR marked landings/DZ operations	Yes	Yes	Yes	Yes	
Conduct Unprepared landing surface ops	Yes	Yes	Yes	Yes	
Static line, freefall airdrop	Yes	Yes	Yes	Yes	
Auto response to external interrogation by mil/civ grnd/air interrogators	Yes	Yes	Yes	Yes	
Operate in CBRN environment	Optional	Optional	Optional	Optional	All capable of accommodating aircrew with external powered AERPS gear. Aircraft not sealed from CBRN
Minimum Requirements Score Yes=2 points, Optional=1 Point, and No=0 points	21	27	25	25	

Table 3: Aircraft Scored Against SOF Mobility Minimum Requirements from *NATO Special Operations Forces Study Annex C*

SOF Mobility Desired Requirements					
All environment flight ops	Yes	Yes	Yes	Yes	
IFR low altitude/terrain avoidance	No	Yes	No	No	
Conduct precision airdrop (<95 meter accuracy)	Optional	Optional	Optional	Optional	All aircraft could be easily modified to operate with JPADS System
Autonomous ID of landing and drop zones	No	Yes	Yes	Yes	
Conduct Automatic computed air release point systems (ACARPS) ops	No	No	No	No	
Ops into unmarked landing/drop zones	Yes	Yes	Yes	Yes	
Discreet or covert ops	No	No	Yes	Yes	CN235 and C295 have civilian operated variants allowing them to operate covertly
Multi-ship formations with dissimilar aircraft	Yes	Yes	Yes	Yes	All visual formation capable
Improved SA suite (Ir sensor, enhanced radar, etc)	No	Yes	Optional	Optional	C-27J equipped with AN/APN 241 radar. CN235 and C295 both have factor optional sensor ball
Enhanced msn management system with precision timing +/- 30 sec	No	Yes	Yes	Yes	
Automated self-contained approach capes	No	Yes	Yes	Yes	
Extended range (aux tanks or in flight refueling)	No	Optional	Optional	Optional	CN-235/295 Optional NATO Probe
Beyond Line of sight comms	Yes	Yes	Optional	Yes	C27A has HF radio Cn-295 ARC-231
Data Link comms	Yes	No	Optional	Optional	C27A equipped with Sky Connect
Directed IR Countermeasures	No	Yes	Optional	Optional	
Ballistic armour	No	Optional	Optional	Optional	
Automated IRCM/ECM suite	No	Yes	Optional	Optional	IRCM/Ecm suite optional factory modification for CN235 and C295
Reduced Aircraft Signature	No	No	No	No	
Desired Requirements Score Yes=2 points, Optional=1 Point, and No=0 points	11	25	22	23	

Table 4: Aircraft Scored Against SOF Mobility Desired Requirements from NATO Special Operations Forces Study Annex C

Given the above capabilities requirements it is clear to see that the C-27J again stands out. Both the CN235 and C295 are very close to the C-27J in minimum and desired capabilities. Areas where they scored less could all be resolved via aircraft optional modifications. Of note, both the CN235 and C295 are highly proliferated in civilian versions as well. This would allow for an advantage over the C-27J in performing discreet or covert ops. The older, less equipped, C-27A does not fall far behind in the minimum capabilities but is significantly less capable when

analyzed against desired requirements. The three areas where the C-27A does fall behind in minimum requirements could be rectified with aftermarket aircraft modifications.

Aircraft Availability

The second area of aircraft evaluation to be considered is aircraft availability. In evaluating availability for the proposed aircraft I considered both excess defense articles (EDA) available through the U.S. government as well as aircraft purchases and leases. As no timeline for standup of a medium-fixed wing capability has been finalized, speed of acquiring newly manufactured or leased aircraft was not examined.

As previously mentioned, the C-27A aircraft was retired from the USAF in 1999 and subsequently transferred to the DoS in the 2000-2001 timeframe for operations in support of their INL mission.¹⁷⁵ Of the ten C-27As developed for the U.S. government only four remain in a flyable condition. They are all currently stationed at Patrick Air Force Base where they are utilized for the joint USAF/DoS Afghan National Air Force Air Advisor training mission. Currently, the DoS and USAF MOA specifies the DoS will provide two aircraft to the Air Advisor training which is scheduled to end in 2014.¹⁷⁶ The other two aircraft are currently not under contract with the DoS and are not being utilized for INL operations. Per conversations with DoS reps NSHQ could initiate a dialogue with DoS reps at NATO to have the two excess aircraft transferred to NSHQ for SOF airlift utilization, with the possibility of acquiring the other two upon completion of the Air Advisor Training mission in 2014.

Availability of the C-27J is a bit more complicated than that of the C-27A. In early 2012, the USAF identified the fleet of 21 USAF C-27Js as being part of more than 280 aircraft identified for retirement as part of ongoing Department of Defense (DoD) budget cuts.¹⁷⁷ The future of these aircraft, which are still in production, is currently being analyzed by the USAF Air Staff and the Office of the Secretary of Defense. Although final plans have not been made, the USAF is compiling lists of possible options as well as list of those organizations and agency which may

¹⁷⁵ C-27J Spartan, "Did You Know."

¹⁷⁶ Mr. Gerrald L. Gallmeister, DoS, email messages to author, March 15, 2012 and March 22, 2012.

¹⁷⁷ United States Air Force, "Air Force Priorities for a New Strategy with Constrained Budgets," February 2012, <http://www.af.mil/shared/media/document/AFD-120201-027.pdf>.

be interested.¹⁷⁸ In addition, Alenia recently announced their lack of support for the U.S. selling the 21 aircraft through Foreign Military Sales (FMS). In a recent interview Alenia's CEO, Giuseppe Giordo, stated "If they want to sell additional airplanes as FMS, we will support them, but not those 21 airplanes," Giordo said. "In fact, we will do our best — not only us, but the Italian government — not to support those planes. In that case the U.S. government will be competing against our international campaigns in a market where 21 airplanes is a big deal."¹⁷⁹

If the C-27J proves a viable alternative, NSHQ could submit a request to the USAF for a number of the aircraft to be transferred onto their U.S. owned property book. Under NSHQ framework nation responsibilities the aircraft would still be U.S. owned, therefore allowing them to be supported by Alenia.¹⁸⁰ A final, and more costly, option for the C-27J is to contract with Alenia for purchase of new aircraft. Estimated procurement costs will be covered in the next section of this analysis.

Aircraft availability for both the CN235 and C295 is a different story than the C-27 variants. Both aircraft are still in production and are heavily proliferated around the world. As there are no excess U.S. defense articles of either of these aircraft, the only option for NSHQ to acquire them would be through a lease or purchase. Both variants are heavily utilized in the civilian aviation market so viable lease and purchase options may exist, both from Airbus Military, as well as other third party vendors. For the purpose of this study these options were not explored. If this aircraft was chosen these options would need to be considered in much greater depth.

Given the available information, it is clear that the C-27J represents the best aircraft availability. Ideally, NSHQ could negotiate a transfer of a number of these aircraft, upon their retirement, from the USAF to NSHQ's property book. This would allow the aircraft to be U.S. owned and give NSHQ the benefit of a near new aircraft. If the USAF decides to divest these aircraft via other means and they are not available for NSHQ to request, a greater analysis will have to be

¹⁷⁸ Vago Muradian, "Alenia Warns U.S. Over C-27J Sales," *Defense News*, <http://www.defensenews.com/article/20120227/DEFREG02/302270007/Alenia-Warns-U-S-Over-C-27J-Sales>

¹⁷⁹ Ibid.

¹⁸⁰ North Atlantic Treaty Organization Special Operations Headquarters, *Memorandum of Understanding Concerning The Establishment, Organisation, Administration, Security, Funding, and Manning of the NATO Special Operations Coordination Center (NSCC)*, 2009.

done to calculate long term cost comparisons of getting the C-27A with no acquisition cost versus a lease or purchase of the CN235 or C295.

Cost Comparisons

When evaluating the candidate aircraft for cost two primary areas of consideration are analyzed. The first is unit acquisition cost and the other is the average cost per flying hour (CPFH). For the purpose of this study organic versus contract maintenance support cost comparisons will not be analyzed, nor will any research and development costs associated with modifying the aircraft for NSHQ utilization.

Acquisition costs. If aircraft are acquired as excess defense articles from the U.S. government acquisitions cost will be greatly reduced. Exact costs in this case will vary depending on what support equipment, parts spares, etc. are included in the transfer. Table 5 displays approximate aircraft cost if NSHQ was to contract for new aircraft purchases.

Per Unit Acquisition Cost		
C-27A	N/A	C-27A no longer in production
C-27J	\$32-37M	Estimate based on C-27J DoD 2012 USAF Budget Estimates ¹⁸¹
CN235	\$20-25M	Based on U.S. Bureau of Land Management Smokejumper aircraft Screening and Evaluation Board (SASEB) CN235 data. ¹⁸² FY2003 cost of \$17.085 inflated for 2012 using DoD Procurement inflation tables. ¹⁸³
C295	~ \$30M	Based on AFSOC AC-XX AoA. BY2008 cost inflated using DoD Procurement inflation tables. ¹⁸⁴

Table 5: Candidate Aircraft FY12\$ Per Unit Acquisition Cost Estimates.
CPFH

When evaluating the average cost per flying hour for the candidate aircraft it must be noted that each U.S. agency that currently operates the platforms being analyzed (USAF, USCG, and DoS)

¹⁸¹ United States Department of the Air Force, *Department of Defense Fiscal Year (FY) 2012 Budget Estimates PDF*, (February 2011): 02-69. <http://www.saffm.hq.af.mil/shared/media/document/AFD-110211-038.pdf>.

¹⁸² United States Bureau of Land Management, *EADS CASA CN-235 Preliminary Aircraft Evaluation for SASEB*, (2003): 56 <http://www.blm.gov/nifc/st/en/prog/fire/Aviation/Airops/aircraft.html>.

¹⁸³ United States Department of Defense, "Defense Cost and Resource Center," http://dcarc.pae.osd.mil/reference/osd_ces_index.aspx.

¹⁸⁴ United States Air Force Special Operations Command, *AC-XX Analysis*, 74.

calculates CPFH differently. Using open source data it is difficult to do an “apples-to-apples” comparison so the costs which follow are all rough ballpark estimates.

C-27A: The DoS estimates a CPFH of almost \$10,000. The DoS rate includes everything from manpower costs to petroleum, oil, and lubricants (POL), and routine spare parts. This more expensive CPFH is driven by the age of the aircraft and a lack of a vendor base for parts.¹⁸⁵

C-27J: The average CPFH for the C-27J is reported to be around \$5300. This cost includes POL, unit operations costs, and repair parts and depot maintenance.¹⁸⁶

CN235: The CN235 CPFH was derived from estimated USCG HC144 CPFH values and is made up of similar expense categories to the C-27J. Current estimates for a CN235 CPFH are around \$3000. Conklin & de Decker, an open source civilian aircraft cost estimator service, estimates the variable cost of the civilian variant of the CN235 to be \$1784 per hours. This variable cost includes fuel, airframe maintenance, labor and parts, engine restoration and miscellaneous costs.¹⁸⁷

C295: No U.S. Government agencies currently operate the C295. In order to obtain a CPFH the theory that maintenance costs tend to be proportional to acquisition costs. Given that the C295 has an approximately 15% cheaper acquisition cost when compared to the C-27J, a 15% cheaper CPFH would result in an approximate CPFH of \$5500.

Given the above CPFH it is clear to see the large disparity. By taking the current CPFH and increasing it for inflation, it is possible to calculate a 15 year cumulative operating cost. When comparing the aircraft over a 15 year time span the CN235 and C295 have the lowest cumulative operating cost. Figure 7 shows that over this period the C-27A could cost as much as 3 times more to operate than the CN235.

¹⁸⁵ Eric Wilhelm DoS Contractor, email message to author, March 20, 2012.

¹⁸⁶ Brian Dougherty, SAF/AQQU, email message to author, March 24, 2012

¹⁸⁷ United States Coast Guard HC-144 Platform Management Office, email message to author, March 22, 2012 and Conklin & de Decker, “Aircraft Cost Summary,” <http://www.conklindd.com/CDALibrary/ACCostSummary.aspx>

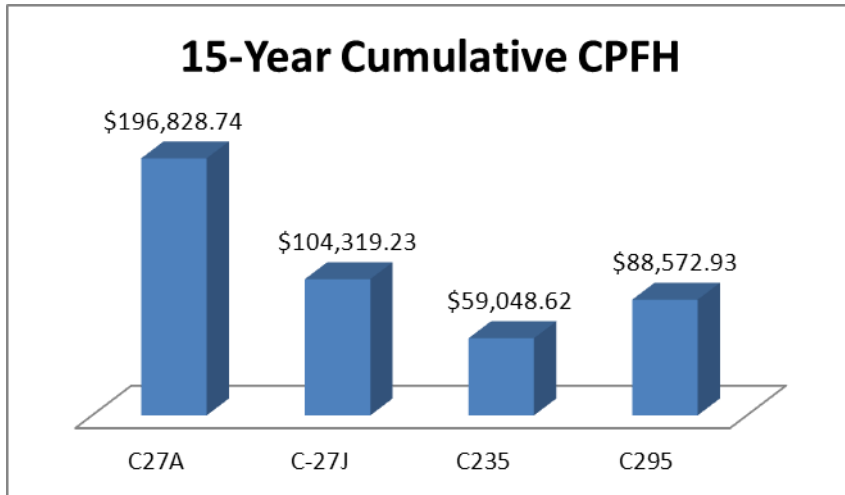


Figure 7: 15 Year Cumulative CPFH estimates.

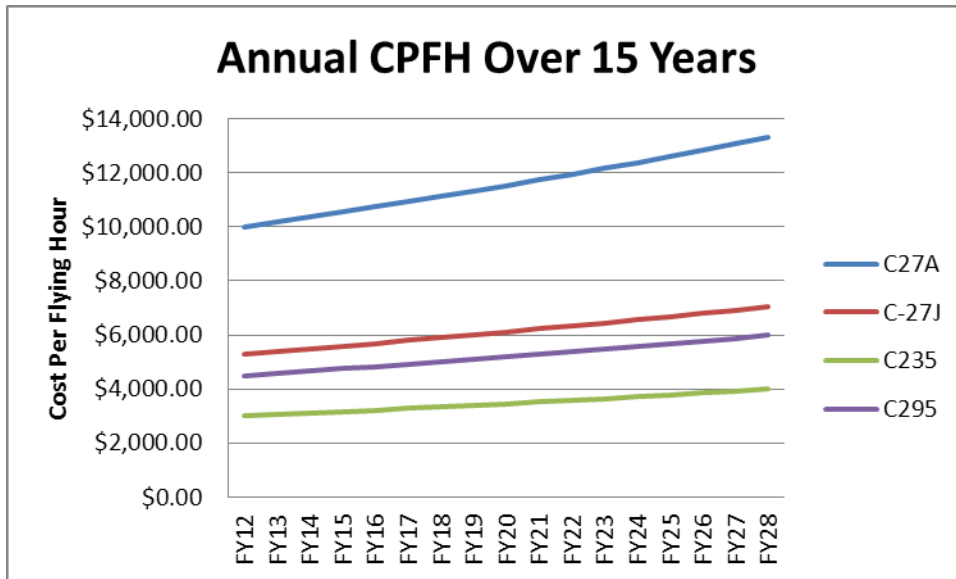


Figure 8: Annual aircraft CPFH inflated at an average rate of 1.8% annually.

Aircraft Program Management

When evaluating medium-fixed wing aircraft for NSHQ a few items other than capability, availability, and cost must be considered. First, if NSHQ was to acquire a small fleet of fixed wing aircraft, who would be responsible for their life cycle program management? Traditional U.S. military models establish separate commands which are responsible for aircraft sustainment management, acquisition management, and aircraft life cycle accountability. The U.S. Army established the Army Aviation and Missile Command (AMCOM) to manage their weapons

systems.¹⁸⁸ The USAF's Materiel Command operates numerous system program offices (SPOs) which are responsible for the cradle-to-grave oversight of aircraft and weapons systems.¹⁸⁹ Likewise, the U.S. Navy operates the Naval Air Systems Command (NAVAIR) to perform similar aircraft management and oversight. Depending on aircraft selection and quantity procured, NSHQ would have a couple of options to perform the above function. If NSHQ's aircraft are still utilized by other U.S. military services, NSHQ should attempt to work out a process whereby NSHQ could utilize that services aircraft management agency. If the aircraft are not common to U.S. military inventory, NSHQ should evaluate if the NATO Maintenance and Supply Agency (NAMSA) could perform this function. NAMSA, which performs logistics support tasks for NATO member nations aircraft (including C-27J, CN235, and C295) is a well-established agency and has established contacts throughout NATO and the aviation industry.¹⁹⁰

Thinking outside the box

Many nations are plagued with domestic financial problems while still needing to maintain a modern defense force to combat domestic, regional, and transnational threats. As Lt Gen Kisner mentioned in his Speech to XXI Seminario Internacional Cátedra Alfredo Kindelán, "a synchronized...*Smart Defense* approach...is the key to success."¹⁹¹ In addition, recent USAF documents addressing pending force structure changes calls for an increased emphasis on multi-mission platforms as a cost saving tool. The document states, "...multi-role platforms provide more utility across the range of the potential missions for which we are directed" while we look to "retire all aircraft of a specific type, allowing us to also divest the unique training and logistic support structure for that aircraft."¹⁹²

If NSHQ does acquire a small fleet of fixed-wing aircraft for SOF training or operations there are many opportunities for NSHQ to think outside the box and further their SOF aviation capabilities by expanding to multi-mission capable aircraft. As previously mentioned, once NSHQ masters

¹⁸⁸ United States Army, "U.S. Army Aviation and Missile Life Cycle Management Command," <http://www.army.mil/info/organization/unitsandcommands/commandstructure/amcom/>.

¹⁸⁹ United States Air Force, "Air Force Materiel Command," <http://www.afmc.af.mil/shared/media/document/AFD-120112-024.pdf>.

¹⁹⁰ North Atlantic Maintenance and Supply Agency, email message to author, February 23, 2012.

¹⁹¹ Frank Kisner, "Special Air Speech."

¹⁹² United States Department of the Air Force, "USAF Force Structure Changes: Sustaining Readiness and Modernizing the Total Force," (February, 2012): 3.

the “crawl” skills of basic SOF airlift they could begin to branch into more niche or refined SOF aviation skill sets such as ISTAR and CAS from their MSFW. Many past and current U.S. programs could help NSHQ rapidly succeed in these mission sets while reducing startup costs. For example, in 2008 AFSOC worked on a since cancelled acquisitions program, AC-XX, evaluating the utility of equipping MSFW to perform a “mini-gunship” mission. Significant amounts of test data was acquired, including live fire testing and blast over pressure analysis for firing a 30mm gun out the side of a C-27.¹⁹³

In another example, Air Force Research Labs (AFRL) and U.S. SOUTHCOM are currently working a cooperative research and development agreement with Alliant Techsystems Inc. (ATK) to develop a Lightweight/Low Cost Gunship Module, called “a gunship in a box”. This effort will provide a true roll-on/roll-off side firing weapons capability which can be used on any number of existing cargo aircraft (including C-27, CN235, and C295). The system, which includes a GAU-23 stretched 30mm gun and 500 rounds of ammunition at a weight of less than 3000 pounds, will require no modifications to the host aircraft and should cost less than \$600,000 per unit.¹⁹⁴ These types of initiatives, along with numerous other USAF ISR projects, could allow NSHQ to rapidly field a more in depth SOF aircraft package at reduced acquisitions risk and cost.

Recommendations

Given the above capabilities, availability, and cost analysis I recommend that NSHQ should aggressively pursue an agreement with the USAF to acquire a small number of their, soon to be divested, C-27J aircraft. These brand new aircraft are superior in capability and could easily be utilized for SOF airlift with little to no modifications. While their operation cost is more than the CN235 and C295 their availability, superior capability, and proliferation amongst other NSHQ member nations make them a clear frontrunner.

If an agreement for acquiring the U.S. Air Force C-27J’s is reached, NSHQ should also evaluate the utility of also acquiring the DoS C-27A’s. The C-27A’s may be able to serve as an

¹⁹³ Charles McClenahan, email message to author, March 14, 2012.

¹⁹⁴ Ibid.

additional training aircraft, an interim solution while finalizing C-27J plans, or an invaluable ground trainer for aircrew and the NATO SOF Training and Education Program (NSTEP) school. Finally, an unflyable DoS C-27A hulk (currently in storage at the 309th Aerospace Maintenance and Regeneration Group) could be procured to serve as a load trainer for aircrew. If the C-27J aircraft are not available NSHQ should conduct a more in depth long term cost comparison between the C-27A and buying/leasing new C-27Js, CN235s, or C295. Although the C-27As may appear to be an easy acquisition choice, modifications to meet a SOF capability, scarcity of available parts, and expensive flying hour costs could make them a poor choice for an operational SOF capability. As previously stated, the C-27A could, however, prove to be a valuable tool utilized for training purposes. Regardless of the path chosen, any MSFW aircraft acquired by NSHQ for training and/or operational use will prove to be an invaluable SOF force multiplier and a crucial step forward for NATO.

Summary

Dr. Keenan D. Yoho, Assistant Professor, Graduate School of Business and Public Policy

The nature and origin of the threat to the NATO Alliance is much more uncertain than it was when the North Atlantic Treaty was signed April 4, 1949. Future threats and requests for force are more likely to be directed toward non-peer as well as non-state actors where swiftness of action to reliably execute a mission with precision and efficiency will be paramount.

Ayre and Hough have described why NATO needs a special operations aviation capability. The outcome of *Operation Eagle Claw* – the failed attempt to rescue 52 American hostages held in the U.S. Embassy in Iran – provided the motivation for the U.S. to develop specially trained aviators to support special operations forces (SOF). Over the last four decades the U.S. and other nations have developed and honed the capabilities of their SOF air capability because it is widely recognized that special operators require specific types of air support to enable them to meet their full capability. Brand, Kraag, Larssen and Rahman have described the importance of building trust and technical skills as well as a common culture and operational understanding to enable missions to begin and conclude swiftly without loss to friendly forces and non-combatants. Carrano, Rahman and Sheehan have described how to build an organizational structure that is robust with respect to changes in the environmental and strategic picture. Sheehan and Cox developed a method for determining where bases should be established to support a NATO SOF air unit. Cervantes, Enderton, and Powers as well as Jones, Lowry and DiCola identify the costs and comparative capabilities of different rotary wing aircraft that might serve as a bridging solution in the immediate and near-term to jump-start a NATO SOF air capability until other aircraft might be acquired to meet specific levels of ambition. Weeks and Winter discuss light and medium-sized aircraft that might support future NATO SOF airlift, airstrike and intelligence, surveillance, target acquisition, and reconnaissance (ISTAR) requirements. Collectively, these essays sketch the need and justification for a special air capability, organizational structures that would be robust to changes in the strategic environment, a method for evaluating basing alternatives, and affordable alternatives for rotary as well as light and medium-sized aviation assets that would support the current desired capabilities that would increase the capacity, interoperability, and cohesiveness of NATO SOF.

The Near Future

The 2011 NATO military intervention in Libya exposed important capacity shortfalls critical to ensuring the effectiveness, decisiveness and expediency of combat operations. In particular, precision strike and aerial refueling were identified as key gaps in capability that were filled almost entirely by the United States. SOF-enabling air power rests in the hands of a few NATO nations. In order to expand capacity, the knowledge and expertise in specialized SOF air skills must be shared and diffused throughout Alliance countries that aspire to build greater SOF capacity. Should the need arise in the near future to deploy NATO SOF – such as a joint operation between multiple Alliance members – a NATO SOF air capability could do much to prepare for success in the way of sharing information, building joint capacity and working to ensure greater interoperability between people and systems.

The Distant Future

Future NATO SOF air capability may require creative solutions that move us beyond the current systems being employed. The need for persistent “eye-in-the-sky” capability could possibly be filled by aerostats or dirigibles (manned or unmanned) that could serve as low-cost, long-dwell ISTAR platforms. It is widely accepted that unmanned aerial vehicles will increasingly become the dominant system of choice for reconnaissance and aerial strike, and there are many tests being conducted to improve the capability of using unmanned systems for logistics resupply. However, manned systems will continue to play a large role as adaptability at a moment’s notice is often required to support SOF operations and this is often most expedient and effective when there is a face-to-face contact between the ground and air operator. Additionally, systems that have a flexible architecture – those that may be adapted to conduct multiple missions or have multiple capabilities – and can be deployed in groups when necessary to provide effects and capabilities that are multiplicative would be highly desirable. These types of systems need not be technologically exquisite. Utilizing existing, commercially available airframes that are enhanced by adding modules, pods, and/or weapons, and then deploying them using new concepts of operation (such as exploiting network advantages, arraying to fight in “packs” or swarms, or working in tandem in groups of twos) would likely advance capability while keeping the costs of innovation within bounds that are manageable.

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
Ft. Belvoir, Virginia
2. Dudley Knox Library
Naval Postgraduate School
Monterey, California
3. Research Sponsored Programs Office, Code 41
Naval Postgraduate School
Monterey, California
4. Lt Col Michael Maksimowicz, OF-4, USA, NSHQ
NATO Special Operations Headquarters
Brussels, Belgium
5. COL Stuart Bradin
US Special Operations Command, Global SOF OPT
Tampa, Florida