



ER

Winter 2014

Posturing Logistics for the Next



Fight

THE EXCEPTIONAL RELEASE

WINTER 2014 – CONTENTS

LOGISTICS OFFICER ASSOCIATION

*Professionals Shaping the
Military Environment*

EXECUTIVE BOARD

President

Col(ret) Emily Buckman
president@loanational.org

Vice President

Lt Col Chris Boring
vp@loanational.org

Chief Financial Officer

Mr. Brad Leonard
cfo@loanational.org

Chief Information Officer

Ms. Lynn Arias
cio@loanational.org

Membership Development

Maj Alex Mol
membership@loanational.org

Chapter Support

Maj Camille LaDrew
chaptersupport@loanational.org

Executive Senior Advisor

Lt Gen Judith Fedder

Webmaster/Website

Lt Col (ret) JD Duvall
webmaster@loanational.org
www.loanational.org

THE EXCEPTIONAL RELEASE

Editor

Lt Col Jim Dorn, 92 AMXS/CC
editor@loanational.org

Assistant Editor

Col (ret) Mary H. Parker, 412 AMXS/MXAD
assteditor@loanational.org

ER Worldwide Staff

Maj Timothy Dodson, 55 AMXS/CC
Maj Dara Hobbs, DET 4/JPPSO Mid-Atlantic
Capt Scott Manno, 927 LRS/LGR

LOA National
PO Box 2264 - Arlington, VA 22202 Issue No.
132 - Winter 2014

President's Log.....	3
Editor's Debrief.....	7
Exceptional Writers Awards.....	10
From the E-Ring.....	11
<i>Lt Gen Judith Fedder</i>	
Senior Leader Perspective.....	14
<i>Maj Gen Warren Berry</i>	
AFSO21 Event for Osan's A-10 Phase Dock.....	20
<i>TSgt Richard Liveoak</i>	
Strategic Management throughout a Weapon System's Life Cycle: The Case for Supply Chain Resilience.....	30
<i>Lt Col Tim Pettit & CMSgt Brian Tobin</i>	
LOA's Information Technology Development and Strategy.....	49
<i>1Lt David Loska</i>	

PRESIDENT'S LOG(ISTICS)

Posturing Logistics for the Next Flight

As we look forward as the AF Logistics Community ...Military, Civil Service, Retired and Corporate LOA members...I commend that we embrace last month's LOA 2014 Symposium theme...Leaner, Stronger and Connected.

Despite a two-year hiatus away from the main stage, the whole enterprise came back in full force for an action-packed symposium thanks to our Symposium Co-Chairs, Col Eric "Action" Jackson and Ms. Lynn Arias, our National Capital Region (NCR) and Mt Vernon Chapter leaders, Lt

Col Brad Coley and Maj (ret) Louis Littleton, your National Board, Lt Col Chris Boring (VP), Maj Mike Sander (CFO), Ms. Wendy Yonce (CIO), Lt Col (ret) JD Duvall (CTO), Mr. Brad Leonard (Sponsor lead), Lt Col Rich "Fletch" Fletcher (ER Editor), Maj Alex Mol (Membership), Maj Camille LaDrew (Chapter lead), our amazing eventPower team and a huge cast of selfless volunteers from the NCR and beyond.

Thanks to our whole Log Nation, LOA is truly leaner, stronger and connected. Over the last year LOA adapted to DOD changes and fiscal environment. LOA's business model changed across many fronts. We worked smartly to reduce costs by streamlining our online journal, the Exceptional Release, and by leveraging technology benefits to include video streaming last week's symposium to logisticians around the world that weren't able to attend in person. LOA worked hard to ensure the venue last week provided great value to each attendee and the DOD.



Colonel(ret) Emily Buckman

It was clear that leaders sent their very best young officers to the event as the conversations and questions in every forum were ones laced with critical thinking and follow up action at all levels.

Our speakers last week included the Secretary of the Air Force, The Principle Deputy Under Secretary for Defense in Acquisition, Technology and Logistics, the Commander, USTRANSCOM, the Assistant Secretary of the Air Force for Acquisition, the Director of the Defense Logistics Agency, the Director of Logistics, the Joint Staff, the Service 4's, the Commander of the Air Force Sustainment Center, the Commander of the Air Force Installation and Mission Support Center (Provisional), the Lockheed Martin Director of Logistics, the Boeing Director of Logistics Concepts as well as many other important panel members from our educational, retired and corporate partnerships. All highlighted the things we must to do remain relevant by being lean, strong and connected.

Our LOA University (AFIT, DAU, a Civil Servant Panel led by Ms Estep, Army Logistics University, Penn State University, North Carolina University, Lockheed Martin PBL experts and APICs partners), was our backbone of the Symposium, as it included all day courses the first day of the Symposium to further educate our logisticians.

We also highlighted our extraordinary LOA performers by recognizing our annual Chapter, Individual and Scholarship award winners to include our Lifetime Award Winner, Maj Gen (ret) Bob McMahon, who is one of the reasons our Symposium was so successful this year. His incredible mentoring helped your National Board work through very tough decisions in preparation for our event last week. All the Award winners will be highlighted and shown in the next ER publication.

The entire event would not have been possible without our generous sponsors to include our Platinum Sponsor, Northrup-Grumman, Diamond Sponsors, Lockheed Martin and Boeing,

our Gold Sponsor, General Electric, and Silver Sponsor, Raytheon, and many others. Thank you teammates and partners.

This forum was truly the most important event all year as we came together at all levels to synergize and glean new insights on how we can best support the world's greatest Air Force. We truly left the week better equipped to meet the demands we will continue to face as leaders in the coming months and years. As I told the young CGOs who attended, the memories and relationships created at LOA's annual Symposium will last their whole career and beyond.

As we look towards the future, the best way to posture us for the next fight is to remain lean, strong and connected. We have started off the new Fiscal year by coming together as an AF Log Nation. Let's not lose the momentum gained, but instead use it to fuel us and prepare us for what is to come.

With the utmost respect for all of you,

Emily A. Buckman

**Emily A. Buckman, Col, USAF (ret)
President, LOA**



LOGISTICS OFFICER ASSOCIATION SYMPOSIUM 2014

Leaner, Stronger, Connected

October 19-22, 2014 | Hyatt Regency Crystal City, Arlington, VA

On behalf of over 3,000 Logisticians, we would like to thank our sponsors for their continued support of LOA!



Platinum Sponsor



Diamond Sponsor



Diamond Sponsor



Gold Sponsor



Silver Sponsor



Photos from the Symposium can be found at
www.logisticsymposium.org/Photo-Gallery

Editor's Debrief



“Paint the Wall”...When dealing with change or new ideas, my Washington Air National Guard counterpart here at Fairchild AFB, Lt Col Thorne Tibbitts, has a saying that I’ve recently adopted. He often states that he is a “paint the wall kinda guy.” Honestly, for the first few months, I didn’t really understand what he meant until one day it finally resonated. We all try to make changes for the better so we paint the wall a color we

think we’ll like. If it turns out we don’t like the new color, then we can repaint the wall the same color it was before or we can try a different color. In other words, we can’t be afraid to try something new. Why am I talking about painting walls? Well, it’s time to paint the walls of the ER.

The overall goal of the ER Staff is to produce and constantly improve the journal. We want people to want to read it, not just thumb through it. We also want the journal to be relevant and make people think. Over the past few months we’ve solicited and received feedback from all levels of LOA, from general officers and SESs to eager lieutenants. So with the feedback we received, we’re going to make a few changes.

Relevant Material

First and foremost, we’re going to seek and welcome articles which challenge our current ways of logistics thinking. Given the current fiscal constraints, changing political environment, and the state of world affairs, logisticians will be tasked heavily and we’ll need to find better and cheaper ways to do what we do. In the Senior Leader’s perspective of this edition, Major General Berry challenges the idea that we are truly an expeditionary Air Force.

Edition Themes

Each Exceptional Release in the past had a theme which guided most of the articles and their content. Several people felt the themes hindered their willingness to contribute to the ER because the content of their potential article didn't match any of the upcoming themes. So in the interest of spurring new content, we're going to eliminate the ER themes except for the Fall edition which will carry the theme of the Annual LOA Symposium. However, don't be discouraged. We will still consider ALL articles for publication, regardless of the Fall edition's theme.

New Comments Section

The sharing of new ideas and the challenging of old ideas should be a two-way street. There should be discussion, both critical and supportive. In order to do this, we're adding a comments section where readers may ask questions of the author and/or provide constructive observations. I emphasize the word constructive. This will not be a tabloid style section for personnel attacks. Comments and questions can be sent to ERcomments@loanational.org. The ER Staff and I will evaluate each comment or question, give authors opportunity to respond, and publish both comments and responses in the following edition. Again, the goal is to generate informative dialogue.

Joint Perspective

The majority of the articles in the ER are normally USAF focused, with an occasional article coming from an Air Force person who does a Joint deployment. From our operations in the Pacific to the multi-modal efforts to move equipment and personal out of Afghanistan, almost everything we do is Joint. Future editions of the ER will contain a Joint Perspective section highlighting topics from sister-services or from Air Force Airmen serving in a Joint operation.

Electronic Version

The recent conversion to the electronic format of the ER was clearly the hottest topic in all the feedback we received. Unfortunately, going back to a printed edition is cost prohibitive right now. The ER staff and the LOA Board are aware that the online ER cannot be read on most government computer systems. The LOA Chief Technology Officer, JD DuVall, is working with the Board to put a long term solution in place. In the meantime, we will continue to email a direct link to download the PDF version on most government computer systems though our partnership with EventPower.

My Request

We currently have a few Field Editor positions open on the ER staff. The Field Editors are responsible for editing submitted articles and helping to determine if the content warrants publication. We are also looking for a Publisher to take over the job of the actual layout and development of each issue. If you are interested in joining the crew please contact me at Editor@loanational.org. You may also provide any feedback on the above changes or any other recommendations at the same email address.

Safe, Reliable, and Efficient...in that order

Jim

2014 Exceptional Writer's Awards

Field Grade Officer Category

Major Michael Boswell, Spring 2014

Leading in a New Era of Fiscal Change

Company Grade Officer Category

Captain Dan Whalen, Spring 2014

Continuous Process Improvement in a Complex Environment

Civilian Category

Mr. Steven Morani and Mr. Bill Black, Winter 2013

Evolving Maintenance Data Sharing to Fully Support the Joint Logistics Enterprise

Honorable Mention

MSgt Chad Ohr, Winter 2013

Vehicle Fuels Inspections of the Future

FROM THE E-RING

Posturing Logistics for the Next Fight

Fly, Fight, Win - Anywhere, Anytime:

Even a casual look at today's front page news gives us an immediate appreciation for the magnitude of how and where Air Force logisticians will be operating when looking ahead to "the next fight". Growing unrest in Eastern Europe, the emergent threat posed by the Islamic State in Iraq and the Levant (ISIL) in the Middle East, and our response to a potential Ebola pandemic in West Africa all demonstrate how different and dispersed, not to mention simultaneous, future support requirements may become.



Lt Gen Judith Fedder

So what should you and I be doing to be ready to respond to a major theater conflict or providing humanitarian assistance at the international, national, or local level?

What is the "next fight?"

As I look at the news...or the Air Force's strategic assessment...or any other global sight picture, one thing is clear: we must support when conflict inevitably



occurs. Authoritative documents, such as the Quadrennial Defense Review and our AF's 30 Year Strategy, "A Call to the Future", serve as vectors for us by detailing the end states that we must achieve to effectively support the warfighter.

The ongoing "Rebalancing to Asia-Pacific", Cyber Preparedness, and Anti-Access/Area Denial (A2/AD) operational capabilities are just a few of the end states that our AF logistics leaders are examining closely to make sure we have the right plans, the right expertise, and the right resources in place **before** we are called to the next fight.

How do we adapt for the next fight?

When Logistics leaders convened in May 2012 to draft the Enterprise Logistics Strategy (ELS), they recognized the importance of ongoing readiness when establishing the second Strategic Priority (yellow arrow): "*Posture logistics for the next fight*".



In past forums, we have discussed how our logistics strategy is designed to be dynamic and adaptable to meet shifting priorities and challenges. The work done by a coalition of senior logistics leaders (The Logistics Board) has been less about developing a strategic plan and more about establishing the initiatives for ongoing strategic planning to address requirements for the foreseeable future.

This past October, Logistics leaders convened in Washington, DC after the Logistics Officer Association symposium to address *how we must advance logistics to be ready for the next fight*. We discussed the critical concern areas in which systemic shortcomings might cause us to fail to meet support requirements for the next fight. The meeting was a culmination of an

eight-month ELS Risk Review to validate and update our ELS goals and objectives to more closely align to concern areas identified by logistics leaders from all MAJCOMs across the enterprise. As we look at the remainder of FY15 and beyond, we remain task-focused on identifying and implementing solutions to alleviate high priority concern areas.

How are we currently preparing for the next fight?

Since its creation, the ELS has served as our guiding framework in helping us make sure that we drive towards a logistics enterprise adequately postured for the next fight. This framework is comprised of three initiatives: OPLAN Alignment, Repair Network Integration (RNI), and War Readiness Materiel (WRM). These initiatives are helping us evolve from how we have done logistics in the past to drastically improve our ability to meet future challenges.

 OPLAN ALIGNMENT	 RNI	 WRM
Reviewing current and future OPLANs to make sure AF logistics plans cover down on all of the right areas for the next fight	Helping AF Logistics transform current logistics repair processes into a centrally managed, repair network helping us to become more agile, responsive, and ready for wherever the next fight takes us	Maturing a single enterprise manager with the sole responsibility and authority to allocate WRM resources across the globe in support of the next fight

How can you help prepare for the next fight?

Our collective success rests heavily on individual contributions from logisticians, like you. As we charge forward through the rest of FY15, I would like you to reflect on the following:

- Familiarize yourself with the [ELS](#), and particularly the [objectives that fall under the “Posture logistics for the next fight” priority](#). What role will you play in helping AF Logistics incrementally achieve these objectives at your MAJCOM/base?
- Ask “What currently *prevents* us from supporting the next fight? Conversely, what currently *enables* us to support the next fight?”
- What thoughts and ideas do you have around changing logistics today that might help us be better equipped to fight tomorrow?

Please take some time to think about these questions. Use the ELS and these questions as a litmus test when you are performing your duties. Most importantly, if you identify efficiencies or opportunities to do logistics better, communicate it through your chain of command.

With a sound strategy to keep us focused on the AF mission, and our sharp, dedicated military, civilian and contractor logisticians helping us execute our strategy, I am confident that we will continue to deliver what our Air Force needs of us. Thank you for what you do...it is an honor to serve with you.

Lt Gen Judith Fedder
Deputy Chief of Staff for Logistics, Installations, and Mission Support
Headquarters U.S. Air Force, Washington, D.C.

SENIOR LEADER PERSPECTIVE

In step with Major General Warren Berry, Director of Logistics, Headquarters Air Mobility Command, Scott Air Force Base, Ill.

On Second Thought

Call me a geek, but one of my favorite “leisure” reads is *Foreign Policy* magazine. If you happen to pass by me at a pool (not there often enough) or on an airplane (there far too often), you’ll usually see this publication on my iPad. *Foreign Policy* has an interesting, recurring series called, “Think Again,” which offers an alternative viewpoint to ideas and statements we would consider the prevailing wisdom. It’s intended to get you questioning our fundamental beliefs, challenging our biases, and, well, thinking again. Clever, huh?



Major General Warren Berry

In the vein of “imitation is the sincerest form of flattery,” I’d offer up my own version that I’ll call “On Second Thought.” You don’t have to like or agree with what I write; in fact, I’d be surprised if you didn’t take issue with some of my comments. But I would hope that this dialogue challenges how you might think about the conventional wisdom and gets you to have second thoughts about what we accept as ground truth. If this catches on, maybe we’ll do more in future editions of *ER*, covering things like WRM, joint logisticians, AF readiness, and more.

“Over the last 15 years of combat operations, we’ve proven that we are an expeditionary Air Force.” Well, maybe. Make no mistake, what our Airmen have accomplished over the last 20+ years of combat operations, from Operation ALLIED FORCE through Operations DESERT SHIELD/DESERT STORM, NORTHERN and SOUTHERN WATCH, ENDURING FREEDOM, IRAQI FREEDOM, NEW DAWN, ODYSSEY DAWN, and more, has been nothing short of remarkable. During the liberation of Libya alone, we began flying combat sorties over Tripoli within 36 hours of the JCS EXORD (Execute Order). We bedded down dozens of aircraft at multiple European locations, flying combat sorties in the first 2 weeks of implementing the No Fly Zone with our coalition partners before turning the operation over to NATO. Add to that the countless deployments of aircraft, munitions, combat support personnel and others to the operations listed above (and even more not listed), and we have a right to be proud.

But before we complete all the high fives and pats on the back, we need to ask ourselves, “Are we *really* expeditionary?” If you’re a purist, you’d be inclined to agree since our collective actions during those many operations certainly fit the Webster definition of “expeditionary.” If you’re an Airman who served outside-the-wire, I think you’d vehemently agree that we are an expeditionary force. My brain tells me you’re right, but my gut tells me, “well, maybe.”

Too often, we tend to think that moving 18 F-16s from Shaw AFB to Al Udeid AB is expeditionary. If you think about all the infrastructure and support available at the ‘Deed, it’s really not much different than moving those 18 F-16s from Shaw AFB to Nellis AFB...just a little longer. We’ve come to believe that moving a relatively modest footprint of forces thousands of miles away is what defines expeditionary. In the process, we’ve grown accustomed to deploying into an area that has a very robust support structure, a well-defined transportation

system, and many of the amenities of home, from both creature comforts to mission support facilities. In some ways, maybe we're tricking ourselves into thinking we're expeditionary...and maybe it's time to think of expeditionary in a much different way.

“So what?”, you might ask. Well, as we come to rely on that robust deployed infrastructure...as we come to take the transportation and sustainment system for granted...as we accept that expeditionary means moving 18 F-16s to “Shaw AFB East”...we risk being woefully unprepared to meet the new defense strategy that first took shape in SecDEF’s comments in January 2012 and underpins the 2014 Quadrennial Defense Review (QDR). From the former, we tend to focus on what the “pivot” to the Pacific really means in practical terms, yet the strategy also called for a “more agile, more flexible” military force that will be ready to deploy quickly and be more innovative as well as technically advanced. That innovation (among other important messages) is echoed in CSAF’s latest strategy document, *America’s Air Force: A Call to the Future*. In the QDR, you’ll see verbiage that talks to “...future conflicts [ranging] from hybrid contingencies against proxy groups using asymmetric approaches, to high-end conflict against a state power...with A2/AD capabilities...moving toward greater emphasis on the *full spectrum* [emphasis added] of possible operations.” While under re-write, even the current

I believe that expeditionary operations required to support these evolving defense strategies require us to rethink our working definitions and our concepts for expeditionary operations.

National Military Strategy (NMS) calls for a force posture that is “geographically distributed” with a “capability to fight through a degraded environment.” Most

telling to us as logisticians, our NMS tells us that joint forces (and thus, Air Forces) must “become more expeditionary... [with] a smaller logistical footprint,” developing “joint

operational concepts leveraging mobile and more survivable bases.” Not much of that sounds like Al Udeid, or Bagram, or Al Dhafra.

I believe that expeditionary operations required to support these evolving defense strategies require us to rethink our working definitions and our concepts for expeditionary operations. In this construct, an expeditionary mindset means developing innovative ways to equally support operations from one end of the spectrum, characterized by far smaller footprints in far more austere locations, to the other, envisioned as large-scale deployment to dispersed locations against a near-peer adversary. Granted, as a nation, we will continue to use all elements of national power in securing our nation’s interests around the globe. We will continue to build partner capacity and work to join those partner nations who share our values and our interests. But when our nation needs the military arm, and when it calls our Air Force, we need to be ready for a truly expeditionary response. We need to be able to rapidly deploy several remotely piloted aircraft to a small, remote airfield in West Africa and, more importantly, have a viable concept to support that mission where a sustainment chain doesn’t yet exist. Similarly, we need to be able to send a small handful of F-15Es in dispersed operations to an as yet unknown airfield in the Pacific Rim and clearly understand the full mission support tail that must accompany it, from spares to equipment to the BOS tail as well, in an environment where the adversary may not grant us “free” access.

Much like “50 is the new 30” (at least that’s what I’m hoping), austere and widely dispersed may well be the new expeditionary no matter which end of the full-spectrum operations we find ourselves. While we have not yet completely proven that we can be expeditionary in this regard, we still have time to figure this out. We need to expend the intellectual capital now to understand how we deploy, sustain, and support an expeditionary mission set, particularly in an

anti-access and/or area denial environment where our potential adversary doesn't intend to allow us to ever build an AI Udeid again.

What we can't do is simply accept the success we've enjoyed since Operation ALLIED FORCE and assume the future will look much like the past. History has taught us the pitfalls of that thinking. So we need to have *second thoughts*, redefine what we consider expeditionary, and develop the logistics concepts that support the employment of air power that our nation's senior leaders expect. As logisticians, we have never let down our country, our leaders, or our operators when it came time to deliver...and *that* is a trend we need to continue. And it will only continue if we can innovate new logistics and sustainment concepts for a different kind of expeditionary environment.

About the author: *Maj. Gen. Warren D. Berry is the Director of Logistics, Headquarters Air Mobility Command, Scott Air Force Base, Ill. He develops policy and provides critical guidance to organize, train, and equip aircraft maintenance, aerial port, transportation, supply, and logistics plans units at 14 major active air installations in the U.S. and 17 enroute locations around the world. He is responsible for 496 active aircraft, 8,200 vehicles and 24,000 people. He also assists in the readiness of more than 579 aircraft and 80,339 people in the Air Force Reserve and Air National Guard, providing total force augmentation to support flexible, global reach for America.*

General Berry earned a Bachelor of Science degree from the University of Notre Dame and was commissioned a second lieutenant through the ROTC program as a distinguished graduate. He entered active duty in January 1988 as an acquisition officer at Wright-Patterson AFB, Ohio, before cross-training into aircraft maintenance in 1992. He served as an Air Staff logistics programmer, commanded the 435th Mission Support Group at Ramstein Air Base, Germany and the 78th Air Base Wing at Robins AFB, Ga., and served as the Assistant Deputy Director for Western Hemisphere Political-Military Affairs on The Joint Staff, Washington, D.C. Prior to his current assignment, General Berry was the Director of Logistics, Installations and Mission Support, Headquarters U.S. Air Forces in Europe, Ramstein Air Base, Germany.

AFSO21 Event for Osan's A-10 Phase Dock

Written by TSgt Brian Richard Liveoak

Osan AB Korea is known for having one of Combat Air Force's most aggressive flying hour programs with plans of flying even more hours next Fiscal Year. But that doesn't go without a cost, as any maintainer can tell you; a high production requirement due to this aggressive flying schedule takes its toll on the maintenance personnel and the aircraft they work on. Maintaining each weapon platform safely for longevity and sustainability is paramount and at the forefront of every maintainer's mind. However, there are only so many hours in a day to keep Osan's aircraft safe, reliable and ready for a moment's notice tasking. Figuring out how to do the most beneficial maintenance effectively is a daily endeavor for Osan's Maintainers.

Every aircraft must eventually be held down for an extended period of time to overhaul and inspect key areas to lengthen the aircraft's integrity and combat capabilities.



Figure 1. A-10 Phase Dock at Osan AB. (USAF Photo)

The A-10 is scheduled for this inspection every 500 hours of flying and it is commonly referred to as a “Phase Inspection.” Due to the increase in the flying hour program, Osan’s A-10s will need to go through the Phase process more often, which in-turn has made the annual schedule much tighter.

The 51st Maintenance Squadron (MXS), led by Lt Col Earl Williams III, is the owning organization for the A-10 Phase process. In March of 2014, faced with the forethought of the increased Phase flow, Lt Col Williams decided to initiate an Air Force Smart Operations for the 21 Century (AFSO21) event to find improvement areas and push for a more efficient Phase process. He selected SMSgt Ronald Kunce as his Team lead and MSgt Eric Ordonez (AFSO21 Green belt) to facilitate the event.

The first step in any AFSO21 event is to come up with an agreed upon problem statement and a well-defined goal. To accomplish this SMSgt Kunce and MSgt Ordonez sat down with Subject Matter Experts (SMEs) from within the organization and looked at the previous year’s

The team developed this problem statement: Over the past year, MXS performed 14 A-10 Phase inspections. Only three (23%) were completed within the 10-day standard established by 51FWI 21-165.

data on the Phase process. Over the past year, MXS performed a total of 14 A-10 Phases. The duration timeframe ranged between 10 to 19 work days (weekends

were not counted) with an overall average of 14 days. This was well outside the preferred timeframe of 10 work days. In fact, only two aircraft were completed within the 10-day standard. The team developed this problem statement: Over the past year, MXS performed 14 A-10 Phase inspections. Only three (23%) were completed within the 10-day standard established by 51FWI 21-165.

Before the team could establish the goal, they had to bring together all the agencies that perform inspections and maintenance on the aircraft during the Phase. In fact, there are 14 different agencies that have inspection requirements or perform maintenance on the aircraft. SMEs were brought together from each of the 14 agencies. The team was comprised of Crew Chiefs assigned to Phase, the AMU, and Aero Repair; an Avionics Specialist; an Engine specialist; a Weapons specialist; a Fuels technician; an Electrical and Environmental specialist; a Sheet Metal technician; a Metal Technology Journeyman; a NDI Journeyman; an Aerospace Ground Equipment Mechanic; a Production Superintendent; and a Quality Assurance inspector. Synergizing these 14 agencies (four being outside of the MXS) was a challenge especially when you add in the other day-to-day operations these agencies also perform on the flightline.

Due to the complex and changing priorities the 51 MXG maintainers face as they deliver aircraft to project air power, the Phase process sometimes gets put on the “backburner” because of the “get to it when you can” maintainer attitude. This mindset is one thing the team hoped to change with this AFSO21 event. The team of SMEs also knew that you could always anticipate supply problems and “hard breaks” so they decided to create a goal that was attainable and still provided the flexibility to meet the flying schedule. The goal of the team was: To increase A-10 Phase operational efficiency through scheduling maintenance actions in a sequence that will both maximize manpower and reduce aircraft downtime and to increase MXS’s on-time phase rate to at least 80% within a 12-month period.



Figure 2. Personnel from the 51st Maintenance Group complete the value stream mapping for the A-10 Phase flow process from start-to-finish. (USAF Photo)

The next step was for the team to do Value Stream Mapping. The team had to map out every task that was performed using the Dock Chiefs notes and work cards for one of the average Phases performed. There are 520 carded tasks that must be performed and multiple steps for each task. The process took a little over two days to map out and this was deemed the Current State. Once that was complete, the team went through each individual step and had to categorize them into one of three categories: value added, non-value added/required, and non-value added/not required. The team identified over 400 non-value added steps in their process. Removing these steps would create the Ideal State or what the process should be in a perfect world.

The team identified over 400 non-value added steps in their process. Removing these steps would create the Ideal State or what the process should be in a perfect world.

After all the non-value added steps were identified, they were categorized into major areas. They were: 1.) communication, tools and parts availability, and 2.) personnel support when needed. It was apparent that communication was the leading cause of the greatest issues with the process flow for the Phase inspection. Problems such as miskeyed and broken radios, lack of effective personnel time management, pre- and post-dock coordination issues, and lack of clear concise direction were all deficiencies tackled by this AFSSO21 team. The lack of effective personnel time management was the second leading cause for delays, for example, weapons personnel were unavailable to perform the gun bay maintenance until late in the phase process. This was followed by tool and parts availability--there were many cases where the specialist had to return to their workcenters to get the tools or parts they needed to perform their task.

The Team then performed some Root Cause analysis using the 5 Whys process for the major problem areas and then developed an Action Plan to combat these problem areas. In all, the team came up with 17 Just do-it improvement and 7 projects to improve the overall process.

To tackle the communication issue, the team came up with two major changes. The first was simply installing base stations in the Dock Box to give the Dock Chief another method of contacting the back shops and Pro Supers. Traditionally they relied on phone calls which made it difficult when the back shop personnel were out on other jobs or the Pro Supers were in production meetings. The base station alleviated that problem.



Figure 3. TSgt Gregory calls for AGE assistance with the newly installed bay stations. (USAF Photo)

The second major change was who the Dock Chief called. In the past, everything had to go through the MXS Pro Super, who in turn was responsible for coordinating with the AMU Pro Super or other MXS back shop to pass on the requirement. This led to some confusion and personnel arriving unprepared for the task they needed to perform. The change now allows the Dock Chief to contact the shop directly and contact the Pro Super to give updates on status. This change eliminated the middleman and reduced some of the confusion created when passing a message through multiple people. The support personnel were more prepared for the jobs that needed to be done.

The second major area the team tackled was addressing personnel support when needed. To do this, they started with the pre-dock. For every aircraft that goes into Phase, the Plans and Scheduling section sets up a pre-dock meeting to discuss all the TCTOs, Time Changes and open write-ups and delayed discrepancies that need to be worked. In the past, the Dock Chief, Pro

Supers, Crew Chiefs, and the AMU supply person would attend. In the past the Dock Chief would call the Pro Super to let the back shops know when they were needed. This led to many delays due to shift schedules and personnel availability depending on other flightline priority work. The Team decided that if every agency that played a part in the Phase attended the pre-dock, this would lead to more effective and efficient planning. The Dock Chief would give out the tentative work schedule for the Phase allowing the other back shops to adjust their manpower accordingly and reduce the delays in the overall Phase process.

The final major area was tools and parts availability. This area played a major role in the timely completion of each Phase inspection. The biggest waste of time was when a back shop would come to the Phase Dock to do a job only to find they didn't have the right tool or parts to do the job. Many times they would have to return to their shops to get what they needed, thereby adding hours to the overall process. To diminish this inefficiency, the team decided to create tool boxes that focused specifically on the back shops' tasks and they would remain in the Phase hangar.



Figure 4. SrA Hahn cuts out foam for a new inspection toolbox for weapons technicians. These new toolboxes eliminate the need for support agencies to bring their own tools to the phase hangar. (USAF Photo)

Additionally, each support section from the support agencies provided common parts lists, such as bolts, rivets, screws, washers, etc., and these were then added to the existing A-10 bench stock. The Phase bench stock monitor added over 150 items. Additionally, they moved MXS's supply liaisons office into the Phase hangar which proved to be an essential asset to getting required parts within a timely manner and reduced lag time because the maintainer can now go directly to a LRS liaison without leaving the area.

During the AFSO21 event many issues were uncovered that fell outside of the three main problem areas. Those items were placed on the "Parking Lot" to be discussed after the main problems were addressed to see if they could be improved as well. Of note, the team discussed the Dedicated Crew Chief (DCC) and dedicated weapons crews, the Pave Penny Pylon (PPP) [an unused pylon that still required a time consuming inspection], Maintenance Data collection, Dock Chief control of back shop personnel, Phase flow binders for each workcenter or back shop, tracking system for the next five flights out of phase and the update of 51 FW Instruction (FWI) 21-009 which covers the overall Phase process.

Getting the required crew chief from the 25th AMU seemed impossible prior to the AFSO21 event, even though it was stated as a requirement in 51 FWI 21-009. Since the incorporated changes were initiated, there has been a crew chief assigned to Phase from the 25th AMU for the past seven Phase inspections. The dedication of a full weapons crew for each Phase jet has been crucial as well.

The dedicated weapons crew enabled oversight from start-to-finish of each aircraft. Prior to this



Figure 5. Two weapon technicians upload a pylon after a completed inspection. A dedicated weapons crew for each phase jet is crucial to a timely phase inspection completion. (USAF Photo)

change, it was not uncommon for minor maintenance discrepancies to be considered the norm due to one weapons crew not turning over correct information to the next weapons crew. The dedicated weapons crew can also focus on the Phase tasks assigned when they are not being pulled back to the flightline to perform other maintenance.

The PPP is an unused pylon which is still required to be inspected according to

the work cards, but this action was wasting manpower and time. The system is not used because the Pave Penny Pod no longer exists, but if there is a structural problem with the pylon, it had to be fixed regardless of cost. Currently there is a fleet-wide TCTO to eventually remove this pylon completely, and this will save money and precious time by eliminating this inspection criteria.

Additionally, the team dedicated computer terminals for back shops to input maintenance data eliminating the need to return to their workcenters to complete their jobs. Furthermore, they separated the work cards and placed them in individual binders for each back shop which saved time flipping through one large phase package. The team also created a database to track the next five flights after Phase to be used to find future improvements areas and identify problem areas on the aging fleet to be added to the Phase process.

Finally, the team is currently working on updating the 51 FWI 21-009. The Instruction will outline the responsibility of each specific agency throughout the MXG and is being overhauled to line-up with the vision from this AFSSO21 event. This rewrite will be the final key to solidify the communication deficiency that plagued the A-10 Phase flow process.



Figure 6. Newly fabricated books to track each support agencies work as opposed to one overburdened book. (USAF Photo)

Overall the event was a success. Incorporating the AFSSO21 changes has vectored the A-10 Phase flow process onto the correct path. Additionally, The QA zonal inspection pass rate has increased as well. Passing 30 out of 32 zonal inspections on the last five aircraft shows the dedication of each supporting agency throughout the MXG. Ensuring safe and reliable aircraft at

Since the inception of the improvements, the last seven of eight aircraft to go through the Phase process have been sold back within the 10 work-day standard, thereby meeting the AFSSO21 event’s overall goal.

Osan AB are returned to “Fight Tonight” in a timely manner is paramount to the mission. The 51 MXS is now postured to handle the additional Phase Inspections that are going to be generated by the increase in the flying hour program.

For more details regarding the AFSSO event, please contact TSgt Liveoak at DSN 784-5524 or Brian.liveoak@us.af.mil.

Strategic Management throughout a Weapon System's Life Cycle

The Case for Supply Chain Resilience

Written by Lt Col Tim Pettit and CMSgt Brian Tobin

Air Force capabilities in air, space and cyberspace depend on innovative research, design, production and sustainment. This means the team isn't just the operators, maintainers and loggiers – it's also the acquisition experts, researchers at the Air Force Research Laboratory and Defense Advanced Research Products Agency, and our commercial partners from the aircraft manufacturers to the smallest cyber component designer. And managing a weapon system isn't a static event, we need to adjust our management techniques based on the right "time" in the weapon's life cycle, just like it takes a variety of leadership styles to best lead every airman. Visionaries such as Ms. Lorna Estep, Deputy AFMC/A4, want to be able to actively manage this decades-long process – rather than fighting each battle like it was a surprise – as our systems mature and age.

Supply chain resilience is becoming a new tool in the tried-and-tested risk management toolbox. We now know that it's not just about managing risk within our organization – it takes a supply chain to keep our aircraft flying, spacecraft in orbit, and cyber networks operational. We also know we can't fight

yesterday's battles. We can't just use past data to manage

Supply chain resilience is becoming a new tool in the tried-and-tested risk management toolbox.

known risks. We need to be able to manage our changing vulnerabilities in real time, but also with a future-looking mindset.



Figure 1. Cursor on Target. (Courtesy of 66th Air Base Group Public Affairs)

The variations in management issues are evident in three aircraft examples, each at a separate stage in their life cycle: F-35 Joint Strike Fighter, F-22 Raptor and the B-52 Stratofortress.

Concurrent development, test and production – The F-35 Joint Strike Fighter. The F-35 is the future of multi-role, multi-nation airpower. The initial development contract was signed in 1996 and system development awarded in 2001 to Lockheed Martin whose X-35 won the fly-off, as the F-35 was deemed to have less risk and more growth potential. However 13 years later, “The program has seen cost overruns. In inflation-adjusted dollars, the cost of F-35 development has risen from an estimated \$306 billion in 2001 to an estimated \$390 billion now.”¹ Initial operational capability (IOC) was pushed back from 2010-2012 for the three variants to the revised 2015-2018 at the March 2013



review.² Compounding production concerns from hardware and software suppliers, the customer is also a key player in any supply chain. “People keep adding new features and requirements, and trying to make one aircraft do the job of three and trying to simultaneously solve every problem in attack aviation at once,” according to Anthony Cordesman of the Center

¹ Maxim Lott, F-35 fighters plagued with delays, cost overruns, federal report says, www.FoxNews.com, Apr 03, 2014.

² GAO, F-35 Joint Strike Fighter: Problems Completing Software Testing May Hinder Delivery of Expected Warfighting Capabilities, GAO-14-322, www.gao.gov, Mar 2014

for Strategic and International Studies.³ Fortunately, “Critical learning has taken place and manufacturing efficiency has improved.”⁴ With production planned through 2037 and operational lifespans of up to 50 years, this F-35 is still in its supply chain infancy.

Production complete and sustainment maturing – The F-22 Raptor. The world’s premier air superiority fighter is fully operational after a production run of 187 operational jets ended in 2011. However, for the second time in 2012, the Air Force grounded the Raptors just over a month after the F-22s were cleared following a nearly five-month, nationwide grounding because of mysterious oxygen problems.



“In announcing that grounding, Air Force officials said that in 12 separate incidents pilots had experienced ‘hypoxia-like symptoms’ while flying the planes over the last three years.”⁵ After identifying a faulty valve in the pilots' vests,⁶ the Air Force will complete installation of an automatic On Board Oxygen Generating System backup system in 2015.^{7,8}



Another example of unexpected sustainability problems arose quickly with the new F-22s. The Low Observable (LO) system quickly drove operational jets below mission readiness standards. For maintenance of the fighter, LO-techs are the first to touch the

jet – removing the coatings to allow another technician access to their compartments and bays –

³ Lott, 2014

⁴ GAO, 2014.

⁵ Lee Ferran, F-22 Raptor, America's Most Expensive Fighter, Grounded Again After Oxygen Scare, www.abcnews.com, Oct 24, 2011.

⁶ Michael Hoffman, Air Force Confident F-22 Oxygen Riddle Solved, www.military.com, Aug 1, 2012.

⁷ Brian Everstine, All F-22s To Have Backup Oxygen Systems Within 12 Months, www.DefenseNews.com, Apr 9, 2014.

⁸ Lt. Col. Jay Flottmann explains how a valve in the upper pressure garment and the shape and size of oxygen-delivery hoses and connection points contributed to previously unexplained physiological issues during F-22 Raptor flights. He spoke during a press conference in Washington, D.C., July 31, 2012. Flottmann is a flight surgeon and 325th Fighter Wing chief of flight safety. (USAF Photo by Senior Airman Christina Brownlow)

then LO is the last to touch the jet as the Raptor is returned to mission ready.⁹ Material and process solutions are improving the operational readiness of the Raptor, but it takes a supply chain working together to put all the right pieces together. Thus, 17 years after its first flight, the sustainment supply chain is still maturing and evolving.

Aging but still evolving – The B-52 Stratofortress. A total of 744 B-52s were built, ending in October 1962 – now with an average age of 50 years old.¹⁰ The B-52H variant, with 58 aircraft in active service at Minot AFB and Barksdale AFB and another 18 with the Air Force Reserve flying together at Barksdale AFB, is a testament to engineering longevity.



“Engineering analyses predict the B-52’s life span to extend beyond the year 2037. The B-52H has a certified service life of 27,701 flight hours...as of December 31, 2013.”¹¹ Sustainability of the B-52H isn’t easy. For example, TF-33 engine overhauls have already reached 3-times the estimated costs, and by the end of the B-52 airframe life, 2040, would be \$7.5M per engine in then year dollars.¹² To help modernize the fleet, the FY 2014 budget funded the B-52 Combat Network Communication Technology (CONNECT) acquisition program to upgrade the data link and voice communications plus improve the threat and situational awareness – for \$100.6 million. Not ready for disposal yet, the B-52 supply chain has yet another variety of

⁹ Alex Echols, LO: how the F-22 gets its stealth. www.tyndall.af.mil, Aug 8, 2013.

¹⁰ Jeremiah Gertler, U.S. Air Force Bomber Sustainment and Modernization: Background and Issues for Congress, Congressional Research Service, 7-5700, www.crs.gov, Jun 2014.

¹¹ Joakim Oestergaard III, About the B-52 Stratofortress, www.bga-aeroweb.com, Jun 1, 2014.

¹² Defense Science Board Task Force on B-52H Re-Engining, Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, www.acq.osd.mil, Jun 2004.

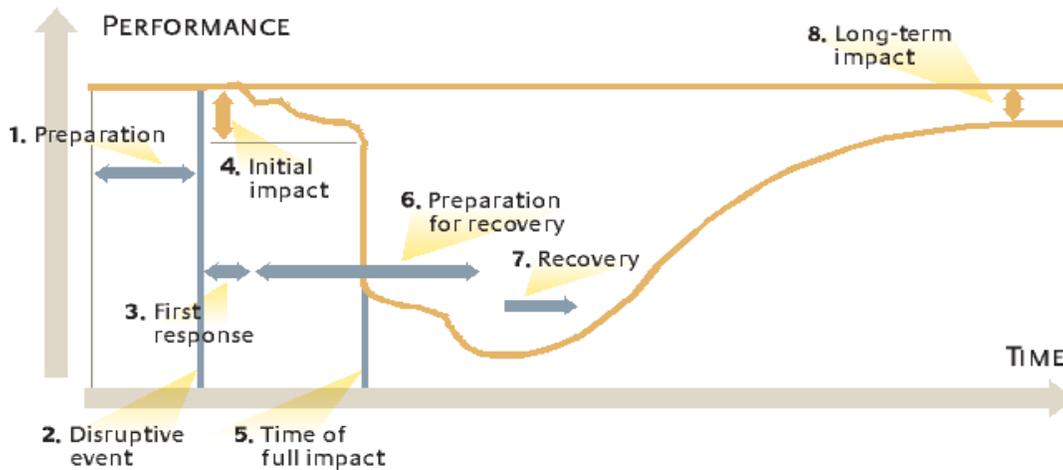
vulnerabilities that must be actively managed to ensure its piece of the nuclear triad and massive conventional airpower capabilities.

The Goal -- Aircraft Availability

Of course, the combined efforts of maintenance, logistics readiness, engineering and acquisition dream to avoid all aircraft downtime...an impossible vision. We employ scheduled maintenance, time-change or condition-based maintenance, inventory of spare parts and monitoring of lead-the-fleet aircraft, but disruptions in the supply chain are inevitable for such complex systems during decades of use. Therefore, when prevention fails, immediate identification and rapid recovery are our only options. A generic supply chain disruption cycle is shown in Figure 1 as we prepare, identify, respond and recover. However, as a commercial company may lose valued customers during a disruption – with the immediate impact of lost revenue – they may also lose these customers permanently to their more reliable competitors, hence never returning to full performance as depicted at the right of the performance curve. With a long-term loss in national security not an option for the Air Force, we prefer to view a disruption as a learning event. Thus we should focus not solely on risk management – *returning to normal operations as quickly as possible* – but to “*survive, adapt and grow* in the face of turbulent change”, as the definition of supply chain resilience states.¹³ The Air Force as an organization, and loggies as individuals, must learn from our mistakes, adapt to our enemies and only then can we GROW our combat capabilities over time!

¹³ Joseph Fiksel, Sustainability and resilience: Toward a systems approach. *Sustainability: Science, Practice & Policy*, 2(2), 1-8, 2006.

Figure 2: The Disruption Profile¹⁴



Each of the previous aircraft examples demonstrate the need for long-term, real-time risk management to keep our jets in the air. However, traditional risk management techniques have significant gaps which the addition of new resilience concepts can fill. Risk management requires computation (or in many cases estimation) of the probability of a damaging event occurring and then assessing that risk compared to its potential severity if it does occur. Some new techniques add a third dimension – the confidence of the estimates. However, in the realm of low-confidence or the difficult-to-manage low-probability/high-consequence events, determining the expected value of damage is an inaccurate science, and thus it is impossible to

justify with confidence any potential return-on-investment of new prevention, mitigation or recovery programs. And remember too, risk management requires each possible future event to be identified

Each of the previous aircraft examples demonstrate the need for long-term, real-time risk management to keep our jets in the air. However, traditional risk management techniques have significant gaps which the addition of new resilience concepts can fill.

¹⁴ Yossi Sheffi and James B. Rice Jr, A Supply Chain View of the Resilient Enterprise, *MIT Sloan Management Review*, Fall 2005.

and defined well in advance. This will overwhelm even the best of us if you try making a complete list of the millions of possible scenarios. And another failing: our operational plans are developed to combat intelligent, adaptive adversaries. A traditional risk management plan will not drive our own adaptation as enemies seek to exploit our weakest links.

The solution to adapt our risk management techniques is to learn from ecology and psychology. Living systems survive and evolve, and so must our organizations. Military units are made of living beings leading and working toward near-term objectives and long-term goals. The concept of resilience embodies this sense of thriving, even in the face of hardships and disasters. Recent adaption of the concept of resilience into organizations started with Dr. Martin Christopher's work in the UK¹⁵ and Dr. Yossi Sheffi's studies at MIT¹⁶ in the early 2000s. Dr. Joseph Fiksel integrated resilience concepts of biology and engineering to relate to the business world, as mentioned earlier, as he defined enterprise resilience as the capacity of an enterprise to survive, adapt and grown in the face of turbulent change.¹⁷ This integrates leading experts' ideals of allowing a firm to withstand a disruption – survival – but also includes the desired attribute of learning from your mistakes (and those of others) and not just returning operations to the status-quo, but to grow and expand if you have a profit motive. Or in the case of the military, to become more capable or more efficient in our operations – or both!

¹⁵ Cranfield University, Supply Chain Vulnerability: Executive Report. Cranfield, UK: School of Business, Cranfield University, 2002.

¹⁶ Yossi Sheffi, *The Resilient Enterprise: Overcoming Vulnerability for Competitive Advantage*. Cambridge, MA: MIT Press, 2005.

¹⁷ Joseph Fiksel, Sustainability and Resilience: Toward a Systems Approach." *Sustainability: Science Practice and Policy* 2(2):1–8, 2005.

The problem -- Vulnerabilities

Leaders of military logistics units spend stressful days combating vulnerabilities – fundamental factors that make an enterprise susceptible to disruptions.¹⁸ In a world of calm, static operations, we wouldn't need tools like forecasting (the future would be just like today!) or services like security (no one would want to change anything!). However, as the saying goes – 'the only constant in life is change.' Recent commercial studies have categorized supply chain vulnerabilities as factors such as Turbulence, Deliberate threats, External pressures, Resource limits, Connectivity and Sensitivity. We can trace down causes – remember AFSO21 and the 5 Whys? – to one or more of these vulnerabilities that are inherent in our supply chain. Of course, each supply chain is different in each category; therefore, every supply chain needs a different set of actions – or a unique portfolio of capabilities – to counteract our vulnerabilities.

Our response -- Capabilities

Supply chain capabilities are the things of business schools and leadership training. We coined a definition that fits well into the concept of supply chain resilience: capabilities are “attributes that enable an enterprise to anticipate and overcome disruptions.”¹⁹ These are sometimes referred to as the “-ilities”, managerial controls such as Flexibility, Adaptability, Visibility, Sustainability, Efficiency, Collaboration, Anticipation, Security and Recovery. Of course, it's always better to anticipate and prevent major problems in our supply chain, like a fleet-wide grounding due to a defective part; however, not everything can be foreseen and the other “-ilities” help us minimize the damage, recover quickly and learn from our mistakes.

¹⁸ Tim Pettit, Joseph Fiksel and Kelley Croxton, Ensuring Supply Chain Resilience: Development of a Conceptual Framework, *Journal of Business Logistics* 31(1):1–21, 2010.

¹⁹ Pettit, Fiksel and Croxton, 2010.

The solution -- Balanced Resilience

So here's where resilience comes in. We want to achieve the goal of surviving disruptions, then adapting, then growing even when disaster strikes, but we need a way to manage our supply chains strategically to create a system-of-organizations to be resilient, not just talk about the horrors stories of the past. So facing vulnerabilities – a fact of life – we need to actively manage our capabilities to give the “best” portfolio of those “-ilities”: capabilities. When we've found our “sweet spot”, we've achieved what's referred to as Balanced Resilience. Why balanced? Because we are matching – or balancing – our resource expenditures on capabilities based directly on the vulnerabilities that we're facing. Figure 2 highlights this concept. We don't want to have higher vulnerabilities and get caught without sufficient

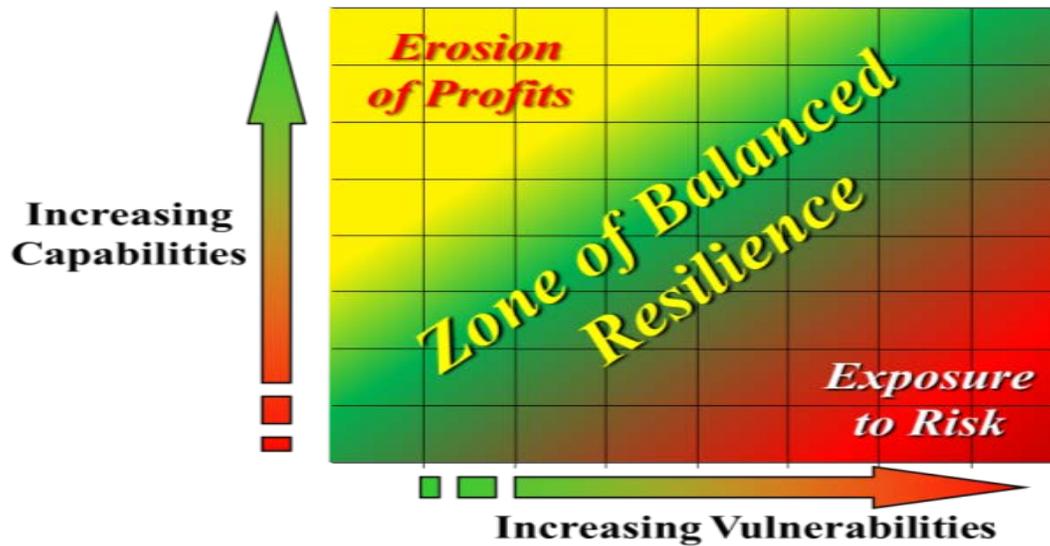
<i>We want to achieve the goal of surviving disruptions, then adapting, then growing even when disaster strikes, but we need a way to manage our supply chains strategically to create a system-of-organizations to be resilient, not just talk about the horrors stories of the past.</i>	capabilities that would be overly exposing the supply chain to unacceptable risks. On the other hand, investing in extreme capabilities – say a perfectly tuned Sense-and-Respond logistics system – when we
--	--

are faced with very low vulnerabilities; that would just be wasting taxpayers' dollars, or in the corporate world, eroding our profits! So how to achieve this best combination – the portfolio of capabilities that creates balanced resilience? ‘You can't manage what you can't measure!’ Right? So a self-assessment tool was created to do just that. The Supply Chain Resilience Assessment and Management tool – SCRAM, is a qualitative survey that digs deep in each vulnerability and asks the tough questions about each capability. The analysis process and connections between vulnerabilities and capabilities was developed using 7 global supply chains

and was refined from 2005 to 2010^{20,21}, with the last few years of real-world implementation.²²

All of the categories are listed in Tables 1 and 2; a complex list of 152 questions in all.

Figure 3: Resilience Zones²³



²⁰ Pettit, Fiksel and Croxton, 2010.

²¹ Tim Pettit, Kelley Croxton and Joseph Fiksel, Ensuring Supply Chain Resilience: Development and Implementation of an Assessment Tool, *Journal of Business Logistics* 34(1): 46–76, 2013.

²² Joseph Fiksel, Mikaella Polyviou, Timothy Pettit, Keely Croxton, Embracing Change: From Risk to Resilience, *MIT Sloan Management Review*, accepted for publication, June 2014.

²³ Pettit, Fiksel and Croxton, 2010.

Table 1. Vulnerability Factors

Vulnerability Factor	Definition	Sub-Factors
Turbulence	Environment characterized by frequent changes in external factors beyond your control	Natural disasters, Geopolitical disruptions, Unpredictability of demand, Fluctuations in currencies and prices, Technology failures, Pandemic
Deliberate threats	Intentional attacks aimed at disrupting operations or causing human or financial harm	Theft, Terrorism/sabotage, Labor disputes, Espionage, Special interest groups
External pressures	Influences, not specifically targeting the firm, that create business constraints or barriers	Competitive innovation, Social/Cultural change, Political/Regulatory change, Budget constraints, Corporate responsibility, Environmental, Health and Safety Concern
Resource limits	Constraints on output based on availability of the factors of production	Supplier, Production and Distribution capacity, Raw material and Utilities availability, Human resources
Sensitivity	Importance of carefully controlled conditions for product and process integrity	Complexity, Product purity, Restricted materials, Fragility, Reliability of equipment, Safety hazards, Visibility to stakeholders, Symbolic profile of brand, Concentration of capacity
Connectivity	Degree of interdependence and reliance on outside entities	Scale of network, Reliance upon information, Degree of outsourcing, Import and Export channels,

Note: As modified from Pettit, Fiksel and Croxton, 2010.

Table 2. Capability Factors

Capability Factor	Definition	Sub-factors
Flexibility in Sourcing	Ability to quickly change inputs or the mode of receiving inputs	Part commonality, Multiple uses, Supplier contract flexibility, Multiple sources
Flexibility in Manufacturing	Ability to quickly and efficiently change the quantity and type of outputs	Modular product design, Delayed commitment/ Production postponement, Small batch sizes, Equipment change over
Flexibility in Order Fulfillment	Ability to quickly change outputs or the mode of delivering outputs	Alternate distribution channels, Risk pooling/sharing, Multi-sourcing, Inventory management, Re-routing
Capacity	Availability of assets to enable sustained production levels	Reserve capacity, Redundancy, Backup energy and comm
Efficiency	Capability to produce outputs with minimum resource requirements	Waste elimination, Labor productivity, Asset utilization, Product variability reduction, Failure prevention
Visibility	Knowledge of the status of operating assets and the environment	Business intelligence, Information technology, Product, equipment and people visibility, Information exchange
Adaptability	Ability to modify operations in response to challenges or opportunities	Fast re-routing of requirements, Lead time reduction, Strategic gaming and simulation, Seizing advantage from disruptions, Alternative technology, Learning
Anticipation	Ability to discern potential future events or situations	Early warning signals, Forecasting, Deviation/near-miss analysis, Risk management, Business continuity planning, Recognition of opportunities
Recovery	Ability to return to normal operational state rapidly	Crisis management, Resource mobilization, Communications strategy, Consequence mitigation
Dispersion	Broad distribution or decentralization of assets	Distributed decision-making and Assets, Decentralization of key resources, Empowerment, Dispersion of markets
Collaboration	Ability to work effectively with other entities for mutual benefit	Collaborative forecasting, Customer management, Communications, Postponement, Life cycle management, Risk sharing
Organization	Human resource structures, policies, skills and culture	Accountability, Creative problem solving, Cross-training, Substitute leadership, Learning/benchmarking, Culture
Security	Defense against deliberate intrusion or attack	Layered defenses, Access restrictions, Employee involvement, Collaboration with governments, Cyber-security, Personnel security

Financial Strength	Capacity to absorb fluctuations in cash flow	Insurance, Portfolio diversification, Financial reserves and liquidity, Price margin
Product Stewardship	Assurance of sustainable business practices throughout product life cycle	Monitor environmental, health and safety, Communicate sustainability with Suppliers, Communicate disposal requirements with Customers

Note: As modified from Pettit, Fiksel and Croxton, 2010

Test and evaluation – The Dow Chemical Company

One of the original companies in the development sample, the Dow Chemical Company continued to work with Dr. Fiksel and Dr. Keely Croxton through The Center for Resilience at The Ohio State University and with the authors while at the Air Force Institute of Technology, working under a Cooperative Research and Development Agreement. Dow saw the potential for both cost savings as well as performance enhancements and has since applied the SCRAM tool with over 30 business units. The first success story began with the Glycol Ethers P-series unit, who worked with the research team while combining the talents of Dow’s Supply Chain Technical Center in Midland, Michigan. The results of the SCRAM assessment were used to identify several resilience gaps where resilience was not balanced. Then, system dynamics modeling tested several recommendations for improving the balance. Results of this project weren’t trivial: 200 million pounds of hazardous chemicals were removed from inventory and an annual cost avoidance of \$200,000 was realized. The entire story earned world-wide recognition as Dow presented their case as a Finalist for the Supply Chain Innovation Award at the 2011 Global Conference of the Council of Supply Chain Management Professionals (CSCMP).²⁴

²⁴ Jennifer McIntyre and Shannon Hemmelgarn, How One Business Made Its Supply Chain More Resilient, Presentation for the 2011 Supply Chain Innovation Award, Annual Global Conference of the Council of Supply Chain Management Professionals (CSCMP), Philadelphia, PA, Oct 4, 2011.

Air Force application of SCRAM

Life cycle management is beginning to formalize into all of our thinking as logisticians and supply chain managers – from our job descriptions (life cycle logistics) to our organizations (Air Force Life Cycle Management Center - AFLCMC). For this exploratory study to test the application of resilience for proactive management throughout the life cycle, we started by splitting the life cycle into two distinct phases: research, design and production as Phase I, when

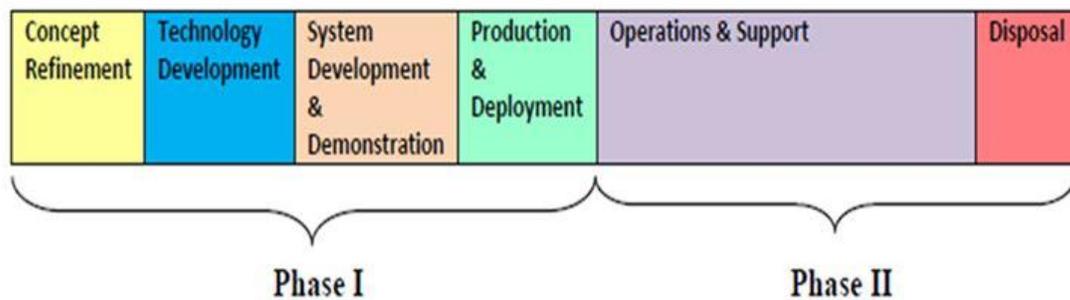


Figure 4. The Product Life Cycle with Phases as Defined in this Study (Adapted from Defense Acquisition University, 2009)

the initial engineers and suppliers are fully engaged members of the supply chain, and post-production as Phase II when many suppliers move on to new projects, are out-of-business, or simply may no longer be active in the sustainment supply chain of repairing failed parts or manufacturing spares.

From the aircraft side of the AFLCMC, there were 21 weapon system supply chains identified as sample ‘products’ by the sponsoring organization. A request letter was distributed to the leadership of these organizations and 11 agreed to participate in the project, representing a 52% response rate. To protect their strengths and weaknesses, individual findings will not be presented here, but the sample included aircraft systems from fighters, to bombers, to cargo aircraft, to RPAs, to mission support aircraft. Each organization’s leadership was asked to identify a cross-functional team of top- and mid-level supply chain managers for this study. A

supply chain cross-functional team should include, but not limited to, such functional roles as acquisition, engineering, budgeting/finance, logistics, manufacturing, procurement, sustainment and program management. Each team was to include a minimum of five members to get a varied sample of managerial levels and functional experts. A total of 54 total participants from the 11 weapon systems completed the SCRAM assessment on their supply chains. Answering 152 questions about their vulnerabilities and capabilities (see Figure 4 examples), the on-line assessment took an average of 27 minutes per person – a small investment in time for the vast insight provided.

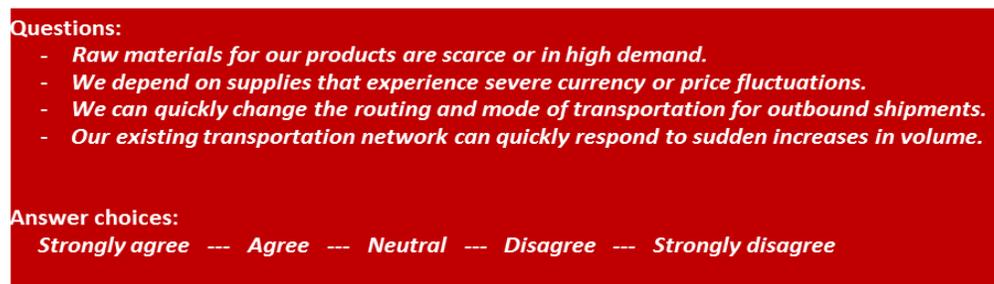


Figure 5: Examples questions for Vulnerabilities and Capabilities

Results – Current state of resilience

Each participating weapon system was given a report of their current state of supply chain resilience. Here their current capability scores were matched with their existing pattern of vulnerabilities. Examples may be something like – “your supplier base is too vast and should be consolidated” or “your supplier base is too concentrated and needs redundancy”. An example summary is shown in Table 3, using the same color-coding as in the Resilience Zones shown in Figure 2. However, these more “conceptual” factors are difficult to manage, so leadership was also presented with the resilience gaps at the 152-item level. Example: “your resilience gap from budgetary constraints can be offset by enhancing your capabilities in one or more of the following areas...”

Table 3. Example Results of Resilience Gap Computations

<i>Notional Weapon System</i>		Turbulence	Deliberate Threats	External Pressures	Resource Limits	Sensitivity	Connectivity
		V1	V2	V3	V4	V5	V6
Flexibility in Sourcing	C1	-12.0%	-5.8%		-33.1%	-23.6%	8.8%
Flexibility in Manufacturing	C2	-5.7%		-14.8%		-25.4%	
Flexibility in Order Fulfillment	C3	3.1%				-19.0%	
Capacity	C4	-8.8%	-15.3%	4.4%	-1.0%	-28.8%	-29.5%
Efficiency	C5	-8.1%		-16.8%	-5.8%	-22.7%	-29.6%
Visibility	C6	-6.7%	-2.8%			-24.1%	-11.5%
Adaptability	C7	-6.8%	-7.3%	-6.7%		-24.3%	-6.7%
Anticipation	C8	-4.6%	-12.3%	-16.7%	-13.5%	-21.0%	-11.1%
Recovery	C9	2.3%	-5.0%		-8.1%	-17.8%	-8.1%
Dispersion	C10	-5.6%	-4.2%			-38.8%	-9.3%
Collaboration	C11	-12.4%	-21.9%			-29.4%	-16.9%
Organization	C12	1.3%			-6.4%	-17.3%	
Security	C13		8.2%				32.2%
Financial Strength	C14	8.1%				-12.5%	
Product Stewardship	C15		1.9%	1.6%	3.1%	-5.2%	-1.4%

*Note: Color-coding shown with gap limits at -10% (red=exposure to risk) and +5% (yellow = erosion of profits/resources)

The same resilience assessment can be taken over time, say every year, to measure the effectiveness of managerial initiatives and to evaluate changes in vulnerability patterns.

However, this study set out to evaluate proactive, not reactive management. Thus, in assessing

the general sense of where programs are currently in their life cycle, we can test the current capabilities with the pattern of vulnerability *of where you are going*. For example in 2007, the F-22 program could have looked ahead and used SCRAM as a part of their 5-year strategic planning processing for 2012 and beyond – the future after the production line closed down. Interestingly, the results of the 11-aircraft study showed a clear pattern at the strategic “factor” level: the average resilience gaps went down as programs matured, e.g. they are less resilient (42 areas) – or stayed the same (19 areas with a 5% margin), and only 1 area improved its resilience gap later in the life cycle (within Financial strengths). Clearly each stage of the life cycle presents its own issues, but as weapon systems age and we gain experience maintaining our fighters, bombers, cargo planes, RPAs – our job doesn’t get easier!

Leadership implications

Whether you lead an aircraft program, a space system or a cyber-project, you are a member of a supply chain – and resilience is key to your success! Here’s how you start: scope your supply chain to the desired product or service, establish a team of key cross-functional experts (5-20 individuals), conduct the SCRAM assessment, analyze the results to identify resilience gaps, validate SCRAM with a business case analysis based on your proposed solutions, and then maintain a state of Balanced Resilience through annual re-assessments. Your improvement areas may be appropriate for an AFSSO21 event, a full A9-supported analysis

Whether you lead an aircraft program, a space system or a cyber project, you are a member of a supply chain – and resilience is key to your success!

project, or simply a GO-DO!

Other areas to consider, especially if you’re new to the supply chain game, is to

first map your supply chain as it currently exists – this visual representation can be very insightful. The network map can also be the framework for later modeling analysis (based on

inventory levels, procurement lead times, transportation times/cost, repair/replacement costs, target service levels, etc.) or real-time supply chain monitoring and management.²⁵ Another key process to consider before involving other supply chain members in your resilience analysis is to conduct a Partnership Session to determine the proper management processes that you should be conducting with that key supplier or customer.²⁶

We all play a vital role in national security: maintainers, loggies and contracting officers, whether you are in a squadron, program office or headquarters. Let's update a famous quote: "Gentlemen, the officer who doesn't know his communications and supply as well as his tactics is totally useless." - Gen. George S. Patton, US Army. *'The officer who doesn't know the resilience of their supply chain as well as his or her tactics is totally useless!'*

Your next step!

Referring back to the F-35 program status, "The prime contractor has put in place a supplier management system to oversee key supplier performance."²⁷ This shows the increasing relevance of supply chain management as an organizational boundary-spanning risk management program. The F-22 Raptor keeps improving in readiness measures and the B-52H is *still* flying. However, this study on supply chain resilience recommends that risk management is an ever-evolving process as products advance throughout their life cycles – a tool like the Supply Chain Resilience Assessment and Management (SCRAM) can be used to see if you're still on the right track and where you should be going!

²⁵ See www.scrlic.com for more examples and resources.

²⁶ See [Building High Performance Business Relationships](#) by Lambert, Knemeyer and Gardner, published by the Supply Chain Management Institute, 2010.

²⁷ GAO, 2014.

Note to readers: The SCRAM tool as published in the *Journal of Business Logistics* is available in its current version to all Air Force organizations in Excel, PDF or on-line survey format.

Please contact the lead author at timothy.pettit@usafa.edu for more information about conducting a resilience assessment within your organization.

About the Authors:

Lt Col Tim Pettit is the Deputy for Research and Consulting , Department of Management at the USAF Academy. His career includes a breadth of logistics experience serving as an aircraft maintenance officer and a logistics readiness officer, leading F-16, A-10, and F-15 maintenance organizations as well as in-garrison and expeditionary logistics squadrons. Lt Col Pettit's breadth of experience has extended overseas as a technical advisor to foreign militaries and later as a headquarters weapon system manager for fighter, cargo, tanker, and special operations aircraft. His research interests include Lean/Six-sigma process improvements, distribution optimization, and inventory management—all within the view of risk management and resilience. He has a Masters from AFIT and a PhD from The Ohio State University. Lt Col Pettit is a long-time LOA member and past chapter president.

CMSgt Brian Tobin is currently the 52d Equipment Maintenance Squadron Superintendent at Spangdahlem AB, Germany. He is a career aircraft maintainer and has worked various weapons systems. His breadth of experience includes technician, Section NCOIC, Low Observable Production Superintendent, System Program Office, MAJCOM Fabrication and Accessories Manager, and Squadron Superintendent. In 2008, Chief Tobin was selected for the Enlisted-to-AFIT graduate program, where he earned a Master's degree in Logistics and Supply Chain Management and completed this data collection and analysis as his thesis.

LOA's Information Technology Development and Strategy

Written by 1Lt David Loska

The use of technology and social media enables this 3,200-member organization to not only perform in the prevailing environment of sequestration and cutbacks, but also has helped the Logistics Officer Association make tremendous growth in its industry outreach. In a short period of time this has generated an excellent ROI for LOA's influence in the defense logistics industry.

LOA's IT and social media strategy is based upon their mission; to "Develop professionals and foster innovation to enhance logistics in the national security environment." The organization uses many forms of social media, direct emails and a database of over 5,000 industry contacts to promote organized events such as the annual LOA symposium. However, "Social media is only effective to a point," states LOA's Chief Technology Officer (CTO), Lt Col (Ret) Jondavid DuVall. "For a non-profit organization, effectiveness occurs at the chapter level." As LOA's CTO, DuVall performs a number of tasks including: maintaining LOA's website and social media pages; conducting organizational research and writing news articles;

LOA is becoming increasingly IT intensive, and is utilizing and developing new ways to accomplish its organizational priorities within a widely diverse membership base.

writing guidance and strategy; and developing marketing plans. LOA is becoming increasingly IT intensive, and is utilizing and developing new ways to

accomplish its organizational priorities within a widely diverse membership base. "LOA is about the professional development of our members." DuVall explains, "LOA isn't just Air Force logisticians and retirees...over the past several years LOA has become more joint and industry focused. We also have one chapter that solely consists of members of the Peruvian Air

Force!”

Like many nonprofits, raising financial support is not the organizations first priority. However, raising effective support is critical to LOA’s ability to commit to projects that enhance membership services. DuVall explains; “Membership dues are one piece of our revenue pie, advertising is another piece, and the symposium is probably the largest piece because that is where corporations get the biggest return on investment.” As a policy, LOA does not commit forecasted funds to projects. “It’s a struggle,” DuVall remarks, “We actually operate our organization solely based on the membership dues, because that is our only real source of income. Tomorrow a war may break out and the symposium would be cancelled. If we made business decisions based on the potential of making revenue at something in the future, and contracted and committed the organization for funding for initiatives, and then that future funding stream dried up, we would go bankrupt! Nobody’s going to make that business decision.” Bankrolling projects to benefit members is a balancing act, and planning organizational initiatives is a constant challenge. DuVall states, “It’s a long way to get to where we want to go, but we have to mitigate risk.”

As our membership demographics change, we will have to evolve the way we communicate to our members,” remarked DuVall

LOA’s most effective means of communicating with members has long been the face-to-face interactions that occur at chapter meetings, and direct email contact. When the organization was founded under its original title, the Maintenance Officer Association, DuVall explains that, “Communication was done at the club and on the golf course.” As the existing means of communication become more digitized, LOA’s communication strategy is developing in stride. “As our membership demographics change, we will have to evolve the way we communicate to

Within its marketing strategy, LOA offers sponsorship packages to corporate partners with established ROI based on readership.

our members,” remarked DuVall. “Clubs are all but gone, golf courses in some places, believe it or not, are closed down.

Nobody really picks up the phone, they always email on their mobile device. So we will communicate with you, the way you are used to communicating.”

LOA’s quarterly publication, the Exceptional Release, has recently been entirely digitized. This has allowed the organization to increase access, and provide better analysis on the readership. Formerly, LOA would print and mail 3,500 copies of the publication. This provided little valuable analytics on readership and created challenges attracting advertising revenue. Now that the ER is digitized, LOA has more insight into how readership occurs including information on which articles are read and for what duration. “Going digital allowed LOA to put the ER in the hands of the member instantly, and significantly reduced operating costs,” explained DuVall. Within its marketing strategy, LOA offers sponsorship packages to corporate partners with established ROI based on readership. The more detailed the readership analytics, the more accurately LOA can advertise the package and the less risk the corporate sponsor assumes. DuVall explains, “I can tell you how many people are reading a specific page, how many people look at an ad, or click on a link...you are now able to get behind the scenes into the minds of your readers, and ask ‘what is really important?’” Each edition of the ER attracts 600 to 1000 readers, reaching max readership within the first thirty days of its release. DuVall adds that articles written by Lieutenants attract the most interest. Another important conclusion reached by use of the new analytics happened when LOA learned that more readers were accessing the ER on a mobile device than any other platform. This reaffirmed the

importance of developing a mobile app.

Along with its many mainstream social media sites and the ER publication, LOA utilizes its mobileLOA app and the recently updated loanational.org website. The previous version of LOA's website operated off of dedicated servers. This increased operating costs, driving the organization to find a more cost effective alternative. The solution came when LOA partnered with Google to manage all of their server needs. This was accomplished free of charge under the Google for Nonprofits Program, saving LOA about \$25K annually. DuVall advises, "Websites should always be a constant process improvement initiative. You have to continually evolve and push relevant content to your members." In 2013, LOA launched the mobileLOA app. The app's creation was initiated when LOA Vice President, Lt Col Chris Boring conceptualized that "LOA should be the organization that has an app for that." DuVall explained that Lt Col Boring saw the need to make the LOA website more mobile and to put content in the hands of the logisticians. "From his vision, I put a demo together of what we could do to turn that vision into reality and have a platform for future mobile content." LOA also set out to create educational modules to be developed through use of volunteer man-hours. In this plan, separate LOA chapters would create each individual module. This initiative took nearly two years of dedicated effort by the chapters. DuVall admitted that subcontracting the project would have been a quicker, albeit more costly alternative. However, the overall benefit to the organization and its members was increased by employing the chapters to put their personal touch on each lesson plan. "Because the Lieutenants and Captains who put those together not only learned the subject matter, they learned project management, program planning, education and training. They got smart...they started to talk about

LOA also set out to create educational modules to be developed through use of volunteer man-hours.

the organization and about professional development in their career field. They were able to be a part of something bigger than themselves that would have a global impact on 3,000 logisticians and not on 20 logisticians at the chapter level.” According to DuVall each member involved was able to, “export their knowledge for the greater good.”

After opening the mobileLOA app, readers can access LOA’s digital news source the Joint Logistics Daily (JLD). The JLD provides a summary of news articles on many contemporary topics relative to the military logistician. Readers can access a constant feed of stories through social media sites such as LinkedIn or Twitter. They can also subscribe to a bi-daily email at the JLD website, jointlogisticsdaily.com. The JLD has an interesting history with its origins in the halls of CENTCOM. During the development of the mobileLOA app, DuVall and the LOA executive board wanted the app to access the Pentagon’s Early Bird, which was the most popular summarizing news source in the DoD. However, on October 1, 2013, the nearly fifty-year-old news service was halted during the government shut-down, and later announced that it would never resume. This created a void in the original plan for the app’s development. DuVall and the LOA board decided to fill that void with another news clipping service that

After opening the mobileLOA app, readers can access LOA’s digital news source the Joint Logistics Daily (JLD). The JLD provides a summary of news articles on many contemporary topics relative to the military logistician.

DuVall had created for a different purpose during a tour at CENTCOM. DuVall clarifies that the JLD was not originally created for the purpose of the app. “It was never intended to be something big, it was

always intended for a Battle Captain in a joint logistics environment.” While on the CENTCOM staff, DuVall explains that he and his team were monitoring social media feeds from Twitter and Facebook, and using Google Translate to convert the information to English so they could

monitor what was happening in their AOR. “We wanted to look at the political, economic and social impacts of the region and what that would do to our strategic lines of communications as a logistician.” During the conceptualizing of the JLD, DuVall was performing duties as a Battle Captain and later as a J4 representative in the CENTCOM War Room. While having to monitor and prepare information on the status of Operations IRAQI FREEDOM and ENDURING FREEDOM, he assessed lines of communication for operations of all branches of the DoD within the AOR. It was at that time DuVall thought “My God! I don’t have enough information. I am reacting to things that are happening over here because I don’t know...and I need to know.” DuVall said that the information he required was available on social media, but he and his team could not compile it. “It was on Twitter,

on Facebook, it’s in different languages. I need to ingest it, I need to translate it, and I need to see it. So then my brain can assess it, and go...Do I need to chase this

We were constantly trying to explain to the intelligence community that logisticians...are a HUMINT resource because, not only are we on the ground, we are on the ground and outside the wires.

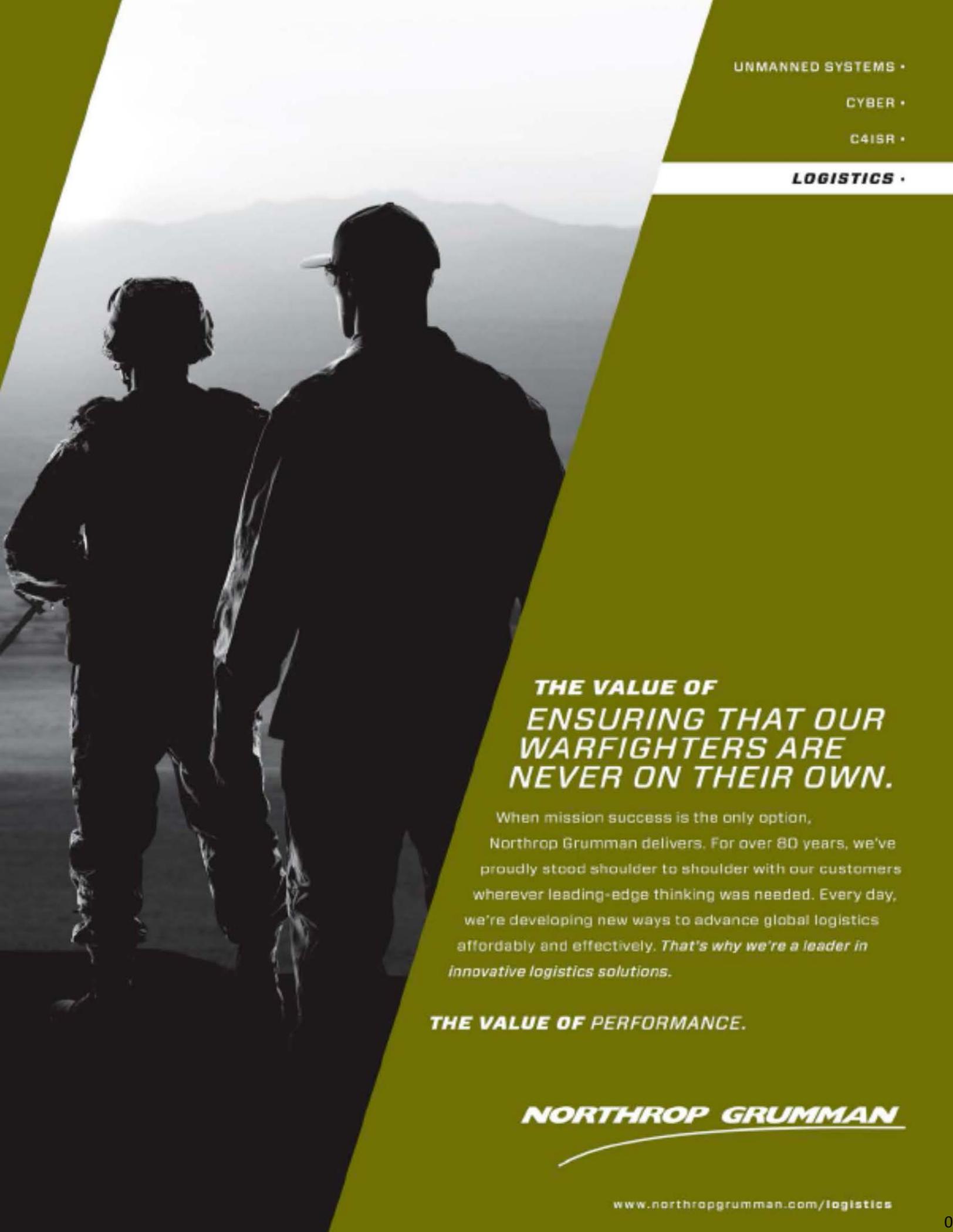
rabbit? Is it a potential problem? Do I have a potential subversive awakening occurring?”

DuVall asserts, “We didn’t have that information.” He and his team then started developing the JLD to provide the essential information they required. With the JLD operational, DuVall and his team would change their media sources often, monitoring new sources every day. They would closely monitor open source news and concentrate on traffic or “chatter.” “We were doing stuff that the J2 couldn’t even believe. That “loggies” were assessing something that was in their realm. We were constantly trying to explain to the intelligence community that logisticians...are a HUMINT resource because, not only are we on the ground, we are on the ground and outside the wires. From a joint logistics viewpoint we are contracting with these

folks, we are reporting back what's going on and we can assess.” DuVall illustrates that when logisticians partner with the intelligence community, it provides a more complete picture of operations. Before the mobileLOA app's launch, the Early Bird was pulled and the JLD was added as the app's primary news source. Although the JLD now represents a much more global news prospective, its CENTCOM roots are still visible. If readers subscribe to the email service of the jointlogisticsdaily.com, they will receive a curated news source every twelve hours at 0600 and 1800 because that was the Battle Captain's shift change, and the original time at which the news source was required.

In recent years, LOA has made tremendous strides in developing contemporary methods to communicate to its members, and to develop leaders within the defense logistics environment. However, it is very apparent that these tools are meant to support the long-established interpersonal means the organization has employed since its foundation.

About the author: 1Lt David Loska is an Aircraft Maintenance Officer currently serving as an Assistant AMU OIC in the 437 AMXS GOLD AMU at Joint Base Charleston, SC. He is responsible for coordinating maintenance and generation of Joint Base Charleston's 51 assigned C-17 aircraft and the supervision of Gold AMU's 250 personnel. His hometown is Bensenville, IL. After serving five years as an aircraft maintenance technician in the U.S. Navy, he received his commission from the ROTC at Southern Illinois University Carbondale. 1Lt Loska has been a LOA member since 2012.



UNMANNED SYSTEMS •

CYBER •

C4ISR •

LOGISTICS •

**THE VALUE OF
ENSURING THAT OUR
WARFIGHTERS ARE
NEVER ON THEIR OWN.**

When mission success is the only option, Northrop Grumman delivers. For over 80 years, we've proudly stood shoulder to shoulder with our customers wherever leading-edge thinking was needed. Every day, we're developing new ways to advance global logistics affordably and effectively. *That's why we're a leader in innovative logistics solutions.*

THE VALUE OF PERFORMANCE.

NORTHROP GRUMMAN

www.northropgrumman.com/logistics