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BEND, DON’T BREAK
Optimizing a Resilient Supply Chain
By: Col Michael Allison, Capt Damiqueta Champion, Capt Benjamin Flores, Ms. Ginger Hassen, Ms. Ann Wimberly

The Arctic Logistics Readiness Group
By: 1st Lt Andrew Giezentanner

When is the best time to attend AMOC?
By: Capt Aaron Vincent, Maj Benjamin Hazen, Lt Col Matthew Douglas
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On the Cover

The cover art design came from Capt Damiqua Champion and Capt Benjamin Flores who authored the article “Bend, Don’t Break: Optimizing a Resilient Supply Chain”, along with Colonel Michael Allison, Ms. Ginger Hassen, and Ms. Ann Wimberly.

The article details the reliance on a resilient supply chain throughout the history of modern warfare and how military logistics will evolve with future wars and ever-improving technologies. (Chris Gray)
LOA is now part of the Combined Federal Campaign!

"Show some logistics love by giving to the Logistics Officer Association through the CFC. Our designation number is #53503.

LOA CFC #53503
#LOALove #ShowSomeLoveCFC”
I remember it like it was yesterday. On Oct 23, 1983, I arrived at my first duty assignment, the 1SOW, to find out we were going to fight—we were going to Grenada to rescue American hostages. I had missed the last few days of “The Evening News” because I was travelling from munitions officer school in Colorado to Hurlburt Field and, other than a newspaper, The Evening News was the only way to get the news back then. As a ”Butter Bar,” I didn’t even put it together that my unit might be participating in this operation. But, it all became clear when I was tasked to issue personal weapons to deployers, and I saw the look in their eyes. They had their game-face on. It became real for me, and I knew right then that I was a part of something special. One thing I learned early on at Hurlburt Field was that change was a regular part of our Air Force culture. At Hurlburt we were trying new employment concepts. Across the Air Force we were breaking in new jets (F-16s and F-15s). We were turning in our “Selectric” typewriters to be introduced to the computer (I can still hear the Chiefs griping), and we traded in our green fatigues for BDUs. And each year after that more and more change occurred……rapid change affecting the very way the Air Force conducts warfare. In many respects the rapid escalation of technology in the “technology-thirsty” Air Force has become our trademark. Ever since America watched GBU’s bust enemy bunkers in 1991 our Air Force has been branded as the technology Service, known for our exquisite technologies. But one thing hasn’t changed--people. I have been blessed to know incredible Airmen throughout my career. I could fill this journal from cover to cover with names of Airmen who were great leaders. Airmen who cared about me, pushed me to do better, inspired me to excel, and kicked me in the butt when I needed it. I am grateful for each of them. The first leader I remember meeting was CMSgt Stephen D. Foster, the 1SOW’s AMMO chief. He was an exceptional leader, an incredible mentor to me, and he commanded everyone’s attention. I initially thought I had won the lottery to serve with such a great leader only to find that there were even more great leaders in my unit, too. I also found great leaders at my second unit. And at my third unit. I can say without hesitation
that while the Air Force is a “technology-thirsty” Service, and we will always look for the next new thing, it is the men and women I’ve served with—people with such a relentless sense of service to their Nation and a commitment to accomplishing their mission—that give me a sense of overwhelming pride, and a knowledge that I am still a part of something special. As I close my career now, after three and a half decades, I chuckle a little as I reflect that some things never change. Today the news is instantaneous, I watch us breaking in new jets (F-35 and soon-to-be KC-46!), we’re putting electronic forms on the flightline (and hearing the Chiefs gripe), and we’re trading in our ABUs for OCPs……and you still have your game-face on. Take a look around Loggies……you are a part of something special!

ABOUT THE AUTHOR:

Lt. Gen. John B. Cooper is Deputy Chief of Staff for Logistics, Engineering and Force Protection, Headquarters U.S. Air Force, Washington, D.C. General Cooper is responsible to the Chief of Staff for leadership, management and integration of Air Force logistics readiness; aircraft, munitions, and missile maintenance; civil engineering; and security forces, as well as setting policy and preparing budget estimates that reflect enhancements to productivity, combat readiness and quality of life for Air Force people.
President’s Log

By: Col Carol A. Howitz

Your Executive Board is gearing up for another fantastic symposium this fall in Oklahoma City and we can’t wait to unveil all we have to get you involved with during the four days. This year we focus on “Executing Logistics and Acquisition within Full Spectrum Readiness”. And what a year it has been, maneuvering through what that means to each and every one of us. We are excited to take advantage of the close proximity to our schoolhouse and host a contingent of logistics officers coming up from Sheppard AFB and introducing them to this amazing world of logistics!

We have a captivating line-up of professional development areas of our business from the highest levels of our government to young professionals executing the mission at the grass-roots level. Day one with LOA University has something for everyone, everywhere along their careers. We are excited to bring some historical roots of the war efforts to main stage with a fireside chat and some original Rosie the Riveters that made history at Tinker AFB. We have Air Force acquisition leaders delivering keynote addresses and also involved in panels dealing with our past and future challenges and innovations. We’re excited to add acquisition professionals to our attendees this year. Our logistics leaders of course will give the State of Logistics and Sustainment updates and roll-out our developments and the future of Logistics Command and Control. We couldn’t be more excited with our industry partners joining us with discussions on leveraging commercial industry innovations in government operations and we have some exciting panels working these concepts within Additive Manufacturing and data analytics! Our small business pavilion will be, once again, in action and as always, we couldn’t have the quality symposium we bring every year without all the exhibitors you’ll get acquainted with on the exhibit floor. Don’t forget to sign up for a one-on-one meeting with your AFPC career functional and your career field managers will also be hosting a breakout session to maneuver you through what your future holds.

What a great era to be in logistics! The challenges and dilemmas our combatant commanders face is never-ending and our work never seems to be able to catch a breath! Themes of readiness, agile, lethal and full-spectrum are everywhere you turn in our business. No rest for the weary for any logistics and acquisition discipline and we rely on every LOA member and attendee to bring their A-Game to work every day with new insights, discussions and ideas to keep us the best Air Force this world has witnessed and will ever behold. I thank you all for your support and for what you do to make our world safe and allow the freedoms only we can enjoy. See you at the symposium! Carol

Col Carol A. Howitz, USAF, President
Logistics Officers Association
The Arctic Logistics Readiness Group (LRG)

I had always heard Joint Base Elmendorf Richardson (JBER), Alaska was one of the premiere locations the Air Force had to offer. Whether the stories came from seasoned SNCOs or from my sister-in-law, who is an aircraft maintainer at Tinker AFB, there were many fascinating accounts about the adventures in the “Last Frontier.” Naturally, when it came time for me to submit my assignment preferences, JBER was at the top of the list. The 79K acre installation contains the 11th Air Force, Alaskan North American Aerospace Defense Command (NORAD) Region, Alaskan Command, Department of Homeland Defense, US Army Alaska (USARAK), Pacific Air Force’s (PACAF) Regional Support Center, 4th Infantry Brigade Combat Team (Airborne), 25th Infantry Division, 17th Combat Sustainment Support Battalion, 3rd Wing, 176th Air National Guard Wing, 477th Air Force Reserve Fighter Group, 732nd Air Mobility Squadron, the Alaska Army National Guard and a host of others. In 2010, when JBER was established, it pulled the Mission Support Group and Medical Group from the 3rd Wing and major elements of the US Army Garrison to create the 673r Air Base Wing (ABW) to manage Base Operating Support and command of the installation. The 673 ABW is both unique and diverse in that it houses both a Civil Engineer Group and one of just two Logistics Readiness Groups (LRGs) in the Air Force.

You would think that such diverse mission sets would lead to great angst among the units on base; however, it’s a part of everyday life at JBER, as we work to excel in fulfilling the needs of our various customers. On a typical day, you can find Air Force logisticians inspecting Army cargo for deployment, issuing Chemical, Biological, Radiological and Nuclear (CBRN) and field gear preparing household goods shipments, managing the fleet of 1,700 vehicles, ordering Mission Capable (MICAP) aircraft parts, and simultaneously hot-pitting the F-22s and refueling an E-3 on the airfield. Without a doubt, the men and women of the 673 LRG have their work cut out for them. In order to better support the broad JBER customer base, the Logistics Readiness Squadron (LRS) functions are split by mission set with the inception of JBER. The 673 LRS provides the core functions of Materiel, Vehicle and Fuels Management. While the majority of their mission set focuses on supporting the very active flightline, they also provide support to the multiple JBER Mission Partners. Additionally, the 773 LRS mission centers primarily on
transportation into, around and through JBER. The squadron has a unique structure, as it separates the usual Deployment and Distribution Flight into two flights, each specializing in their function supporting Airmen and Soldiers. The squadron also includes an Army Materiel Management Flight providing direct supply support to over 4,000 Soldiers with a $161M portfolio covering supply classes I-IV, VII and IX. If that wasn’t enough, the squadron has one of the three Combat Mobility Flights in PACAF providing on-call aerial port operations to the theater and rigging air drop training bundles supporting mobility aircrew certifications. There is no such thing as normal operations here because, on top of all the nuances of the 673 ABW, JBER works in arctic conditions with approximately seventy-five inches of snowfall every winter!

Accordingly, our arctic logisticians must overcome many obstacles on any given day. In the 673 LRS, the Fuels Management flight operates twenty-four hours per day to accommodate the C-17s, F-22s, E-3s, C-130s, C-12s, HH-60s, in addition to the daily transient aircraft that use JBER as the gateway into the Pacific. The flight is responsible for pumping/distributing nearly 40M gallons of JP-8, 1.5M gallons of ground fuel, and 40,000 gallons of liquid oxygen annually. The Materiel Management flight ensures the supply chain enterprise is well represented and supported by accounting for over 54,000 line items valued at $359M, managing four Mobility Readiness Spare Package accounts and overseeing approximately 233 equipment accounts. The aircraft on station average around fifty MICAP requests per month, so the supply personnel maintain constant contact with their partners at Defense Logistics Agency (DLA), Pratt & Whitney, Boeing, Lockheed Martin, and the Supply Chain Operations Wing to ensure timely delivery of
parts from the Logistics pipeline. Last, but not least, is the 673 LRS’ Vehicle Management Flight which plays a large part in the success of the flying mission because they are responsible for the maintenance of over 1,700 vehicles, including the 102 vehicle JBER Snow Fleet dedicated to keeping the 2.4M square yards of runway clear of ice and snow for the seven months of Alaskan winter. Accordingly, the 673 LRS Vehicle Management Flight is also responsible for the Air Force’s largest summer rebuild program. Every summer, the Vehicle Management team completely overhauls all 102 snow removal assets within the facility affectionately known as “D29.” This includes over 6,800 direct labor hours and a $1.2 million budget. The team faces multiple challenges along the way to include long lead times for parts and shipping to Alaska and an abbreviated summer rebuild timeline of approximately 5 months. Despite these challenges, our snow fleet team overcomes all and has met the JBER October deadline to have the entire fleet ready to meet winter ops every year without fail. The 673 LRS Commander, Maj Heather Mueller, had this to say about her Squadron’s role at JBER: “Each day within PACAF is different from the last and it keeps us always wondering what tomorrow will bring, but that’s the exciting part. My team of Military and Civilian Professional Logisticians are always at the ready with a positive attitude and the will to do what needs to be done to meet our customer’s needs. We strive to provide innovative, accurate and on time Logistics support to enable the success of JBER’s multiple Mission sets.”

The 773 LRS is where the “Joint” in Joint Base is executed. The squadron forges joint logisticians supporting both Air Force and Army mission partners. At a moment’s notice, they can conduct logistics operations via airlift, sealift, line-haul and rail. The 773 LRS Commander, Lt Col Dave Walker, puts it simply, “Joint Logistics happens every day here. Our arctic tough logisticians can handle any challenge, at any time. I couldn’t be prouder to be part of this team.”

The Deployments Flight plans, organizes and executes deployment operations for Pacific Command’s (PACOM) only Infantry Brigade Combat Team (Airborne), the 3rd Wing, and the 673 ABW. They are able to do so with their Joint Mobility Complex (JMC), a unique facility designed for arctic conditions. It’s capable of holding 600 personnel and two C-17s worth of cargo within its bays enabling year-round deployment capabilities, no matter what Mother Nature throws at us. Whether it’s deploying a F-22 squadron across the Pacific Ocean, or 2,500 soldiers and 4,000 tons of equipment to the Joint Readiness Training Center, no challenge is too great.

The Distribution Flight has perhaps the most diverse mission on base, as it is faced with the challenge of supporting the robust USARAK requirements. This includes transporting aircrew, processing and delivering cargo across base, and providing Joint Personal Property Shipping Office (JPPSO) services to every military member on the installation, as well as Eielson AFB and
Clear AFS. Picking up and moving 600 soldiers at once across miles of ice covered roads is routine operations for the “Ice Road Truckers” of the Ground Transportation Section. Plus, they move over 20,000 supply items to Maintenance back shops and flightline operations keeping our arctic Airpower ready to go. The Cargo Movement Section is the Alaska Joint Theater Distribution Center. They handle cargo for both Joint Base and all DoD locations in Alaska, moving nearly three million pounds of cargo annually. Finally, the 773 LRS has a flight of 2T2s – an LRS requirement unique to the PACAF theater – who would normally be found in an Air Mobility Squadron or Aerial Port Squadron. The Combat Mobility flight not only provides their expertise to rig and support C-17 aerial drops, but are also tasked with the responsibility of deploying at a moment’s notice to support missions worldwide.

In closing, I hope that I have enlightened you to the unique and diverse JBER mission and how it would not succeed without the dedicated Big “A” Airmen within the 673 LRG. The relentless work schedule and various missions mentioned here are just the tip of the iceberg. There is no shortage of stories where our people go above and beyond the call of duty to ensure victory and mission success for our JBER Teammates. However, that’s just part of our daily adventure and what we bring to the fight tonight in the “Last Frontier”!

ABOUT THE AUTHOR:

1LT Andrew Giezentanner is a Logistics Readiness Officer stationed at JBER. He is the Vehicle Management Flight Commander for the 673 LRS, which is currently responsible for the largest joint base vehicle fleet in the DoD.
Bend, Don’t Break: Optimizing a Resilient Supply Chain

“The amateurs discuss strategy. The professionals discuss logistics”

- Napoleon Bonaparte

Although decades have passed in the interim, Napoleonic innovations in the application of logistics are direct precursors to the United States’ modern principle of the sustainment warfighting function. As a foundational warfighting function, logistics continues to serve as the bridge between the ever-changing art of war and the uncertainty of counterinsurgency abroad. Because of this fundamental reliance on logistics, maintaining a responsive and resilient supply chain is more critical than ever as the United States Air Force pivots to new theatres of conflict.

**HISTORY – Napoleon and WWII**

Napoleon’s personality and leadership style are areas of great interest for professional military logisticians. As history would show, supplying a force the size of Napoleon’s army was a logistical nightmare for the French command. In 1812, during Napoleon’s ill-fated invasion of Russia, it quickly became evident how disastrous his decision would prove. Consequently, his decision for his Army to “live off the land” during the invasion has stood as one of the greatest military blunders not only of Napoleon’s military career, but also throughout history. While some scholars theorize that the Russian Winter (or Russian Army) were the primary agents of the demise of Napoleon’s Grande Armée, these theories understate a harsher reality: Napoleon’s own logistical oversight proved to be the greatest cause of his destruction in Russia.

Similar threads of “lessons learned” would continue throughout history and into WWII. The most critical example that comes to mind is the petroleum shortage during the Battle of the Bulge; an allied logistics victory with a series of sustainment challenges.

Denied the use of English Channel ports, the Allied supply points were displaced over 500 miles from the Normandy supply dumps. Even with the commission

Red Ball Express Ref. (Hull, 2016)
of the Red Ball Highway Express, critical supplies were often slow to reach the front lines of advancing armies. On one occasion, when convoys carrying rations arrived, General George Patton raged to General Omar Bradley, commander of the 12th Army Group, that he would “…shoot the next man who brings me food. Give us gasoline; we can eat our belts”.

Just like any facet of history, modern logisticians should learn from the mistakes of the past so that they may be avoided in the future. In this same context, modern military logisticians must consider all of these lessons learned, actively adapt them to today’s warfighting models, and ensure due consideration is afforded to all possible future outcomes.

**TODAY’S WARFIGHTER – Responsive and Resilient Supply Chain (RRSC)**

To address the past, present and future challenges to our logistical supply operations, the Air Force is considering what capabilities are inherent in a supply chain that are both responsive and resilient. ‘Responsive’ in the sense that the supply chain can adapt to both sudden and gradual changes in the threat environment; either through the use of current processes and technologies or with the insertion of new technology into current business practices. ‘Resilient’ in ensuring the supply chain can integrate and interoperate with other supply chains, (i.e., Contract Logistics Support (CLS), organic assets, etc.).

**WHAT IS RRSC?**

‘The World’s Greatest Air Force – Powered by Airmen, Fueled by Innovation” is the Air Force vision that considers both the “today” and the “tomorrow” while at the same time being Warfighter focused. Air Force logisticians focus on a vision that reads:

“Globally integrated agile Logistics, Civil Engineering and Force Protection enabling operational effects in an ever-changing threat environment.”

This vision has its foundation set by four strategic principles: 1.) Evolve competencies to fully support Joint Operations; 2.) Posture for current and future fights; 3.) Deliver cost effective readiness; and 4.) Leverage collaborative partnerships and share resources.

Air Force logisticians march towards this vision, and its associated strategic principles by advancing several “enabling capabilities”. RRSC is one such capability, and its goal is to provide “…affordable, quality, timely material support from point of origin – inventory, maintenance, manufacture or procurement – to point of need enabling the full spectrum of operations in uncontested and contested environments.”

In a broad sense this capability considers many different aspects of supply from global and theater distribution, to integration of new technology into supply chain processes, to the development of additive manufacturing capabilities, as well as addressing current and future risks to the supply chain.

This article will consider the RRSC capability in the context of three perspectives: 1.) How it can support the Warfighter supply operations from point of origin to point of need; 2.) How those same supply chain operations can be accomplished in a cost effective and timely manner; and 3.) How the supply chain can respond to future warfighting environments. All three perspectives will consider historical challenges and lessons learned to help inform the logistician about the requirements for better supporting the Warfighter.

**POINT OF ORIGIN TO POINT OF NEED – Right Place/Right Time**
Merriam-Webster defines logistics as “The aspect of military science dealing with the procurement, maintenance, and transportation of military materiel, facilities, and personnel.”

Following World War II, the Under Secretary of War and the Chief of Staff directed a report be written by the Director of the Service, Supply and Procurement Division of the War Department General Staff about the effectiveness of logistics during the course of the war. This report provided a very detailed analysis of WWII challenges and logistics lessons learned. Specifically, it emphasized the overarching goal of the Army Service Forces, from a supply standpoint, was to ensure several things: 1) end items were produced in accordance with schedules; 2) items were stored in readily accessible locations without waste, and last but not least; 3) the delivery of end items “…to all parts of the world in the right quantities and at the right time.” Ensuring the right item was at the right place at the right time. This right place/right time goal became such a focus that as the report points out, the Army was ultimately guided by the mindset that it was better to have “too much” supply rather than “too little” supply. This was, in turn, criticized as a flaw that would lead to overestimating requirements.

In today’s context, RRSC considers this right place/right time origin to need focus by considering past and current challenges to ensure future supply capability. One of the essential “ability to(s)” of RRSC is to ensure repair capabilities can respond to changes in demand patterns or disruptions in sources of repair. In a perfect world supply demand would be static in nature. However, when you consider changes in operations tempo, warfighting environment, and simultaneous operations, static/non-fluctuating demand is not a reality. RRSC and the supply chain at large are making direct efforts to address supply and demand planning inputs to ensure a sound output, which ultimately leads to parts on hand for the Wwarfighter. One of the ways in which this is being addressed is through the implementation of an Advanced Planning System (APS). This system is a “state of the art requirements determination system for demand, supply and inventory planning”. RRSC is overseeing the development of the APS called ESCAPE. This capability will be vital in ensuring the demand input results in a better output. For example, the current system only addresses supply demand through either an eight or four quarter moving average, or exponential smoothing and only offers a quarterly requirement computation capability. An APS like ESCAPE can use multiple algorithms to generate requirement computations as frequently as every day. This is significant not just from a generic input/output standpoint, but it has the ability to address the internal and external influences that impact supply demand. In the end, if the planned demand input is correct, current and the associated systems allow for flexibility in demand changes, it will help ensure the Warfighter has what they need when and where it is needed.

COST EFFECTIVE & TIMELY LOGISTICS EFFORTS – Supply Chain Risk Management (SCRM)

According to the November 2012 DoD Instruction (DoDI) 5200.44, Supply Chain Risk Management, (SCRM) is a systematic process for managing supply chain risk by identifying susceptibilities, vulnerabilities and threats throughout DoD’s “supply chain” and developing mitigation strategies to combat those threats whether presented by the supplier, the product and its subcomponents or the supply chain (e.g., initial production, packaging, handling, storage, transport, mission operation and disposal).

Within the defense industry, theft and counterfeiting of high value components or high-tech
gadgets are on the rise, demanding a safe and secure supply chain. Because our supply chain is a globally distributed and interconnected web of suppliers and customers, doing so offers strategic and competitive advantage in various forms. Therefore, being agile, flexible and very quick to respond are certainly some of the core requirements all businesses need to succeed in the “new normal.”

- **Security** provides the confidentiality, integrity and availability of information.
- **Integrity** focuses on ensuring that the products or services in the supply chain are genuine and contain no unwanted functionality.
- **Resilience** focuses on ensuring that the supply chain provides required products and services under stress.
- **Quality** focuses on reducing unintentional vulnerabilities that may provide opportunities for exploitation.

The 4 Aspects of SCRM Ref. (Ferry & Poindexter, 2016)

A May 2012, the Senate Armed Services Committee inquiry report stated that China was found to be the dominant source country for counterfeit electronic parts, a major vulnerability in the supply chain. The Chinese government has failed to take steps to stop counterfeiting operations, which means DoD must step up its efforts to manage and mitigate the counterfeit threat.

To challenge similar risks within the industry and answer this call to action, the *Basing and Logistics Flight Plan* points to enabling capabilities for Maintaining a Responsive and Resilient Supply Chain. One of which speaks to the “identification, assessment and mitigation of risk from potential supply chain vulnerabilities” (*Air Force*, 2018). According to a 2016 article published by the Defense Acquisition, there are four basic ways to manage identified risk within the supply chain.

- **TREAT**: Employ protective measures (countermeasures and mitigations) that may either reduce the consequence or likelihood of a threat exploiting or triggering a vulnerability or remove the threat or vulnerability that generates the risk.
- **TRANSFER**: Allocate some or all of the responsibility for risk mitigation to another organization and/or phase of life cycle by passing the risk along.
- **TOLERATE**: Make a conscious decision to continue with the activity (or acquisition) despite the identified risk.
- **TERMINATE**: Eliminate the likelihood of a threat, susceptibility to a vulnerability or impact of exploitation by not continuing with the activity or acquisition.

Knowing where our risks originate and taking the necessary steps to prevent and eliminate these risks will make for a more improved processes and business relations with our customers.

**FUTURE 2050 – Considering Current and Future Warfighting Environments**

What is on the horizon for military logistics
A 2012 article written by Petra Kiwitt and Steffen Frankenberg might provide some insight into possible revolutionary changes to logistical capabilities. They address the extensive possibilities of advances in dematerialization and 3D printing; essentially, the ability to fabricate spare parts using 3-D printing and additive manufacturing. These effects offer dramatic changes to the logistical environment, especially when used to manufacture products that may no longer be available in the marketplace.

These revolutionary ideas are no longer far off in the future and/or strangers to Air Force logisticians. RRSC is exploring these innovations to ensure success in future Warfighter environments, no matter where in air or space they exist. Imagine a future where a deployed airman at a forward operating base could create a part for a stranded aircraft with little more than items he and his comrades can carry in their vehicles or on their person. A 3-D printer and the resin(s) required for its operation could meet the needs of several pallets of material that would normally accompany such a mission, or even replace the need for a logistical supply network in challenging and contested environments. Envision a time when the technician at the depot had the appropriate technology to reverse engineer an aging aircraft end item no longer built by a diminishing manufacturing base. These would be significant advances in terms of supply capability in the future, but they have to be tempered with the assurance of aircraft and maintenance safety and usability. In the end, these capabilities address the “resiliency” of the supply chain; ultimately, ensuring the viability of supply chains in future warfighting environments—whether contested or not.

CONCLUSION – Where are my Parts?

Throughout the history of modern warfare, through Napoleon’s foray into Russia and the United States’ 20th century engagements, there has always been a significant and ever-present challenge to ensure the Warfighter was adequately supplied to complete the mission. What is essential to understand is that this generic question of “Where are my parts?”, is not just a question for military logisticians in 1812, 1914, 1944, 1965, 2001 or 2018, but rather a recurring question that will be asked in 2020, 2030, 2050 and beyond. As the nature of wars evolve and technology matures, the logisticians who support the modern Warfighter need to continually adapt. They need to develop and sustain a supply chain flexible enough to adjust and respond in a timely manner to whatever environment or circumstance is encountered. The United States Air Force’s work to pursue and sustain a capability to ensure a responsive and resilient supply chain may not prevent the question of “Where are my parts?” from ever being asked again, but it can certainly reduce its recurrence and mitigate its effects.
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When is the best time to attend AMOC?

The following is the result of a thesis in partial fulfillment of the requirements for the degree of Master of Science in Logistics & Supply Chain Management at the Air Force Institute of Technology. The authors would like to thank the members of the Air Force Aircraft Maintenance community for their participation and insights. Special thanks to the sponsors of this thesis:

Brigadier General Carl A. Bubler, Colonel Barton D. Kenerson, and Lieutenant Colonel Christopher J. Fontana, ACC/A4

INTRODUCTION

The aircraft maintenance (21A) community currently doesn’t have a standard policy that spells out the sequence for formal training and on-the-job training (OJT) for new 21A officers. The Air Force Personnel Center (AFPC) traditionally tries to schedule new officers to attend the formal Aircraft Maintenance Officer Course (AMOC) after they spend one month at their duty location. This time is primarily allotted to conducting in-processing tasks. However, AMOC scheduling conflicts and class sizes limit AFPC’s ability to strictly adhere to this scheduling policy. Since no set policy exists, we sought to determine if there might be any optimal formal training timeline for new 21A accessions.

Formal training and on-the-job training (OJT) are two of the most popular (and effective) methods to train new hires. The Department of Defense, the United States Air Force (USAF) and, more specifically, the USAF 21A community extensively use these methods. However, there is no consensus as to the best time to integrate formal training (AMOC) within an overarching, rigorous OJT program like the one established for the 21A community. Therefore, it is important to investigate if it is most effective for new 21A officer accessions to attend AMOC immediately, or to undertake a prescribed amount of time to conduct OJT beforehand.

To investigate this issue, we developed and deployed two different surveys to the 21A community. The Company Grade Officer (CGO) survey was designed for respondents who had graduated from AMOC in the past four years. The Leadership (21A commanders and operations officers) survey was designed for respondents who were leading new 21A officers or had led them in the past. This scope allowed us to gather information from a large swath of 21A officers, both new and experienced.
We begin the remainder of this article by providing some background on professional training. We then describe our data collection and analysis techniques. Finally, we provide the results of our investigation, and end with some concluding remarks.

FORMAL, ON-THE-JOB, AND BLENDED TRAINING: WHICH IS BEST?

There are three schools of thought regarding formal training and OJT. The first school of thought favors formal training over OJT. The second school of thought favors OJT over formal training. Finally, the third school of thought favors a blend of formal training and OJT.

Formal training has been linked to improved productivity, but the high cost of formal training has encouraged firms to shift more toward OJT. In addition to a lower cost of training, another advantage of OJT is the ease of implementation. Beyond that, OJT serves to produce learning out of actual work, which simultaneously provides benefits to the organization and trainee.

Blended formal training and OJT may be able to draw from the strengths of both types of training. This premise suggests, for example, that if an organization added a period of OJT before formal training, the formal training could be reduced in length with no productivity losses in order to realize actual cost reductions or savings. Related to this form of blended training, the Center for Creative Leadership developed the 70-20-10 rule. This concept states that for training and growth, an employee needs three types of experiences. Those experiences are challenging assignments or tough jobs (70%), developmental relationships (20%), and coursework or reading (10%). All those experiences add up to develop an optimally trained employee in any industry (Lombardo & Eichinger, 1996). When applied to this topic, the 70% and 20% categories of this rule make up OJT, as these two components encompass learning from tough jobs and mentors. The 10% of this rule represents the necessary formal training. This concept is useful in that it helps support the idea for utilizing OJT in conjunction with formal training as part of a comprehensive training program. Figure 3 shows the breakdown of the 70-20-10 rule.
THE SURVEY

To acquire data for this study, we created two separate web-based surveys to disseminate to the 21A community. A web-based survey was the best fit for this study due to the large size of the population and geographical distance between the respondents in the sample frame. The CGO Survey was focused on 21A officers who were recent graduates from AMOC. The CGO Survey population included Second Lieutenants through Captains who had graduated from AMOC within the past four years. Additionally, the CGO Survey was designed to determine the relationship between AMOC performance, the respondent’s actual AMOC attendance timeline, and the respondent’s preferred AMOC attendance timeline. The final CGO Survey included 32 questions and was administered via Survey Monkey®.

The Leadership Survey was designed for mid-to senior-level Captains through Lieutenant Colonels who are currently or have served as commanders or operations officers leading new 21A officers. This second survey was designed to compare the post-AMOC performance of new 21As to their AMOC attendance timelines, while also gathering the respondent’s preferred AMOC attendance timeline. The final leadership survey included 21 questions and was administered via Survey Monkey®. Additionally, both surveys included questions to gather background and demographic information, and additional open-ended questions to help us understand more about the “why” and “how” behind the quantitative responses.

We disseminated the surveys to 1,247 current 21A officers through an AFPC generated call for responses. We received 332 usable responses across both surveys (26.8% response rate). We analyzed the data according to standard quantitative and qualitative analysis methods.

THE RESULTS

The CGO Survey had 116 usable responses. Additionally, 109 of the 116 responses listed their core AFSC as 21A, and all 116 respondents had recently attended AMOC and met the desired sample frame. Table 1 shows the CGO Survey sample demographic information.

The Leadership Survey had 216 completed responses, and 214 of the 216 responses came from officers with core 21A AFSCs. Additionally, the majority of the respondents are currently Commanders or Operations officers, and all have spent time leading new 21A officers. Table 2 shows the demographic information from the Leadership Survey.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Count (%)</th>
<th>Duty Title</th>
<th>Count (%)</th>
<th>Time in Service</th>
<th>Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Lieutenant</td>
<td>32 (27.59%)</td>
<td>Flight Commander or Flight OIC</td>
<td>39 (33.62%)</td>
<td>Less than 6 months</td>
<td>2 (1.72%)</td>
</tr>
<tr>
<td>1st Lieutenant</td>
<td>64 (55.17%)</td>
<td>Assistant AMU OIC</td>
<td>30 (25.86%)</td>
<td>6 months-1 year</td>
<td>2 (1.72%)</td>
</tr>
<tr>
<td>Captain</td>
<td>20 (17.24%)</td>
<td>AMU OIC</td>
<td>19 (16.38%)</td>
<td>1-2 years</td>
<td>34 (29.31%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Squadron/Group/Wing Executive</td>
<td>16 (13.79%)</td>
<td>2-3 years</td>
<td>24 (20.69%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Student</td>
<td>4 (3.45%)</td>
<td>3-4 years</td>
<td>20 (17.24%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ALEET/LCBP Officer</td>
<td>2 (1.72%)</td>
<td>4+ years</td>
<td>34 (29.31%)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Instructor</td>
<td>2 (1.72%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Program Manager</td>
<td>1 (0.86%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depot Maintenance Officer</td>
<td>1 (0.86%)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Exchange Officer</td>
<td>1 (0.86%)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>DV Coordinator</td>
<td>1 (0.86%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1: CGO Survey Sample Demographic Information
We did find some evidence that new 21A officers who attended AMOC after any amount of OJT scored higher than those who received no OJT before AMOC. However, while these results were statistically significant, they were not conclusive due to the small size of some of the comparison groups. Therefore, for comparing AMOC scores to AMOC timelines, we relied on the qualitative data. The coded qualitative data revealed that 73.33% of CGO respondents and 74.61% of Leadership respondents felt OJT added a frame of reference for new officers’ AMOC training. For example, one respondent said, “The classmates with the least experience had the greatest difficulty in class, and probably did not glean as much understanding.” While another specifically stated that “...if I did not have several months of training before AMOC I would have been lost like several of my classmates.” Thus, while the quantitative results were inconclusive, the qualitative results showed that 21A officers who received OJT before AMOC seem to have a better educational experience and a higher level of performance at AMOC.

Next, when looking at post-AMOC performance based on the timeline that a new 21A officer attended AMOC, Leadership Survey respondents were asked to rate recent AMOC graduates’ performance after AMOC. The majority of respondents rated new 21A officers who received OJT before AMOC as higher performers than those who did not receive OJT before AMOC. Additionally, when asked to justify these ratings, 45.79% of Leadership Survey respondents stated that attending OJT before AMOC produced a higher quality maintenance officer and 36.84% said officers who attended AMOC immediately had lower knowledge retention after AMOC and required a greater amount of baseline learning after AMOC. Therefore, on average, leaders felt that 21A officers who received OJT before AMOC performed better post-AMOC than those who did not get any amount of OJT before AMOC.

First, we looked to determine when new 21A officers and when the 21A Commanders and Operations officers felt it was best for new 21A officers to attend AMOC. Both groups were given the following choices regarding perception of an optimal AMOC attendance timeline: prior to arriving at the first duty location; within one month of arrival; one to three months after arrival; three to six months after arrival; greater than six months after arrival; or write in one's own preferred timeline. From these data, 63.07% of CGO respondents and 61.95% of Leadership respondents felt that between one and six months of OJT was optimal to produce the most proficient 21A officers. When justifying these rankings, 73.33% of CGO respondents felt OJT added a frame of reference for new 21A officers to learn the basics and retain more AMOC curriculum, as well as allowing them to add more to learning and discussion for all students in their AMOC class. Additionally, 74.61% of Leadership respondents felt it added a frame of reference for new 21A officers to learn the basics and retain more AMOC curriculum and allowed them to add more to the learning and discussion for all students in their AMOC class. Thus, both CGO and Leadership survey respondents felt that new 21As should get a minimum of one to three months of OJT but no more than four to six months to produce a more proficient 21A officer post-AMOC while avoiding training stagnation before AMOC.

Additionally, the research found that 90.27% of CGO respondents and 90.64% of commanders and operations officers felt that OJT helps a new 21A officer before AMOC and 71.90% of Leadership respondents felt that new officers were beneficial to the unit during OJT by adding a different perspective and through their long-term benefits to the unit. Ultimately, through these findings and the initial findings we determined that a predefined period of OJT before AMOC would improve new 21A officer development. This period of OJT should last for a minimum of one to three months and a maximum of four to six months to add to retention of AMOC curriculum, to enable new 21A officers to bring more to the discussion and learning at AMOC, and because it will result in less remedial training for re-
cent AMOC graduates once they have returned to their units at their first duty location.

**FINAL CONCLUSION: OJT FIRST, THEN AMOC!**

In conclusion, through this study, we found that OJT before formal training, or more specifically AMOC, results in better performance at and after said formal training. Both junior and senior maintenance officers felt that the addition of OJT prior to AMOC for a minimum of one to three months but no more than four to six months would be optimal to produce the most proficient new 21A officer by improving the retention and application of AMOC curriculum, adding to the educational experience for all at AMOC, and avoiding training stagnation before AMOC. Additionally, these results fit directly with the 70-20-10 rule, as they show the importance of a blended approach to training. Finally, these results reveal the advantages of blended training by integrating the easy to standardize formal training with the benefits garnered through OJT to produce a more proficient output from formal training.

By applying these results to a general logistics training program, we propose a few recommendations. First, training programs should incorporate OJT before formal training, as it will benefit all employees in formal training and increase a person's retention of the curriculum from formal training. Second, training programs should schedule OJT to fit their specific situation and needs but attempt to schedule OJT for a minimum of one month but no more than six months before formal training to avoid training stagnation. These two recommendations will result in a more proficient output from a general logistics training program.

This research easily lends itself to future research opportunities including expanding the scope to other career fields within the USAF, i.e. the munitions maintenance (21M) or logistics (21R) career fields. Additionally, this study could be extended to look at the enlisted side of the 21A career field or to other branches of the military, i.e. the United States Army or Navy, or a civilian organization, i.e. a restaurant or supermarket chain. Future research could also look to determine the specific amount of on-the-job training that produces the most qualified 21A officer or logistic manager, i.e. what is the exact amount of OJT between one and six months that produces the most qualified trainee. Finally, to branch off from this research, a potential future research opportunity could be to look into the formal training knowledge retention of trainees based on the amount of exposure the trainee has had to the material before the formal training. Ultimately, this survey study clearly presents the finding that the inclusion of on-the-job training prior to formal training benefits the performance of the trainee both at and after formal training and this finding would benefit from further research in this or related areas.

References
Crafting an effective resume is crucial to success in an increasingly competitive job market. Easier said than done though, right? With so many templates, formats, and ways to display your professional experience, the task of writing a complete and relevant resume may seem daunting. Below are some suggestions on developing a resume that will enable success as you apply for your next civilian position with the Air Force, and possibly other federal agencies. While some of these suggestions may also apply to private industry resumes, our focus is on civil service resume building success.

First, is there a required format? No, not at all. Are there formats that should be outlawed? Yes, however USAJOBS.gov has an optional template for use that includes the basic required information. As a word of caution, this format is not easily reviewed by hiring managers compared to other formats. Furthermore, some job announcements require a special, formatted resume based on a provided template. For example, in the Logistics Career Field, career broadening opportunities require a resume following a provided template. When searching for positions, make sure to read the job announcement and detailed information for any special requirements that are related to the position.

Once you choose a format for your resume, or have found the required template, there is some specific information that is always required on your resume. Most importantly, include contact information so you can be reached for an interview or a job offer. Including both work phone and cell phone, and home contact information ensures you won’t miss the call or email. Include all relevant job experience, education and specialized training. Also, include the organization, address, job title, grade and series, with start and end date (month and year) of each position. Further, including hours worked per week will assist the Human Resource specialists in determining whether your previous positions were full- or part-time.

In addition to the required information, you are also encouraged to include current security clearance, post-secondary education, and Professional Military Education (PME). Any licenses, professional certifications, and special awards on your resume will help you stand out from the crowd. Highlighting special opportunities you have been selected for such as Civilian Developmental Education (CDE) and career-broadening opportunities can also demonstrate what qualifies you for the position.

Now that you know what information to include on your resume, let us circle back to job experience. It is important to describe your experience in a quantifiable manner (if possible) to clearly demonstrate your accomplishments. Many of us volunteer in different capacities in our personal time. If the impacts of your volunteer activities are relevant for the job to which you are applying, you can include them in your resume. Leadership roles and your impact on the organization is a great example. The key is relevance.

The concept of CCAR – Challenge, Context, Action, and Result can help you develop strong statements that show the value of your experience which can be used in your resume, as well as in preparation for interviews. Challenge describes a specific problem you faced, or goal you accomplished. Context includes who you worked with and the environment in which the challenge occurred. Action describes the specific actions you took to work through the challenges. Even if it was a team effort, this is your resume so include actions that were your responsibility. Results explain the outcome and more importantly, the impact it had on the organization. If you can quantify the outcome/impact, make sure to do so. When constructing CCAR statements, either a narrative or bullet statement format is acceptable. The CCAR concept lends itself easily to bullet statements about specific challenges and their impact.

With your entire job history, volunteer experience, and other required/suggested elements, how many pages is your resume? Is it appropriate to have one standard resume to apply for every job? While federal resumes can be longer than the standard one page, you can go overboard with the maximum length of your resume. Providing lengthy resumes to hiring managers can result in dismissal from consideration for the position; it is a resume — not a biography. One critical tip is to maintain a master resume that includes all job experience, education, etc., and then extract the position relevant information into a concise resume for the specific job application. A three- to four-page, hard-hitting, relevant resume will provide key details.
and demonstrate your ability to communicate effectively.

Many of you have served as active military and are continuing to serve in a civilian capacity. When addressing past military experience, include your military rank; it is not necessary to convert your rank to a civilian equivalent, especially for Air Force positions. Again, make sure to tailor your accomplishments to the position for which you are applying. Also, when sharing your leadership/supervisory experience, be sure to include the supervisory level (first or second), the number of employees supervised, and the makeup of your employees. Were they all civilian, military or a combination? Did you oversee contractors within your organization? Also include if you supervised employees in more than one functional area.

Your resume is your calling card. It is the first look hiring managers and organizations have into who you are and what you can do for their organization. It is important that your resume is visually appealing, including consistent and legible font, and deliberate use of bolding and underlining. Too many fonts, any graphics, and inconsistent structure decrease the value of your resume. Take the time to create a relevant, understandable and applicable resume. This will help you stand out from other applicants. Best of luck as you pursue each new position throughout your career!

For additional tips and suggestions from a current Air Force Senior Executive Service member, Ms. Lisa Smith, and from Civil Engineering, Ms. Carol Gaudette, check out the video, “Writing an Effective Resume” at the following link:  https://www.youtube.com/watch?v=6tsgs6XyJEM

Other Helpful Links:
Airforce.usajobs.gov
Afciviliancareers.com
ONetonline.com

If you have any further questions or concerns, please feel free to contact the Logistics Career Field Team at afpc.logisticscareerfieldprogram@us.af.mil, DSN 665-2365/Commercial 210-565-2365.

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Approximately three years ago the Air Force Institute of Technology, School of Systems and Logistics (AFIT/LS), teamed up with Command Fleet Readiness Center (COMFRC) to improve aircraft flow through the Navy’s aircraft depots. These depots are called Fleet Readiness Centers (FRCs) and report to the Commander of COMFRC.

The FRCs had experienced significant delays in aircraft flow transitioning through the depot repair process. Navy leadership was concerned because aircraft repair schedules were not being met. The approach being used was not effective and they needed a high quality solution quickly. The Navy’s choice to solve this growing crisis was an application of the Theory of Constraints called Critical Chain Project Management (CCPM). They used CCPM, Lean and Six Sigma in harmony with each other to improve aircraft depot repair cycle times. In order to improve flow, each aircraft must be managed as a project. The CCPM approach is a relatively new project management methodology. In order to achieve sustained outstanding results specific actions must be taken that are counterintuitive to most people's expectation and therefore, must be taught to those individuals using the process. This is where AFIT’s LOG 238 course provided tremendous help. Below is a comment made by a depot leader after the CCPM course had been taught to students at Lemoore Naval Air Station, CA.

According to CAPT Steve Leehe, Commanding Officer of FLEET READINESS CENTER WEST,

“LOG 238 works! With an optimal WIP of 10, our challenge is sometimes keeping schedule and inductions up with the flow. In FY16 we completed 18 F/A-18 Super Hornets. We implemented CCPM in Jan 2017 and now this year we expect to complete 36 aircraft with the same amount of crew, facilities and tooling. CCPM has been a real difference maker for us.” May 2018

Capt Leehe’s organization is providing quality aircraft back to the warfighters faster than ever.

FY17 COMFRC Global Improvements:

80% improvement in F-18 aircraft throughput 40% improvement in V-22 aircraft throughput In FY17 the Navy’s COMFRC began implementing CCPM across all aircraft depot repair lines and has achieved impressive results. That year ended with 100 fewer aircraft possessed by their depots each of which were delivered back to the flightlines. This was greater than a 40% increase in performance (equates to over eight squadrons with “Ready Basic Aircraft”).

BACKGROUND – Prior to AFIT’s Involvement

While a handful of leaders at COMFRC understood and supported the CCPM approach, their dilemma was how to get this knowledge out to the masses: supervisors, planners, schedulers and people doing the work. Simply telling people to start using CCPM would not be an effective approach. The right people must have a good understanding of CCPM and be able to apply that methodology correctly. They lacked education in the CCPM process. This is where AFIT came into the picture. AFIT/LSM had developed a CCPM course that instructors had been teaching at Air Force depots for several years.” The course matured very nicely with inputs from every Air Force depot (and then Navy/Marine air depots).

The COMFRC commander sent an email to all members of the Navy’s aircraft maintenance community espousing CCPM as the approach the Navy planned to use to improve aircraft depot flow.
Those of us who help produce Naval Aviation readiness are working hard to reduce the number of F/A-18s in out-of-reporting status. Initiatives like Critical Chain Project Management enable us to focus efforts on accelerating aircraft deliveries back to the flightlines.”

Rear Adm. Paul Sohl
Commander
Fleet Readiness Centers (COMFRC)
June 2015

When AFIT’s CCPM course director saw this email from the Navy exchange officer and fellow CCPM instructor, a light bulb went off. Could the Navy use AFIT to help teach CCPM knowledge to FRC personnel? Naval officials were presented with the idea and then evaluated the course (LOG 238 – Critical Chain Project Management Foundational Concepts) by having two offerings taught to senior FRC leadership. Afterwards, they asked AFIT to teach this course to the Navy’s FRC bases. After two years of teaching the course to the FRCs, over 700 students have graduated. These students were taught the foundational concepts of CCPM. Understanding these concepts was a critical success factor to improving aircraft flow through the FRCs.

One of the worst performing Navy FRCs became one of the best in only a few months. Having both leadership support and a course taught to the masses proved to be a very powerful force for positive change for the entire command. When one of the best performing FRCs implemented CCPM, it too became even better. CCPM helps all “project” oriented organizations become better by finding the organization’s hidden capacity and using it to achieve more of the system goal.

Mabin and Balderstone in their meta-analysis of seventy-eight published case studies on CCPM, found that implementing CCPM resulted in:

a. Mean reduction in lead-times by 69%
b. Mean reduction in cycle-times by 66%
c. Mean reduction in inventory levels by 50%
d. Improved due date performance by 60%
e. Increased revenue by 68%

Inhibitors to Flow

So what are the inhibitors to the flow of products and/or services organizations experience? Many professionals claim most organizations throughout the world waste between 25% and 50% of their capacity! Why? What are the reasons? Below are just some reasons causing organizations to lose some of their capacity:

1. Not knowing the location of the system constraint. The system constraint is the factor that keeps an organization from achieving more of the system goal. An organization will improve simply by eliminating system constraints when possible, and then managing them. Some will simply ignore the system constraint because they do not understand it is the control mech-
anism for throughput. Others may misidentify the constraint. Many process improvement experts recommend using Work-In-Process (WIP) as a tool to locate the system constraint. This may be true most of the time, but it certainly is not true all of the time. The WIP levels in a process will change frequently especially in a balanced line. Just because the highest WIP level changes from one station to another does not mean the system constraint has changed. Identifying the system constraint is the first step in improving flow. If the constraint is misidentified, then our process improvement events being used to increase flow will be useless because improvements will be accomplished on non-bottlenecks rather than the system constraint. The result is no return-on-investment while making the situation worse in some cases. How many Lean events to improve “process flow” have been accomplished on non-bottlenecks in your organization?

2. The system constraint is idle. Every minute the system constraint is sitting idle is equivalent to a minute of lost productivity for the entire system. If you do not know where your system constraints are, then these constraints have a high probability of sitting idle when there are opportunities for them to be productive. A well thought out schedule minimizes down-time at system constraints which translates into much more productivity for the organization.

Lean and Six Sigma are very powerful and necessary process improvement tools to increase flow. But are they sufficient by themselves? Do they identify system constraint(s)? Do they encourage decision makers to focus on and leverage the constraint each day? Do they encourage buffers to help mitigate variation like TOC and CCPM? TOC and CCPM certainly added more value for the Navy’s air depots that have great Lean and Six Sigma programs. CCPM is a powerful tool to help improve project flow and improve readiness.

3. Too much WIP. One of the keys to successful project management is having the appropriate amount of WIP. This is where Little’s Law can help you understand your process. The formula for Little’s Law is: \( WIP = \frac{Throughput \times Cycle\ Time}{Cycle\ Time} \). Stated another way, \( WIP = \frac{Exit\ Rate \times Flow\ Days}{Cycle\ Time} \). Basically it tells us the higher the level of WIP there is in a process, then the longer the cycle time or flow days will be for projects going through a stable system. Simply reducing WIP to the correct level will translate into shorter project cycle times. Historically, our intuition for dealing with project schedule slips is to induct another project into the system on the scheduled induction day without considering the consequences the system faces without the capacity for extra workload. If the system does not have capacity for this new project, then project cycle times will become longer and longer as we exponentially increase work to an overloaded system. This approach puts stress on the entire system. Some of our maintenance technicians have coined a new term, “Visual Progress.” This occurs when an aircraft (a project) is scheduled to move from one cell to another cell on a specific date. On this date the aircraft is moved to the next cell, even when it is not ready to move because not all of the required work will have been accomplished. This action of moving the aircraft to the next cell compounds the schedule problem by adding more stress to the system (much more activity) without improving the schedule. In reality, this approach actually makes the problem worse; a late project will now be even later. This approach is repeated over and over again throughout the year simply because “Visual Progress” looks good on a chart presented during production meetings. This is a clever way to temporarily hide a problem when we should be looking for ways to overcome lost schedule time. Hiding a project schedule problem does not help reduce the late scheduling. Too much WIP is not limited to aircraft. For example, when the Air Force depot component scheduling system, EXPRESS, is forced to induct too much WIP, then Little’s Law is applicable here too. Too much WIP in a commodities shop will result in late deliveries back to the aircraft and will thus increase risk of longer aircraft repair cycle times.

4. Schedule Conflicts. Projects frequently experience at least two types of conflicts embedded within a schedule: resource conflicts and sequence conflicts. We should never schedule “known” conflicts! When this happens, at some
point the constraint will become overloaded with work. When the overloaded worker asks which project or task is the number one priority, many times he or she is told, “They are all priority!” There is an old saying that seems to be true, “if everything is a priority, then nothing is a priority.” When a system has reached maximum capacity and is further forced to accept more work, system deadlines will continue to shift back. There is a strong correlation between too much work being placed on a process and the amount of stress the workers, supervisors, customers, suppliers etc., experience. With increased stress levels, mistakes usually follow, which will make a late project even later. This is the situation we find ourselves in far too often.

5. Metrics. Metrics drive behavior and must be used to align the goal of an organization with the activities of the organization. It is extremely helpful if a metric is a leading indicator and also drives the correct behavior. A very successful leading indicator used by TOC and CCPM is Buffer Status. As the buffer enters the red, yellow or green zone, it will signal the action required by the system. First and second line supervisors need to monitor progress daily at the tactical level and take the necessary actions while in the yellow and green zones every day to keep the project on schedule. Management gets involved when the red zone is breeched. The Fever Chart’s buffer status will help answer the question, “How do you know if you had a good day?” Buffer management will help you put the right workers on the right jobs.

Bad metrics drive bad behavior! An example would be the “efficiency” metric where a resource that is not the system constraint is expected to produce the maximum amount of work possible. Doing so creates too much WIP and as mentioned earlier, results in longer repair cycle times. This is not what the system needs. The “efficiency” metric has been used in all DoD depots. High efficiency rates on the system constraint are good, but not on non-bottlenecks. While “efficiencies” are important, they should not be used to degrade our system “effectiveness.”

6. Deadline management. This is when project managers simply focus on the project’s due date when they should focus on the project’s status. In other words, they focus on the aircraft with the next due date while ignoring other projects that are slipping and are in trouble now. This type of project manager would put extra resources on the “wrong” project! Thus the aircraft that is in trouble due to a schedule slip will be ignored during a critical period and the outcome will be a late delivery. When significant recovery actions are finally taken, they are usually taken too late to make a significant improvement in the schedule.

A very similar approach was being used by a highly respected, proud and successful maintenance manager. He stated he was not going to use CCPM because he had a better approach. He considered aircraft in the depot as “chickens in a pot.” He was going to put the majority of his workforce on the aircraft that had been in the depot process the longest duration. Once this aircraft left the depot, focus would be shifted to the next one in line. While this approach seemed to work for him in the short term, several months later, all aircraft under his control were being delivered late. His depot repair cycle time, the metric of greatest concern to his customer, was moving in the wrong direction…a metric he was not even monitoring.

Buffer management would have been a much better approach for him; it has a very successful track record when the CCPM methodology is followed correctly.

7. Parkinson’s Law. This law contends that work time expands and consumes extra time given for task completion. It is rare for completed tasks to be turned in early when extra time is still available for task completion. Adding more and more time for task completion does not result in shorter or more predictable schedules. Amazingly, new employees are informally taught to “bank” work. This simply means, “Do not turn completed work in early.” This type of action slows down progress and makes us less competitive!

8. Cheerleader approach. Some project managers
do not provide the needed leadership, structure or environment to be successful. They simply make their way around the different work centers encouraging everybody to work hard and meet the target for the year. These organizations usually end up with too much WIP and missed deliveries. WIP must be maintained at the correct level when possible.

The problems mentioned will actually induce more and more variation into the process which will create more and more confusion. The more variation there is in a process, the less output (aka throughput) that process will deliver. This is even more pronounced when variation occurs at the system constraint. One must understand variation and how to mitigate and/or manage it, especially variation at the system constraint.

Variation is the enemy. It’s the enemy to quality. It’s the enemy to improvement. It’s the enemy to management. There is perhaps no more misunderstood concept in business today than the concept of variation. This misunderstanding is the root cause of knee-jerk reactions, over control, micromanagement, and tampering with results.

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Frequently TOC applications like CCPM are ignored simply because decision makers think Lean and Six Sigma are sufficient by themselves. This is a huge mistake because there is a synergistic effect when all three work together. Without all three, the gains are marginalized. The American Production and Inventory Control Society May 2006 magazine reported a case study accomplished over a period of 2.5 years, where a corporation had twenty-one plants using Lean or Six Sigma or a combination of TOC, Lean and Six Sigma (TLS). The four Lean plants had a 4% cost reduction in 2.5 years. The eleven Six Sigma plants had a 7% cost reduction in 2.5 years. The six TLS plants had an 89% cost reduction in 2.5 years. If the complete financial picture was looked at (increased profits and reduced costs), the TLS approach would be even better. Gaining more productivity on the system constraint(s) significantly increases system productivity by improving flow. This allows the process to achieve more of the system goal! The best results occur when TOC, Lean and Six Sigma (TLS) are all working together to improve flow.

Generating Flow

CCPM provides tools for dealing with such problems. Two of these are the concepts of “Buffers” and “Buffer Management.” Some people incorrectly assume that buffers make project schedules longer. Schedules are a key communication tool and should represent reality. An unrealistic schedule is not a useful tool for anyone. CCPM uses aggressive but possible task durations and then identifies and adds appropriate time and resource buffers at key leverage points in the project schedule to ensure the system constraint is fully utilized, but not overloaded. Buffers are there to help mitigate and manage harmful variation in the project as it occurs—not after the fact. If a project does not have buffers and buffer management, the unintended consequence is lost productivity when variation occurs at the system constraint. This is different from previous approaches that relied on “safety time” at the end of each task. Safety time at the end of each task approach has not been very successful and virtually guarantees excessive project duration and inefficient use of resources due to Parkinson’s Law. When understood, the critical chain and buffer management provides the right structure to prioritize work and achieve more of the system goal with same amount of resources. This structure enables managers to specifically target their actions to maximize the organization's ability to deliver projects on time. Schedule slips must be addressed as soon as possible, not hidden until the “eleventh” hour. Many want to “hide” problems when the best approach is to identify challenges and then rally the team to help resolve them.

These are only a few of the challenges faced by project managers every day in every country in the world. Sometimes the best approaches are counter-intuitive. Using systems thinking, we stand a much better chance at being successful. As stated earlier in this article, having both 1.) leadership supporting CCPM; and 2.) a CCPM course taught to the masses proved to be a very powerful force for positive change at the Navy’s COMFRC. One FRC leader commented on the Air Force course being taught at a Navy base. He said, “These instructors have never been to our base, but they opened several closet doors that contained skeletons. We thought we were doing the correct thing, but they pointed out many things we were doing that was killing productivity.” If these were the same types of problems other depots and project management orga-
nizations had experienced, then our FRC should at least give CCPM a chance to succeed. They did give CCPM a chance and the FRC doubled their output in only a year. They are still flying high over eighteen months later.

Organizations that correctly follow the CCPM approach all see improved process flow and achieve more of the system goal. These organizations are disciplined and know how to use the right tool at the right time. Even with a successful track record, there are people who still dislike this approach. When visiting one depot repair facility, the following statement was made, “I know CCPM says not to do this ______, but we do it any-

way.” Additionally, many LOG 238 students have made the following statement, “My supervisor will not let me do this (CCPM).” Another student said his supervisor thinks buffers are, “BS.” Based on comments from numerous students over several years, it seems many (leaders, supervisors, planners, schedulers) are confused about the necessary and sufficient actions that must be taken to optimize flow through a process. Most constraints are not physical; they are either beliefs and/or policies (management constraint). The result of these types of constraints is an entrenched system of making decisions that achieves less of the system goal. Sadly, in this type of system “bad” results are rewarded while “good” results are punished.

Log Truth #6 – “All good Logistics work is done in process.” Good work is accomplished in a process, however, we simply cannot force large amounts of work into an overloaded process and expect more output. Every system’s output will be the same as the output of its constraint.

It has been said that, “Speed is King.” If you are struggling to deliver projects, products or services on time, within budget and with high quality, then consider taking a deep look at TOC Applications (CCPM, Drum Buffer Rope, etc.). Including them with your Lean and Six Sigma programs just might provide you with the breakthrough solution you are looking for. TOC can and has provided the framework for achieving more of the system goal, simply by identifying key leverage areas to focus on. Focusing on these areas daily, will help improve flow for the project, product, or service your organization is providing. COMFRC has made significant gains in their depot process by doing this.

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