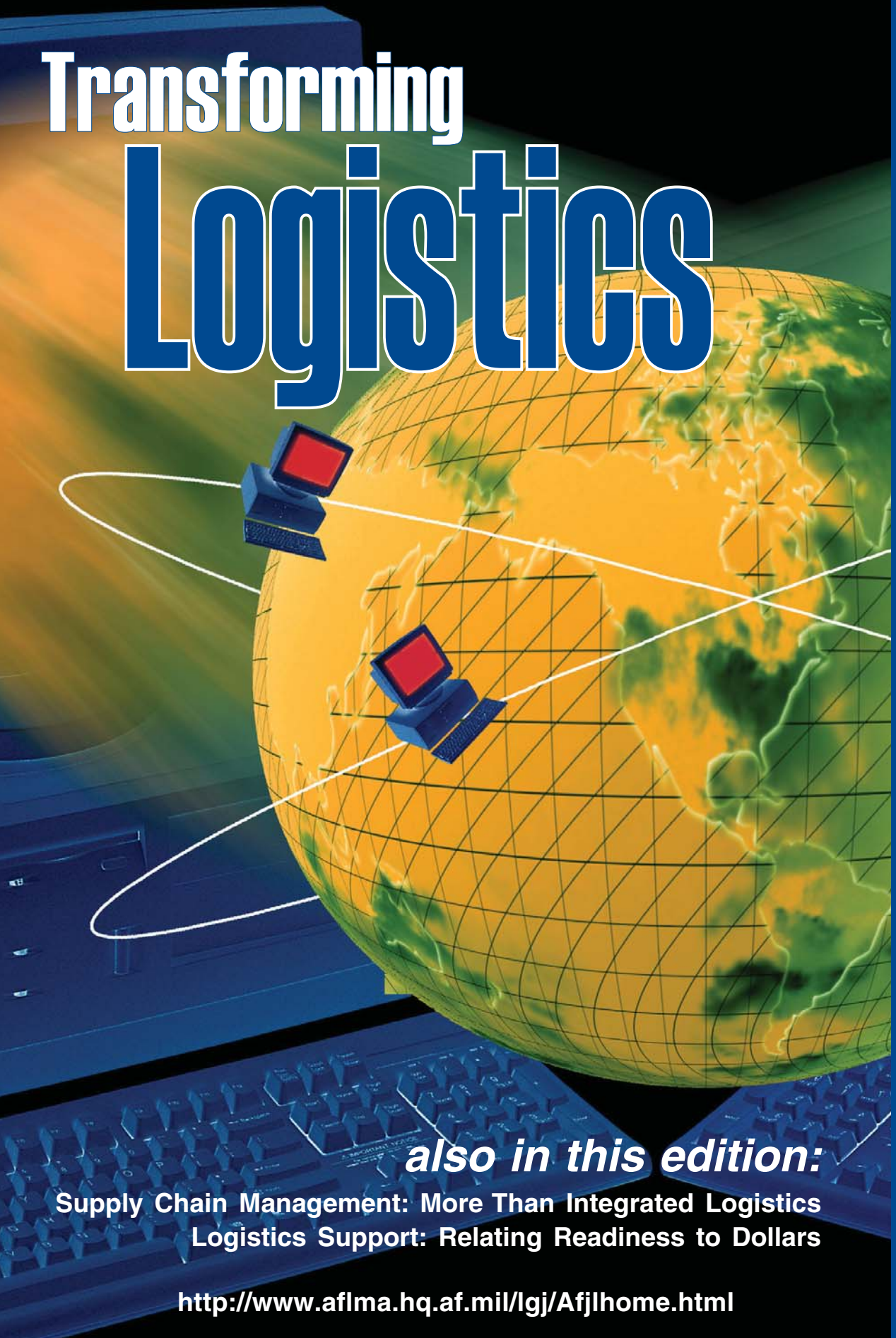
Special ECSS Edition

Transforming Logistics



also in this edition:

Supply Chain Management: More Than Integrated Logistics

Logistics Support: Relating Readiness to Dollars

http://www.aflma.hq.af.mil/lgj/Afjlhome.html

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ECSS Featured Articles

SPECIAL FEATURE

CONTEMPORARY ISSUES

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The *Air Force Journal of Logistics* (*AFJL*), published quarterly, is the professional logistics publication of the United States Air Force. It provides an open forum for presenting research, innovative thinking, and ideas and issues of concern to the entire Air Force logistics community. It is a nondirective publication. The views and opinions expressed in the *Journal* are those of the author and do not necessarily represent the established policy of the Department of Defense, Department of the Air Force, the Air Force Logistics Management Agency, or the organization where the author works.

The *Journal* is a refereed journal. Manuscripts are subject to expert and peer review, internally and externally, to ensure technical competence, accuracy, reflection of existing policy, and proper regard for security.

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Unsolicited manuscripts are welcome from any source (civilian or military). They should be from 1,500 to 5,500 words. The preferred method of submission is via electronic mail (e-mail) to: **editor-AFJL@maxwell.af.mil**. Manuscripts can also be submitted in hard copy. They should be addressed to the *Air Force Journal of Logistics*, 501 Ward Street, Maxwell AFB, Gunter Annex AL 36114-3236. If hard copy is sent, a 3.5-inch disk, zip disk, or compact disk containing an electronic version of the manuscript should accompany it. Regardless of the method of submission, the basic manuscript should be in Microsoft Word or WordPerfect format, and all supporting tables, figures, graphs, or graphics must be provided in separate files (preferably created in Microsoft Office® products; if Microsoft Excel is used to create any of the charts or figures, the original Excel file must be supplied). They should not be embedded in the manuscript. All submissions will be edited in accordance with the AFJL submission guidelines.

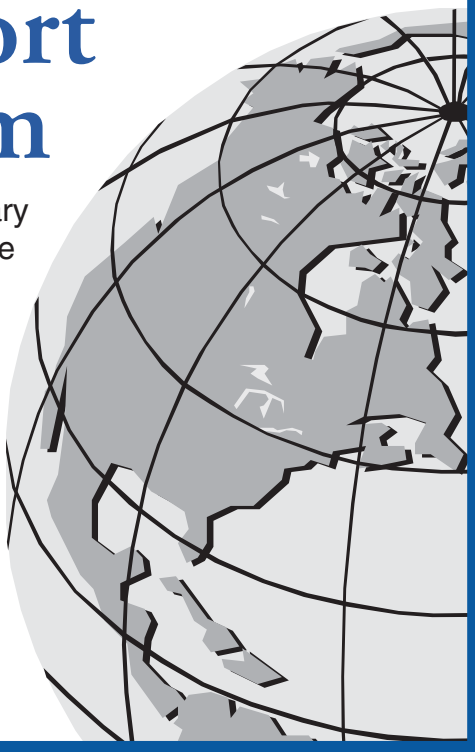
special edition

ECSS expeditionary combat support system

This edition of the *Air Force Journal of Logistics* is the first of two special editions focusing on the Expeditionary Combat Support System (ECSS). ECSS is, without question, the most significant change in Air Force support and support concepts since the inception of the Air Force in 1947. It will affect virtually every Air Force logistics process—changing most of them.

The ECSS-specific portion of the edition is divided into three sections—Combat Support Transformation, Implementing Transformation, and The Way Ahead. The edition begins with "The New Vision" by Mr Grover Dunn. Mr Dunn is the Air Force's senior executive responsible for developing and implementing ECSS. In the article, he outlines, in general terms, the vision for transforming Air Force logistics. His article is followed by "Concept to Reality" by Mr Kevin Kelley, Computer Science Corporation's (CSC) vice president and program executive for the Air Force ECSS program. He is responsible for CSC's actions as the systems integrator for the ECSS program. Mr Kelley's article describes the role CSC will play as the systems integrator and what the systems integrator will do.

The third section, The Way Ahead, contains six articles that discuss the details and key organizations involved in transforming Air Force logistics—ECSS, Expeditionary Logistics for the 21st Century, change management, ECSS Program Management Office, Logistics Transformation Office, Logistics Enterprise Architecture, and enterprise resource planning. The authors of these articles are all subject matter experts or individuals managing specific transformation efforts. For those readers interested in a broad overview of major ECSS and transformation efforts, "The Road to Success" is a good start.



ECSS expeditionary combat support system

The edition concludes with two ECSS-related articles—"Supply Chain Management: More Than Integrated Logistics" and "Logistics Support: Relating Readiness to Dollars." The supply chain management article will be of particular interest to those readers who have little or no background in supply chains and supply chain concepts.

Change management practices designed to let everyone understand what is changing, when, and why, will be used throughout the life of ECSS.

ECSS Facts at a Glance

Summary

- End-to-end Air Force logistics transformation
- Supports Expeditionary Logistics for the 21st Century goals
- Over 250,000 end users
- Replaces more than 420 aging systems

The Technology

Computer Sciences Corporation: systems integrator

Oracle: e-Business Suite

Industrial Financial Systems: maintenance, repair, and overhaul; materials requirements planning; and constraints scheduling

Click Commerce: demand planning, supply planning, and readiness-based sparing

Communication Tools

Communicating with the ECSS end-user community is one of the program's critical success factors. A variety of communication vehicles will be used, including:

- Leadership slide decks
- Brochures and specification sheets
- DVD and thumb drive giveaways
- Dedicated user web site
- Wikis
- Blogs

Two major organizations—the ECSS Program Management Office and the Logistics Transformation Office are involved with defining and managing ECSS requirements. The primary focus of the PMO is to ensure that logistics community requirements are met on time and within budget, while the LTO's primary role is gathering requirements and acting as an advocate for the logistics community.

- News inserts
- Videos
- Podcasts
- White papers
- Trade shows

More Information
https://www.ecss.wpafb.af.mil

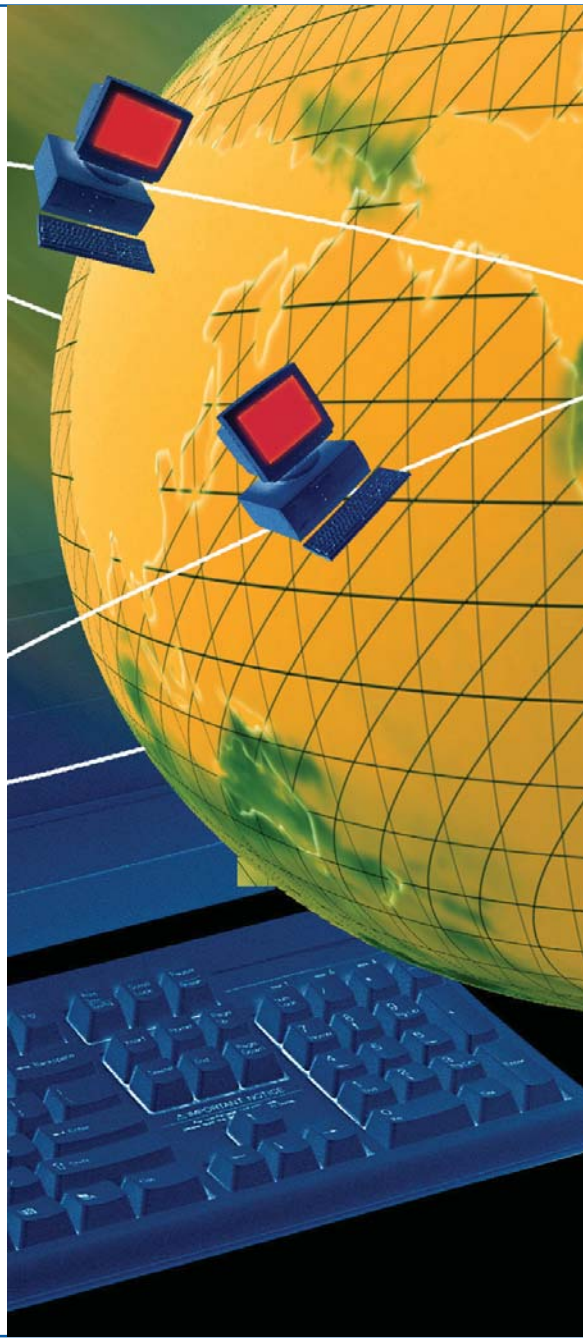
Essential ECSS Glossary

Blueprinting: Blueprinting is the creation of an overall business process description that defines how functions and capabilities, provided by commercial off-the-shelf software products and systems, will be used to support organization and business needs.

Change Management: Change management is the process of aligning an organization's people and culture with changes in business strategy, organizational structure, and systems. Its purpose is to help organizations accept, adapt to, and integrate changes that must be made to improve performance.

Commercial Off-the-Shelf (COTS): COTS is a term for systems or software products which are manufactured commercially and then may be tailored for specific uses. They are most often used in computer and robotic systems. COTS software and systems are in contrast to those produced entirely and uniquely for a specific application.

Expeditionary Combat Support System (ECSS): ECSS is an initiative, whose goal is to improve support to the warfighter by transforming the way the Air Force performs its logistics business by adopting commercial best practices. It will convert stovepiped capabilities into end-to-end business processes. It will redefine



and transition Air Force logistics business processes (and their attendant information systems) into a coherent integrated solution. Along the way, the majority of retail and wholesale systems, and many of their related processes, will be replaced with a set of integrated business processes, and data, supported by a COTS application.

Expeditionary Logistics for the 21st Century (eLog21): eLog21 is an overarching logistics transformation campaign. It strives to improve and expedite Air Force logistics by prioritizing and categorizing current and future initiatives while ensuring those with the highest payback are identified. eLog21 initiatives focus on product support, system engineering, logistics command and control, supply chain management, and repair operations.

Enterprise Resource Planning (ERP): ERP, in its simplest sense, is software that integrates departments and functions across an organization or enterprise into one computer system. ERP runs off a single database, enabling various departments to share information and communicate with each other. ERP systems comprise function-specific modules designed to interact with the other modules, for example, finance, personnel, and so forth.

ECSS Program Office (PMO): The PMO is responsible to ensure that logistics community requirements are met on time and within budget. Building on lessons learned, they have developed a three-phased strategy.

Information Technology (IT): At its most basic level, IT is processing, using, managing, and storing information by computer and computer networks.

Legacy Systems: A term commonly used to refer to existing computer systems and software applications with which new systems or software applications must exchange information. In the case of Air Force logistics, the term refers to more than 420 software systems or applications.

Logistics Enterprise Architecture (LogEA): LogEA is the strategic map guiding the Air Force's logistics transformation effort. It is a compilation of operational architecture, systems architecture, and a transition plan that provides the overall future direction for Air Force logistics.

Logistics Transformation Office (LTO): The LTO is responsible for blueprinting, change management, and gathering end-user requirements. Ultimately, the LTO is the voice of, and the advocate for, the end-user community.

Supply Chain: A supply chain is the sequentially-connected organizations and activities involved in creating and making a product available. It can also be described as the flow of resources into and out of the enterprise's collective operations.

Supply Chain Operations Reference (SCOR) Model: The SCOR model isolates key supply chain management processes and matches their process elements against industry-specific best practices, benchmarking performance data, and appropriate software applications, providing users with a framework for understanding where they need to make improvements.

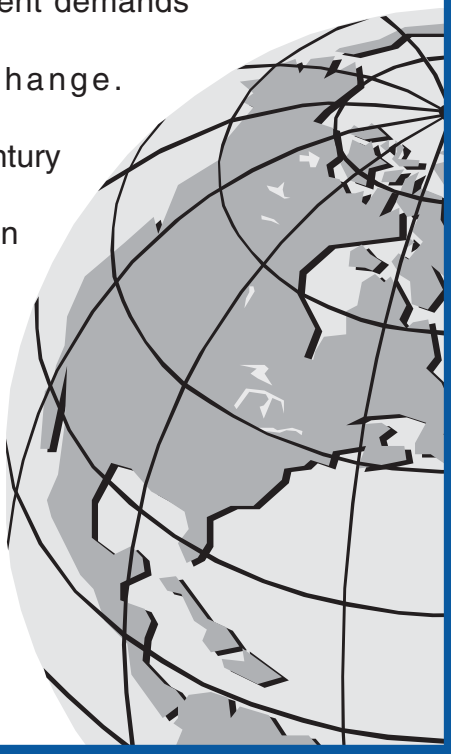
Systems Integrator (SI): From a broad perspective, a systems integrator is a company that combines various components and programs into a functioning system. Unlike software developers, SIs typically do not produce any original code. Instead they enable an organization to use commercial off-the-shelf hardware and software packages to meet specific computing needs.

ECSS
EXPEDITIONARY COMBAT SUPPORT SYSTEM

A New Global Vision for Transforming Logistics

combat support transformation

Meeting the ever-changing needs of the warfighter in today's Joint expeditionary environment demands that Air Force logistics must change. Expeditionary Logistics for the 21st Century (eLog21) is the Air Force transformation campaign to improve logistics to meet both the current and future threat environment. It is a strategy that guides key logistics transformation initiatives to realize expeditionary logistics. eLog21 is action focused.



the new Vision

Expeditionary Logistics for the 21st Century is a comprehensive attempt to change all of our business processes as well as the enabling information technology. It is targeted at the entire Air Force logistics enterprise.

Over time the Air Force logistics community has performed superbly despite operating in a challenging and rapidly changing environment. To accomplish our missions in the future, we must effectively manage change and adapt to new circumstances and requirements. This means changing and, in some cases, totally transforming our business processes and the underlying information technology (IT). Unfortunately, our past unwillingness to change our business processes has led to a series of failed IT programs. One of the key lessons learned from these failures is ineffective change management. Effective change management includes activities and action plans for mitigating risk and creating conditions optimizing the impact of a new process enabled by a new system. The Expeditionary Combat Support System (ECSS) will touch every process we operate and will make major changes to most of these processes. Throughout the life of ECSS, we will be using change management practices designed to let everyone understand what is changing, when, and why, in order to get input from and gain the support of all Air Force logisticians.

By now you should know that Expeditionary Logistics for the 21st Century (eLog21) is the Air Force-wide transformation campaign comprised of over 20 initiatives that will fundamentally revolutionize the way the Air Force provides logistics support. The *eLog21 Campaign Plan* is designed to transition Air Force logistics processes from the current reactionary, functionally stove-piped processes, to an anticipatory (planning based), cross-functional, integrated (full visibility by all parties), enterprise-wide set of processes. Individual elements of eLog21 are being rolled out in a phased approach to allow time for process development, integration, and training.

Expeditionary Logistics for the 21st Century is a comprehensive attempt to change all of our business processes as well as the enabling information

The logistics mission is straightforward: get the force to the fight, keep the force in the fight, and prepare the force for the next fight. Transformation is essential to effectively meeting these mission requirements.

technology. It is targeted at the entire Air Force logistics enterprise, to include business process redesign, performance metrics, training, systems, supply chain management, maintenance, change management, and more. Technology is not the focus of the campaign, but the enabler. The Air Force currently has over 400 disparate logistics legacy information systems. In order for Air Force logistics to transform, we need to establish an enterprise view, integrate processes, better utilize resources, and integrate data and technology across the supply chain. Embedded within the eLog21 initiative, ECSS is the IT modernization component of the overall logistics transformation effort.

ECSS is an IT suite with a proven commercial enterprise resource planning (ERP) system at its core. An ERP is defined as a set of applications software that brings manufacturing, financial, distribution, and other business functions into balance. It integrates all departments and functions across an enterprise into a single computing system that can serve all unique departmental needs. It standardizes business processes and tools across the entire enterprise, regardless of program or site. The integration of systems

and technology also enables reengineering of the business processes by leveraging technological capabilities that were previously unavailable. Oracle Corporation, teamed with Click Commerce and Industrial Financial Systems, was selected to provide the software solution for ECSS. Oracle is the leader in innovative software technologies for enterprise information management, and is a proven commercial off-the-shelf-based solution supplier.

Once the software suite was selected, the Air Force selected Computer Sciences Corporation (CSC) as the overall systems integrator. CSC brings a proven ERP implementation history and proven implementation methodologies in Catalyst. The CSC Catalyst methodology is a broad, integrated knowledge framework that provides comprehensive coverage for all domains of business change—process, organization, location, data, application, and technology—at all stages of the system life cycle, from vision and strategy to operations. These processes and concepts are all part of business process redesign.

The ECSS selection process took too long and was fraught with numerous obstacles and delays. Finally, on 1 May 2007 we launched the ECSS development process. The next part of this transformation journey will be the most difficult because this is where we must commit ourselves to facing the changes ahead and turning them into opportunities to improve and enhance support to the warfighting mission. Transformation is a tough job, especially within complex organizations like the Air Force, but so long as we are willing to adapt to the changes ahead, we will keep the Air Force ready for the future. Your knowledge and insights are important to us as we move forward. Airmen have never been shy about expressing their opinions, so I have no doubt we will hear from many of you. Only by working together can we drive comprehensive and effective logistics transformation.

Mr Grover L. Dunn

Mr Grover Dunn is the Director of Transformation, Deputy Chief of Staff for Logistics, Installations & Mission Support, Headquarters United States Air Force, Washington, DC. He is responsible for planning, developing, and implementing innovative and transformative concepts across the full United States Air Force logistics enterprise. He started his Air Force career in 1974 and has over 30 years experience with end-to-end logistics processes. His past assignments include managing logistics for all Air Force aircraft, subsystems, embedded software, and sustaining engineering; managing the overall logistics health of Air Force aircraft and missile systems; and managing the programming and budgeting of aircraft and missile modifications and spares, depot maintenance, contractor logistics support, stock fund, industrial fund, manpower, and infrastructure for Air Force Logistics Command.

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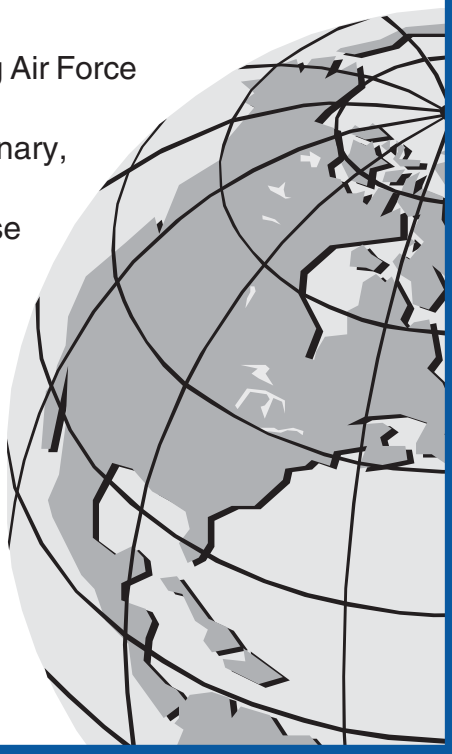
ECSS
EXPEDITIONARY COMBAT SUPPORT SYSTEM

Making Logistics Transformation a Reality

implementing transformation

The results expected from transforming Air Force logistics are fourfold. To be expedition-ary, logistics must operate with an enterprise view, across integrated processes, with optimized resources, while leveraging integrated technology. Combined, these four effects drive the future state of Air Force logistics.



Concept to Reality

Ultimately, transformation is about results. Team CSC's focus on outcomes ensures that program activities tie directly to Air Force objectives, the realization of benefits, and achieving the results the Air Force expects.

As a key element of the Air Force Expeditionary Logistics for the 21st Century plan for transformation, the Expeditionary Combat Support System (ECSS) has clear mission objectives— improve Air Force logistics support at a lower cost. A Computer Sciences Corporation-led team (Team CSC) is the systems integrator (SI) for this program and brings a business-transformation approach to the Air Force's business processes and culture supported by an enterprise-wide logistics solution to realize the objectives of ECSS.

Team CSC is experienced in performing as the SI for some of the government's and Department of Defense's largest and most complex transformations. Team CSC's lessons learned from the Army Logistics Modernization Program and Internal Revenue Service's Integrated Financial System projects provide a strong foundation for the team's approach. These programs provide rich lessons in integrating business process redesign and commercial off-the-shelf (COTS) enterprise resource planning packages in the highly complex process, data, and cultural environments that are unique to the government.

Team CSC has adopted a business-focused strategy for ECSS by driving a business process management methodology across the entire transformation effort. This approach affects the way Team CSC organizes its work, conducts blueprinting workshops to gather and shape requirements, and configures the COTS packages to meet Air Force requirements.

"Don't let the term *systems integrator* mislead you. This is not simply an IT [information technology] implementation project," said Christopher Beiswenger, CSC vice president and ECSS transformation executive. Beiswenger continued,

> It's much more than that. Team CSC has embarked on an exciting journey with the Air Force logistics community, the Air Force acquisition community, and Oracle Corporation that will revolutionize

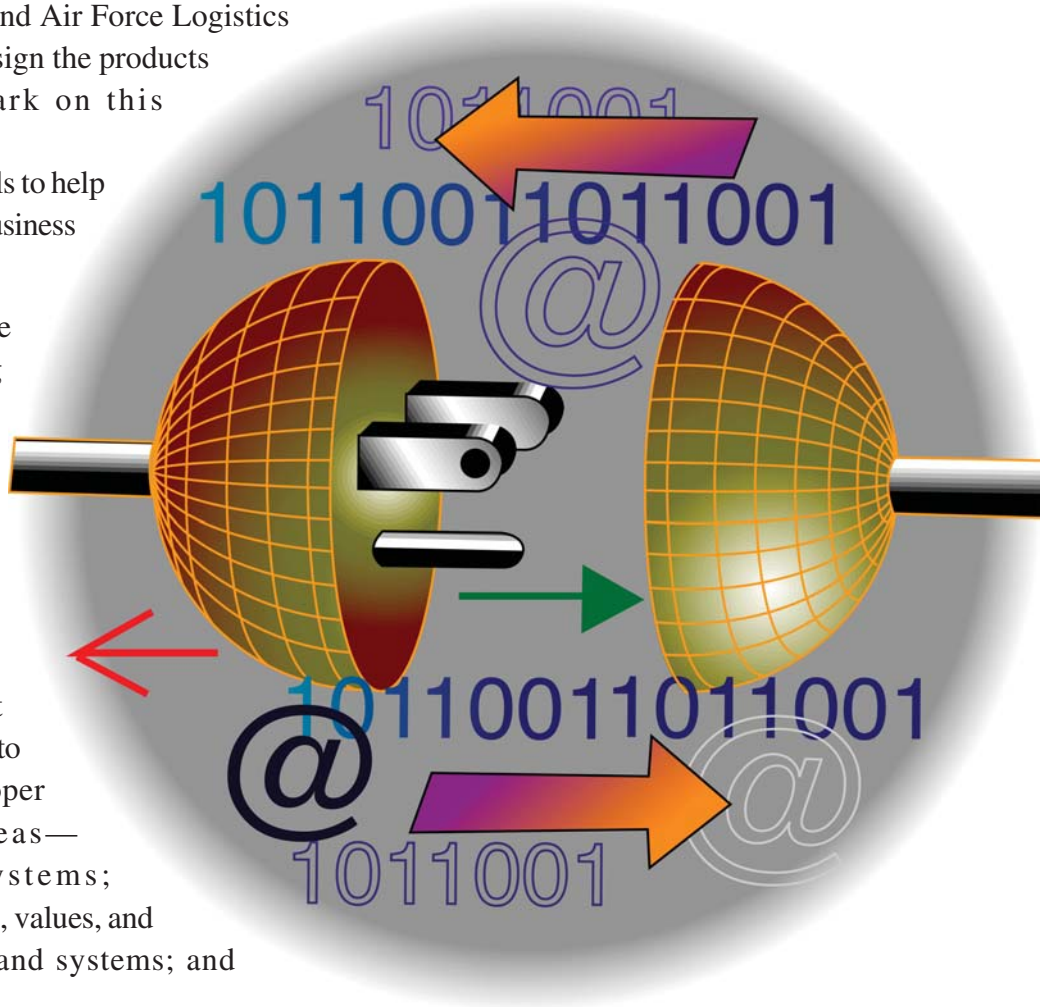
Team CSC has adopted a business-focused strategy for ECSS by driving a business process management methodology across the entire transformation effort.

Air Force logistics for the 21st century. Our mindset is to deliver transformed Air Force processes with technology as the enabler. Our vision includes a partnership between Team CSC and the Air Force to horizontally integrate processes, eliminate vertical functional stovepipes, and assist in the adoption of best practices for the logistics community.

Team CSC has been working hand-in-hand with the Air Force ECSS Program Management Office and Air Force Logistics Transformation Office to plan and design the products that will be necessary to embark on this transformation journey.

Team CSC leverages two critical tools to help guide the transformation of Air Force business processes:

- The **CSC Business Diamond** (Figure 1). Provides a framework for ensuring that each aspect of change is addressed when considering the implementation of new business processes.
- The **Catalyst Methodology** (Figure 2). CSC's proprietary methodology that guides the way CSC engages in transformation programs. Catalyst provides a commercial methodology to guide Team CSC through the proper steps to address the five areas—management and control systems; organization, jobs, and skills; beliefs, values, and norms; information technology and systems; and



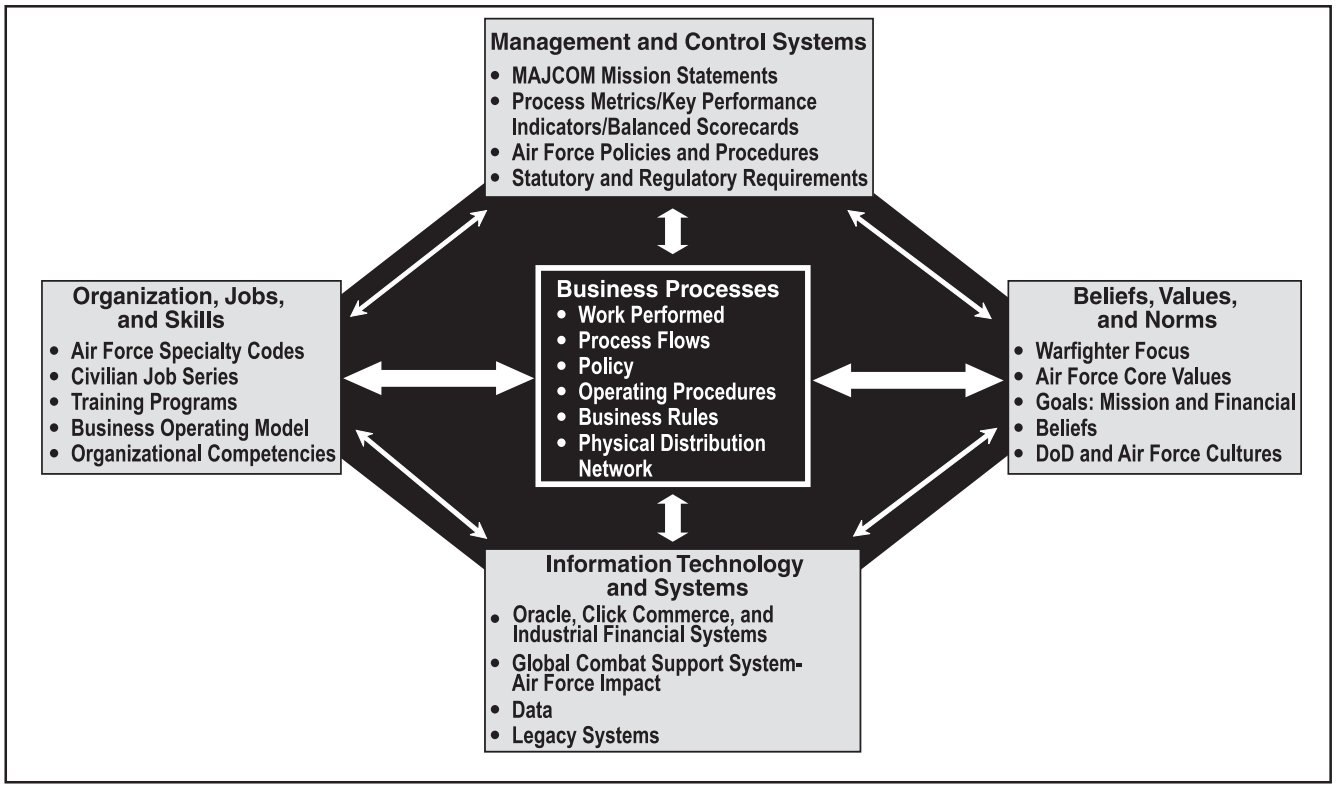


Figure 1. CSC Business Diamond

business processes—identified on the Business Diamond.

The Business Diamond provides a framework that places business processes at the core of the transformational effort. As integrated product teams analyze existing processes and define new logistics processes in blueprinting workshops, they *walk the Diamond*, examining all aspects of an enterprise that a business process impacts.

The Business Diamond helps those involved in process design understand the impact of changes to business processes on other areas of the Air Force. It also reminds individuals participating in process design that many of the transformational considerations are people- and process-oriented, not simply software application- or technology-centric.

"In order to successfully transform an organization to improve business performance, we must address each one of the items identified on the Business Diamond," Beiswenger said. He continued,

> Every person involved in Air Force logistics is touched by one or more of the diamond's four points. We must be sure to address each area if ECSS is to be successful. When we are involved in business transformation it is critical that we look at the entire picture including how the organization is managed, and how its values, beliefs, and norms affect logistics performance.

While the Business Diamond ensures that all integral parts of the enterprise are addressed, Catalyst provides a single methodology to integrate the ECSS effort at all levels of Team CSC and its Air Force partners. Catalyst converts hard-fought experience into world-class, field-tested processes, techniques, role definition, and work products. It provides a flexible structure to enable enterprise transformation, a cohesive set of concepts, and a common vocabulary to support effective communication and shared activities across program execution, change management, and program management.

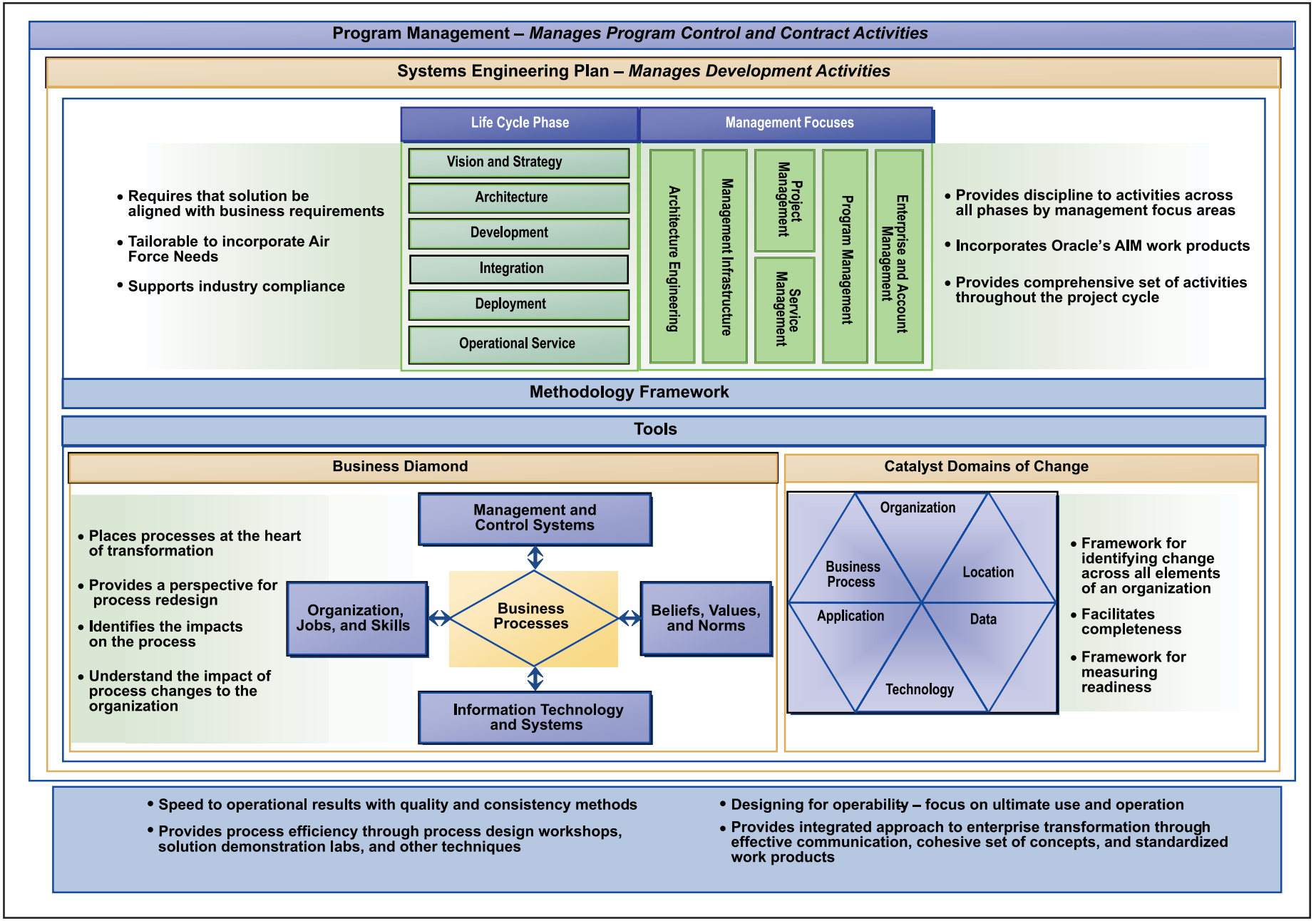


Figure 2. CSC Catalyst Methodology

Catalyst is Team CSC's approach to initiating, motivating, designing, implementing, managing, and coordinating change in large organizations. It provides the mechanism by which CSC gathers, validates, and integrates best practices and makes them available to Team CSC members and clients.

Team CSC uses the process templates and knowledge base components of the Catalyst Methodology to develop and implement processes for ECSS. Catalyst reflects the thinking of CSC organizations worldwide serving the government and commercial markets. It combines proven methods with innovations appropriate to a rapidly changing business and technical environment.

Ultimately, transformation is about results. Team CSC's focus on outcomes ensures that program activities tie directly to Air Force objectives, the realization of benefits, and achieving the results the Air Force expects. With a collective mindset that ECSS is about business process transformation and not simply an IT implementation, and a clearly-defined approach, supported by the Business Diamond framework and Catalyst methodology, Team CSC and its Air Force partners will, absolutely, revolutionize Air Force logistics for the 21st century.

Mr Kevin C. Kelley

Mr Kelley is CSC's vice president and program executive for the US Air Force ECSS program. As program executive, he is responsible and accountable for CSC's performance as the systems integrator for the ECSS program. Prior to assuming this role, Mr Kelley was vice president of the treasury business area and program executive for the Internal Revenue Service PRIME program in the Information Technology and Science Solutions Division of CSC's North American Public Sector–Civil Group. In that role, he was responsible for all CSC work performed for the US Department of the Treasury.

Previously, Mr Kelley completed a 20-year career in the United States Army and retired as a Lieutenant Colonel. During his career, he served in various assignments including 10 years in the acquisition corps. Mr Kelley holds a bachelor of arts degree from John Carroll University and a master of science degree in computer information systems from Bentley College.

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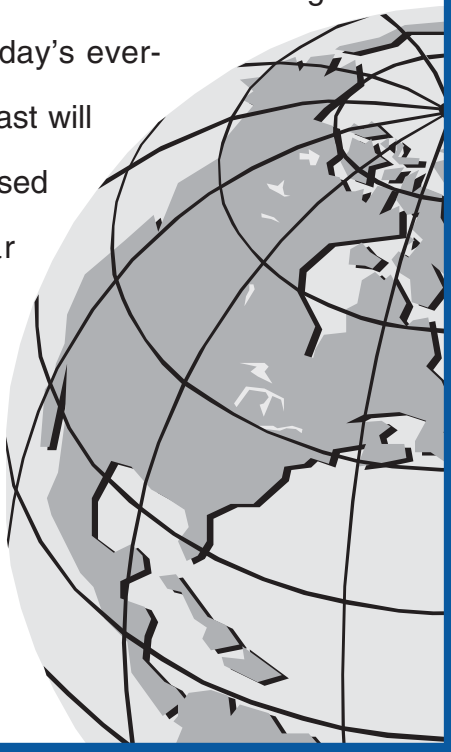
ECSS
EXPEDITIONARY COMBAT SUPPORT SYSTEM

ECSS and Transformation

the way ahead

To effectively support the Expeditionary Air Force, an integrated logistics chain must establish better ways to respond to two critical warfighter questions: “Where is our part?” and “When will we get it?” Clearly, this is no small task in today’s ever-changing world. The solutions of the past will not work for the future. The garrison-based processes born out of the Cold War posture must be fundamentally rethought. Air Force logistics must also become more expeditionary—satisfy operational requirements, be rapid in its response, flexible in its structure, consistent in its delivery, reliable, and economical in its actions.



Captain Damelsa D. White, USAF and Lieutenant Colonel Jeffrey C. Bergdolt, USAF

The Road to Success

Introduction

In order to meet the logistics challenges of today and tomorrow, the Air Force logistics chain (also called the logistics supply chain, logistics support chain, and at times just the supply chain) must be more efficient and effective in getting the right part, to the right place, at the right time. To do this, the Air Force must make the responsiveness of its logistics chain more rapid, while managing logistics at the enterprise level with a common operating picture in which processes and capabilities are predictive, streamlined, standardized, and provide added value. The ability to *sense* the capabilities and requirements of the entire Air Force logistics chain in near real time will allow the Air Force to move faster and lighter, which will ultimately provide better support to the warfighter.[1]

Why We Need to Transform Air Force Logistics

Logistics operations and processes are becoming increasingly more critical as support requirements and locations change according to national security needs and objectives. To continue to meet these changing requirements, the logistics chain must be able to quickly adjust and respond, regardless of where the warfighter is located and support is needed.[2] However, today, the business of Air Force logistics is conducted in loosely integrated functional silos in which there are segmented and duplicative processes, competition for resources without an enterprise view, reactive and limited real-time management, and no common measure of success.[3] In addition, Air Force logistics does not possess a true capability to rapidly replan requirements or reallocate resources when operational goals and scenarios change.[4] Furthermore, there are slow distribution, multiple plans, various standards, wasted resources, excess material, massive deployment seams, multiple customer touch-points, and loss of accountability. Figure 1 depicts how logistics processes are presently duplicated at all Air Force levels.

Clearly, Air Force logistics needs to encompass business intelligence, provide dynamic command and control, be network-centric and predictive, and execute strategic collaborative planning and distribution. To do this, logistics must be transformed.

How We Will Transform

Expeditionary Logistics for the 21st Century (eLog21) is the Air Force-wide transformation campaign that will dramatically change the way the Air

Force provides logistics support. It is a comprehensive effort to change all Air Force logistics business processes as well as the enabling information technology. eLog21 targets the entire Air Force logistics enterprise, to include business process redesign, performance metrics, training, systems, supply chain management, maintenance, and change management. It has two primary objectives—first, increase equipment availability by 20 percent, and second, reduce annual operation and sustainment costs by 10 percent or $2.75B.[6]

Guiding eLog21 is the *eLog21 Campaign Plan.* It is designed to transition Air Force logistics processes from the current reactionary, functionally stove-piped processes, to an anticipatory, cross-functional, integrated, enterprise-wide set of processes. Individual elements of eLog21 will be deployed in a phased approach to allow time for process development, integration, and training.

LogEA: Transformation Roadmap

The Logistics Enterprise Architecture (LogEA) is the strategic map guiding the Air Force's logistics transformation effort. Simply put, it is compilation of operational architecture, systems architecture, and a transition plan that provides the overall future direction for Air Force logistics. It employs the Department of Defense Architecture Framework, linkages to the Design Chain Operations Reference model, and the Supply Chain Operations Reference (SCOR) model.[7] SCOR describes the business activities associated with all stages of satisfying customer demand and serves as a basis for:

- Improving collaboration and supply chain performance
- Understanding and measuring the flow of information or goods through the supply chain
- Understanding stakeholders in the supply chain

SCOR breaks down each of the three entities of the supply chain (supplier, enterprise, and customer) into five primary management processes (Plan, Source, Make, Deliver, and Return) as depicted in Figure 2. This model provides common definitions that can be used to describe and link supply chains of various types and sizes.[8]

LogEA will define and align organizational vision, mission, goals, and objectives with logistic business processes and information technology initiatives. It will provide the foundation for achieving the Air Force's vision for logistics and ensure that all eLog21 initiatives are aligned with the goals of eLog21.[9]

Article Acronyms

ALC – Air Logistics Center
BOM – Bill of Materials
BRAC – Base Realignment and Closure
C2 – Command and Control
CAM – Centralized Asset Management
CIRF – Centralized Intermediate Repair Facility
CLS – Contract Logistics Support
COCOM – Combatant Command
CSC – Computer Sciences Corporation
CY – Calendar Year
COTS – Commercial Off-the-Shelf
ECSS – Expeditionary Combat Support System
eLog21 – Expeditionary Logistics for the 21st Century
ERP – Enterprise Resource Planning
GLSC – Global Logistics Support Center
GSD – General Support Division
IPT – Integrated Process Team
IT – Information Technology
LogEA – Logistics Enterprise Architecture
LRS – Logistics Readiness Squadron
LSC – Logistics Support Center
LTO – Logistics Transformation Office
MAJCOM – Major Command
MSD – Material Support Division
MICAP – Mission Capable
PMO – Program Management Office
RE21 – Repair Enterprise for the 21st Century
RSP – Readiness Spares Package
SCOR – Supply Chain Operations Reference
SI – Systems Integrator

Enterprise Resource Planning: Information Technology Transformation

The Expeditionary Combat Support System (ECSS) is the information technology (IT) modernization component for the entire transformation effort and it will enable the vision of eLog21.

Two major organizations—the ECSS Program Management Office (PMO) and the Logistics Transformation Office (LTO) are involved with defining and managing ECSS requirements. The primary focus of the PMO is to ensure that logistics community requirements are met on time and within budget, while the LTO's primary role is gathering requirements and acting as an advocate for the logistics community.

At the core of ECSS is a proven commercial enterprise resource planning (ERP) system. An ERP is a set of applications software that integrates functions across an enterprise into a single computing system. The

software runs off a common database and enables better communication and information sharing.[11] ECSS will replace more than 420 logistics and evaluation systems with a commercial off-the-shelf (COTS) product suite. The suite, to be deployed by the systems integrator (SI)—Computer Sciences Corporation (CSC), will improve logistics operational processes and will include separate but integrated modules as depicted in Figure 3. CSC will configure, integrate, and implement the COTS suite and provide support to help the Air Force achieve its logistics business performance objectives.[12]

ECSS Capabilities

Basic ECSS capabilities are depicted in Figure 4 and briefly outlined below:

- **Advanced Planning and Scheduling**: demand forecasting and collaborate plans development.
- **Material Management, Contracting, and Logistics Finance**: procurement and purchasing, contract management, repair and maintenance support, and finance transactions.
- **Configuration and Bill of Materials (BOM)**: primary, alternate, common, and phantom planning and configuration BOMs.

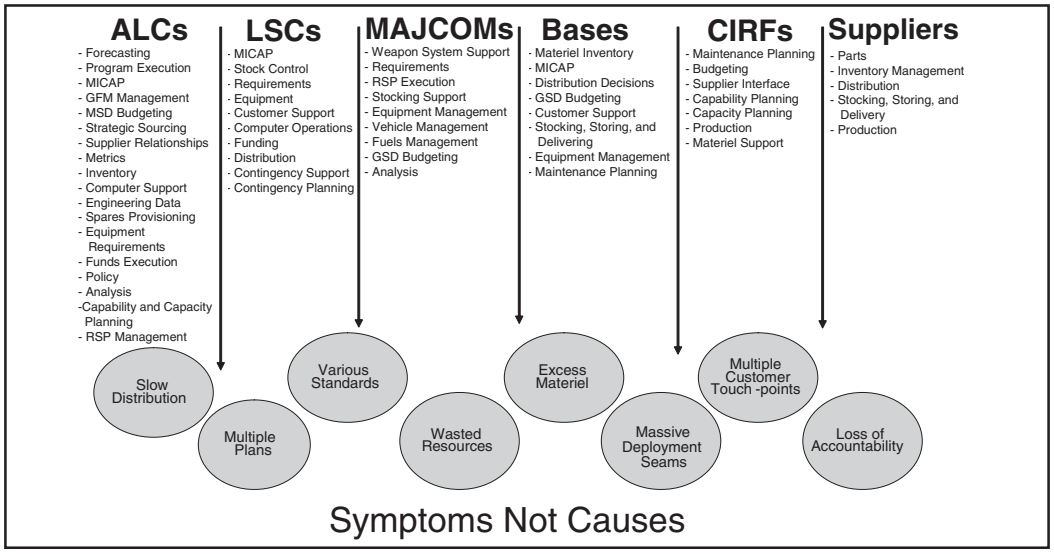


Figure 1. Current Weaknesses in Air Force Supply Chain Management[3]

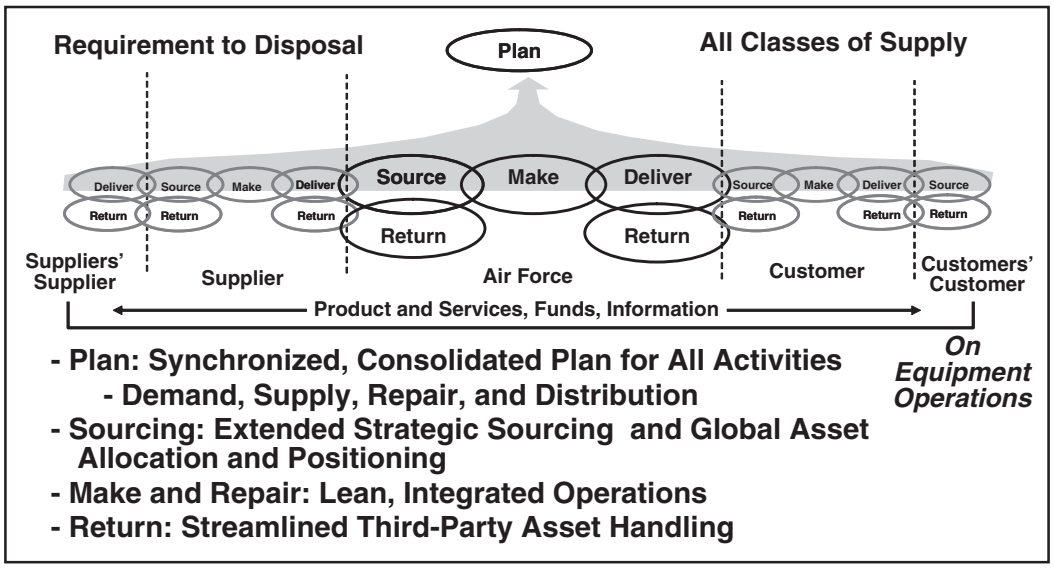


Figure 2. Logistics Enterprise Architecture and SCOR[10]

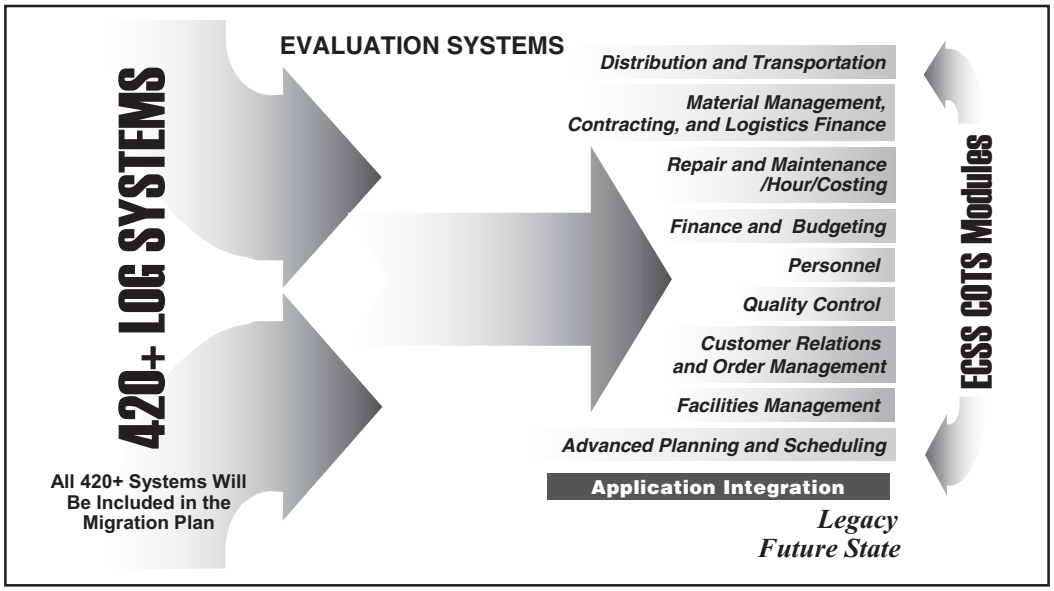


Figure 3. Notional Future Logistics State[13]

- **Repair and Maintenance**: repair and maintenance planning and operations; visibility into maintenance costs, equipment history, and maintainability and reliability data.
- **Product Life-Cycle Management**: integrated engineering and execution functions; life-cycle view of assets to include repair history, cost, engineering changes, and relationships to other assets.
- **Customer Relationship Management and Order Management**: order fulfillment processes and tracking from material requests to fulfillment of the order.
- **Distribution and Transportation**: physical control of material to include cycle counting, storage, shipping, transporting, and tracking.
- **Decision Support**: integrated information across process and functional areas; can include legacy system data.
- **Facilities Management**: track and maintain equipment; provide asset visibility.[14]
- **Quality Control**: data collection; reporting with traceability back to the transaction; trend analysis.
- **Document Management**: identify and maintain documents used in current and future state processes; data cleansing standardizes formats and methods used to link data.[15]
- **Budgeting**: develop budget proposals; monitor expenditures; assess variances and causes of variances; develop revised budgets based on changes in assumptions.[16]

Implementation Benefits and Strategy

Implementing ECSS will add value by reducing inventories while increasing availability, reducing maintenance cycles, reducing clerical efforts for financials, and will result in more timely decisionmaking, better allocation of resources to demand, improved financial management, and improved product and data quality.[18] ECSS will also merge retail and wholesale logistics systems, provide near real-time worldwide visibility of assets, and provide seamless transition from peace to wartime operations. There will also be greater combat support capability provided to Joint and Air Force commanders.[19]

ECSS development will continue until final implementation in late calendar year 2013 (CY13). Initial ECSS tasks included selecting the ERP software, defining current processes (pre-blueprinting), and selecting the SI to implement the ERP software solution. Subsequent tasks include constructing the future functional and technical design, configuring the system, deployment, and training.[20] In addition to the LTO, subject matter experts (SME) from the major commands (MAJCOM) will participate in ECSS blueprinting efforts. According to Mr Grover Dunn, Director of Transformation, SMEs from the various MAJCOMs are still needed to participate in short term temporary duty assignments during the 18-24 month blueprinting phase for the software product.[21]

Identifying the gaps between what the COTS suite provides and the requirements needed will be determined during the blueprinting phase. A formal gap analysis will be conducted, allowing decisions based on what is best for the Air Force. Integrated process teams (IPT) will determine what processes, systems, and procedures should be used in the future Air Force supply chain. The LTO, in conjunction with the SI, will coordinate and facilitate IT related IPTs. Headquarters Air Force Materiel Command A4I will coordinate and facilitate financial and customer relations related IPTs.[22]

Transformation Challenges

Successful implementation of ECSS will require a considerable amount of change management. As a result, a change management plan is being developed which will help achieve a higher probability of success, ensure leadership commitment and accountability, address organizational and human resource change issues, make certain the right people with the right skills are confident and ready to perform at implementation, and communicate the need for change to all the stakeholders.[23] As with the inception of all new initiatives, there is *ramp-up* time that entails ensuring people across the Air Force logistics enterprise are aware of the need to transform logistics.

Road-show briefings, describing ECSS and future courses of action, have been conducted for the MAJCOMs as well as leadership at the Air Staff. Other training and education efforts will follow. The goal is to ensure that every member of the Air Force logistics enterprise understands the importance and scope of the changes that will take place.

Understanding that ECSS is not just another temporary improvement initiative is critical to its success. Members of the Air Force logistics enterprise must have confidence and believe in the credibility of the initiative so that they become personally invested and committed to the changes that will occur as ECSS is implemented.[24] It is expected that there will be a

learning and training curve, as well as some deficiencies; however, much planning is going into how to train and develop the force to ensure people understand the ECSS vision, the benefits of ECSS, and the need to change.

Another major challenge will be to ensure a standard set of business processes and policies are deployed and maintained across the entire logistics enterprise.

Lastly, the impact of redefined job roles within the logistics enterprise workforce, as a result of ECSS implementation, may prove challenging and must be evaluated.

What Do We Do While ECSS Is Being Developed? The Global Logistics Support Center (GLSC)

An interim enterprise management capability is needed until ECSS is implemented. While ECSS is being developed, the Air Force will leverage existing IT tools and initiatives to help understand new processes and identify temporary work-arounds. It will implement a GLSC, as depicted in Figure 5. The GLSC will provide better levels of common resource sharing and greater asset visibility. Enterprise planning and execution and total asset visibility will be achieved by CY13.

The GLSC will be the command and control (C2) center for the supply chain and maintenance, repair, and overhaul capability for the Air Force.[26] The GLSC will consolidate the planning functions being accomplished at the air logistics centers with the operationally focused planning being accomplished in the combat air forces and mobility air forces logistics support centers.[27] The logistics supply chain will be managed using supply chain planning, supply chain operations, and supply chain strategy and integration as illustrated in Figure 6. A discussion of the major elements within the GLSC follows.

GLSC Supply Chain Planning

The planning cell will look at ways to expand and increase current operational planning capabilities of

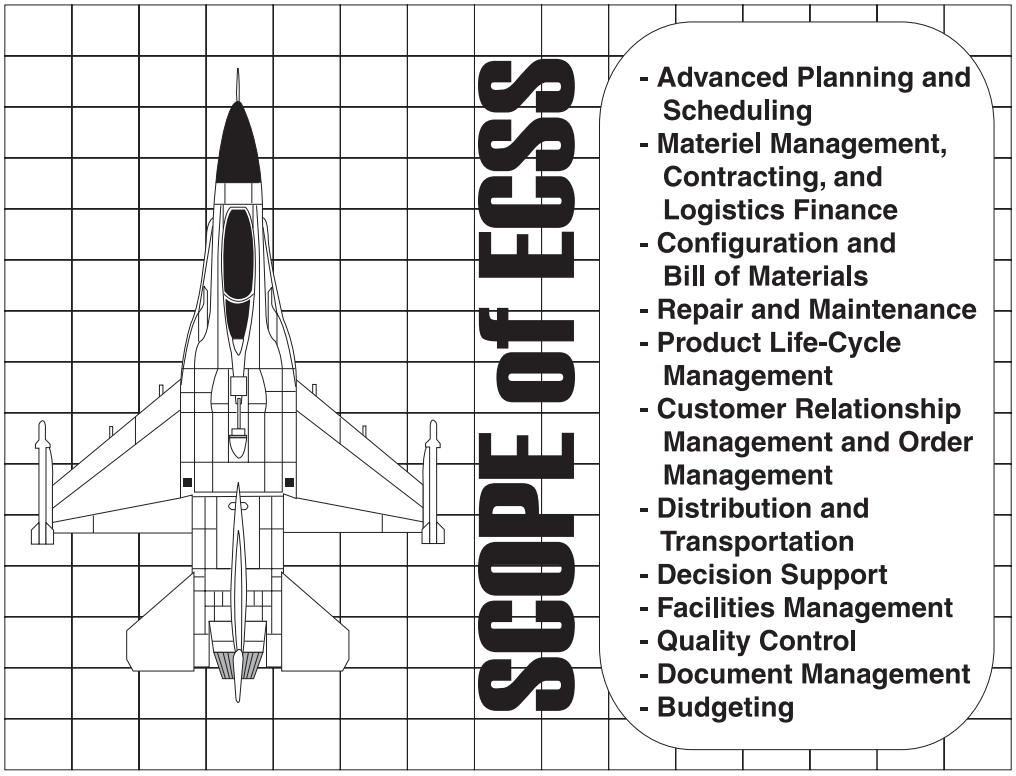


Figure 4. ECSS Capabilities[17]

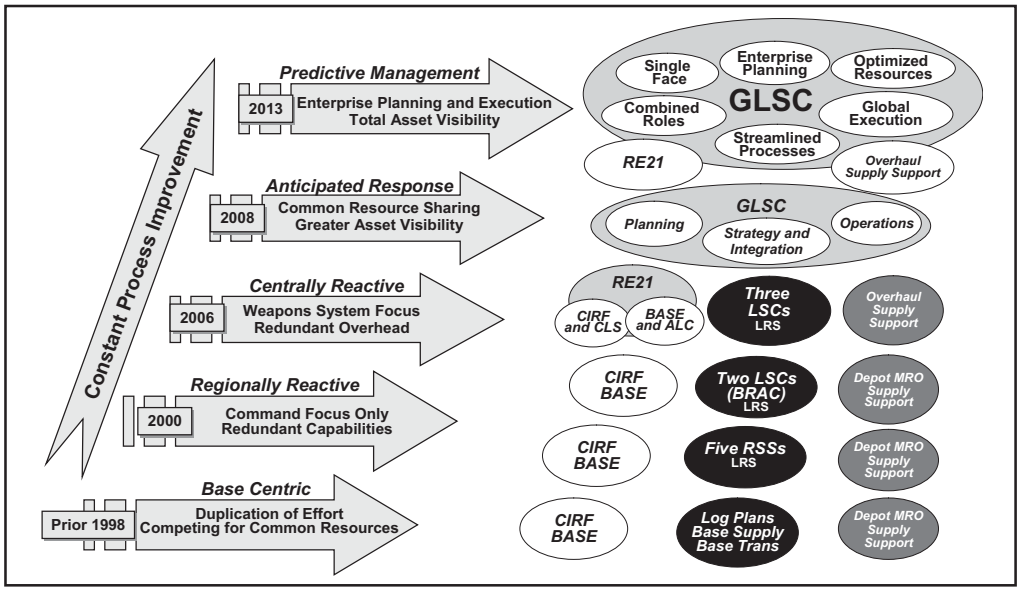


Figure 5. GLSC, the Next Evolution of Supply Chain Management[25]

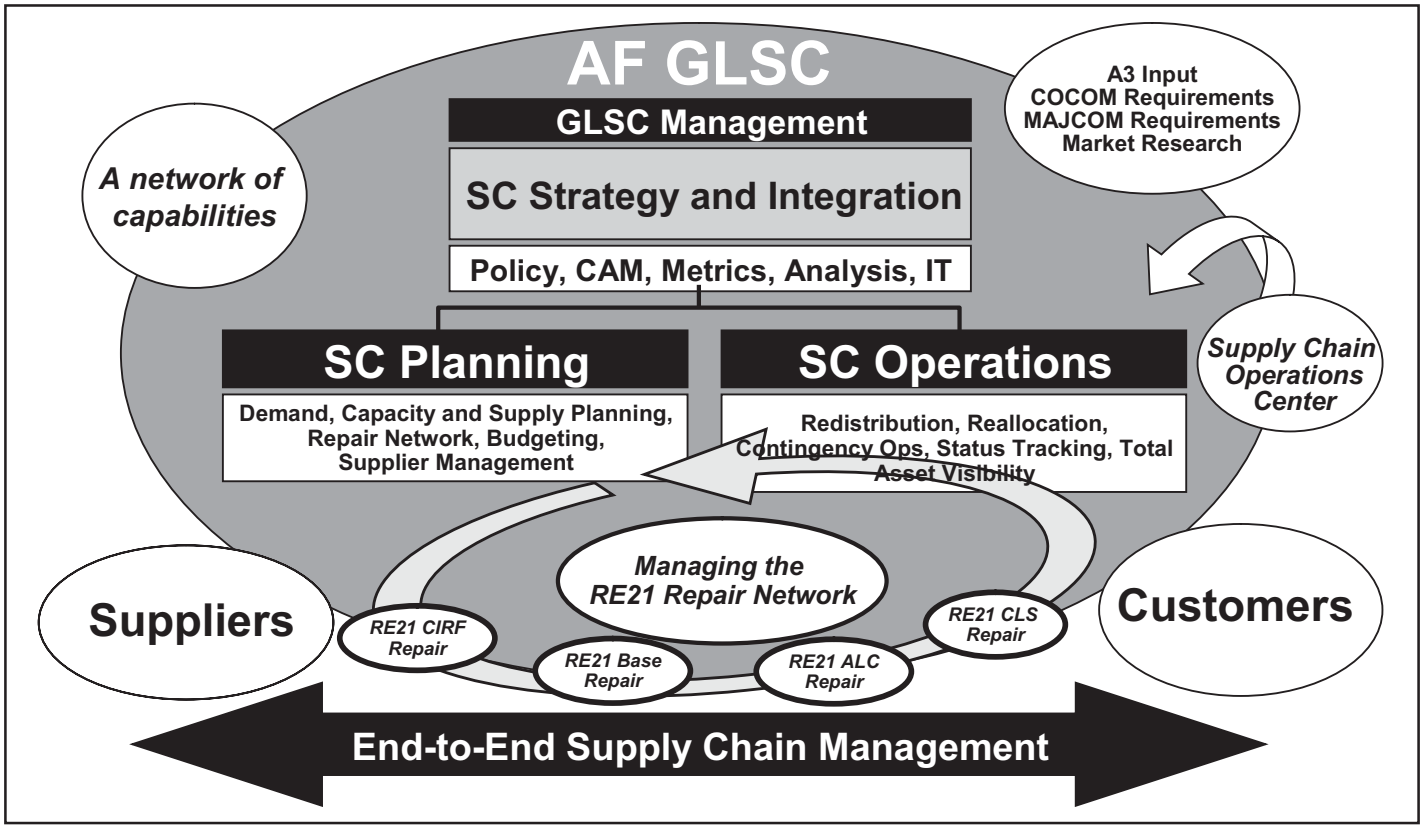


Figure 6. GLSC - AOC for the Air Force Supply Chain[28]

D200 to include planning for material, repair, distribution, transportation, and infrastructure.[29] The planning responsibilities of this cell will include developing a demand plan for all weapon systems and commodities as a result of collaborative forecasting. A material sourcing strategy will also be developed with the Defense Logistics Agency and other suppliers. Other responsibilities will include setting and allocating inventory levels and buffers across the enterprise, developing gross capacity and allocation and management, life-cycle commodity engineering, surge capacity planning for production, repair, stocking, distribution, and financial planning and execution.[30]

GLSC Supply Chain Operations

Once there is a demand plan, the operations cell will control the execution of the plan. The execution cell will be the single unified command and control node for execution of commodity management. Other responsibilities include managing distribution based on operational priorities and managing equipment and stock control, to include reallocation, repair prioritization, demand prioritization, contingency operations (reach back), surge execution, and data management.[31] For example, if there is a hurricane and the centralized intermediate repair facility in New Orleans cannot meet the engine repair (CIRF) need, the C2 will shift those engines to other repair locations, determine the changes in needed stocks and kits, and direct redistribution of engines to proper customers and maintenance locations.[32] The cell will also provide a single point of contact for logistics customers to resolve issues.[33]

GLSC Supply Chain Strategy and Integration

The strategy and integration cell will analyze how well the plan is working. The metrics that will enable measurement and analysis of the logistics chain are yet to be determined. Automated and standardized balanced scorecards are needed to provide a common source of truth. Standard procedures and policy will be used to ensure the logistics chain is standard, flexible, and lean.[34] The strategy and integration cell will also ensure focus remains on the ability to support the warfighter and that funds are properly utilized in supporting operational requirements.[35]

Conclusion

There will be bumps and tough times ahead while implementing ECSS, but the results will be well worth the challenges that lie ahead. ECSS will increase

enterprise-wide asset visibility, improve weapon system availability, reduce inventory footprint, and reduce costs. Without question, successfully deploying and implementing ECSS requires focused and strong leadership, a strong change management program, and buy-in and collaboration from everyone involved in the Air Force logistics enterprise. In the words of Vice Admiral Arthur Cebrowski, US Navy (Retired), "…You have a choice: you can either create your own future, or you can become the victim of the future that someone creates for you."[36]

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Sound logistics forms the foundation for the development of strategic flexibility and mobility. If such flexibility is to be exercised and exploited, military command must have adequate control of its logistic support.

—Adm Henry E. Eccles, USN

He who will not apply new remedies must expect new evils; for time is the greatest innovator.

—Viscount Francis Bacon

Logistics comprises the means and arrangements which work out the plans of strategy and tactics. Strategy decides where to act, logistics brings the troops to that point.

—Gen Antoine Henri Jomini

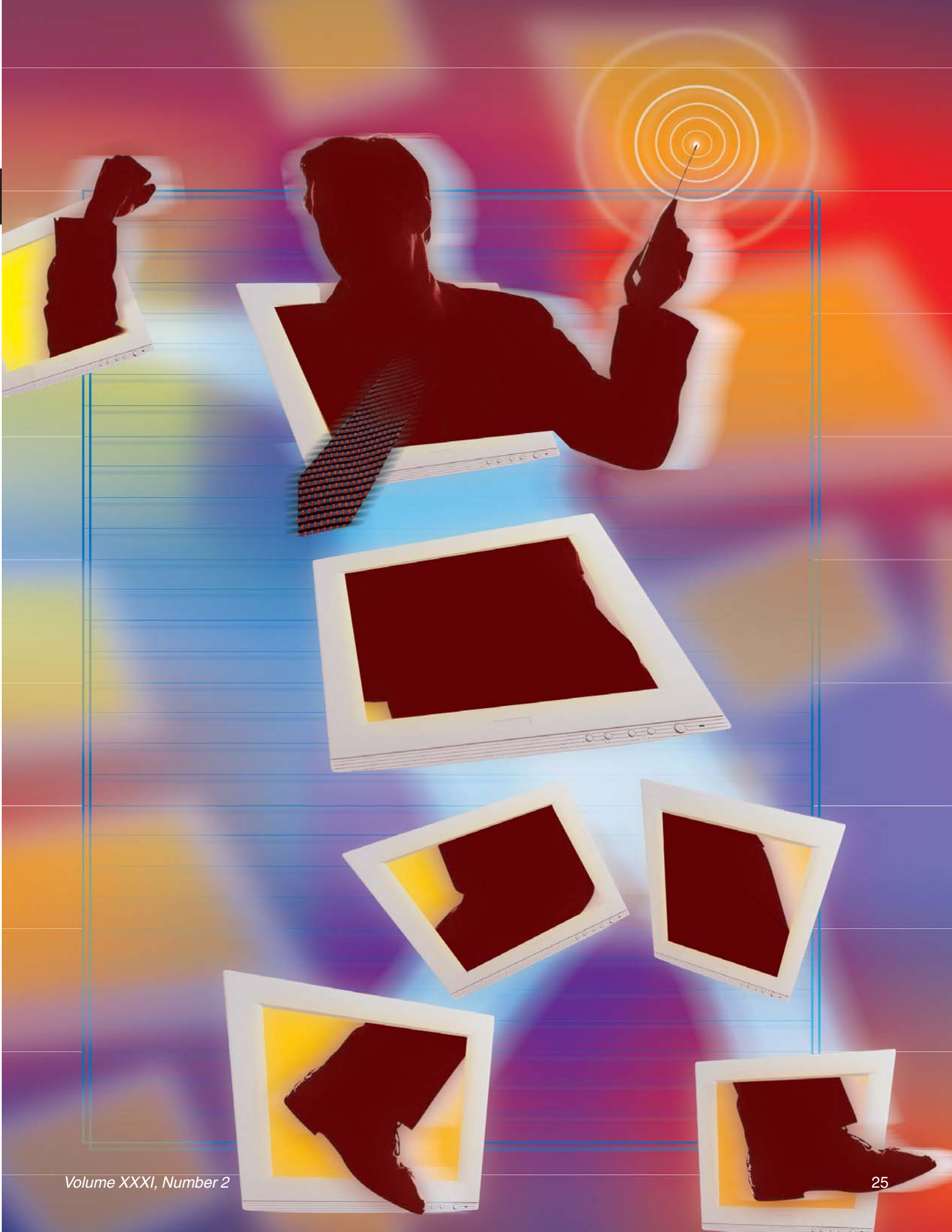
Paul Hartman, Morgan Borszcz Consulting

ECSS Change Management

How would you have done it? That really is the fundamental question that arises after years of high-level meetings, strategic studies, systems engineering analysis, and expenditure of millions of dollars. Unfortunately, the answer one often finds is that the business savings or improvements expected to be achieved with implementing an enterprise resource planning (ERP) product suite have partially or completely failed. More often than not, one also finds a string of very similar and very predictable patterns of chaos which could have been overcome through the use of end-user input and ideas, superior leadership, and the well-developed, structured approach clearly spelled out in an overarching organizational change management plan (OCMP).

By late calendar year 2013 (CY13), the Air Force will have successfully completed the implementation of the world's largest, single instance ERP. With over 250,000 primary, secondary, and casual users, the Expeditionary Combat Support System (ECSS) will have enabled transformation of every process, policy, system, and job skill within the end-to-end (E2E) supply chain (E2E supply chain refers to core traditional logistics functional area disciplines, as well as several enabling disciplines such as contracting and finance). ECSS will afford unprecedented opportunities to increase weapon system availability, decrease operations and support costs, and dramatically improve logistics readiness and maintenance support to the warfighter.

In order to accomplish this significant level of transformation, each member of the Air Force logistics enterprise (active duty, Air National Guard, Air Force Reserve, civilian, and contractor) must answer for themselves, "How would you have done it?" and ensure that the answer that works for them as an individual is woven into the overarching ECSS OCMP. This single document establishes the framework and outlines the core processes and procedures the ECSS systems integrator, Computer Sciences Corporation (CSC), believes will best guide the Air Force logistics enterprise through the multiyear stretch of unparalleled transformation. You may be wondering how the Air Force Logistics Transformation Office (LTO) and ECSS Program Management Office (PMO) will ensure that your answers and ideas make it into CSC's OCMP framework. LTO and CSC representatives will come to your installation, your shop, your office, and ask you for your input. CSC has built a dynamic, integrated approach for gathering and assessing



your ideas through the use of interviews, surveys, and questionnaires. Let's address the reasons why your individual input is so critical to the success of the overall ECSS program.

In his 1996 article for the *Harvard Business Review*, "Why Do Employees Resist Change," Paul Strebel provides the following perspective.

> Despite the best efforts of senior executives, major change initiatives often fail. Those failures have at least one common root: executives and employees see change differently. For senior managers, change means opportunity—both for the business and for themselves. But for many employees, change is seen as disruptive and intrusive.

The challenges of controlling the impact of predictable disruption and intrusion rest with the LTO. As the organization focuses on ensuring that ECSS end-user interests are kept at the forefront of every organizational change management (OCM) engagement, the LTO will provide the operational lens and filter from which CSC will view all below the major command (MAJCOM) level or tactical OCM activities.

In its capacity as the *single voice of the user*, the LTO will provide CSC initial operational perspectives (to include early warning chaos assessments provided by the MAJCOM champions) on scheduled or phased activities as a way to minimize (where possible) the predictable but necessary disruption of and intrusion into the Air Force logistics enterprise. Achieving success or heading off potential failure of a particular phase, or in some cases the overall effort, may well rest on the timeliness and accuracy of your individual feedback. The LTO and ECSS PMO need your input, via the OCMP interview, survey, and questionnaire processes, to be honest, candid, and constructive when identifying potential disruptive and intrusive activities scheduled for your work center or shop. While disruption and intrusion are necessary components of enterprise-wide transformational change, each is both predictable and, within reason, controllable.

In addition to your individual ability to increase awareness of potentially disruptive or intrusive transformation activities associated with ECSS implementation, your role as a leader at the flight-, squadron-, group-, wing-, MAJCOM- or headquarters-level cannot be understated. If achieving small, incremental, and measurable change within a single organization requires good leadership, then successfully implementing the world's largest ERP and totally transforming the entire Air Force logistics enterprise requires superior leadership. Superior leadership is the nontechnical, nonsoftware related element that sets the Air Force ERP implementation apart from so many others. Many commercial and government organizations have implemented an ERP application; however, none were individually as large and complex as the ECSS effort. As the Air Force Materiel Command Director of Logistics, Major General Morrill, recently said, "When we've successfully implemented ECSS it will be equivalent to a fundamental DNA change for the entire logistics enterprise—everything about the way we do business will have changed."

The scope of the ECSS program is huge. From a pure information technology (IT), commercial off-the-shelf (COTS) software perspective, the magnitude of the ECSS program is unparalleled. By late CY13, ECSS will have eliminated (through a comprehensive legacy deconstruction and retirement program) the Air Force's reliance on more than 400 legacy systems and applications which control every aspect of the E2E supply chain. This in and of itself is impressive—imagine a future with no D200, D035, G081, CAMS, SBSS, LOGMOD, or any one of your favorite legacy systems or applications. The ECSS COTS product suite, coupled with industry best practices, serves as the enabling capability supporting the enterprise-wide transformation.

A superior leadership effort will be required to transform every underlying process and its associated policy directives in order to be consistent with industry best practices. Note that the statement emphasizes *industry*, not *commercial* best practices. The Air Force has established itself in a position of being fully qualified to develop *industry* best practices and processes through initiatives such as Air Force Smart Operations for the 21st Century, Expeditionary Logistics for the 21st Century, Repair Enterprise for the 21st Century, and the Global Logistics Support Center. The Air Force has a

Article Acronyms

CSC – Computer Sciences Corporation
COTS – Commercial Off-the-Shelf
CY – Calendar Year
E2E – End-to-End
ECSS – Expeditionary Combat Support System
ERP – Enterprise Resource Planning
IT – Information Technology
LTO – Logistics Transformation Office
MAJCOM – Major Command
OCM – Organizational Change Management
OCMP – Organizational Change Management Plan
PMO – Program Management Office

proud history of working with our industry partners to benchmark future-state technological and process-driven approaches. That same superior leadership demonstrated over the course of the last several years will be instrumental in ensuring the spectrum of activities critical to ECSS implementation are accomplished on a specified timeline. Your direct involvement and your superior leadership are just two more aspects of the focused OCMP approach and are the backbone of the ECSS transformational effort. As Fred Nickols said in his 2006 online document, *Change Management 101: A Primer*,

> The honest answer is that you manage [change] pretty much the same way you'd manage anything else of a turbulent, messy, chaotic nature, that is, you don't really manage it, you grapple with it. It's more of leadership ability than management skill.

Tying user input and ideas together, as well as focusing the leadership effort, is the job of the entire ECSS Organizational Change Management Team—LTO, PMO and CSC. The OCM Team has embedded many lessons learned in its dynamic approach to OCM. CSC brings years of OCM experience to the effort. Many of CSC's specific OCM tools, methodologies and approaches are accepted industry wide as *best of breed*. From the use of *change agents* to identifying and measuring the readiness of the Air Force logistics enterprise to accept phased implementation and transformational changes, CSC's reputation in harnessing the power of the end-user community is solid. The LTO and PMO representatives assigned to the team bring years of operational logistics and COTS IT experience to the engagement. The OCM Team is responsible for creating the tools to gather your input and ideas via interviews, surveys, and questionnaires.

All information obtained from across the logistics enterprise will be compiled, analyzed, and presented to the LTO and ECSS senior stakeholders. They will then use the information to make informed decisions about upcoming scheduled events. The role of the OCM Team, simply put, is to keep its finger on the pulse of the enterprise, and ensure the LTO and ECSS PMO are well aware of the enterprise-wide health prior to proceeding with specific ECSS implementation activities. It is important to remember that CSC and all of its teaming partners (subcontractors) are focused on assisting the Air Force logistics enterprise through this challenging and chaotic series of events. The OCM Team will be your customer-facing agent tasked to keep you informed of what's ahead and will work with the LTO, PMO, and CSC to establish the tempo by which we transform our entire way of doing business and provide support to the warfighting community.

This is an unprecedented, unparalleled opportunity to completely transform the fundamental business rules, processes, policies, and systems which comprise the Air Force logistics enterprise. ECSS is the enabling technology which will support enterprise-wide process and policy transformation. The LTO, ECSS PMO, and CSC are committed to ensuring the success of the ECSS program. The OCM Team and its representatives are posturing themselves to work with each of you on an individual and organizational basis to ensure we've captured your input and ideas at every phase of the program. Your ideas, input, and superior leadership are the nontechnical aspects of the effort which are absolutely critical to ensuring the success of the overall program.

As Major Deborah Blood outlined in her Air Force Institute of Technology thesis, "Predicting the Benefits, Barriers, and Bridges for USAF ECSS Implementation," there are several *bridges* to success for the ECSS program. Superior leadership and a strong change management program are at the top of the list. The OCM Team, capitalizing on years of logistics and IT experience, has designed the OCMP to build these bridges; however, you, as individuals, are the most important link to controlling the predictable chaos.

Paul Hartman is a manager with Morgan Borszcz Consulting assigned to support the Air Force Logistics Transformation Office. His current duties include being the lead for organizational change management. Mr Hartman recently retired after 20 years of Air Force service. His areas of expertise include acquisition program management and Air Force logistics transformation. Mr Hartman received a bachelor of science degree in business from the University of Maryland. He has advanced degrees from the Air Force Institute of Technology, master of science in logistics management, and the University of Dayton, master of arts in international affairs.

Tom Hamilton, USAF

Strategies for Success

Introduction

The Expeditionary Combat Support System (ECSS) is one of the largest and most comprehensive business transformations ever envisioned. ECSS will enable the end-to-end transformation of Air Force logistics processes and is critical to shaping tomorrow's Air Force capabilities. The benefits of ECSS will be extraordinary. It will enable greater expeditionary combat support capability by providing near real-time asset visibility, increasing availability of mission critical weapon systems, and synchronizing logistics planning and execution, while reducing the cost to support global logistics operations.

For the functional, end-user community, this encompasses the complete service supply chain:

- From original equipment manufacturer through maintenance, repair, and overhaul (MRO)
- Exception-based tools to support enterprise-wide planning
- Integration and links among forecasting, distribution, maintenance, scheduling, and production planning
- Enterprise-wide knowledge management

As such, ECSS serves as the foundation for realizing the Expeditionary Logistics for the 21st Century (eLog21) transformation objectives of increasing equipment availability by 20 percent and reducing operational and support costs by 10 percent. As an eLog21 enabler, ECSS provides a core platform of integrated functions, such as order management, purchasing, inventory, distribution, and financial information. More specifically, the deployment of ECSS allows the Air Force to deconstruct and migrate data from more than 400 legacy retail and wholesale logistics information technology systems to a single, enterprise-wide solution. By reducing the number of independent and redundant systems currently being used, ECSS will enable improved quality and flow of information to aid decisionmaking across the enterprise.

A proven and competent team is in place. The Air Force ECSS Program Management Office (PMO) and the Logistics Transformation Office (LTO) are staffed and work is underway. The primary focus of the PMO is to ensure that logistics community requirements are met on time and within budget, while the LTO's primary role is gathering requirements and acting as an advocate for the logistics community. Industry partners have also been selected. Computer Sciences Corporation

(CSC) will act as the systems integrator. Software selected includes the Oracle e-Business Suite, complemented by Industrial Financial Systems software for MRO, material requirements planning, and constraint scheduling and Click Commerce software for demand planning, supply planning, and readiness-based sparing.

This is a large, complex effort. A recent study found that less than 10 percent of enterprise resource planning (ERP) implementations were completed on time, within budget, and delivered measurable stakeholder benefits. Many factors can be cited for these shortcomings. Global accounting firm KPMG surveyed over 250 large companies and found nearly 70 percent of problems in failed implementation efforts could be traced to three factors:

- Inadequate project management
- Scope complexity
- A lack of communication

Armed with this knowledge, the PMO determined that, in addition to managing the traditional cost, schedule, performance, and risk paradigm, it would also include governance, requirements management, and change management as critical program success components. Deputy Undersecretary of Defense for Business Transformation, Mr Paul Brinkley, agrees. Recently, when discussing logistics modernization, Brinkley said the key to program success is "emphasis of key transformation principles, leadership engagement, effective governance, and effective change management."

The PMO also turned to the Government Accountability Office (GAO) report (GAO-05-858, September 2005) regarding the Navy's four ERP pilot programs for lessons learned. That report validated the importance of programmatic governance as well as requirements and scope management.

The GAO recommended that Department of Defense (DoD) ERP programs develop and implement quantitative metrics. These metrics are to be used for evaluating project performance and compliance with disciplined processes that help minimize program risk. The GAO further recommended establishing an independent verification and validation (IV&V) function and advised that all IV&V reports be provided directly to program management leadership. Lastly, the GAO suggested DoD ERP PMOs institute semiannual reviews of the program.

Accordingly, due to the complexity and size of the ECSS program and its importance to the Air Force logistics community, the PMO has instituted monthly program reviews with senior leadership. Furthermore, the PMO has adopted the Supply Chain Operations Reference (SCOR) model. Developed by the Supply Chain Council, the model captures the council's consensus view of supply chain management. It provides a framework that clearly links processes, metrics, best practices, and technology features into a unified structure that supports communication among the PMO, systems integrator, and software partners. Specific, actionable, and verifiable metrics are in place to ensure compliance.

The PMO has also established an IV&V process that reports directly to the program leadership team. As noted by the GAO, performing IV&V activities independent of development and management functions helps to ensure that the results are unbiased and based on objective evidence.

Based on the guidance provided by other DoD organizations involved in ERP implementation and the recommendations of the GAO, the PMO quickly drew some important conclusions. First, KPMG was correct—inadequate program management (governance in particular) will quickly derail the best efforts of the program team. Second, failing to align systems integrator deliverables with end-user requirements and expectations is a recipe for scope chaos. And, third, the scale and scope of DoD ERP implementations magnify the importance of organizational change management, communication, and other *people-related* tasks that must be addressed by the PMO.

Based on industry reports, lessons learned from other DoD ERP implementations, and recommendations from the GAO, the PMO identified three strategies to help ensure success.

Article Acronyms

CSC – Computer Sciences Corporation
DoD – Department of Defense
ECSS – Expeditionary Combat Support System
eLog21 – Expeditionary Logistics for the 21st Century
ERP – Enterprise Resource Planning
GAO – Government Accountability Office
IPT – Integrated Process Team
IT – Information Technology
IV&V – Independent Verification and Validation
LTO – Logistics Transformation Office
MRO – Maintenance, Repair and Overhaul
PMO – Program Management Office
SCOR – Supply Chain Operations Reference

Strategies for Success

Strategy One: Develop and Enforce Strong Programmatic Governance Structure

A recent study of 300 enterprises by the Massachusetts Institute of Technology's Sloan Center for Information Systems Research found that, on average, only 38 percent of senior managers know how their organization's information technology (IT) is governed. The study went on to say that senior management awareness of its IT governance process was the single best indicator of program effectiveness. Without this awareness, managers were slow to make decisions, did not follow processes, and were unable to achieve program objectives. Consequently, governance was one of the first areas addressed by the PMO. The risk was simply too high not to take immediate action.

Developing an effective governance structure is not as easy as it may seem, particularly when governance responsibilities will be split among the PMO, LTO, and industry partners. The questions began:

- How are we going to standardize governance structure and processes?
- Who will be empowered to make decisions?
- How do we enforce adherence to governance processes?

Clearly, the PMO needed a comprehensive governance plan that included senior representation from PMO, LTO, the systems integrator, and other partners with a vested interest in the program's success. It was important the group have the depth and breadth of knowledge to evaluate the wide variety of complex technical and functional issues it would confront. One clear advantage for the group is that all members are geographically situated in Dayton, Ohio, speeding team formation and ongoing interaction across the governance and other functional teams.

The decision was made to elevate governance as a specific subset of the overall change management process and assign a full-time resource to develop and manage the program's governance process. The first step was to develop a governance structure, including an organization chart, a decision-responsibility matrix, and an escalation hierarchy. Its purpose was clear. Members of the governance board needed to know the one person in charge with senior leadership support, what decisions they are empowered to make, and how issues get escalated to a higher decision authority in the event resolution is not forthcoming in a specified period of time. Furthermore, the governance structure was specifically designed to capture issues affecting policy, architecture, technology, and data. This helps ensure that, in addition to addressing the roles and responsibilities of governance team members, no functional or technical area is underrepresented.

Second, a program issue resolution process was developed. It included issue identification and analysis, issue management, and monitoring processes. This allows the PMO to assign and track each issue to ensure none escapes the governance process. The last step was to assign the solution teams, integrated management team, executive steering group, senior executive oversight group, and process council with specific roles and responsibilities in accordance with assigned programmatic and operational decision thresholds. This structure allows the PMO to manage each issue from introduction to resolution.

This framework helps to ensure each integrated process team (IPT), committee, or group is aware of its decision authority, understands the issues assigned to it for resolution, and knows what happens if issues are not resolved in a timely fashion. Furthermore, by creating an inclusive process that clearly delineates roles and responsibilities and empowers group decisionmaking, overall programmatic risk has been reduced and communication improved. The PMO's expectations are that 80 percent of issues will be resolved by program IPTs, 10 percent by the PMO and LTO jointly, and 10 percent will be elevated to panels, councils, and groups empowered to resolve issues that the PMO and LTO are unable to resolve. In fact, the plan is for less than one-tenth of 1 percent of the issues to actually be elevated to the process council, the program's highest governing board.

Strategy Two: Align and Manage Contractor Performance and End-User Expectations

One of the more important roles the PMO plays is that of honest broker. It must balance the requirements defined by the LTO and its user community and the work that is on contract. The best way to keep this relationship in balance is to foster regular and candid communication between the requirements gathering and product delivery leaders. To accomplish this, the PMO has established weekly executive leadership and project leadership meetings that include representatives from the PMO's functional and business areas, subject matter experts from the LTO, engineers from Oracle, and functional teams from CSC. By bringing these groups together early and frequently, the PMO has been able

to broker relationships that benefit the program, create integrated action teams, and identify and resolve problems before there is any impact on program cost, schedule, and performance.

This type of thinking also influences the program structure. Gone are the functional stovepipes. In their place is an organizational structure that is common to the PMO and its industry partners that integrates the activities of all functional areas. This has made it easier for both the PMO and CSC staffs to identify peers and speed interaction among functional groups—reducing the administrative headaches associated with chasing down the right person for the right decision. The PMO has also fostered a shared work environment where project teams from the PMO, LTO, CSC, and Oracle can share work products, briefings, and technical documents needed to complete program objectives.

The decision by the PMO and the integrator to adopt the SCOR model has influenced the team structure. The following IPTs have been established:

- Plan
- Source
- Make and repair
- Deliver and return
- Enable

This drives discipline into the work and mirrors a commercial best practice.

By fostering leadership communication, aligning teams, and adopting commercial best practices, the PMO has reduced programmatic risk and proactively tackled several ERP stumbling blocks.

Strategy Three: Communicate, Communicate, Communicate

Since ECSS is far more about business transformation than technology insertion, communication is critical. The ECSS PMO worked particularly hard to ensure that each of the program's major stakeholder groups were identified, selected the most appropriate communication method for that group, created context-appropriate messages, and developed a program calendar to coordinate all communication among the PMO and its partners. The PMO's goal is to clearly and accurately articulate to each stakeholder why ECSS is important to the Air Force mission and how it will benefit the ECSS user community. To help ensure that the PMO is successful, it has adopted the mantra that *repetition is retention*. In other words, communicate more frequently than you believe is needed. One-third of your target audience is not listening; another third did not hear you correctly; and the last third heard you, but is too busy to acknowledge receipt. This is particularly true in an environment where the audience is large, the business transformation is complex, and users will be asked to abandon homegrown systems and learn new processes. With these facts in mind, the PMO developed an overarching strategy that helps ensure organizational change management, communication, and training strategies of the PMO, LTO, CSC, and Oracle are synchronized from beginning to end.

It is also important to ensure that all communication about ECSS, regardless of the source, is consistent, accurate, and timely. To that end, the ECSS PMO has created a collaborative communication network with representation from the LTO, Oracle, and CSC. By combining forces, the program has been able to distribute the communication workload and allow each member of the communication network to focus on specific communication missions. For instance, the PMO is charged with developing the strategy for all communication messages; however, because of its close relationship with the logistics community and its institutional knowledge, the LTO is best equipped to carry the message the *last mile*. Additionally, to ensure that the program never strays from its core mission, the communication team participates in the communication activities of the eLog21 office and the Defense Enterprise Accounting and Management Systems Organizational Change Management Advisory Council.

Communication efforts are also augmented by the use of field agents who are assigned to support strategically selected installations. These agents will eventually visit more than 170 Air Force operating locations. The agents will field questions, deliver briefings, and support local ECSS champions. Combined with LTO resources and support from the PMO, they will be a knowledgeable network of agents, carrying a common message, ready to support each location, as the rollout of the ECSS solution begins.

This combination of activities provides the foundation to support the program's aggressive communication strategy and ensures appropriate team interaction.

Conclusion

The promise of ECSS is real. Implementation will increase enterprise-wide asset visibility, improve weapon system availability, reduce inventory footprint, and squeeze cost out of the system. Delivering on the promise, however, is not without risk. To ensure

program success, the ECSS PMO has internalized the lessons learned by our predecessors. It has become abundantly clear that a program of this magnitude requires stepping outside of traditional program management responsibilities and embracing new ways of managing governance, balancing user requirements and contract language, and communicating. The ECSS PMO has accepted that challenge.

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Steven L. Cain, USAF

The Logistics Transformation Office

Introduction

Expeditionary Logistics for the 21st Century (eLog21) is a transformation campaign designed to increase the combat capability of the Air Force through logistics management process improvements. The Logistics Enterprise Architecture (LogEA) contains the guiding principles for accomplishing the eLog21 goals, and the Expeditionary Combat Support System (ECSS) is the technology enabler for future Air Force logistics operations. As a key component of the eLog21 campaign, ECSS will adhere to the true vision of eLog21. It will embrace LogEA principles, and through its development, redesign Air Force logistics business processes. eLog21, LogEA, and ECSS will revolutionize Air Force logistics for the 21st century.

The Logistics Transformation Office (LTO) and ECSS

A number of LogEA tenets are used by the LTO in defining the ECSS solution. A major tenet of LogEA is the creation of an enterprise planning capability with decentralized execution. All make, buy, and repair induction decisions will be made from a centralized planning system. The algorithms built into the planning system will be designed to reduce cost and increase weapon system availability across the entire Air Force, not for individual locations. Locations will repair weapon systems to the due dates specified by the enterprise-level plan. Simply put, the future logistics enterprise will be designed with a process-centric approach rather than a function-centric approach. As a result, the LTO will verify that defined business processes (accomplished via the blueprinting process) are based on maximizing the capability of logistics end-to-end processes, rather than individual functions.

Air Force supply chain management responsibilities are a subset of the much larger Department of Defense supply chain management responsibilities, both of which manage internal and external suppliers of goods and services as well as financial procedures. Key performance indicators (KPIs) developed throughout blueprinting will measure performance of end-to-end processes,

and those process KPIs will tie directly back to the goals of eLog21 (20 percent increase in equipment availability and 10 percent reduction in cost). The development of useful KPIs is essential to the LTO's effort to deliver the LogEA capabilities.

Purpose of the LTO

The LTO's purpose is to support realization of the Deputy Chief of Staff Installations, Logistics & Mission Support (HQ USAF/A4-7) vision of a transformed Air Force logistics enterprise by supporting eLog21 initiatives and ECSS development. The LTO is responsible for gathering end-user requirements and ultimately is the voice of, and the advocate for, the end-user community. This effort will result in successfully implementing best business practices, enabling information technology (IT) tools, and aligned organizational structures. By achieving the A4-7 vision, the Air Force supply chain will deliver total asset visibility, centralized planning, and coordinated execution across the entire logistics enterprise. The LTO maintains control over delivering the appropriate functional solution to Air Force logisticians and communicating the future ECSS configured solution to the logisticians at the field level.

The LTO is the primary organization responsible for aligning logistics requirements with the expectations of the logistics community and the capabilities of the ECSS product suite. The LTO's vision and goals make it the primary advocate for user concerns regarding the ECSS solution. The LTO is working with the systems integrator (SI) through the ECSS Program Management Office (PMO) to craft the best possible solution and also communicate the solution to the Air Force logistics community. Looking out over the next 6 years, the LTO will participate in:

Article Acronyms

COTS – Commercial Off-the-Shelf
ECSS – Expeditionary Combat Support System
eLog21 – Expeditionary Logistics for the 21st Century
IPT – Integrated Process Team
IT – Information Technology
KPI – Key Performance Indicators
LogEA – Logistics Enterprise Architecture
LTO – Logistics Transformation Office
PMO – Program Management Office
SCOR – Supply Chain Operations Reference
SI – Systems Integrator
SME – Subject Matter Expert

- Blueprinting processes
- Shaping workforce processes
- Delivering change management

LTO Resources

Within the LTO there are 45 subject matter experts (SME)—all dedicated to supporting the Air Force logistics community throughout the IT transformation process. The LTO is divided into three branches—planning, execution, and integration. Expertise within the LTO can be divided into two separate workstreams, which are represented in each LTO branch:

- Supply chain management processes
- Enterprise resource planning (ERP) and commercial off-the-shelf (COTS) systems

Most of the LTO members are SMEs whose expertise encompasses all Air Force supply chain management processes. These people are all highly experienced, previously enlisted and civilian resources, most with multicommand Air Force logistics experience. LTO SMEs have the primary responsibility for providing the SI with Air Force logistics constraints, assumptions, and knowledge of current Air Force processes. In addition, these individuals have been organizing other Air Force SMEs who are augmenting the blueprinting process by providing targeted expertise. A smaller portion of the LTO is made up of people with an in-depth knowledge of the ERP life-cycle process and the commercial-off-the-shelf (COTS) applications used to build the final ECSS product.

The LTO, Blueprinting, and Legacy Systems

LTO workstreams are aligned to best support the customer—the Air Force logistics community. In this regard, the first major task was to leverage the expertise of Air Force logistics personnel from the major commands, the Defense Logistics Agency, the Defense Finance and Accounting Service, Air National Guard, Air Force Reserve Command, and other organizations—throughout blueprinting process—for expertise on how the Air Force is doing business. The LTO is playing a major role in blueprinting as the voice of the customer and customer needs.

As ECSS development progresses, the LTO will be responsible for coordinating a consistent, clear message about ECSS to the bases. This task is typically referred to as *tactical change management*.

Throughout the Air Force, there are hundreds of databases and applications in use for each of the niche mission needs of the Air Force logistics community. In the new world of ECSS, the LTO will ask, "Can ECSS provide an equivalent functionality for system XYZ?" The LTO is responsible for coordinating, analyzing, and adjudicating all requests for legacy system persistency from organizations across the Air Force. A persistent legacy system is an IT system that will remain active after the implementation of ECSS. The goal is no persistent legacy systems. By contacting the LTO, any organization requesting persistency of its systems will begin a detailed discussion with the LTO. Essentially, any group requesting their system stay active after the deployment of ECSS must prove to the LTO that ECSS cannot provide the required functionality.

In addition to reviewing Air Force systems, the LTO continues its effort to ensure required initiatives are delivered through ECSS. For example, embedded within the eLog21 initiative are several programs intended to alter the current Air Force logistics business processes in an effort to streamline the large Air Force supply chain. Initiatives like Repair Enterprise for the 21st Century, Air Force Smart Operations for the 21st Century, and Centralized Asset Management will not be hindered by the introduction of ECSS, but will be enabled. The LTO's responsibilities include incorporating the intent of eLog21 initiatives into the final ECSS solution.

LTO Guidance

All functional guidance provided by the LTO falls into one of the three areas—planning, execution, and integration—each of which map back to a Supply Chain Operations Reference (SCOR) model process. The SCOR methodology is the technique used to minimize gaps during the blueprinting process through a series of process divisions. These supply chain divisions for IPT purposes are:

- Plan
- Source
- Make and repair
- Deliver and return
- Enable

Just as SMEs attending the blueprinting process are assigned to an integrated process team (IPT) based upon SCOR, LTO members are dedicated to a specific IPT based on specific abilities and expertise. The LTO Planning Branch provides resources for the plan portion of SCOR; the Execution Branch provides source, make and repair, deliver, and return resources; and the Integration Branch provides resources responsible for enable (master data management and product life-cycle management).

Defining Business Process Requirements - More About ECSS Blueprinting

Work on ECSS began with defining the business process requirements. This phase of the project is called blueprinting. Blueprinting clearly identifies the preferred Air Force configuration of the ECSS software. Blueprinting accomplishes this with a top down approach beginning with an Air Force enterprise-wide view and finishes by defining the business area-specific configurations. LTO IPT members participate in the blueprinting process to support and validate the requirements identified by the Air Force SMEs (those augmenting the blueprinting process by providing targeted expertise from outside the LTO). When there is a disagreement among Air Force SMEs in defining the configuration, the LTO member within the IPT is responsible for evaluating the viewpoints of the SMEs and deciding on a final solution. The final solution may be a compromise between two opposing viewpoints, two separate configuration solutions for differing locations or organizations, or as a last resort, moving the decision up the governance chain to obtain a final answer from ECSS management. SMEs participating in the blueprinting process have been empowered to make decisions on the configuration of ECSS and that is why it is estimated that 80 percent of decisions will be made by the SMEs and will not move to the next level of governance.

Measuring Progress - The Balanced Scorecard

The LTO uses a balanced scorecard approach to identify its goals, align initiatives to those goals, and measure progress toward the LTO goals. The balanced scorecard has the following perspectives.

- Customer
- Process integrity
- Change management resources

The customer perspective is aligned to the LTO's goal of representing over 250,000 Air Force

logisticians. In this regard, the LTO is responsible for ensuring comprehensive and balanced participation in the ECSS blueprinting process. Additionally, the LTO must be the representative to the Air Staff and ensure the COTS solution is used without modification. Therefore, the LTO is measuring deviations from the COTS product on a continual basis and has created feedback mechanisms such as the post-blueprinting survey.

The LTO and Change Management

Once configuration is complete, the process of delivering the configured solution to the Air Force will begin. At that point, change management will become the most significant role of the LTO. The LTO is responsible for delivering information to the Air Force logisticians who will be using ECSS. This is a huge effort and will continue throughout the entire program.

Conclusion

The LTO looks forward to continuing work with the logistics community to deliver the best possible product. Success of ECSS is highly dependent on the support of the entire Air Force logistics community. The driving force behind LTO will be ensuring the voice of the logistics community is the main driver for transforming the Air Force's business processes.

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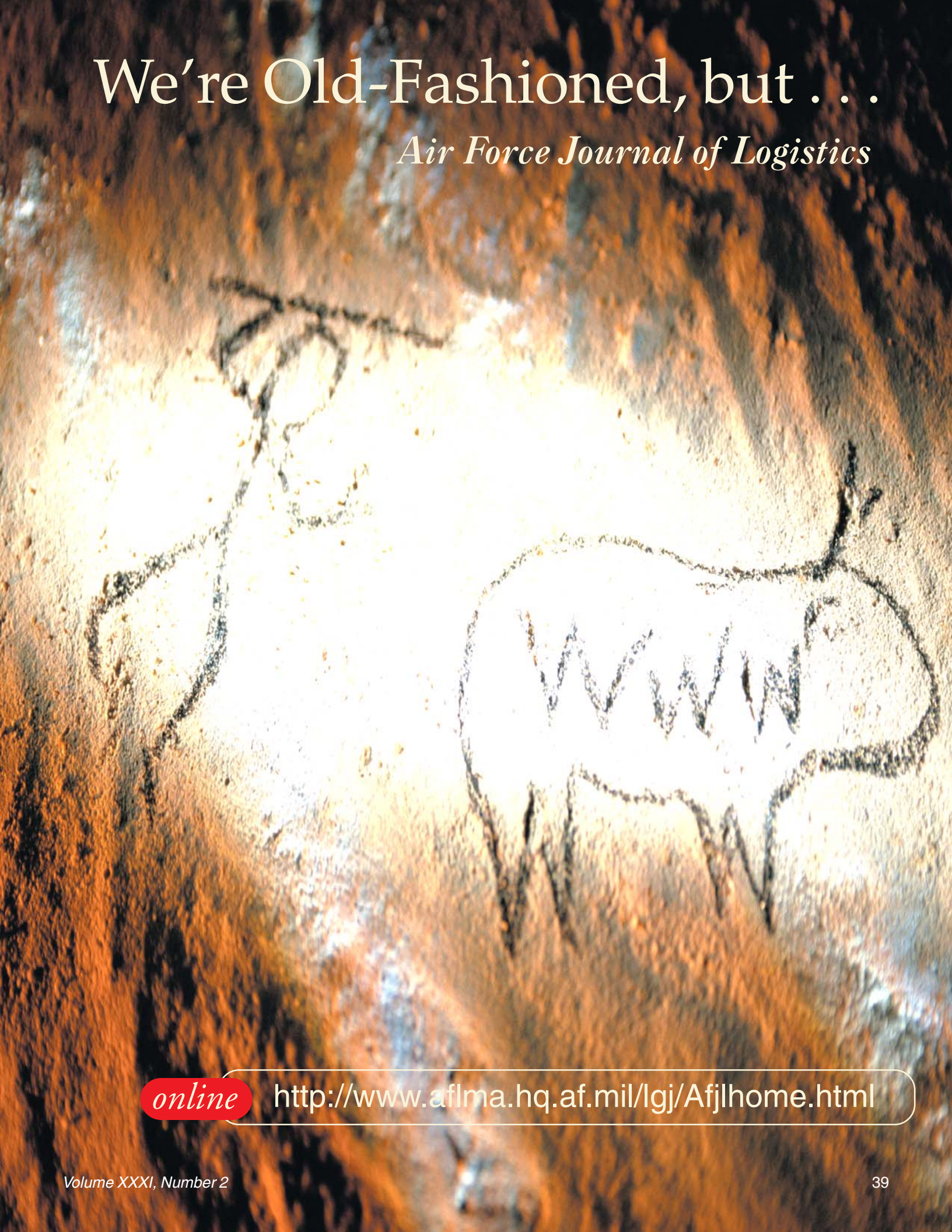
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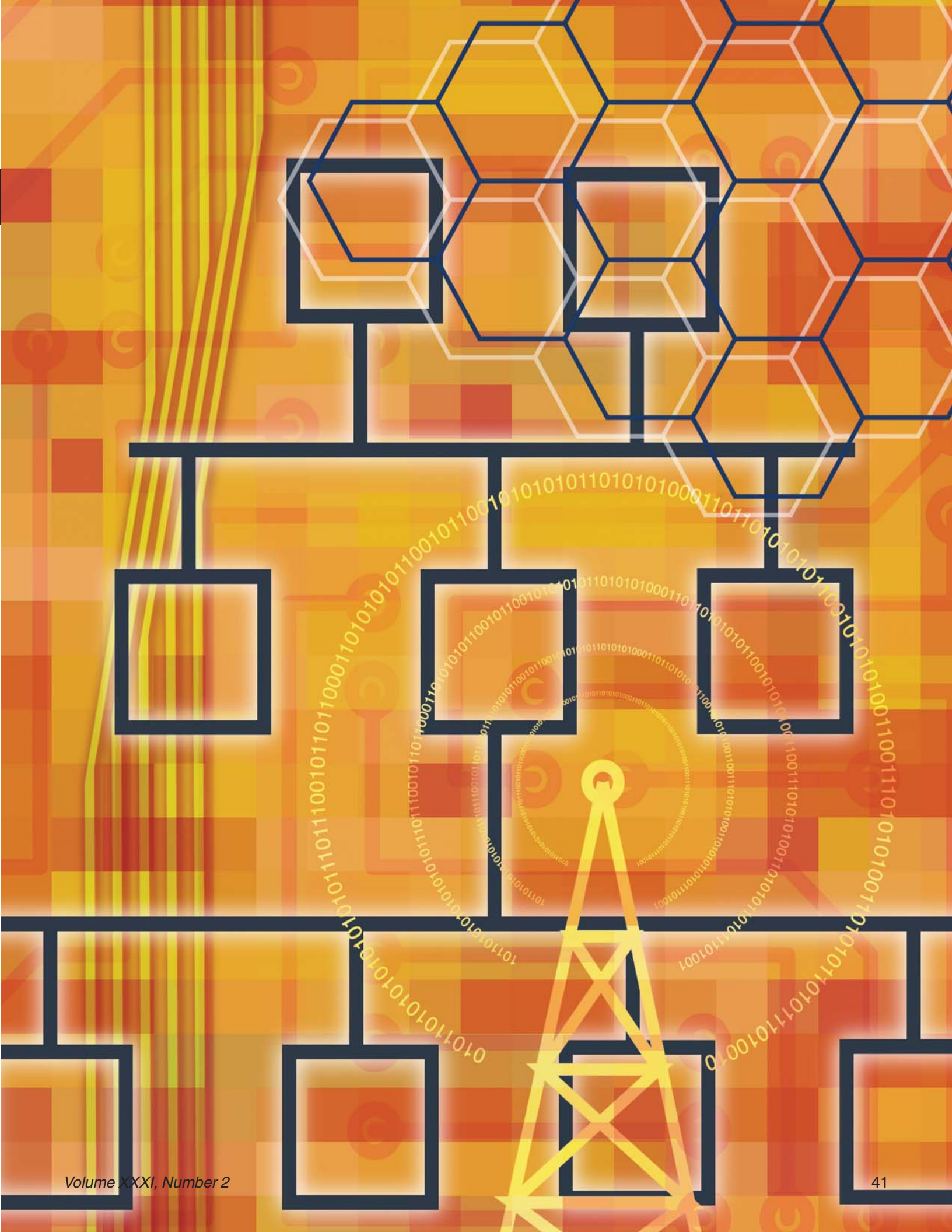
Enterprise Architecture

Discussion

The Air Force logistics enterprise is defined as the collection of processes, technology, and resources that deliver logistics support to the warfighter. This enterprise operates across all products lines, and includes delivery, transportation, maintenance, procurement and purchasing, inventory management, and product life-cycle management. The Air Force supply chain is also part of the larger Department of Defense (DoD) supply chain, both of which include internal and external suppliers of goods and services. The Air Force logistics supply chain is one of the largest and most complex supply chains in the world, involving millions of parts, thousands of business and production processes, and hundreds of information systems. There are significant opportunities to improve Air Force logistics operations in terms of performance and cost. However, current processes, organizational alignments, and information technology systems limit the ability to realize the dramatic improvements needed to transform the way we operate today. The repeated years of budget reductions and increased operations tempo, coupled with current and pending manpower reductions, require that we change the way we do business, while still producing the high-quality support we have always provided to the warfighter.

There are many ongoing initiatives within the logistics community that have produced beneficial improvements and changes to independently improve elements of the logistics supply chain. However, while all of these initiatives are creating positive improvement, they are not necessarily integrated to a level that achieves enterprise goals in a synchronized manner. There is limited common awareness or understanding of how much these initiatives are dependent on each other and must be integrated in a coordinated effort to meet Air Force corporate goals. A key element that has and will continue to guide the transformation and focus initiatives on desired future state attributes is the Logistics Enterprise Architecture (LogEA).

The LogEA is the single authoritative strategic roadmap of future logistics business practices, systems, and organizations. It is a compilation of operational architecture, systems architecture, and a transition plan that will provide the overall future state direction for logistics. LogEA is defining and implementing the guiding principles for logistics transformation via the implementation of key business processes, enabling systems, and organizational alignments. In addition, it provides the framework for centrally managing the implementation of enterprise-wide initiatives, and providing enterprise architecture guidelines for decentralized



execution implementation of initiative driven activities.

Before getting into a more detailed description of LogEA, you must first understand what enterprise architecture (EA) is. EA is the specific description and documentation of the current and desired relationships among operations and management processes and information technology. It describes the *current state* (as-is) and *future state* (to-be), to include the rules, standards, and systems life-cycle information to optimize and maintain the environment which an organization wishes to create. The EA must also provide a strategy that will enable an enterprise (logistics) area to support its current state and also act as the roadmap for transition to its future state. This transition plan includes capital planning and investment control processes, EA planning processes, and systems life-cycle management methodologies. The EA defines principles and goals and sets direction on such issues as operational business processes and the promotion of interoperability.

Enterprise architectures typically use a framework that provides a structured, repeatable method for evaluating investments and investment alternatives, implementing organizational change, creating new systems, and deploying new technologies. In the DoD, the DoD Architecture Framework (DoDAF) was established to serve this purpose. The DoDAF contains the guidance and rules for developing, representing, and understanding the architecture based on a common denominator that ensures architectures can be compared and related across programs, mission areas, and the enterprise it supports to establish a foundation for analysis and decisionmaking throughout the DoD.

LogEA uses both the DoDAF and a reference model, known as the Supply Chain Operations Reference (SCOR), and linkages to the Design Chain Operations Reference model to organize, graphically depict, and communicate the future state we are striving to achieve. The benefits of developing an enterprise architecture using SCOR are to:

- Provide a common supply chain language to communicate with other supply chain owners, the DoD, and commercial entities
- Ensure the ability to use standard cascading metrics with traceability throughout the supply chain
- Ensure the ability to benchmark across industry and the DoD
- Provide a foundation of standardized high-level processes as a starting point to build upon

Article Acronyms

DoD – Department of Defense
DoDAF – DoD Architectural Framework
EA – Enterprise Architecture
LogEA – Logistics Enterprise Architecture
MRO – Maintenance, Repair, and Overhaul
SCOR – Supply Chain Operations Reference

The Expeditionary Combat Support System (ECSS) process blueprinting efforts will continue to decompose LogEA SCOR level 3 processes down to specific tasks, activities, and steps required to seamlessly accomplish the core processes in the dynamic, diverse, and widely-dispersed logistics enterprise.

SCOR was developed by the Supply Chain Council, which is a conglomerate of over 800 manufacturing, distribution, and retail companies operating around the world, along with several DoD agencies and military services. Council members share in the development of the SCOR model, and have produced eight revisions thus far. LogEA, based on SCOR, consists of five core processes, a standard naming convention, common process element definitions, performance attributes, metrics, business best practices, specific process flows, and individual process inputs and outputs.

The five core processes are:

- Plan
- Source
- Make
- Deliver
- Return

Each process is decomposed and identified by an alphanumerical notation from Level 1 to Level 3. Level 1 describes the core process types, known as chevrons, which are annotated with the first character of the title, such as, *S* for Source. Level 2 is a further decomposition of the process types to process categories, which are annotated sequentially using the first character of the title and a number starting at one. For example, Source Stock Product is S1. Level 3 is the first level of process design for each process category, which adds a sequential number to the category notation after a dot. For example, Schedule Product Delivery is the first step (process) in Source Stocked Product (S1) and is labeled as S1.1. The only exceptions to this labeling construct are at Level 1 in the Return and Enable areas where they have 2 alpha characters to represent an association with other process categories. For example, Source Return and Enable Make are annotated as SR and EM, respectively. Levels 2 and 3 use the same notation construct across all process categories and elements. Figure 1 shows the alignments, notation schema, and explains elements of each core process area.

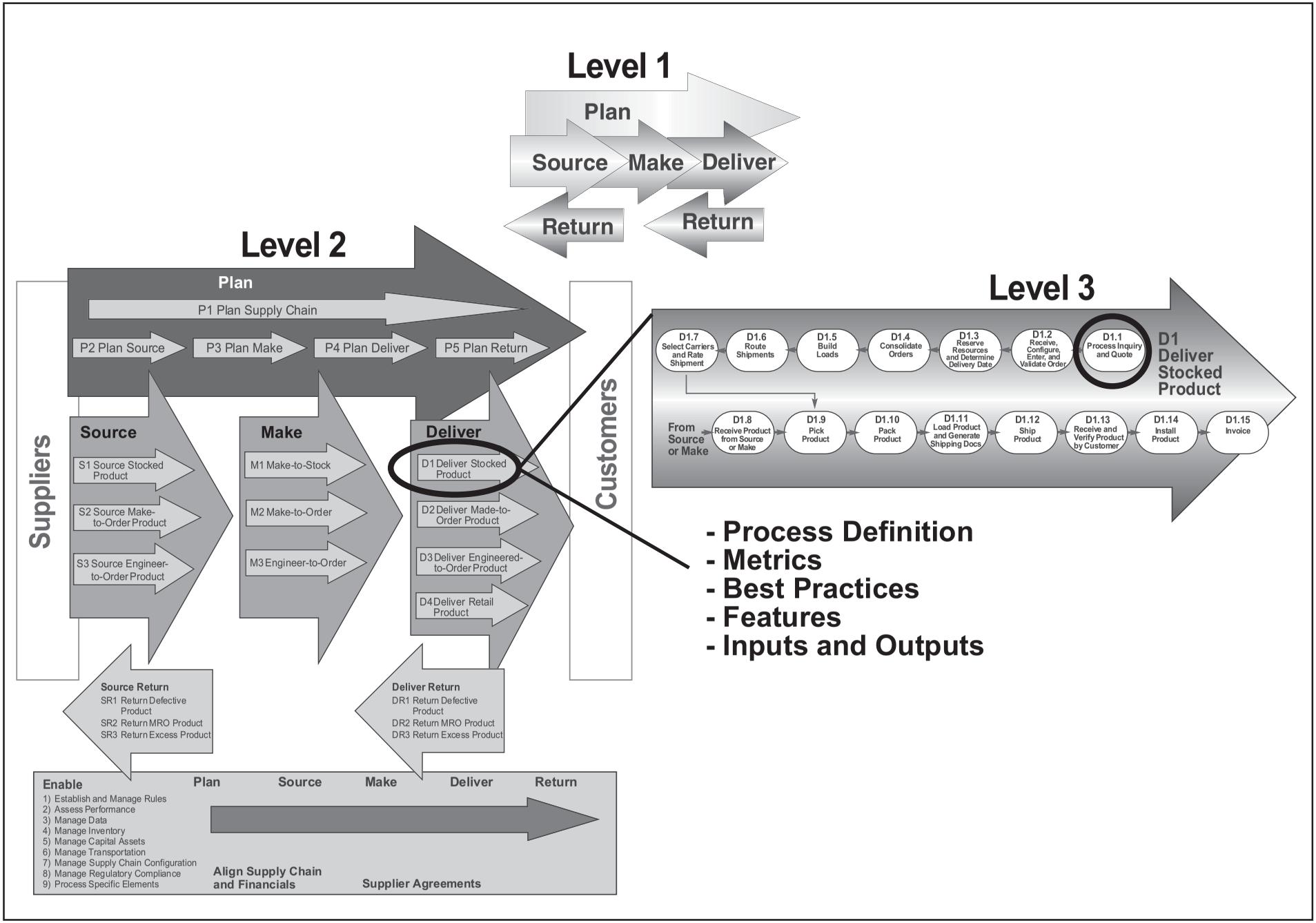


Figure 1. Levels of SCOR

LogEA Core Processes and Process Categories

Plan – Demand and Supply Planning and Management

These planning processes identify, aggregate, prioritize, align, and balance supply chain resources and requirements. All logistics chain-planning actions fall in one of five subprocesses, each of which addresses a set of requirements and resources. Plan Supply Chain is concerned with the expectations and capabilities of the supply chain in its entirety. Plan Source is concerned with determining a time-phased plan of identifying resources (currently available and to-be acquired) to meet demand requirements. Plan Make is concerned with production related requirements and resources. Plan Deliver is focused on order fulfillment. Lastly, Plan Return addresses the planning of materials returned for all reasons. These plan processes are interdependent, each providing to the others forecasts of requirements, assessments of capabilities, and identification of situations where requirements may be misaligned with capabilities.

Source – Sourcing Stocked, Make-to-Order, and Engineer-to-Order Product

This execution process includes the scheduling of product deliveries, receipt, verification and transfer of product, and authorization of supplier payment. This process is executed in direct response to demands, both actual and forecasted. It also includes the creation of demand signals from internal and external suppliers for replenishment of end items, component materials, or repair services based on plans and actual activities. It has critical linkage to the enterprise goals and related plans. The discipline employed in sourcing is key to ensuring the sourcing plan aligns with operational goals. Source establishes priorities and due dates for specific demands. It assigns those demands to specific sources for procuring—making, delivering, and returning based on the enterprise goals and established plans. Source also redirects requirements to alternate sources when necessary to meet due dates, if that can be accomplished within the existing plans and business rules.

Make – Make-to-Stock, Make-to-Order, and Engineer-to-Order Production Execution

This execution process includes all those activities directly involved with (or supportive of) production, maintenance, and repair of materials. It includes preparation for the work, execution of the work, and conclusion of the work. Make is initiated by, and is linked to, enterprise goals through sourced requirements and production plans. It includes new production, maintenance, and repair. The production of items from a bill of materials or other planning documentation as well as the induction of unserviceable carcasses into the maintenance and repair process are considered in the Make Process. If a production or maintenance, repair, and overhaul (MRO) action is triggered to fill an inventory requirement, the item is considered a Make-to-Stock item. If a production or MRO action is triggered to fill a requirement for an item that the supply chain plans to not stock, that item is considered a Make-to-Order item. Shop scheduling and sequencing determines and provides shop routing, tools, manuals, recipes, and operator directions and other items required for doing the work. The process determines shop floor sequencing based on shop capability, shop load and due dates, and creates work instructions. These are driven directly from the Make (production) Plan.

Deliver – Order, Warehouse, Transportation, and Installation Management for Stocked, Make-to-Order, and Engineer-to-Order Product

This execution process provides for the receipt and validation of customer orders, reserving of inventory and determination of delivery dates, shipment planning and actual shipping, material handling and receipt, and invoice processing. Deliver includes delivery of both stocked products and make-to-order products. It is through the Deliver Process that requirements (demands) are satisfied. Deliver includes all those activities directly involved with or supportive of the movement of materials from one place to another. It includes those activities required prior to the movement, the actual movement, and activities that follow or complete the movement. Deliver is initiated by, and is linked to enterprise goals through, source requirements and delivery plans. It includes delivery of inventoried materials and produced (new or repaired) materials.

Return – Return of Raw Materials and Receipt of Returns of Finished Goods

This execution process includes all activities directly involved with and in support of materials to be returned or redistributed. This includes defective materials and MRO, as well as return or redistribution of excess material. This process includes the activities to identify

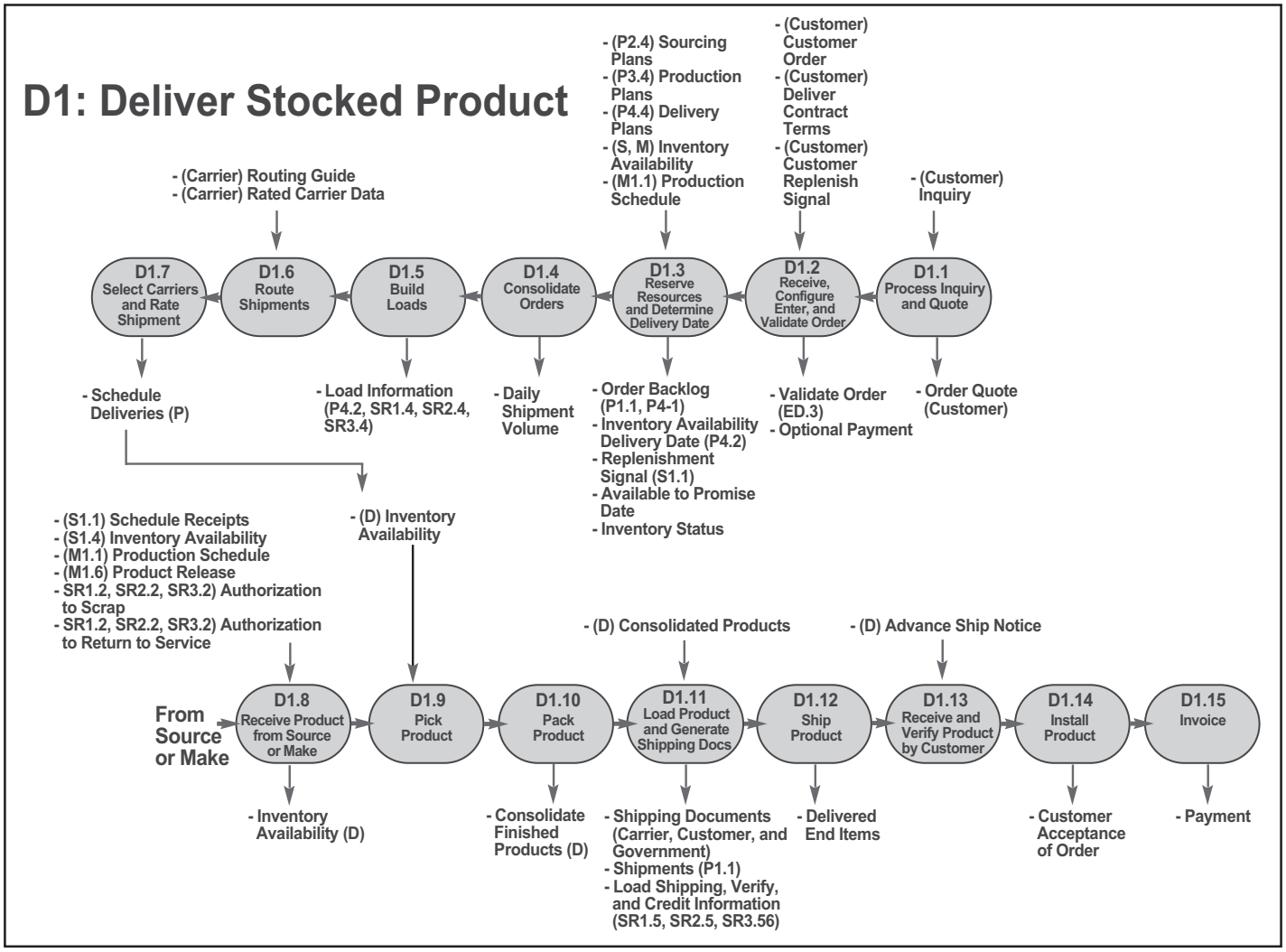


Figure 2. SCOR Level 3 Inputs and Outputs

and disposition the material to be returned, the management of the return, and steps required to complete, close, and account for the return.

At LogEA (SCOR) Level 3, each sequential process contains a description and inputs and outputs required to support the process (see Figure 2) and may have metrics and best practices associated to assist in better performing and measuring the success of the process.

To most effectively support the warfighter and deliver *best-in-class* support, the Air Force must transform key areas of its logistics operations by adopting an end-to-end focus on customer support. To accomplish this, LogEA contains a single set of goals and objectives that are focused on achieving an overarching mission and vision, as shown in Figure 3. In a broader sense, the LogEA also complements the Agile Combat Support architecture to ensure that future state logistics processes are aligned with processes resident in the other functional domains such as financial management, acquisition, human resources, installations and environment, strategic planning, and budgeting. LogEA supports the business enterprise priorities as described by the DoD Business Enterprise Architecture, which provides higher level guidance for developing enterprise architectures. The integration provided by LogEA allows the Air Force to manage logistics from an enterprise-wide perspective focused on meeting warfighter requirements effectively and in a cost effective manner. The result enables the Air Force supply chain to efficiently provide the right stuff, to the right place, on time, every time.

Conclusion

The LogEA is also scalable, responsive, and able to support the Expeditionary Air Force concept at home and during deployed operations. It is focused on delivering reliable, time-certain, and effective support. It is designed to incorporate network-centric operations to leverage centralized planning and decentralized execution with real-time command, control,

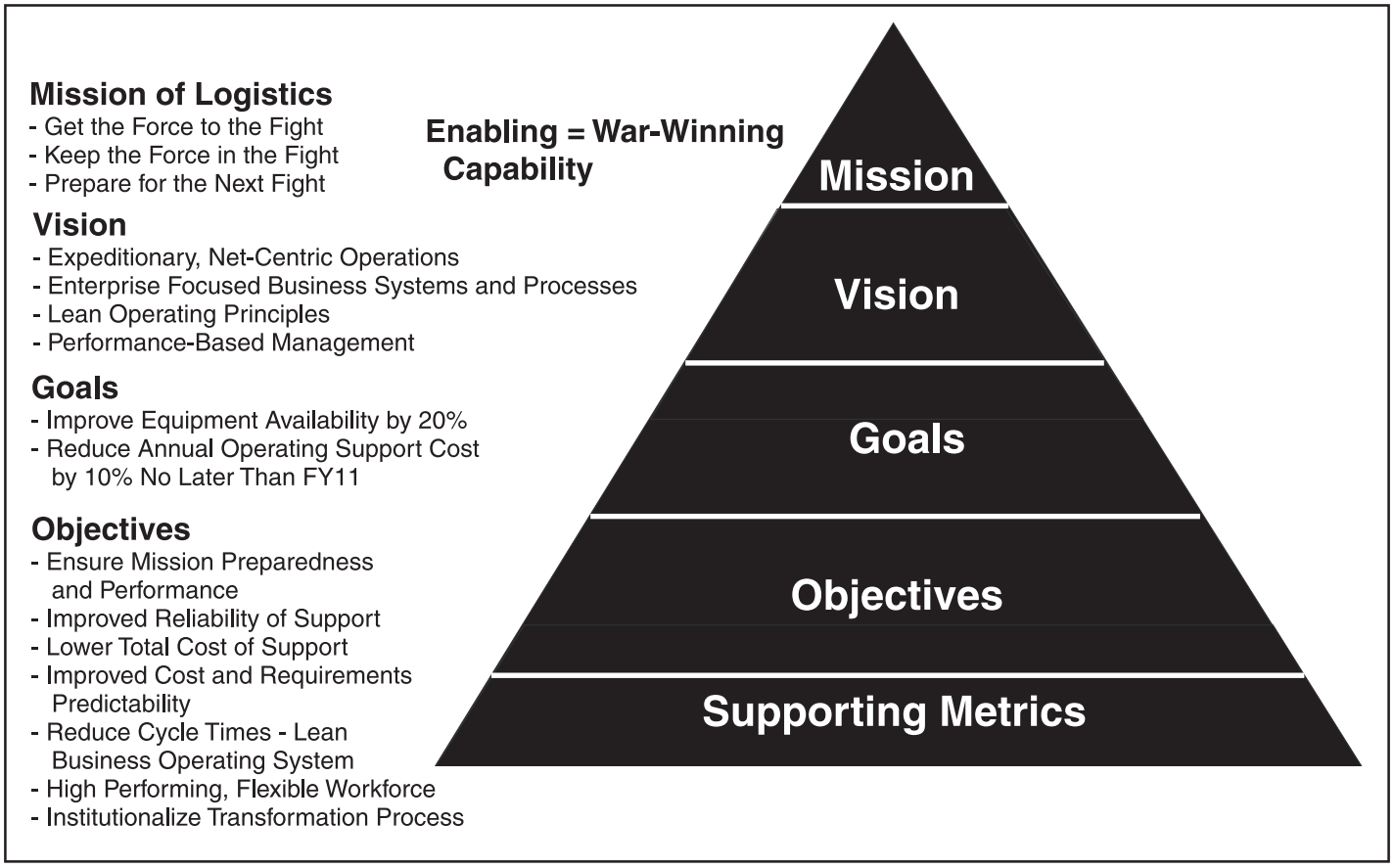


Figure 3. LogEA Mission, Vision, Goals, and Objectives

communications and interoperability. Ultimately it promotes predictive and proactive actions while being responsive and maintaining an enterprise-wide perspective that drives behavior at all levels.

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Logistics…embraces not merely the traditional functions of supply and transportation in the field, but also war finance, ship construction, munitions manufacture, and other aspects of war economy.

—Lt Col George C. Thorpe, USMC

…no success is possible—or even conceivable—which is not grounded in an ability to tolerate uncertainty, cope with it, and make use of it.

—Martin van Creveld

Who bravely dares must sometimes risk a fall.

—Tobias George Smollett

Routine has its reasons.

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Master Sergeant Glenn Dredden, USAF and Lieutenant Colonel Jeffrey C. Bergdolt, USAF

Enterprise Resource Planning

Introduction

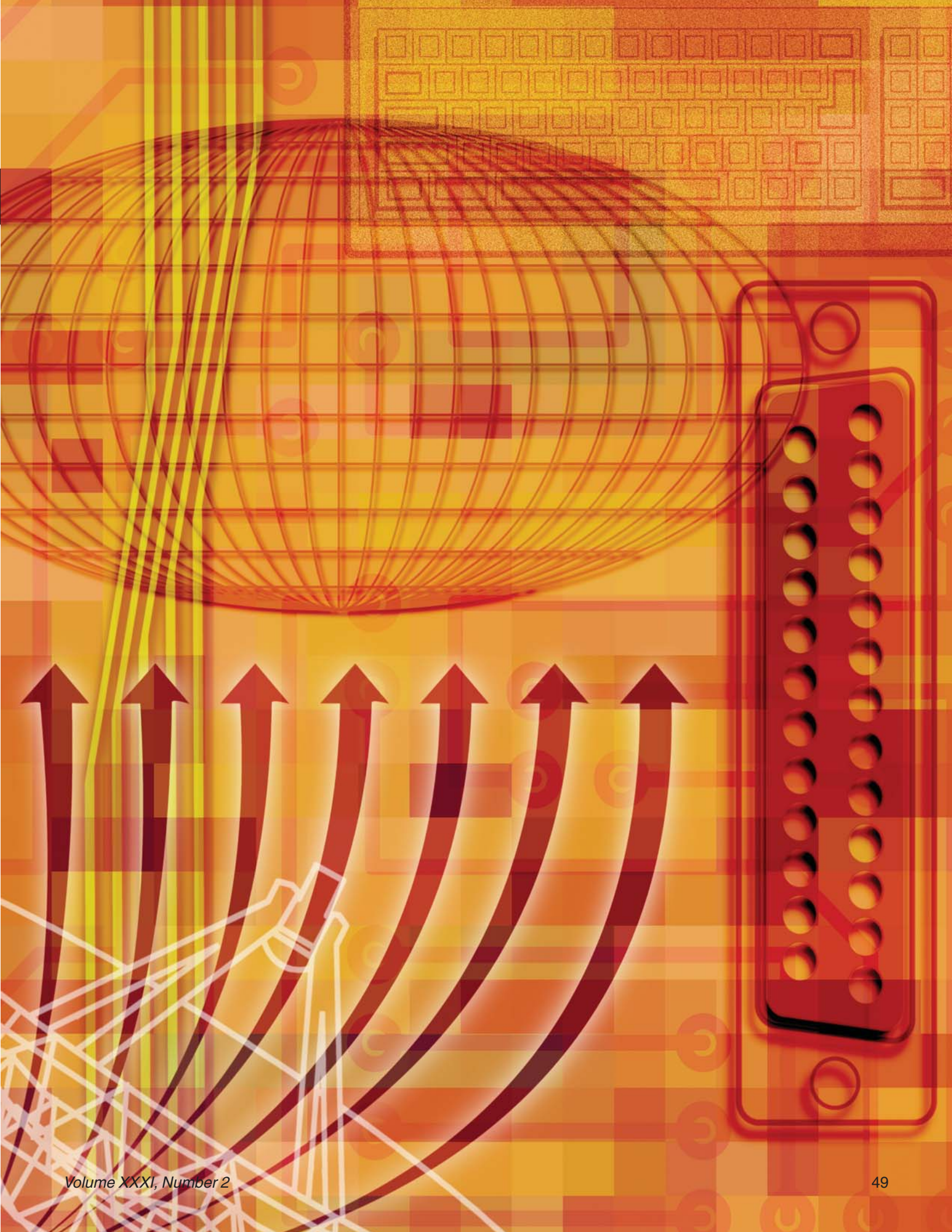
Enterprise resource planning (ERP) systems are information systems that integrate processes in an organization using a common database and shared reporting tools. Simply put, "an ERP system helps the different parts of the organization share data and knowledge, reduce costs, and improve management of business processes."[1] It is this seamless integration that makes ERP systems so attractive when compared to other information systems. Traditionally, Air Force systems have been developed and fielded as functional silos rather than cross-functional integrated systems. We built maintenance, supply, transportation, or accounting systems with little or no regard for cross functionality or the integration of business processes across the various functions. Each of these legacy systems is primarily concerned with specific functional area requirements and needs and frequently duplicates functions seen in other systems. Further, the outputs from the duplicate functions often do not match. Just ask a supply person to retrieve the top supply drivers and then ask someone from maintenance to extract the same information. It is very likely that you will receive similar, yet different answers. Even within Air Force functional areas there are multiple systems that sometimes give different answers using the same data. Many studies have pointed out this problem.

The Air Force has several large maintenance data collection systems, each with strengths and weaknesses. Nevertheless, dissimilarities in the data are all too familiar. ERP systems help eliminate the kinds of problems just discussed by having one database that shares data efficiently and effectively across the enterprise. Since data is shared by all functional areas, it is only entered once as opposed to reentering the data for each function.

With an ERP system, information is available to everyone who needs it, not just users in a particular functional area.

Benefits of ERPs

ERP systems allow software applications that normally do not interact with each other to effectively communicate via integration in a single database. This integration allows the sharing of data from various functional areas across the enterprise. This is a



great improvement over other systems, because it significantly reduces the time to complete a business process. Additionally, departments that would normally be *left out of the loop* are included in the decisionmaking as well as the results. This sharing of information cuts costs, because it helps reduce redundancies and eliminates errors by providing communication and better visibility across the enterprise. Further, it translates into less rework, better decisionmaking, and gets products to the customer faster and more efficiently. In the case of the Air Force, it may mean getting parts to the warfighter more effectively and efficiently than in the past. A final benefit of ERP systems is the use of best business practices.

Although sometimes seen as large information systems projects, ERP projects are in fact change management efforts where basic organizational business processes will change to align with the best practices and processes defined during ERP implementation activities.[2] This is a paradox for the Air Force, when compared to how it previously developed information systems. Prior development of large Air Force information systems, for the most part, only addressed tasks concerned with specific functions, functional areas, or particular viewpoints vice overall business processes. On the surface, this may not sound like a bad idea; however, it led to stovepiped systems and stovepiped views. Consequently, today, most Air Force systems do not have a cross-functional view. Systems built from a functional viewpoint are concerned with the tasks related to a particular function, whereas cross-functional systems share data across different functions. Business processes are cross functional in nature. For example, getting a new part to a maintainer is not a maintenance, supply, or transportation function. It is a business process that involves maintenance, supply, and transportation, because it takes all of these entities, and perhaps some others, to get the part to the maintainer.

Another reason for stovepipe systems is that prior to the 1990s, limited technology hampered creating a cross-functional system view. However, in the 1990s this all changed. Advances in technology and improvements in Internet capability[3] made ERP systems far more viable.

ERP systems help businesses meet the changing needs of customers because they are:

Article Acronyms

DoD – Department of Defense
ERP – Enterprise Resource Planning

- Dynamically reconfigurable in structure
- Capable of integrating across all processes
- More rapid in response
- Common in application across the enterprise (see Figure 1).

Many commercial companies and other Department of Defense (DoD) organizations experienced dramatic improvements by using ERP. One such case is IBM's Storage System Division, which cut the time it took to reprice its product inventory from 5 days to 5 minutes. Shipping and replacement time was cut from 22 days to 3 days, and customer credit checks were cut from 20 minutes to three seconds.[4] In another case, the US Navy Air Systems Command saw its implementation of ERP eliminate 52 legacy systems at a cost savings of $10M to $15M per year. Additionally, the approval time for aircraft engineering change proposals dropped from 87 days to 25 days.[5] Nestlé USA saw ERP implementation result in more accurate demand forecasts and the capability to forecast requirements. Other improvements in the supply chain allowed the company to reduce inventory, cut expenses on reallocation of products, and create $325M in savings.[6]

Why ERPs Fail

Although evidence supports that there are tremendous benefits to implementing an ERP system, there are just as many risks. While the experts offer many reasons why ERPs fail, there are several common factors most agree are essential to the success or failure of an ERP. Probably the most prominent reason ERPs fail is the lack of support from senior management. Changing an organization from being functionally driven to process driven is a monumental undertaking. It requires commitment from top-level management and full employee support throughout the organization. Without this, ERP implementations can be disastrous. Senior management must provide guidance and keep the organization focused throughout the project. Without this commitment and focus the chances for failure are greatly increased.

Data integrity is another vital element in making an ERP implementation successful. There is nothing more important than data accuracy. One can do everything right in an ERP implementation but bad data can make the implementation a disaster. If the data does not have a high degree of accuracy, it can be very costly for an organization. For example, if the inventory data is incorrect, it could cause errors in missed shipments and premium freight charges.

Another reason ERPs are unsuccessful is that organizations fail to reengineer their business practices. In their book *Reengineering the Corporation*, authors Dr Michael Hammer and James Champy, define reengineering as "…fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed."[7] This means that for the Air Force's new ERP to be successful, we will have to dramatically change the way we do business in many areas. As part of implementing ERP, the Air Force will utilize industry best practices to help improve the way we do business. Many ERP implementations have been unsuccessful because organizations vastly undervalued the importance of reengineering current business processes. The misnomer about an ERP is the belief that it is just another information technology solution. However, ERPs are more about changing an organization's business processes or the way it does business than information technology.

ERP implementation professionals note that training is a critical implementation requirement. It must be thorough and occur throughout an organization. Unless employees are properly trained, they will not feel competent using a new system and will do all they can to avoid using it. With continuous training sessions, employees' doubts and difficulties can be overcome. Additionally, training must be ongoing, particularly for an organization as dynamic as the Air Force.

Managing the Change

Organizations who have implemented ERP systems agree that change management is another critical area that can *make or break* the success of a system. This involves getting an organization to embrace the changes involved in converting to an ERP. Even though Nestlé USA's ERP is considered a success, it did not exactly go according to plan. The $8.1B subsidiary of Nestlé SA embarked on an ERP solution code named BEST (business excellence through system technology). The purpose of the project was to bring the USA portion of the business together so that it could function as a single entity with common business processes. However, after 6 years, the project had cost more than $200M and had been fraught with dead ends and costly mistakes.[8] What happened? To begin with, Chief Information Officer Jerri Dunn assembled 50 top business executives and ten senior information technology professionals from eight or nine autonomous divisions, and came up with a set of best practices that would become common work procedures for every Nestlé division.[9] On the surface it appeared to be a practical plan; however, it was flawed because it left out the *key users* whom the system was going to affect. Since there was no end-user involvement, the new changes were not well received. Consequently the users resisted the changes. This serious mistake by Dunn's team caused so much chaos and ambiguity that it almost brought the project to a halt.

Any company that is not prepared to change its business processes will find itself with a large bill for software and consulting fees, with no real improvement in organizational performance.[10] To reiterate, this means ERP implementations are really not about software changes, but about changing the way one does business. Dunn stated the primary lesson she learned was that no major software change is about software, but it is about change management.[11] The fact is, many businesses operate out of a classical functional or a departmental mentality. Nestle found this out when a team examining the various systems across the company found, among many other troubling redundancies, that Nestlé's USA brands were paying 29 different prices for vanilla to the same vendor.[12] Because the business units were operating functionally and independently of each other, no one even realized that this was happening.

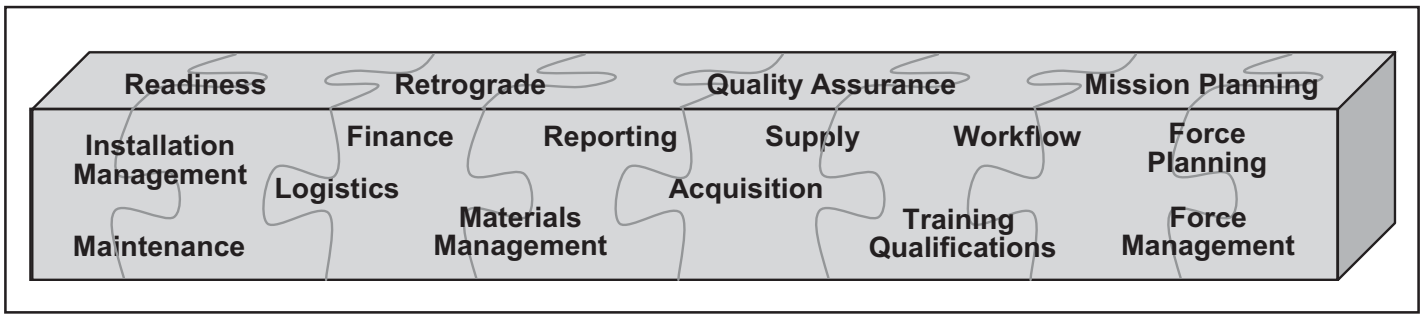


Figure 1. Enterprise Resource Planning Integration

Conclusion

For an ERP to be successful, organizations have to learn new ways of doing business. This means that beliefs and core values have to be changed, and the changes adopted within the organization. Nestlé found out that even when things seemed to get better, change management still needed attention and dedicated resources to ensure its success. The lesson learned here is that changing organizational culture is hard and can take a long time. Further, changing an organization from being functionally driven to being process driven is a huge undertaking and requires support from the top management level in an organization.

Implementing the Air Force's logistics ERP will be a challenging and monumental undertaking from a number of perspectives—collapsing 400 plus legacy systems, change management, reengineering business processes, and adopting industry best practices. However, the Air Force is going the extra mile to ensure a seamless transition. Leadership is providing the support to make it a reality. Lessons learned have been captured from commercial and other DoD organizations. Program governance is in place and change management efforts are ongoing. While ERP implementation will not solve all the problems we face in logistics, it will go a long way in helping us remain the premier Air Force in the world.

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Bitter experience in war has taught the maxim that the art of war is the art of the logistically feasible.

—Adm Hyman G. Rickover, USN

I have no reason to believe that logistics will ever have much military sex appeal, except to serious soldiers.…

—Maj Gen Julian Thompson, Royal Marines

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Special Feature

Supply chain management is more than a passing stage in the continuing evolution of management practice. It is a major revolution which is already delivering end-to-end visibility, cost reductions, and new levels of performance metrics in meeting customer requirements.

logistics supply chains

Supply Chain Management: More Than Integrated Logistics

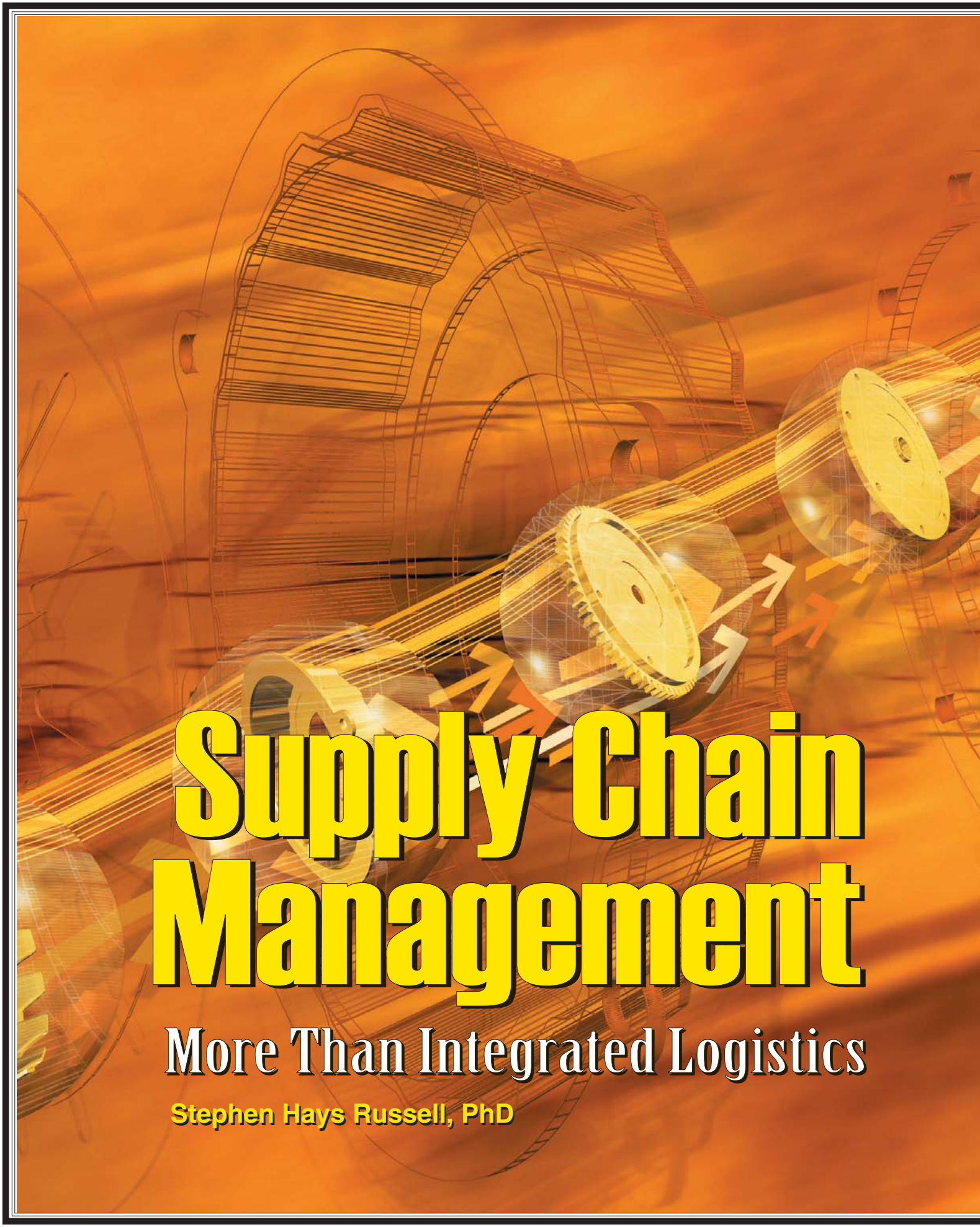
This edition's featured article was written by Dr Stephen Hays Russell. Over the years, Dr Russell has been a frequent contributor to the Journal. He is an accomplished logistician and is on the faculty of the John B. Goddard School of Business and Economics, Weber State University. In "Supply Chain Management: More Than Integrated Logistics," Dr Russell examines the historical evolution of management thought to its newest frontier—supply chain management, reviews the emerging practices that define supply chain management in both commercial and military applications, and demonstrates that supply chain management is more than integrated logistics.

He concludes with three major points.

Integrated logistics in a commercial context is coordinating logistics activities. In a military context, integrated logistics is designing reliability, maintainability, and supportability into weapon systems, focusing on customer requirements, and coordinating supply support, training, technical data, and all other integrated logistics support elements.

Supply chain thinking is a major breakthrough in thought about the interconnectivity of information technology, logistics processes, and customer support.

Supply chain management is not a passing stage in the evolution of management practice. It is a major revolution.



Supply Chain Management

More Than Integrated Logistics

Stephen Hays Russell, PhD

Introduction

Logistics as a management discipline originated in the military and later branched into the commercial sector as business logistics. Now, the hottest topic in the commercial sector is supply chain management. With the Department of Defense (DoD) jumping on this latest revolution in management thought, questions arise as to what exactly is supply chain management.

Special Feature

This article examines the historical evolution of management thought to its newest frontier—supply chain management, reviews the emerging practices that define supply chain management in both commercial and military applications, and demonstrates that supply chain management is more than integrated logistics.

The Development of Formal Management Thought

The evolution of management thought began in a formal way with Frederick Taylor's *Principles of Scientific Management* published in 1911. Taylor focused on issues of worker productivity. In the ensuing decades, research in management practices was directed toward efficiencies in manufacturing and services (collectively referred to as operations). Beginning in the 1950s, work by Harry M. Markowitz and others spawned a thought revolution on capital markets and financial management. During the 1960s, new approaches in marketing emerged as the areas of consumer behavior and the analysis of distribution systems became the focus of much business-related research. During the decade of the 1970s, a trend which began in the 1960s—the migration of military logistics practices to the private sector—accelerated as corporations recognized the need to improve their distribution functions and American universities began to offer degree programs in logistics management.

New attitudes and approaches toward personnel management emerged in the 1980s as organizations recognized the importance of human resource considerations in productivity enhancement and in long-range strategic planning. The term *human resource management* was introduced. The 1980s also saw a major emphasis on quality management as US business faced increased competition from Japan.

The 1990s was a decade in which logistics management truly came of age in management thought and in private sector business practices. As the emphasis on quality matured and high quality became the standard, firms began to differentiate themselves in terms of their logistics performance. Specifically, the focus of research and practice in logistics was in terms of employing the new information technologies of the 1990s to develop capabilities and protocols for efficient and responsive material flows to meet the ever-increasing demands of customers.

The evolution of management as a discipline during the twentieth century generated a body of literature and a set of practices which today define the science of management as effective, efficient planning and control of operations, finance, marketing, quality, human resources, and logistics (see Figure 1).[1]

By the year 2000, this collective maturing of management thought set the stage for a new frontier of emphasis, seeking increased customer service levels, market share, and profits by focusing on organizational interconnectivity in terms of a *supply chain*.

Years	Events
1911	**Management** emerges as a formal discipline of study and practice
1920s – 1950s	Writings on **operations**, worker productivity, and output metrics
1950s	Modern era of **finance** is launched
1960s	Modern thought in **marketing** principles and practices formulated
1970s	Accelerating trend by **business** to adopt principles of military **logistics** to distribution systems
1980s	Contemporary approaches to **human resource management** emerge **Quality** revolution
1990s	Explosive growth in logistics research and **logistics emphasis in organizations**
2000s	**Supply chain management revolution**

Figure 1. Evolution of Management Thought

Article Highlights

The term supply chain management was coined in 1982 by Keith Oliver, a management consultant at Booz Allen Hamilton. Oliver used the term to develop a vision for tearing down functional silos that separated production, marketing, and distribution. The concept was enlarged by J.B. Houlihan in 1985 when he expounded upon efficiencies and mutual benefits associated with information sharing and decision coordinating up and down a supply chain.

This article examines the historical evolution of supply chain management, reviews the emerging practices that define supply chain management in both commercial and military applications, and demonstrates that supply chain management is more than integrated logistics.

A supply chain is the sequentially-connected organizations and activities involved in creating and making a product available. A supply chain can also be viewed as a value chain inasmuch as suppliers, manufacturers, transporters, and all other components of a supply chain add value. It may also be viewed as a demand chain.

In the late 1990s, an entire culture focusing on the supply chain emerged.

According to Dr Russell, some view supply chain management as a sophisticated new name for integrated logistics. However, supply chain management is more than integrated logistics because supply chain management involves far more than logistics. Supply chains ride on the back of information systems, they include manufacturing operations, they interface with marketing and finance, and they involve such concepts as strategic sourcing, business process connectivity, risk sharing, and supplier involvement in new product development. Managing a supply chain involves activities that are outside the purview of logistics.

The Supply Chain Management Revolution

A supply chain is the sequentially-connected organizations and activities (from Mother Earth to the ultimate customer) involved in creating and making a product available. A supply chain can also be viewed as a *value chain* inasmuch as suppliers, manufacturers, transporters, and all other components of a supply chain add value. Conversely, if one looks in the reverse direction at the same activities, a supply chain can be viewed as a *demand chain*.

The term *supply chain management* was coined in 1982 by Keith Oliver, a management consultant at Booz Allen Hamilton.[2] Oliver used the term to develop a vision for tearing down functional silos that separated production, marketing, and distribution. The concept was enlarged by J. B. Houlihan in a 1985 article that expounded upon efficiencies and mutual benefits associated with information sharing and decision coordinating up and down a *supply chain*.[3]

In the late 1990s an entire culture focusing on the supply chain emerged. Universities introduced supply chain management majors or supply chain management concentrations in masters of business administration programs (Arizona State University, Syracuse University, and the University of Wisconsin, for example). Wal-Mart honed supply chain management concepts by building worldwide communication and relationship networks with suppliers to improve reliable material flows with lower inventories. Indeed, Wal-Mart is viewed by many as the premier practitioner of supply chain management with its demonstrated ability to get a network of worldwide suppliers, warehouses, and retail stores to behave almost "as a single firm with near real-time information…."[4,5]

By the year 2000, the trend for major organizations to establish high-level executive positions with supply chain titles was in full swing.[6]

In 2005, the Council of Logistics Management changed its name to the Council of Supply Chain Management Professionals (CSCMP).

The pervasiveness of the supply chain management revolution is skillfully described by Thomas L. Friedman in his 2005 best-selling book *The World is Flat*. He considers supply chain management and its enabling information technology revolution as being behind fundamental changes in the world economy.[7]

Defining Supply Chain Management

The supply chain management concept seeks utopian performance in commerce: all activities up and down a supply chain orchestrated and coordinated (as though a single entity) to synchronize supply and demand at all levels, the sharing of information and technologies to increase innovation and to shorten product development cycles, reduction in order cycle time, replacing stocks with flows, effectively and efficiently responding to customer demands, reduced costs, and increased customer satisfaction.

Some view supply chain management as a sophisticated new name for integrated logistics. However, supply chain management is more than integrated logistics because supply chain management involves far more than logistics.[8] Supply chains ride on the back of information systems, they include manufacturing

operations, they interface with marketing and finance, and they involve such concepts as strategic sourcing, business process connectivity, risk sharing, and supplier involvement in new product development. Managing a supply chain involves activities that are outside the purview of logistics.

Figure 2 illustrates the conceptual transition from classical logistics to supply chain management, and the component parts of supply chain management. Classical logistics is concerned with the acquisition, storage, and distribution of material to get the right product to the right customer, at the right time, at the right place, in the right condition, in the right quantity, at the right cost (the *Seven R's of Logistics*).

Modern logistics, along with modern manufacturing, has moved beyond classical activities by incorporating lean practices. Here the focus is on more than just time and place utility. Lean logistics and lean manufacturing emphasize flows rather than stocks. Stockpiles of material are viewed as generally wasteful and as hiding underlying problems such as excessive production runs, poor demand forecasting, faulty inventory data, and erroneous distribution decisions. A just-in-case attitude is replaced with a just-in-time or other lean approach as systemic process problems are eliminated. In short, inventory is replaced with information in the form of real-time demand (point of sale data, for example), more accurate forecasts, and visibility on inventory location.

As illustrated in Figure 2, lean logistics and lean manufacturing become two of the five components of supply chain management. Contrary to a popular view that supply chain management is just super-charged logistics, the cornerstone of supply chain management is not logistics. Alliances with key partners, and information technology that allows supply chain partners to share accurate information on a timely basis are the building blocks of efficient and responsive supply chain operations.[9] Upon this foundation, the introduction of lean manufacturing and lean logistics processes, together with the integration of key business processes up and down the supply chain create supply chain management.

Alliances are collaborative relationships with key partners built upon trust. In alliances, upstream partners are more than sources. They are resources to the focal firm for problem solving, and for innovation (new technologies for example). With alliances, partners are viewed as extensions of the focal firm and decisions are made in the context of mutual gain. Such collaboration is the underpinning of supplier relationship management (upstream) and customer relationship management (downstream).

Information technology is the glue that holds the supply chain together. The functional areas within the firm operate from a common, shared database. Alliance partners share data. The accuracy, the speed, the relevance, the availability, and the accessibility of information are critical for successful supply chain performance.

Supply Chain Information Systems

Information systems supporting supply chain operations are of four categories:

- **Enterprise resource planning (ERP) software.** ERP software processes all transactions in every functional area and provides real-time access to an enterprise-wide data base. ERP replaces the legacy information systems which through the years have been cobbled together by operations, finance, marketing,

Article Highlights

Russell concludes with three key points:

- Integrated logistics in a commercial context is coordinating logistics activities with other functional areas of the firm and with customers and suppliers. In a military context, integrated logistics is designing reliability, maintainability, and supportability into weapon systems, focusing on customer requirements, and coordinating supply support, training, technical data, and all other integrated logistics support elements.
- Supply chain management is more than integrated logistics. Supply chain thinking represents a major breakthrough in thought about the interconnectivity of information technology, logistics processes, and customer support. Supply chain management is alliances with supply chain partners, lean processes, and end-to-end integration of key business processes. The enabling technology is information.
- Supply chain management is more than a passing stage in the continuing evolution of management practice. It is a major revolution which is already delivering end-to-end visibility, cost reductions, and new levels of performance metrics in meeting customer requirements.

Article Acronyms

ACS – Agile Combat Support
AFLC – Air Force Logistics Command
AFSC – Air Force Systems Command
DoD – Department of Defense
EDI – Electronic Data Interchange
eLog21 – Expeditionary Logistics for the 21st Century
EPC – Electronic Product Code
ERP – Enterprise Resource Planning
ILS – Integrated Logistics Support
IWSM – Integrated Weapons Systems Management
LSA – Logistics Support Analysis
NCW – Network-Centric Warfare
OFT – Office of Force Transformation
OSD – Office of the Secretary of Defense
RFID – Radio Frequency Identification
S&RL – Sense and Respond Logistics
SCA – Supply Chain Analytics

engineering, procurement, and so forth. Legacy systems are capability inhibited, difficult to connect to other functional areas, and cannot support supply chain dynamics.

- **Electronic data interchange (EDI) or Internet connectivity.** EDI and the Internet facilitate an interconnected business environment that allows partners to share decision-relevant information up and down the supply chain.
- **Electronic product code (EPC) technologies.** EPC technologies include bar codes, optical scanners, and radio frequency identification (RFID) technologies. EPC allows for item, case, pallet, and vehicle tagging for a *track and trace* capability in a supply chain.
- **Supply chain analytics (SCA).** SCA is any software designed to assess and improve supply chain performance. SCA can do such things as evaluate capacity, materials, and customer demand imbalances; or identify which carriers and distribution centers are most responsive.

Integrating Business Processes

The final component of supply chain management is that which makes a supply chain operational—integration of key business processes among the players up and down a supply chain.

Product Development

The objective of the product development process is bringing state-of-the-art products that meet customer wants and needs to market faster than the competition. This happens with internal integration of functions, and upstream and downstream involvement of supply chain partners.

In a supply chain management environment, engineering, manufacturing, procurement, logistics, marketing, and suppliers (and sometimes customers) work synergistically in cross-functional teams during product development.

Suppliers, viewed as resources, are involved early in the design stage of a new product. Suppliers (including supplier's suppliers) contribute information on new materials, new technologies, design engineering, process engineering, value analysis, supportability issues, and cost management. Early supplier involvement means shortened product development cycles and faster time to market of superior products.

Downstream, customers are often brought into the process through collaboration to understand their performance and design requirements, as well as their demand patterns.

Demand Management

Modern supply chains are customer-driven pull systems. The focal firm's supply capabilities must be synchronized with known and forecasted demand patterns of downstream customers. The buy-make-move functions at all levels of a supply chain are driven by real-time demand data or by meaningful, current, adaptable forecasts that reduce uncertainty and promote responsive material flows throughout the supply chain. Such a process allows for higher levels of customer service with reduced inventories.

Manufacturing Scheduling and Management

Coordination of manufacturing scheduling and management throughout a supply chain occurs with sharing of business plans and real-time inventory and demand information, and with an integrated business process of collaborative planning and forecasting. The supply chain concept requires movement away from the old, industrial economy mindset of *make to stock* to the information-age economy which means production at all levels reflects demand and supply synchronization.

Order Fulfillment

Real-time visibility on inventory quantity and location, collaborative processes, and shared data foster flexible and responsive management of customer orders across global supply chains. Supply chain capabilities allow for seamless, continuous replenishment systems that meet or exceed customer expectations.

Product Support

The supreme goal of supply chain management—effective, efficient customer service with superior products and service—requires a network of activities for responsive, after-sale product support. This includes high service levels for spare and repair parts, technical data, maintenance and calibration services, warranties, and returns.

In sum, by formula we can define Supply Chain Management as:

Alliances + Information Technology + Lean Manufacturing + Lean Logistics + Integration of Key Business Processes

Figure 3 contrasts characteristics of classical logistics with pure supply chain management. To be sure, these are comparisons of extremes. Classical logistics does not represent information-age or modern, lean practices. Pure supply chain management is an ideal based upon levels of trust, risk, and information purity that are not descriptive of all situations and environments. Nonetheless, this comparison highlights the evolving characteristics of a management revolution called supply chain management.

Evolution from Logistics to Supply Chain Management

Figure 4 graphically portrays the evolution of logistics thought and practice.

Although logistics activities parallel the conduct of war and have existed for thousands of years, the term appears to have received its first official definition in 1905.[10]

Logistical activities on a massive scale occurred during World War II as huge stockpiles of materiel were pushed into theaters. The industrial-age *iron mountain* approach was the sure way to provide strategic support to military forces.

During the 1950s, two factors forced a consideration of *efficiency* in addition to effectiveness in providing logistical support to armed forces. First, the two Hoover Commissions (Commissions on the Organization of the Executive Branch of the Government) and congressional inquiries into military supply management during the Korean War identified waste and inefficiencies in military procurement and logistics. These findings spawned efficiency initiatives by the Department of Defense (DoD) that included creation of the first, single DoD-wide logistics executive (Assistant Secretary of Defense for Supply and Logistics); separate management approaches for *repairables* (now called *reparables*) and *consumables*; introduction of the item manager concept; and efforts toward standardization for items common to the three Services.[11]

Second, major challenges associated with America's first supersonic bomber, the B-58, manifested the need to consider maintainability in design of weapon systems. Not only did engineering complexities of the B-58 make it difficult to fly, flying-hour costs were huge, and maintenance intricacies required inordinate training and skill levels and highly specialized equipment. In 1965 early retirement was ordered for this aircraft. The B-58 demonstrated the need for configuration management; reliability and maintainability engineering, and life-cycle cost management to be included in the field of logistics.[12]

During the 1960s, an engineering perspective was added to the management aspect of logistics. Logistics became a quantitative science. The principles underlying logistics support analysis and integrated logistics support emerged.

The systems approach to logistics matured in the 1970s and 1980s. The art and science of logistics was treated as a set of interrelated activities. In 1970, logistics engineers and provisioning specialists from Air Force Logistics Command (AFLC) were, for the first time, collocated with a system program office in Air Force Systems Command (AFSC).[13] In 1976 AFLC created the Acquisition Logistics Division to work closely with AFSC to promote maintainability and support of weapons systems and ancillary equipment.[14] This era saw a major push on design for maintainability, supportability, and life-cycle cost management.

In 1992, AFLC and AFSC were merged into Air Force Materiel Command. This merger strengthened the systems view of logistics by marrying the research, science, engineering, and acquisition strategy expertise of AFSC with the logistics engineering and management expertise within

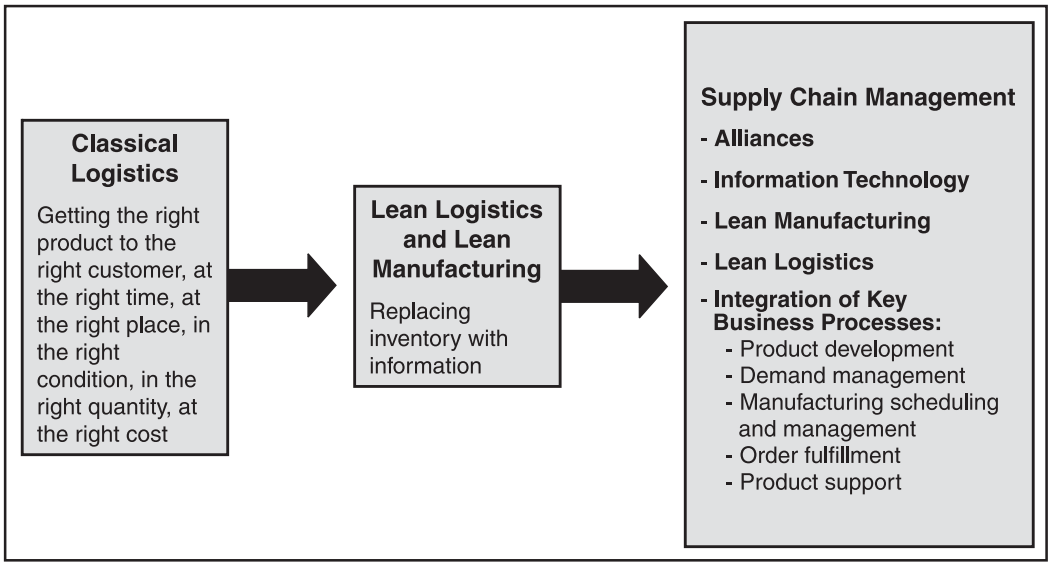


Figure 2. Conceptual Transition from Classical Logistics to Supply Chain Management

	Classical Logistics	Pure Supply Chain Management
Starting point	Requirements determination	Business process renovation
Organization	Functional silos	Integrated supply chain
Strategy	Predetermined plans of action	Adaptive capabilities for flexible response
Span of vision	First tier sources and customers	End-to-end system
Management focus	Logistics optimization	Extended enterprise optimization
Performance standards	Provider-developed	Customer-dictated
Partner selection	Quote and competition	Proposal and negotiation
Partner connectivity	Short-term contracts	Long-term contracts and strategic alliances
Contractual environment	Legalistic	Institutional trust
Relationships	Transactional; arms length	Long term, collaborative
Relationship objective	Opportunistic advantage	Mutually satisfactory outcome with emphasis on continuity of the relationship
Procurement objective	Contract compliance at minimum cost	Best value (innovation, quality, service, and price)
Supplier base	Huge	Circumscribed to select or world-class suppliers
View toward supplier	Source	Resource
Material verification	Material Inspections	Certified suppliers
Business environment	Adversarial	Mutual gain
Transportation approach	Service objective at minimum cost	Consistent, reliable, responsive service
Inventory approach	Push system; just-in-case	Pull system; replace inventory with information
Material flows	Scheduled	Self-synchronizing
Information	Industry standards, performance audits, status and exception reports	Enterprise resource planning system, electronic product codes, Internet connectivity, and supply chain analytics
Cost and service	A trade-off	Reengineer processes to increase service levels and reduce costs
Cost focus	Acquisition cost	Total cost of ownership
Support asset focus	Stocks	Flows
Risk	Low	Higher

Figure 3. Comparative Characteristics of Classical Logistics and Supply Chain Management

AFLC. The Agile Combat Support (ACS) doctrine became the targeted core competency for Air Force logistics. Program managers were given a *cradle-to-grave* responsibility for their acquisition programs as part of the integrated weapons systems management (IWSM) philosophy.[15]

On the commercial side of logistics, the marketing profession began to look at principles of military logistics as a way to improve distribution in the private sector in the mid-1960s. By the 1980s and 1990s, business logistics (defined as a customer-driven order fulfillment process with nine dimensions, as portrayed in Figure 4) became an important area for corporate strategy.

The 1990s also saw the blossoming of the information age, which offered the facilitating technologies for the supply chain management revolution of the 21st century.

Supply Chain Management in the US Military

The private sector borrowed best-practice concepts in military logistics beginning in the 1960s. The defense establishment is now implementing commercial best practices by pursuing the concepts, practices, and technologies of supply chain management.

Although DoD created a supply chain executive position in 1998 (Deputy Under Secretary of Defense for Supply Chain Integration), a supply chain management campaign by the Office of the Secretary of Defense (OSD) was not launched until 2003.[16]

The impetus for this campaign was Secretary of Defense Donald H. Rumsfeld's 2001 initiative to transform US military capabilities and the establishment of the Office of Force Transformation (OFT).[17] Arthur K. Cebrowski, OFT's first director, developed the guiding philosophy of the transformation which he called network-centric warfare (NCW). NCW is best viewed as a theory of war in the information age. Information sharing among networks of intelligence, operations, and logistics communities facilitates speed of command, flexible and situational response, and sustainability.[18]

As part of the NCW model, OFT unveiled the Sense and Respond Logistics (S&RL) initiative in 2003.[19] S&RL is a philosophical umbrella for military supply chain management. It is a strategy for developing supply chains with players, information systems, capabilities, and protocols to respond rapidly to changing combat support requirements in the field. The *sense* aspect of S&RL is a real-time information system for gathering demand signals from the field. *Respond* is capabilities for flexible and speedy action within end-to-end supply chains. In short, S&RL is about the use of networks and sensors to create an agile supply chain with total asset visibility and real-time support capability. In an S&RL world, logistics mass is replaced with logistics speed.[20]

Responsibility for the S&RL project has been given to the Office of the Undersecretary of Defense for Acquisition, Technology and Logistics. Their mandate is to pursue the underlying technologies and to work with the individual military departments to identify and develop their potentials for S&RL.[21]

In the interim, OSD has directed the implementation of modern supply chain practices for all DoD components. The DoD Supply Chain Material Management Regulation (DoD 4140.1-R dated 23 May 2003) mandates a supply chain framework and guiding principles for: effective and efficient end-to-end material support, meeting customer expectations while minimizing inventories, promulgating supply chain best practices in material management, and establishing the customer as the foundation driving all material management decisionmaking. This regulation requires all DoD components to measure total supply chain performance.[22]

The supply chain transformation within the US Air Force was formally launched in 2003 with the Expeditionary Logistics for the 21st Century (eLog21) campaign. The goal of eLog21 is, by philosophy, to offer efficient, Agile Combat Support; by vision, an enterprise view of logistics; and in practicality, to use supply chain concepts and technology to improve weapons availability by 20 percent and to reduce support costs at the same time.[23]

The eLog21 program contains all the elements of modern supply chain management. Fulfillment processes are being reengineered to increase customer service and to reduce costs. Revised and integrated business practices for sustainment mirror private sector best practices. RFID is being extensively employed for asset tracking.

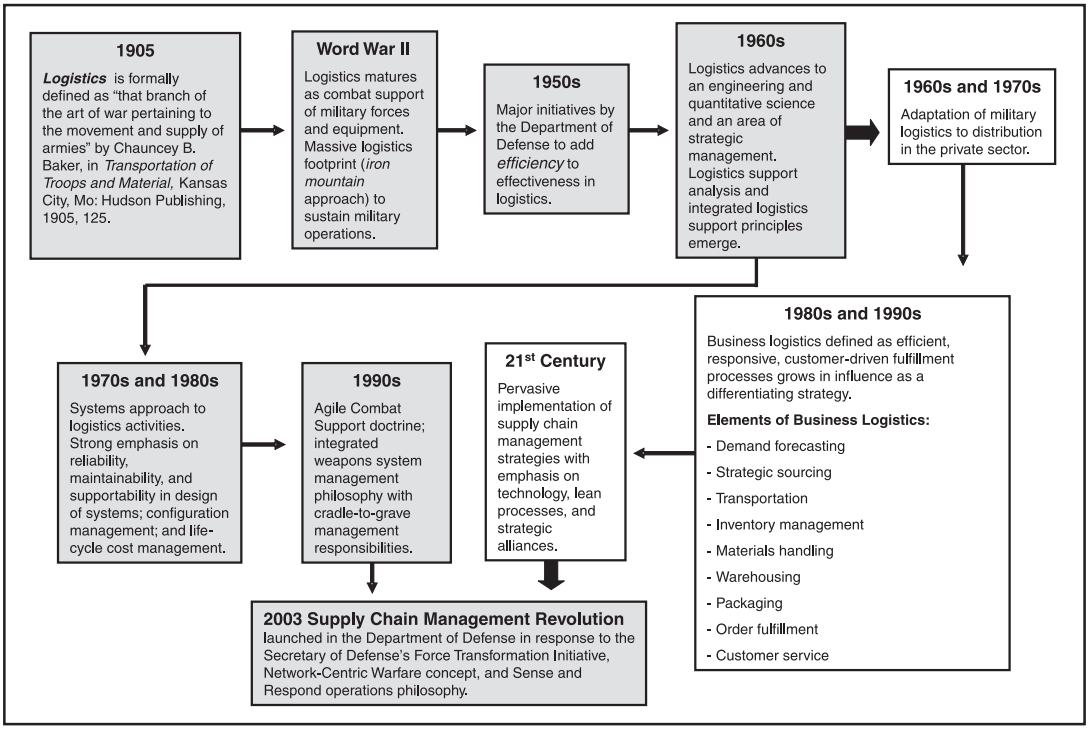


Figure 4. Evolution of Logistics Thought and Practice

And major investment in supporting information technology, the Expeditionary Combat Support System (which is the Air Force version of enterprise resource planning technology used in the private sector) is programmed.

Summary

Integrated logistics in a commercial context is coordinating logistics activities with other functional areas of the firm and with customers and suppliers. In a military context, integrated logistics is designing reliability, maintainability, and supportability into weapon systems, focusing on customer requirements, and coordinating supply support, training, technical data, and all other integrated logistics support elements.

Supply chain management is more than integrated logistics. Supply chain thinking represents a major breakthrough in thought about the interconnectivity of information technology, logistics processes, and customer support. Supply chain management is alliances with supply chain partners, lean processes, and end-to-end integration of key business processes. The enabling technology is information.

Supply chain management is more than a passing stage in the continuing evolution of management practice. It is a major revolution which is already delivering end-to-end visibility, cost reductions, and new levels of performance metrics in meeting customer requirements.

Notes

1. "Historical Background of Organizational Behavior," [Online] Available: http://web.cba.neu.edu/~ewertheim/introd/history.htm, accessed 2 Apr 2007). Another element in the evolution of management thought is that of human motivation and the relationship between work environment and productivity. This field of inquiry (called organizational behavior) originated with the famous Hawthorne Studies on worker productivity in the 1920s and advanced with such notable contributions as Maslow's Hierarchy of Needs (1950s) and Douglas McGregor's human relations approach to management called Theory X and Theory Y (1960s).
2. Keith Oliver, "When Will Supply Chain Management Grow Up?" *Strategy + Business*, Fall 2003, Issue 32, [Online] Available: www.strategy-business.com/press/16635507/03304, accessed 23 Apr 2007.
3. J.B. Houlihan, "International Supply Chain Management," *International Journal of Physical Distribution and Materials Management*, Vol 15, No 1, 1985, 51-56.
4. Scott Webster, *Principles and Tools for Supply Chain Management*, Boston: McGraw-Hill-Irwin, 2008, 7.
5. Thomas L Friedman, *The World is Flat: A Brief History of the Twenty-First Century*, New York: Farrar, Straus and Giroux, 2006, 151. Friedman characterizes Wal-Mart's efficient global supply chains as "The Wal-Mart symphony in multiple movements—with no finale."
6. Early examples include Kraft Foods, The Home Depot, Fairchild Semiconductor, Logitech, Delta Airlines, Whirlpool Corporation, Tyco International, and General Motors.
7. Thomas L Friedman.
8. Nonetheless, the intellectual home for the supply chain management revolution has been in logistics. Logisticians lead this movement. The logistics managers at Wal-Mart, for example, spearheaded the move to supply chain management in that organization. The leading-edge thinkers in the supply chain revolution (Douglas M. Lambert of Ohio State University, James R. Stock of the University of South Florida, and John T. Mentzer of the University of Tennessee, for example) are logisticians by background.
9. This thought appears to have been advanced first by Douglas M. Lambert of Ohio State University and director of the Global Supply Chain Forum. See Douglas M. Lambert, *Supply Chain Management: Processes, Partnerships, and Performance,* 2d Edition, Sarasota, Florida: SCM Institute, 2006.
10. Chauncey B. Baker, *Transportation of Troops and Material*, Kansas City: Hudson Publishing, 1905, 125. For an expanded discussion on the origin of the term *logistics* and for various definitions, see Stephen Hays Russell, "The Growing World of Logistics," *Air Force Journal of Logistics*, XXIV, No 4, 15-19.
11. See "History of the Defense Logistics Agency," [Online] Available: www.dla.mil/history, accessed 18 Feb 2007.
12. For an example, see "B-58 Hustler," [Online] Available: www.globalsecurity.org/wmd/systems/b-58-fc.htm, accessed 18 Feb 2007.
13. In 1970, the B-1 System Program Office (SPO), as part of an initiative dubbed *Innovations*, colocated SPO personnel (engineers and program control people) at contractor sites (North American Rockwell in Los Angeles and General Electric Aircraft Engine Group in Evendale, Ohio). The SPO also had AFLC collocate personnel in these satellite SPOs.
14. *The Logistics of War: A Historical Perspective*, Maxwell AFB, Gunter Annex: Air Force Logistics Management Agency, 2000, 360.
15. Although intended for acquisition programs, the IWSM philosophy was expanded to product and materiel managers. The objective was to create a seamless process for spares by integrating the acquisition and sustainment processes.
16. In April 2003, OSD charged the Services with a series of supply chain transformation objectives including reengineering logistics processes, total asset visibility, and time-definite delivery. The individual Services, however, were pursuing supply chain concepts prior to that date. The Air Force Purchasing and Supply Chain Management (PSCM) project was initiated in February 2001 and progressed to its current design in April 2004. The Expeditionary Logistics for the 21st Century (eLog21) program, of which PSCM is a component and the Air Force approach to supply chain transformation, began in February 2003. For a comprehensive overview of the eLog21 program see, *Expeditionary Logistics for the 21st Century Campaign Plan*, [Online] Available: www.af.mil/shared/media/document/AFD-060831-041.pdf, accessed 30 Mar 2007.
17. See "Office of Force Transformation Homepage" [[Online] Available: www.oft.osd.mil, accessed 18 Feb 2007.
18. D. S. Alberts, J.T. Garstka, and F.P. Stein, *Network Centric Warfare: Developing and Leveraging Information Superiority*, 2d ed (Revised), Washington, DC: CCRP Publications, August 1999, [Online] Available: www.dodccrp.org/files/alberts_ncw.pdf, accessed 18 Feb 2007.
19. Sense and respond as a business philosophy was developed by Stephan H. Haeckel of the IBM Advanced Business Institute in 1993. See S.H. Haeckel and A.J. Slywotsky, *The Adaptive Enterprise: Creating and Leading Sense and Respond Organizations*, Harvard Business School Press, 1999; and "Operational Sense and Response Logistics: Co-evolution of an Adaptive Enterprise Capability," Office of Force Transformation, November 2004, [Online] Available: www.oft.osd.mil/Initiative/srl/S&RL_Concept_Short.doc, accessed 12 Mar 2007.
20. For an excellent treatment of the Sense and Respond model see Karen Butner, et. al., *Reshaping Supply Chain Management: Vision and Reality*, Boston: Pearson Custom Publishing for IBM Global Business Services, 2007.
21. An insightful discussion on the progress and the challenge of organizational change in moving DoD components to S&RL is found in Heather B. Hayes', "Sense and Respond in Fits and Starts," *Defense Systems*, Sept/Oct 2006, [Online] Available: www.defensesystems.com/issues/1_5/features/474-1.html, accessed 11 Apr 2007.
22. Office of the Deputy Under Secretary of Defense for Logistics and Materiel Readiness, *DoD 4140.1-R DoD Supply Chain Materiel Management Regulation*, 23 May 2003, [Online] Available: www.ditc.mil/whs/directives/corres/pdf/414001r.pdf, accessed 2 Jan 2007.
23. "eLog21 Fact Sheet," [Online] Available: https://acc.dau.mil/CommunityBrowser.aspx?id=32774, accessed 2 Mar 2007; "eLog21 Purchasing and Supply Chain Management," *Air Force Journal of Logistics*, 23 May 2003, [Online] Available: www.accessmylibrary.com/coms2/summary_0286-1448758_ITM, accessed 2 Mar 2007.

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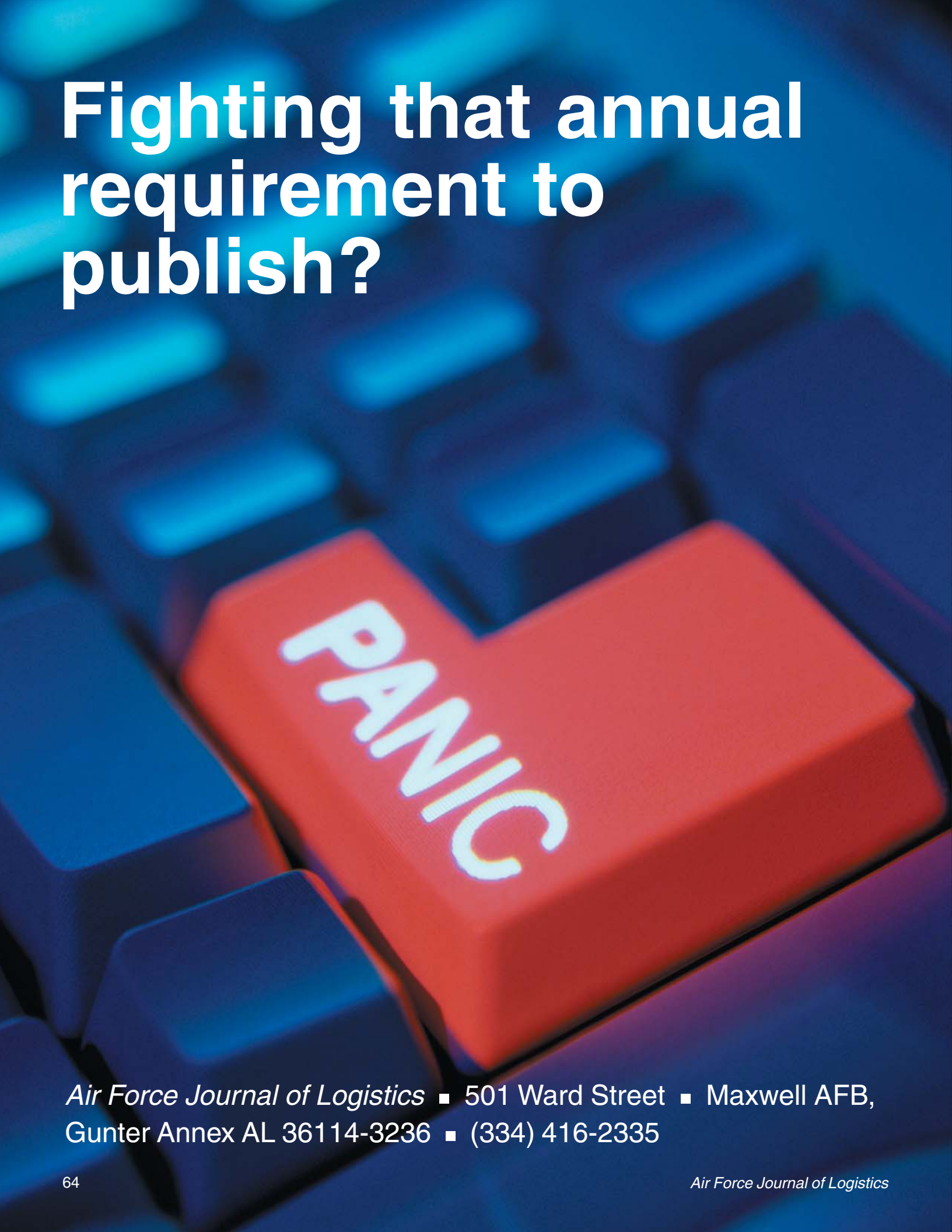
Fighting that annual requirement to publish?



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Air Force managers have the information they need to measure the impact of funding cuts on various commodities (spares, equipment, and consumables) when compared to base-level readiness. What is still needed are tools to trade off one commodity for another or one resource (people, fuel, ammunition, spares, and so forth) for another.

contemporary issues

Logistics Support: Relating Readiness to Dollars

Contemporary Issues, in this edition, presents "Logistics Support: Relating Readiness to Dollars." In this article, Dr Douglas J. Blazer and Lieutenant Colonel Jeoffrey D. Sloan discuss relating funding to operational capability.

In the 1980s it became clear the Air Force logistics community needed a way to link dollars to readiness for the resources managed: spares, equipment, and consumables, as well as munitions and fuel. Since then, a number of models and tools have been developed. Today, there are four major models in use.

- Aircraft Availability Model
- Aircraft Sustainability Model
- Equipment Prioritization Model
- Customer-Oriented Leveling Technique

Blazer and Sloan examine each of the models and describe how each is used, along with individual strengths and weaknesses.

They make a number of salient points as they conclude the article. First, the Air Force now has the tools to relate funding to base-level supply performance. Second, these tools are currently being used to optimally determine what to buy, repair, and distribute. Third, as the Air Force moves to an enterprise management posture the tools available will become more important. Fourth, Air Force managers have the information they need to measure the impact of funding cuts on various commodities in terms of base-level readiness. Fifth, the logistics community needs tools that can analyze commodity or resource trade-offs. Finally, with the formation of the Global Logistics Support Center, development of the next generation of models that can be used to manage multiple resources across an enterprise is anticipated.

Douglas J. Blazer, PhD, LMI
Jeoffrey D. Sloan, Lieutenant Colonel, USAF

relating readiness to dollars

Logistics Support

The Air Force now has tools that relate dollars to base-level supply performance and can be used to trade off readiness against dollars. These tools are currently being used to optimally determine what to buy, repair, and distribute with available dollars. As the Air Force moves to an expeditionary combat support enterprise solution, these tools, and tools like them, will become more important.

How to Make Logistics Decisions

Air Force decisionmakers at all levels need tools that relate dollars to operational capability. For example, if the Air Force has $100M, where should it be spent to achieve the most combat capability? A more strategic question is whether to spend the $100M on weapon systems, logistics support, or people.

In the 1980's, the Air Force logistics community realized it needed a way to link dollars to readiness for the resources it managed—spares, equipment, and consumables, as well as munitions and fuel. Since that time, a number of models have been developed to do just that—link dollars to readiness for Air Force-managed peacetime and wartime spares, equipment, and consumables. In this article we briefly discuss the four major models and how they can be used (see Table 1).

In the late 1980s, the Air Force implemented the Aircraft Availability Model (AAM) as part of the Secondary Item Requirements System (D041 then, now D200A) in order to compute the safety-level component for Air Force spares. It has been used since then and continues in use today. The AAM models the complexity of the Air Force spares logistics system. It is a multi-echelon model that maximizes aircraft availability (total nonmission capable supply) given some level of funding. It also models depot- and base-level repair and resupply (retrograde and order and ship times) to a given operations tempo (usually flying hours). Further, AAM includes the spares indenture levels—only shortages of line replaceable units (LRU) will directly ground a weapon system, while shop replaceable units are needed to ensure LRUs are serviceable.

Article Acronyms

AAM – Aircraft Availability Model
AA – Aircraft Availability
ACC – Air Combat Command
AEF – Aerospace Expeditionary Force
AFMC – Air Force Materiel Command
ASM – Aircraft Sustainability Model
COLT – Customer-Oriented Leveling Technique
CRSP – Consumable Readiness Spares Package
CWT – Customer Wait Time
DLA – Defense Logistics Agency
EBO – Expected Back Orders
ECWT – Expected Customer Wait Time
ERS – Equipment Requirements System
FAD – Force Activity Designator
FRAT – Funds Requirement Analysis Tool
FY – Fiscal Year
GSD – General Support Division
LRU – Line Replaceable Unit
MAJCOM – Major Command
MDS – Mission Design Series
PEC – Program Element Code
RSP – Readiness Spares Package
SA – Supply Availability
SBSS – Standard Base Supply System
WMP – War Mobilization Plan

The AAM uses marginal analysis to build aircraft availability (AA) curves, which can then be used to identify and prioritize what spares to buy with available dollars. Under AAM, the item which creates the largest increase in aircraft availability per dollar (marginal analysis—*bang per buck*) is the next item selected to buy.

Figure 1 illustrates an AA curve and shows that for a given weapon system (or group of weapon systems) the Air Force needs $235M in spares funding to achieve 95 percent aircraft availability. Decreasing the amount of funding by $25M decreases aircraft availability to 94 percent. Figure 2 shows the AA analysis for four weapon systems. This illustrates how Air Force decisionmakers can determine where to take the funding cut and what the impact would be on each weapon system. For example, the Air Force may decide it is better to decrease the B-1 AA by 1.6 percent than to reduce the AA for any of the other weapon systems.

Model	Commodity	Readiness Measure
Aircraft Availability Model (AAM)	Peacetime Reparable Spares	Aircraft Availability
Aircraft Sustainability Model (ASM)	War Time Reparable Spares and Consumables	Aircraft Availability, Sortie Capability, S-ratings, Issue Effectiveness (for Consumables)
Equipment Prioritization	Equipment	Fill Rate, S-Ratings
Customer Oriented Leveling Technique (COLT)	Peacetime Expendable Items (DLA Managed)	Customer Wait Time, Expected Back Orders

Table 1. Tools to Link Readiness to Dollars

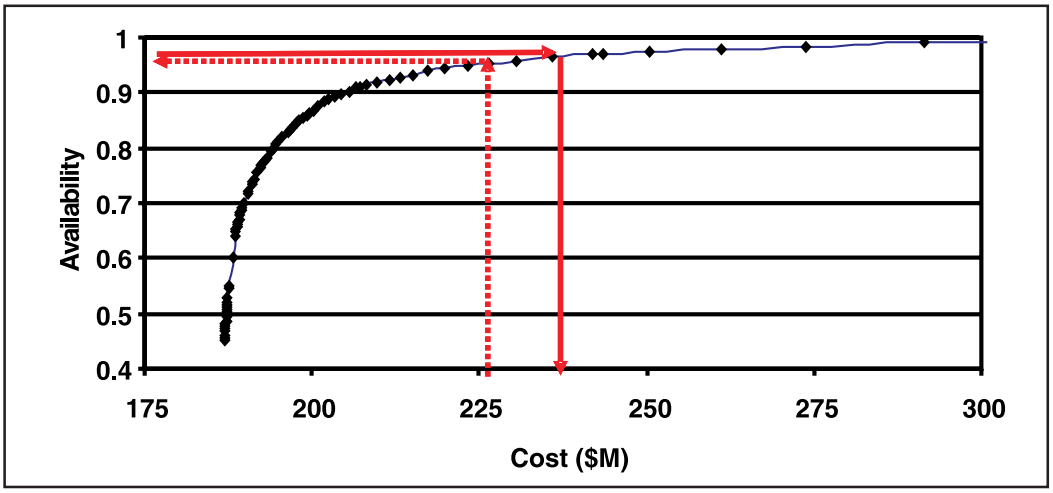

Figure 1. Aircraft Availability Curve

Category	Tier 0	Tier 1	Tier 2	Tier 3	Tier 4	Tier 5	Tier 6	Tier 7	Tier 8
SPRS									
All Use Codes	100%								
Use Code A (Mobility)									
FAD 1, 2, and 3		90%	90%	90%	92%	94%	96%	98%	100%
FAD 4 and 5		80%	90%	90%	92%	94%	96%	98%	100%
Use Code C (Joint Use) and Use Code D (WRM)									
FAD 1, 2, and 3		90%	90%	90%	92%	94%	96%	98%	100%
FAD 4 and 5		80%	90%	90%	92%	94%	96%	98%	100%
Use Code B (Support Equipment)									
FAD 1, 2, and 3		80%	90%	90%	92%	94%	96%	98%	100%
FAD 4 and 5		65%	80%	90%	92%	94%	96%	98%	100%

Table 2. Prioritization Tiers

Aircraft Sustainability Model

The Aircraft Sustainability Model (ASM) uses similar logic to the AAM to compute requirements for wartime spares. It computes the minimum cost mix of spares to support a squadron for a 30- or 60-day wartime (War Mobilization Plan [WMP] 5) requirement to a given direct support objective target (which is the number of available aircraft). For example, ASM can be used to compute and assess the spares needed for an F-16 readiness spares package (RSP) to support a 30-day WMP requirement to achieve a 75 percent AA at the end of day 30. ASM is also used to provide a squadron's Status of Resources and Training System S-ratings given a level of spares for an RSP.

ASM has a capability, albeit more limited than the AAM, to link readiness to dollars. ASM is geared for the squadron level—for example, what spares should be bought to increase F-16 availability for a given squadron. Work is ongoing to expand ASM's capability to conduct fleet-wide assessments. An ASM has been built to compute RSPs for expendable items. It provides the least-cost mix of consumable items to meet a given (85 percent) issue effectiveness target.

Equipment Prioritization Model

Historically the Air Force has only received 40 to 50 percent of the funding required for support equipment buys. To make matters worse, there was no way to prioritize what portion of the equipment to buy with the available (less than full) funding. To correct this problem, the Air Force recently implemented the Logistics Management Institute and Air Force Logistics Management Agency-developed Equipment Prioritization Model in the Equipment Requirements System (ERS). This model uses marginal analysis to maximize the number of organizations' equipment fill rates, thereby maximizing the number of fully mission ready (S-rating) by force activity designator (FAD) and use code. Figure 3 illustrates how the Equipment Prioritization Model works.

The model prioritizes to increase the fill rate the most per

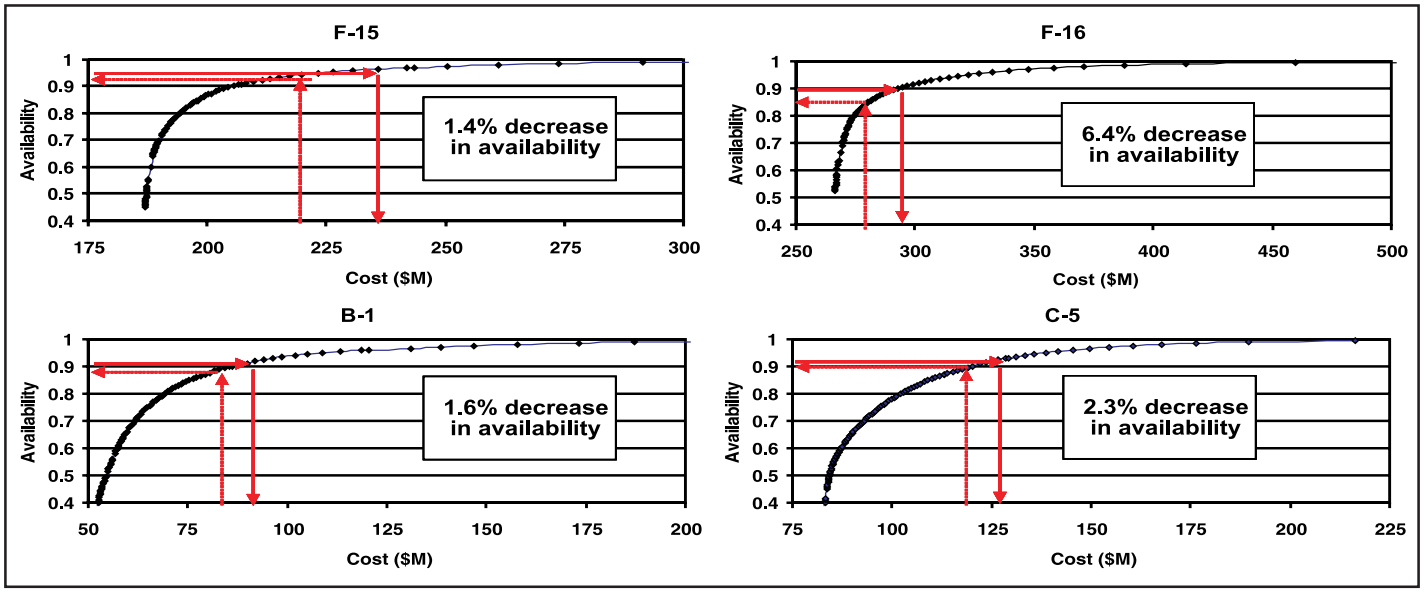

Figure 2. AA Curves - Four Weapon Systems

dollar. It prioritizes FAD 1, 2 and 3, use code A (mobility) organizations to a higher fill rate target than FAD 4 and 5 organizations. Use code C and D (war readiness materiel) is prioritized next and then use code B (peacetime). The model buys the items up to the fill rate target by *priority bucket* and then, like a waterfall, starts buying assets in the next bucket. Finally, when all of the buckets in a tier meet their fill rate targets, the model starts again at the top for the next tier. In this way, it still buys items for the lower priority units. The model optimizes the number of mission ready mobility and war reserve materiel organizations without neglecting the peacetime requirements. Table 2 shows the prioritization tiers.

The model can be, and is used to:

- Prioritize the equipment buy requirement
- Distribute and redistribute malpositioned equipment
- Prioritize repair
- Allocate operations and maintenance buy dollars

In the past, the Air Force allocated equipment funds to the major commands (MAJCOM) proportional to their gross requirements. If the Air Force received 50 percent funding, the MAJCOM with the greatest authorization total would get the largest share of the funds. For example, if Air Combat Command (ACC) had 70 percent of the gross authorizations, it would receive 70 percent of the available funds. With this is mind, we compared three alternative ways to allocate the available funds—the gross requirement, existing *holes* (net requirement), and the enterprise method (using the Air Force prioritization model).

Figure 4 provides an example comparing the gross requirement baseline to allocating using the net requirement.

In our simple example, Case 1 has 10 authorized and 9 in-use (on-hand) so it needs 1 item. Case 2 has 8 authorized and 4 in-use, so it has 4 holes. The gross authorization method would fund Case 1, since it has the most authorizations, whereas the net requirement would fund Case 2 since it has the most shortages. The gross requirement does not consider the asset position, so fully mission capable organizations could still be allocated funds over units that are not fully mission capable (rated S-2 or lower).

Next we compared the holes versus the enterprise allocation method (see Figure 5).

Case 1 has 1,014 authorized and 108 holes for a fill rate of 89 percent. The organization is a FAD 4, use code B (peacetime) priority. Case 2 has 400 authorized and 92 holes for a 77 percent fill rate for a higher priority requirement (FAD 2, use code A, mobility). The Holes allocation method would allocate to the

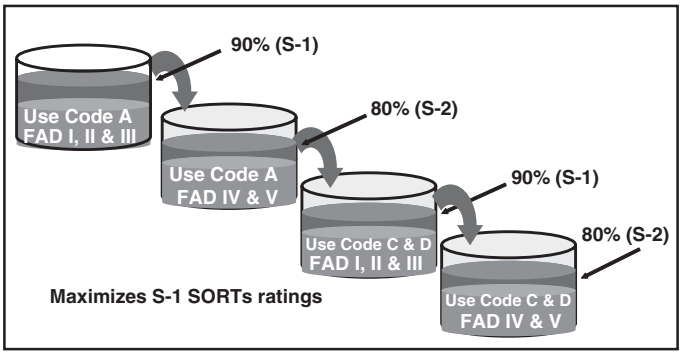

Figure 3. Equipment Prioritization Waterfall

Case 1
Authorized 10, In Use 9 (1 Hole)
Case 2
Authorized 8, In Use 4 (4 Holes)
Gross would fund Case 1 before Case 2
Gross allocation does not consider asset position

Figure 4. Example: Authorized (Gross Requirement) Versus Holes (Net Requirement)

Case 1
Authorized: 1,014; Holes: 106; Fill Rate: 89% FAD IV Use Code B
Case 2
Authorized: 400; Holes: 92; Fill Rate: 77% FAD II Use Code A
Holes would allocate to lower priority need (Org 1) before FAD II Use Code A
Holes method does not consider mission Importance

Figure 5. Holes Versus Enterprise

lower priority need (Case 1). The net requirement does not consider the importance of the shortage to the mission.

Figure 6 shows the differences in the allocation based on actual fiscal year 2006 (FY06) funding and asset position. Note the enterprise method allocates more to Air Mobility Command and Pacific Air Forces since they have relatively more net requirement (holes) and more high-priority shortages.

Figure 7 displays the number of S-1 rated (90 percent fill rate or higher) organizations by MAJCOM that could result from a funding allocation (using the Air Force prioritization model to optimally determine what to buy with the allocated funds). The starting position is the number for S-1 organizations with existing (as of FY06) assets before any buy funds are allocated. With the gross requirement, some MAJCOMs cannot get all of their organizations to S-1 (at least to the 90 percent fill rate). The gross requirement does not consider shortages, so funds are not allocated to some MAJCOMs that have relatively low fill rates. With the net holes allocation method, all MAJCOMs expect that Air Force Materiel Command (AFMC) can have all of their organizations achieve an S-1 rating. With the enterprise method, all MAJCOMs can have all of their organizations achieve the S-1 rating.

The Air Force has approved using the enterprise method to allocate available equipment buy funding and is programming that capability into the ERS. Note some equipment buy funds are allocated by program element code (PEC) or some other program (modernization replacement) constraint. ERS will allocate funds to fit the appropriate (PEC or program) constraint. That is, if a certain amount of funds is allocated to a certain PEC, then ERS will optimally allocate to those MAJCOMs within that PEC.

Customer-Oriented Leveling Technique

The Customer-Oriented Leveling Technique (COLT) sets consumable (Defense Logistics Agency [DLA]-managed) levels for the Air Force depot and bases to minimize customer wait time (CWT) constrained by available dollars. It relates General Support Division (GSD) stock fund dollars to base-level (time-weighted) expected back orders (EBO) and CWT. In this way managers can relate available dollars to base-level performance. COLT can:

- Link to the DLA wholesale level to reduce the total cost of DLA and base levels to reach a given base CWT target
- Determine how to allocate GSD funds to equalize or target support by MAJCOM, base, or weapon system (for example, provide higher levels of support for contingency bases)
- Identify funding trade-offs for unexpected needs (in the year of funds execution)
- Determine the next item to buy to decrease CWT from an Air Force perspective

Linking Base and DLA Levels

Currently DLA sets (wholesale) levels to achieve an 85 percent supply availability (SA) (off-the-DLA-shelf fill rate) target. COLT then uses that expected (depot delay) DLA performance with the 85 percent SA target to set base levels. For example, if the DLA level for an item is relatively high and therefore there is little expected depot delay (most requests are filled immediately), then

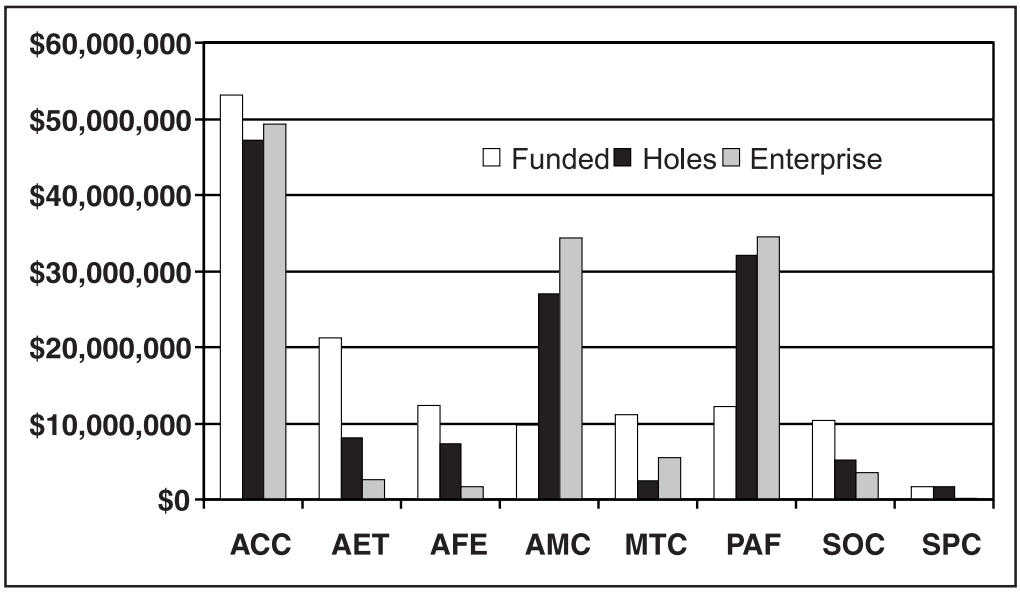

Figure 6. Funding Allocation by MAJCOM

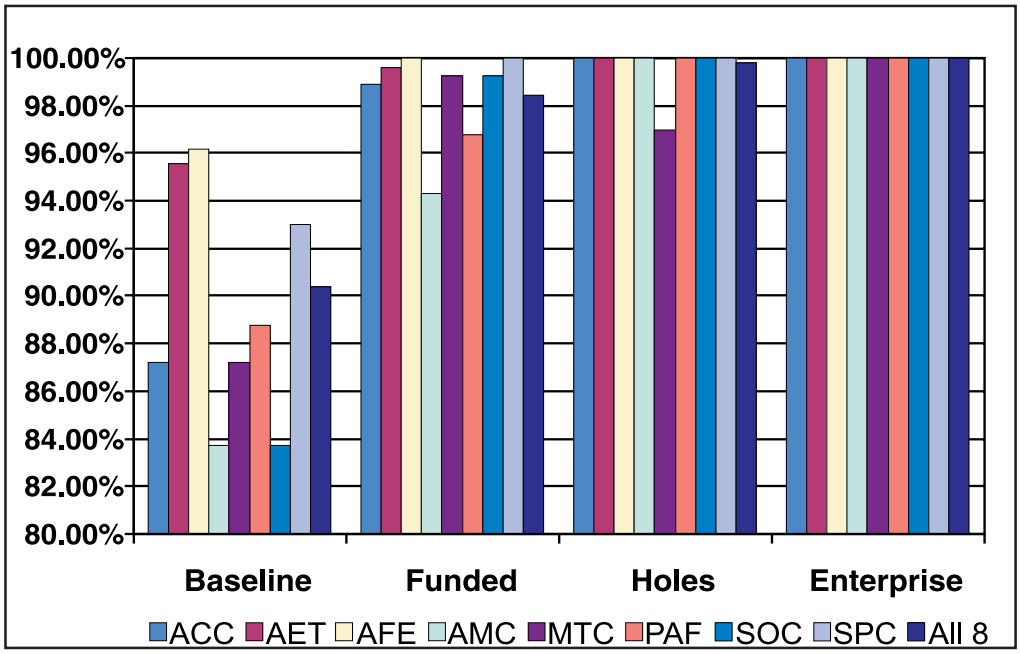

Figure 7. Percentage of SORTS 1 Organizations

COLT would stock less at the base. If DLA increased its SA target, COLT might reduce its base level (see Figure 8).

The question is what level of DLA SA target will result in the least overall (DLA and base) inventory investment—combined level. The Air Force is working with DLA to explore enterprise models (not just COLT) that address this question.[1]

Equalize or Target Support

COLT provides the opportunity to equalize or target support across the enterprise. The Standard Base Supply System (SBSS) levels (and SBSS levels of funding) do not equalize support. Table 3 provides an example for two C-5 bases, Dover and Travis AFB. COLT is constrained by the amount of funds that SBSS would spend at a base (COLT is run to be cost neutral at a base). Using the SBSS obligations, COLT provides unequal support—an expected CWT (ECWT) of .83 days at Dover and .68 days at Travis.

By changing the funding allocated to each base (without changing the overall obligation funding), COLT can provide equal support—.78 days. However, to do so requires Dover to receive some ($.95M) obligation funds from Travis. The Air Force can use COLT to allocate available funding to provide equal COLT performance (see Figure 9).

Without changing the Air Force obligation total, COLT can better allocate funds to various bases to equalize support.

COLT can also optimize CWT across the enterprise. In fact, the Air Force does so for the air logistics centers (ALC). Figure 10 shows how the Air Force sets COLT levels for the three ALCs. AFMC runs COLT for all three ALCs as if there were a single ALC. COLT then uses overall available ALC funding to set levels to minimize CWT across the ALCs. The result is the lowest overall CWT, but not equal CWT for each ALC.

To illustrate further, refer back to Table 3. The middle row shows the *merged* results for Dover and Travis. Running COLT merging the two bases into *one big base* results in the minimal overall CWT of .75 days. In summary, the Air Force can use COLT as a tool to allocate GSD stock fund dollars to optimize the enterprise CWT, to equalize support across the bases or to target support to various bases. Basically COLT provides the opportunity to take an

Run	Base	Total Obligations	COLT ECWT	DL ECWT
Baseline	Dover	$8.77M	0.82	2.18
Baseline	Travis	$8.66M	0.68	2.33
Merged	Both	$17.43M	0.75	2.25
Match CWT	Dover	$9.73M	0.78	2.18
Match CWT	Travis	$7.70M	0.78	2.33

Table 3. C-5 Example

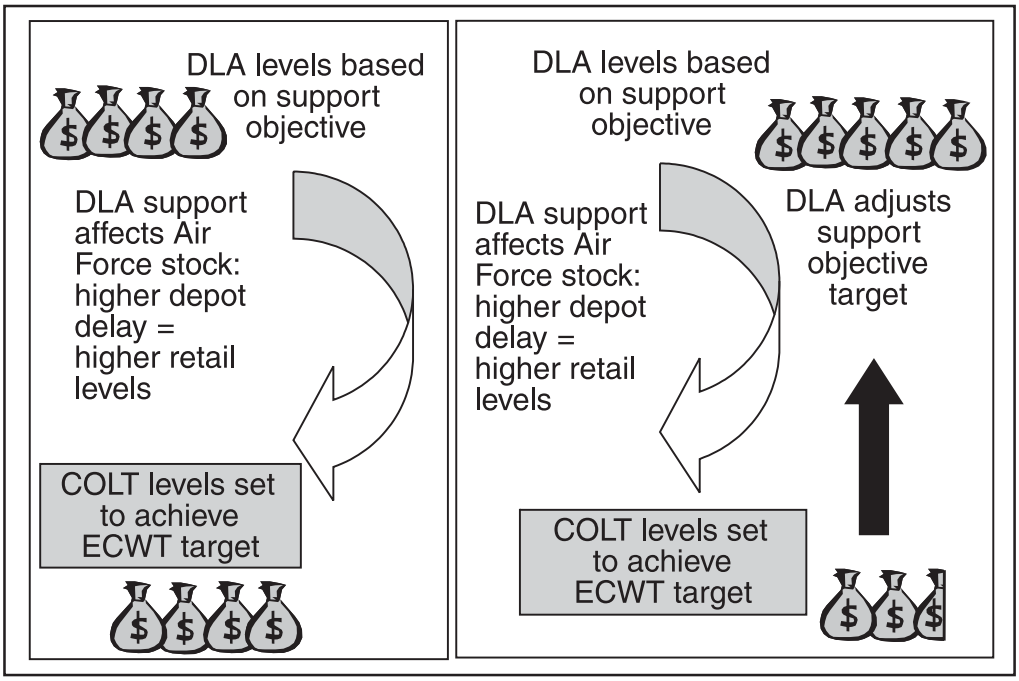

Figure 8. DLA COLT-Linked Levels

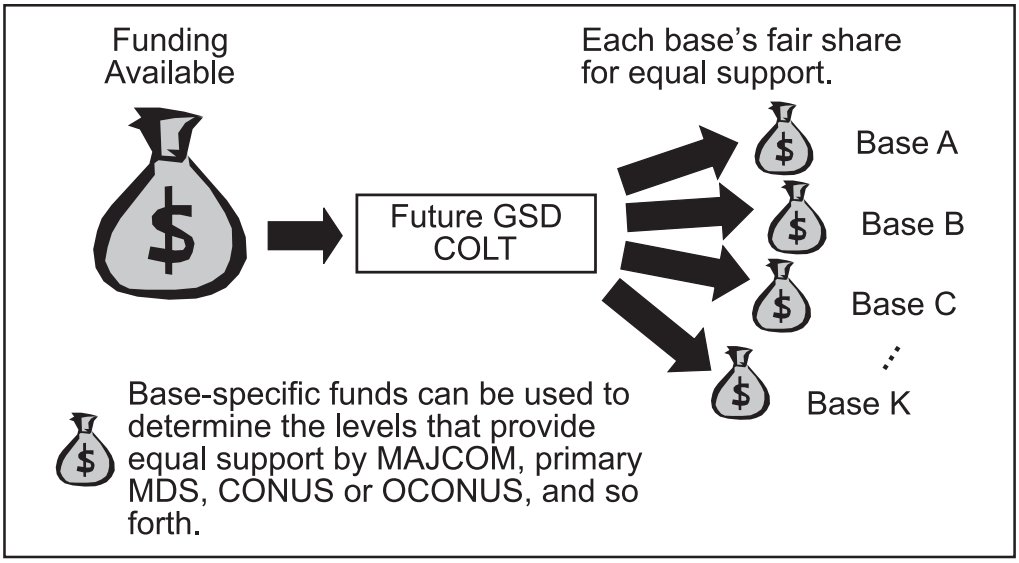

Figure 9. Optimal Merged Levels

enterprise view (instead of a base view) for stock fund management and level setting.

Funding Trade-Offs

COLT can provide stock fund managers with the information they need to make funding trade-offs.

As Figure 10 shows, COLT can optimally ration the amount of funds left after funds are taken for some other higher priority use. For example, if the Air Force needed some amount of funds for a new stockage policy initiative, COLT can identify the impact on ECWT (and EBOs) of taking money from selected bases, or from each base Air Force-wide.

For example, the Air Force recently set a policy to replace mobile bench stocks with consumable readiness spares packages (CRSP). CRSPs require stock fund dollars to implement and the Air Force wanted to implement CRSPs for the Aerospace Expeditionary Force (AEF) 5/6 rotation. The initial creation of the CRSP required an investment of stock fund dollars. COLT can identify prospective trade-offs for funding. In Table 4 we show three possible options to obtain this funding:

- Taking it all from the home station
- Taking it from the ACC bases using the same mission design series (MDS)
- Taking it from all active duty bases using the same MDS

As expected, when taking all the funds from a single base, the impact (in ECWT) is relatively large on that base. Spreading out the costs to multiple bases (based on the number of mission squadrons) reduces the impact to any one base and overall. Estimates of the four CRSPs needed for the next AEF rotation are $800K.

Buy Prioritization

Just as COLT can be used to allocate funds, it can also be used to execute (determine what items to buy with) those funds. In fact, we've developed a tool—the Funds Requirement Analysis Tool (FRAT)—that optimally determines the next item to buy if there are insufficient funds to buy the total requirement. FRAT currently is a base-level tool, it prioritizes all the shortages at a base and, given a level of funding, it will create requisition transactions to buy the items that result in the minimum CWT. (Note, this does not change the COLT levels—the requirement—rather it determines what portion of that requirement to buy.)

COLT also provides the opportunity to determine what DLA-managed items to buy next for a group of bases, a MAJCOM, a weapon system, or Air Force-wide. For example, rather than the next item to buy for the F-15 at Langley AFB, what item should the Air Force buy to reduce F-15 CWT Air Force-wide?

Summary

The Air Force now has tools that relate dollars to base-level supply performance and can be used to trade off readiness against dollars. These tools are currently being used to optimally

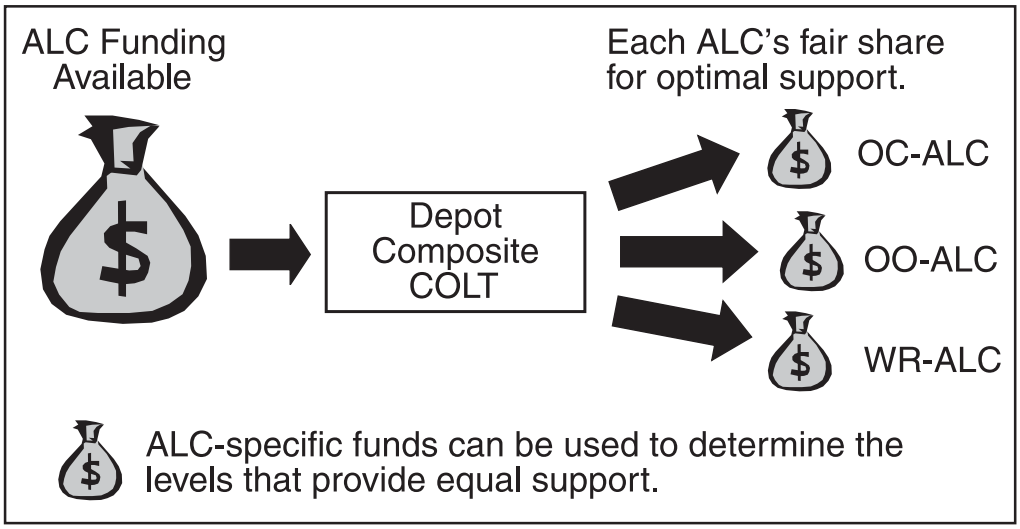

Figure 10. Optimized Levels Current Depot COLT

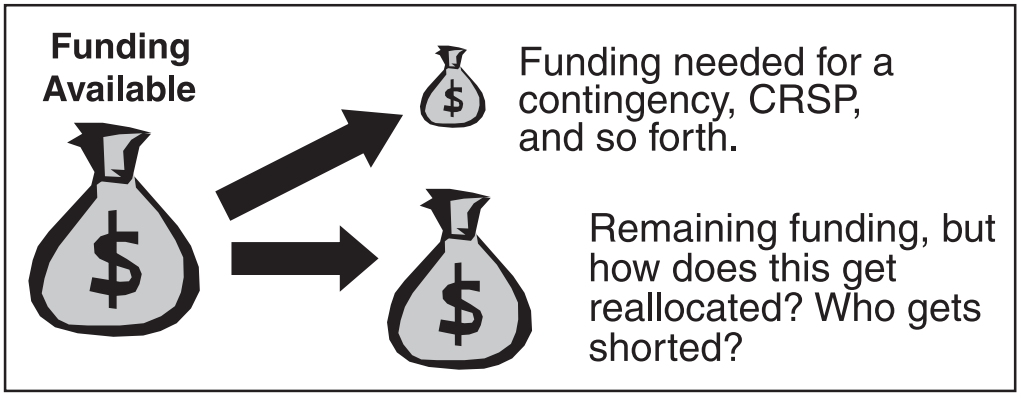

Figure 11. Sourcing Shortages

Option	Bases	Levels Change	ECWT Change
Home Station	Total	22.3K (3.2%)	+0.067 (8.2%)
	Mt Home (100%)	22.3K (3.2%)	+0.067 (8.2%)
ACC	Total	21.3K (1.4%)	+0.025 (3.0%)
	Mt Home (33%)	6.4K (0.9%)	+0.020 (2.4%)
	S-J (67%)	14.9K (1.8%)	+0.029 (3.5%)
Active	Total	18.7K (0.5%)	+0.012 (0.9%)
	Mt Home (17%)	2.8K (0.4%)	+0.009 (1.1%)
	S-J (33%)	7.1K (0.8%)	+0.013 (1.6%)
	Elmendorf (17%)	4.1K (0.3%)	+0.008 (0.4%)
	Lakenheath (33%)	4.8K (0.6%)	+0.019 (1.2%)

Table 4. F-15 CRSP Example

determine what to buy, repair, and distribute with the available dollars. As the Air Force moves to enterprise management organization and systems, these tools, and tools like them, will become more important.

Air Force managers have the information they need to measure the impact of funding cuts on various commodities (spares, equipment, and consumables) to base-level readiness. What is still needed are tools to trade off one commodity for another or one resource (people, fuel, ammunition, spares, and so forth) for another. With the formation of the Global Logistics Support Center, an organization that will need and use the existing models to make enterprise decisions, we anticipate the development of the next generation of models to meet the information needs to manage multiple resources across the enterprise.

Notes

1. An 85 percent SA does not mean every item will have an 85 percent fill rate. Rather, it means that, overall, DLA will satisfy 85 percent of item requests from off-the-shelf stock. Some (relatively inexpensive) items will have fill rates higher than 85 percent and some lower. COLT minimizes CWT, so COLT will stock relatively less of an item with little depot delay.

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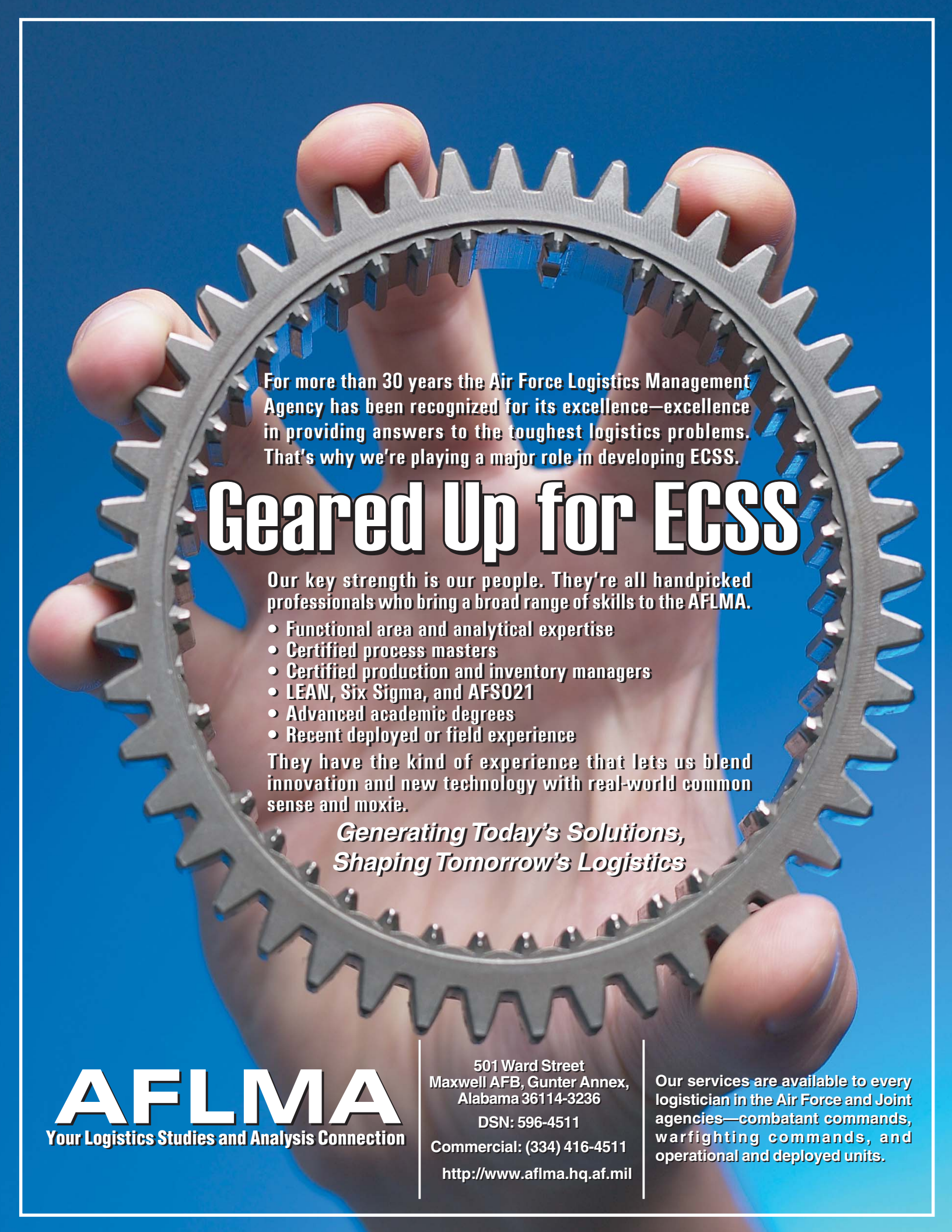

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