



Contract Sustainment Support Guide (CSSG)

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FOREWORD

The Air Force must continue improving Integrated Life Cycle Management (ILCM) across the enterprise. To facilitate this improvement, the Next Generation Contractor Logistics Support (NGCLS) initiative has expanded and updated the Contract Sustainment Support Guide (CSSG) to capture best practices from both industry and Government. Program teams from across the Air Force can leverage the best practices to enable effective use of limited resources and provide affordable warfighter readiness. The updated guide captures 16 of the most effective commercial best practices and 7 Government best practices. The best practices have been utilized across the Air Force to drive affordability, contract flexibility and scalability, and cost visibility.

The guide is written for program team functionals and provides easy reference to the best practices. The broad knowledge base and experience captured in the guidebook will allow program teams to develop strategies and award cost effective contracts. This guide will serve as an operating guide for the program teams during both acquisition and sustainment for the next generation of contract logistics support (CLS) contracts.



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EXECUTIVE SUMMARY

This Contract Sustainment Support Guide (CSSG) is intended to be used by USAF personnel involved in life cycle management processes to help reduce and control cost and risk when procuring products or services. The CSSG provides recommendations based on best practices (BPs) that are mapped to Air Force Product Support Elements (PSEs) and Air Force Cost Analysis Improvement Group (AF CAIG) elements. Each BP includes a look into uses and implementation of the BP and how it can be applied to government program management support and contracting practices for all phases of a system/product's life cycle. Associated recommendations on how to implement the BPs are also provided to include references and related policies. Performance metrics are included and can be used to measure efforts in obtaining contract and sustainment goals.

This document is organized into four main sections and appendices to allow program teams to understand the basis of the information, develop strategies, and use its content.

Introduction and Overview: Provides the purpose and objectives of the CSSG.

Best Practices and Recommendations: Provides an overview and basis for the CSSG BPs.

Commercial and Government Best Practices and Recommendations: Provides BPs with full analysis and recommended actions for program teams to incorporate the BP into their program management support and contracting efforts.

Two matrices are included for the commercial and the Government BPs to allow the CSSG user to easily find the BP that will assist program teams in developing strategies and add value to his/her program management support and contracting activities. These matrices allow the user to find applicable BPs by cross-referencing the user's functional specialty to the individual BP(s) which they may be responsible (or share responsibility) for implementing or by cross-referencing the applicable PSE to which the BP pertains. These matrices are included in the Best Practices and Recommendations section, of the guide to allow for easy identification of the appropriate BP(s). Additionally, the CSSG table of contents provides a quick link to each BP.

Conclusion

Appendix A: ACRONYMS, ABBREVIATIONS, AND NOMENCLATURE

Appendix B: TERMS

Provides descriptions for information referenced in the BPs in alphabetical order.

Appendix C: PRODUCT SUPPORT ELEMENT DEFINITION

Provides definitions of the PSEs as defined in Air Force Pamphlet 63-128, Guide to Acquisition and Sustainment Life Cycle Management.

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INTRODUCTION AND OVERVIEW

The United States Air Force (USAF) faces significant challenges to control and reduce life cycle costs while maintaining flexibility and scalability. It is critical to reduce sustainment operating and support (O&S) costs of systems as these costs comprise a majority of total ownership costs (TOC). In recognizing this necessity, the USAF has developed a number of approaches, including those formulated by the Air Force Cost Analysis Improvement Group (AFCAIG), to capture life cycle costs for the purpose of performing cost analysis and determining optimum cost reduction measures.

Purpose/Overview

This Contract Sustainment Support Guide (CSSG) provides guidance to Air Force personnel involved in supporting life cycle operations through contracting processes including areas such as requirements definition, procuring services, developing products, and more. The CSSG contains recommendations for improvements based on BPs that have demonstrated success, with a focus on the following objectives:

Cost Control, Reduction, and Visibility – improved cost control and reduction during the system O&S phase as well as increased cost visibility for making informed life cycle management decisions and aligning costs to product support elements (PSEs) and AFCAIG elements (see §1.2)

Flexibility/Scalability – improved flexibility/scalability to provide more agile contract management to address the rapidly changing requirements inherent in the sustainment environment (see §1.2.1)

Risk Reduction – reduction of sustainment risk (see §1.2.2)

Efficiency – gained efficiency in contractor performance, emphasizing a win-win relationship between contractors and the government (see §1.2.3).

The commercial BPs included in the guide were identified and analyzed based on proven commercial approaches for addressing similar product support issues. The Government BPs in the guide were identified and analyzed based on proven government approaches and strategies used in the field to address similar product support issues. BP analysis includes identifying the benefits, impacts, and challenges related to industry and government, as well as implementation approaches, tools, and techniques that are used to drive improvements. The CSSG has been designed and developed to enable the USAF to reach the above objectives. The attributes of the CSSG include:

- The BPs are scalable to facilitate various sizes and types of contracts for sustainment and operations support.
- The BPs identify commercial metrics to achieve best value, lower life cycle costs, and promote flexibility/scalability.
- The BPs map to AFCAIG elements to support improvements and cost visibility within the Air Force.

- The BPs include measures (where applicable) that relate to contractor information and USAF operations, sustainment, and contracts. This information serves as insight into sustainment costs and also helps set and measure goals for future improvements to contractor logistics support (CLS) and organic practices, allowing for control and visibility of cost buildups and sustainment performance.
- The BPs suggest tools, techniques, and implementation approaches used by industry and government to aid in applying the BPs and drive improvements. These include technology tools, decision support tools, or business strategies/practices that have been shown to be successful.
- The BPs include a list of specialists with each BP to identify the specialty areas responsible for or impacted by the BP. Additionally, there are corresponding government functional specialists identified that will most likely lead the implementation of the BP within a program office. This allows a solid comparison of industry and government personnel responsibilities when implementing BPs and related recommendations.
- The BPs include ways for the Government to incentivize industry to implement or leverage the BP. An explanation is also provided describing how industry benefits from the incentive and therefore would welcome it.
- The BPs include implementation recommendations that can be applied to the various contracting phases.

Finally, the BPs include references in the form of website links, citations, and abstracts, to aid personnel in fully understanding the BP, its components, and how to implement the BP.

1.1 Contractor Logistics Support Management Objectives

The CSSG is focused on providing best practices and implementation recommendations designed to control and reduce cost while increasing flexibility, scalability, and cost visibility. The overarching objectives are explained below.

1.2 Cost Control, Reduction, and Visibility

CLS life cycle costs have increased over the years but can be controlled by implementing proven industry strategies focused on cost control and reduction. Various commercial and government BPs exist, such as ensuring contracts are written in a flexible manner, using certain types of contracts that contribute to cost reduction methods and incentivizing. Continuously and appropriately applying the BPs and implementation recommendations per the CSSG will assist in reducing O&S costs.

Cost visibility is essential in successful cost management, cost reduction, and informed program decision making. Various measures can validate the successful reduction of costs and provide the level of visibility needed to make informed decisions. Improved cost visibility helps discover hidden costs, whether it be a contractor's hidden cost, life cycle cost, or cost endured by the USAF as a result of its current processes. Cost visibility also provides insight into performance-based agreements to understand the range of possible costs associated to the various service levels.

1.2.1 Flexibility/Scalability

Flexibility/scalability allows for a contract to be adaptable to a dynamic environment of changing requirements, scope, and resources. It can allow for upgrades as requirements change, without ensuing additional costs. It also can allow for more innovative ideas from the contractor performing the work, depending on the phase of the item life cycle. Another perspective of flexibility/scalability is building language in contract documentation to maintain a desired level of capacity based on expected and unexpected needs.

1.2.2 Risk Reduction

Risk reduction can closely be associated with cost reduction and flexibility. Often times funding as well as human resource efforts are lost when risks are not properly identified and mitigated. Several areas of risk lie within the contracting process and sustainment activities for contracted items or services of all sizes and degree of complexity. These risks must be brought to the forefront and quantified to perform trade-off analysis between mitigation strategies. BPs and implementation recommendations in the CSSG provide measures and strategies to address and reduce risk.

1.2.3 Efficiency

Efficient processes allow for reduced workload, which results in cost savings within an organization. The streamlining of processes enables personnel to focus solely on the value added steps within the process and allowing them to provide higher quality input and more focused effort. In addition, focusing only on value added steps within the process promotes improved familiarity and allows for higher efficiency when performing actions.

1.3 Personnel Capability Requirements to Use the CSSG and Policy Impact

The CSSG is built upon commercial and government BPs; however, it is understood that the USAF must follow certain procedures as required by law or outlined by the Department of Defense (DOD) and the USAF. USAF personnel using the CSSG must follow the requirements of applicable policies and law and must abide by those first and foremost when implementing the BPs. Therefore, the CSSG identifies policy related to the BPs that should be considered including the Federal Acquisition Regulations (FAR), DoD Instructions (DoDI), Air Force Instructions (AFI), and other Government-issued guidance documents and laws; the policy references in the CSSG are high-level. If an implementation recommendation or strategy does not comply with current policy, personnel should determine whether to alter the BP to remain in policy compliance.

2.0 BEST PRACTICES AND RECOMMENDATIONS OVERVIEW

BPs relative to O&S PSEs and contracting processes have been identified to help improve and manage life cycle costs. Section 3 and 4 provide the detailed BPs and a full analysis of each. The BPs contain implementation recommendations applicable to the phases of the contracting process. For the CSSG purposes, four contracting phases were identified: Requirements Identification/Development Phase, Request for Proposal (RFP) Development Phase, Proposal Review/Fact Finding/Negotiating Phase, and the Execution Phase. With this categorization,

USAF program personnel can identify implementation actions associated with their particular area of the contracting process and ensure complete applicability of the information throughout the entire contract process.

The BPs are not listed in any particular order and are therefore summarized in a matrix by functional specialty area as well as a matrix by PSE to easily identify the BPs applicable to various functional roles and product support areas. Although the matrices provide this selectability, it would be beneficial for all personnel involved in the program management support and contracting processes to read each of the BPs and use them for cost reduction and to gain flexibility, scalability, and cost visibility. Table 1 shows the six (6) functional specialty areas identified to classify the CSSG users and responsible implementers of the BPs.

Table 1. Functional Specialty Areas

Functional Specialist	Description
Program Manager	Responsible for planning, organizing, directing, and controlling of resources to complete program objectives on time and within budget
Systems Engineer	Responsible for practical application of science to commerce or industry to design and implement materials, systems, and components; may involve both acquisition design activity and sustainment engineering
Industrial Engineer	Responsible for sustainment activities involving lay out and set up of the repair and overhaul of Air Force weapon systems, subsystems and components. Activities range from flightline and component maintenance at base and intermediate level to component repair and major systems maintenance, repair, and overhaul at depot level.
Logistics Specialist	Responsible for acquisition and sustainment activities involving the planning, procurement, transportation, supply, maintenance, and replacement of materiel and personnel, to include product and sustainment activities involving the 12 PSEs identified in AFPAM 63-128
Financial Manager	Responsible for the allocation and management of financial resources involved with acquisition and sustainment activities
Contracting Officer	Responsible for acquisition and sustainment activities pertaining to the procurement of supplies and services to support operations and missions at best value and in the best interest of the Air Force

2.1 Product Support Elements (PSEs) and Contracting Processes

PSEs which affect the O&S phase are used in contracts planning and serve as a standardized means to identify the activity that is being contractually supported. The CSSG maps the identified BPs as they directly correspond to the 12 PSEs listed and defined in Air Force Pamphlet (AFPAM) 63-128, Guide to Acquisition and Sustainment Life Cycle Management (see Appendix B for definitions of these elements extracted from AFPAM 63-128):

1. Sustaining/Systems Engineering
2. Design Interface
3. Supply Support
4. Maintenance Planning and Management

5. Support Equipment/Automatic Test Systems
6. Facilities & Infrastructure
7. Packaging, Handling, Storage and Transportation (PHS&T)
8. Technical Data Management/Technical Orders
9. Manpower & Personnel
10. Training & Training Support
11. Computer Resources
12. Product Support Management

The CSSG recommends specific actions that functional specialists should take to meet CLS management objectives within each contracting phase. These actions directly correlate to contract actions. A majority of the BPs in the CSSG focus on the earlier contracting phases, as actions in these phases lead to cost reduction, control, and visibility and provide the flexibility and scalability necessary for effective contract management in later phases. However, BPs also include recommended actions that are appropriate for later contracting phases to ensure actions are taken to manage contracts.

2.2 Best Practices

Based on analysis results, BPs have been identified that are expected to have a positive impact on USAF management of CLS contracts. Each of these BPs and recommended actions for USAF functional specialists are summarized using the following types of information:

- Assumptions: Overarching objective(s) the BP helps achieve (cost reduction, cost visibility, flexibility/scalability, etc.) along with applicability of the BP to the acquisition/sustainment process. This allows the CSSG user to quickly determine whether the BP pertains to the task at hand.
- Description: Brief description of the BP as it relates to successful application
- Industry and Government objectives: The specific objectives that may be achieved by implementing the BP
- Industry and Government benefits: The benefits that have been experienced by industry and Government may be experienced by implementing the BP
- Industry and Government challenges: The challenges that are realized in implementing the BP and related challenges that the Government may need to overcome when implementing the commercial BPs
- Financial/performance metrics: Measures that allow tracking of targeted improvements based on implementing the BP
- Techniques and tools: Specific business tools, techniques, and practices used to implement the BP. Appendix B contains an alphabetical listing of these tools and techniques with a brief description of each.

- Industry implementation approach: Details of how industry implements the BP
- Industry specialists that implement BP: Industry roles that share responsibility for implementing the BP through specific actions and the supporting tools and techniques listed within the BP
- Ways to incentivize industry to leverage this BP: Strategies for the Government to use to encourage industry to participate in the Government’s initiatives to implement the BP
- Government functional specialists responsible to implement the BP: Government functional roles that share responsibility for implementing the BP
- Applicable PSE(s): PSEs to which the BP pertains
- Applicable AFCAIG element(s): AFCAIG elements to which the BP pertains.

Recommended actions to implement the BP are identified following the detailed analysis of each BP. These recommendations are organized by contracting phase and include pertinent information (as applicable) such as suggestions for contract inclusions, potential measurements to consider, possible outcomes to consider, and how the program office might implement the related business practices.

Each BP also contains a number of resources and references for personnel to use to most effectively implement the BP. When applicable, these resources are identified through case study abstracts, website links, citations, and policy references. These provide CSSG users with examples, additional supporting information, deeper understanding of tools and techniques, and/or applicable policy. The following are included in the BP analysis as applicable:

- Case study abstracts that discuss successful implementation of the BP
- Websites, articles, reports, and other references that may provide assistance or support in implementation of the BP
- Related policy, including Government and Air Force specific policies, regulations, and guidance that relate to implementation of the BP

When combined in this format, this information gives both an industry perspective for using the BP and a government perspective so that functional specialists can use this knowledge and the recommended actions (with the appropriate techniques and tools) to reduce sustainment costs, gain increased cost visibility, and ensure flexibility and scalability in their contracts.

3.0 COMMERCIAL BEST PRACTICES AND RECOMMENDATIONS

This section of the CSSG provides the selected BPs and the related USAF actions to implement them. The matrix in Table 2 provides a mapping between each BP and the functional specialty areas, allowing users to quickly identify the BPs most applicable to their functional role. The matrix in Table 3 provides a mapping between each BP and the PSE(s) to which it pertains, allowing the user to easily identify the BPs most applicable to each PSE. Please note that the functional specialty areas and PSEs that are not checked still may be applicable depending on the application method chosen to implement the BP.

Table 2. Best Practice Applicability by Functional Specialist

Best Practices		Functional Specialist					
		Contracting Officer	Systems Engineer	Financial Manager	Logistics Specialist	Industrial Engineer	Program Manager
1	Collaboration & Synchronization	✓		✓	✓		
2	Performance Based Logistics (PBL) Contracting	✓		✓	✓		✓
3	Supplier Performance and Risk Assessment	✓			✓		
4	Vendor Managed Inventory	✓		✓	✓		
5	Joint Service Agreements (JSA)	✓		✓	✓	✓	
6	Consideration of Supplier's Inventory Position	✓		✓	✓		
7	Contracting for Capable-to-Promise	✓		✓	✓	✓	✓
8	Supply Chain Cost Visibility	✓		✓	✓		
9	Selecting Global Suppliers	✓		✓	✓	✓	✓
10	Sourcing Technical Data Access	✓	✓		✓	✓	
11	Concurrent Engineering	✓	✓		✓	✓	
12	Contract for Condition Based Maintenance		✓		✓	✓	✓
13	Allow Source Suppliers Total Asset Visibility	✓			✓	✓	
14	Risk Sharing Contracts for Procurement and Supply	✓		✓	✓		
15	Online Tracking of Order and Shipping Information and Status	✓		✓	✓		
16	Postponement		✓	✓	✓	✓	

Table 3. Best Practices by Product Support Element

Best Practices		Product Support Elements											
		Sustaining/Systems Engineering	Design Interface	Supply Support	Maintenance Planning and Management	Support Equipment/Automatic Test Systems	Facilities	PHS&T	Technical Data Management/ Technical Orders	Manpower & Personnel	Training	Computer Resources	Protection of Critical Program Information
1	Collaboration & Synchronization	✓		✓	✓	✓		✓	✓				
2	Performance Based Logistics (PBL) Contracting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Supplier Performance and Risk Assessment			✓	✓	✓		✓					
4	Vendor Managed Inventory			✓	✓	✓							
5	Joint Service Agreements (JSA)	✓	✓	✓	✓	✓		✓	✓				
6	Consideration of Supplier's Inventory Position			✓	✓								
7	Contracting for Capable-to-Promise	✓	✓	✓	✓			✓	✓				
8	Supply Chain Cost Visibility	✓		✓	✓				✓	✓	✓	✓	✓
9	Selecting Global Suppliers			✓	✓	✓		✓					
10	Sourcing Technical Data Access	✓	✓	✓	✓				✓				
11	Concurrent Engineering	✓	✓	✓	✓	✓			✓				
12	Contract for Condition Based Maintenance			✓	✓	✓			✓				
13	Allow Source Suppliers Total Asset Visibility			✓	✓	✓							
14	Risk Sharing Contracts for Procurement and Supply	✓		✓	✓	✓							
15	Online Tracking of Order and Shipping Information and Status			✓	✓	✓		✓					
16	Postponement	✓	✓	✓	✓		✓	✓					

Users should read each applicable BP below thoroughly to gain valuable insight into industry strategies that have proven success in improving CLS program and contract management. The USAF functional specialists should apply the applicable BP information to their situation, using the recommended implementation actions or tailor the BP for their purposes, keeping in mind that not all implementation actions may apply to their scenario. Functional specialists may also formulate their own approaches to implementing the BP based on the information and various references provided.

NOTE: The CSSG user should comply with USAF and other Government-issued guidance and policy requirements in applying the implementation actions if actions do not fit policy requirements, the user should tailor the implementation actions for compliance purposes or investigate possible policy changes or waivers.

3.1 Best Practice #1 - Collaboration & Synchronization

3.1.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that requires a strategic supplier relationship to support mission-critical systems, subsystems, and components. Collaboration and synchronization with a key supplier or integrator can improve processes and deliverables across the supply chain, including product design, elimination of the bullwhip effect, integration of forecast accuracy across the organization and supplier, and availability of parts. This best practice addresses the objectives of controlling cost growth, managing capital affordability, managing production rates economically, increasing asset visibility and accountability, and improving order schedule flexibility and the scalability of procurement from reliable suppliers that are willing to share their production capability with the USAF Air Logistics Center (ALCs) and/or product centers.

Description: Sales and Operations Planning (S&OP) provides an integrated business planning capability internal to the enterprise. Sales, procurement, finance, and production functions are coordinated to ensure that sales forecasts are comprehensive and that the enterprise financial and resource capabilities are able to deliver promised orders. The Collaboration, Planning, Forecasting and Replenishment (CPFR) practice integrates the procurement process with other supply chain processes across the value chain. The new supply chain paradigm is shifting towards a push-pull system to manage market uncertainty and risk pooling of products, demand, time, etc., especially when managing many stock keeping units. Collaboration and synchronization across the supply chain extends to system program offices, relevant integrated product teams (IPTs) and other key system stakeholders during the acquisition process and to system sustainment managers, lead commands, and other key system stakeholders during sustainment.

This best practice can have a significant impact on supply chain flexibility because suppliers will be more responsive to their customers' demand uncertainty. Also, it affects scalability by providing more influence in managing the supplier/organization relationship to gain visibility across the supply chain and gain better efficiency in forecasting and planning for service or product delivery.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Replace push-based forecasting with customer replenishment (pull-based) signals - Improve product development requirements - Coordinate sales and operation planning at a strategic level; coordinate demand planning at a tactical level - Establish strong ties and long-term agreements within the supplier network that enhances collaboration with the USAF on product innovation and reduces risk pooling - Improve forecasting of parts requirements and supply base 	<ul style="list-style-type: none"> - Maintain pull-based supply chain based on demand signals versus push-based supply chain based on forecasts - Establish enterprise demand planning with key supplier(s) - Ensure tight supply chain coordination and collaboration between supplier(s) and end user(s) - Develop strategic relationships with key supplier(s) - Target affordability and control cost growth by managing capital allocation for product

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Reduce transportation costs - Reduce inventory carrying costs - Meet customer service expectations - Manage market volatility that can lead to high uncertainty in demand 	<ul style="list-style-type: none"> acquisition - Establish collaborative forecasting across the value chain - Create on-demand access of production information - Manage production rates economically

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Reduced risk of overstocking and pushing excess inventory to customer - Broad requirements developed in order to provide flexibility and scalability, allowing the contractor to develop new ideas - Diminishing sources of supply forecasted - Innovative methods to fulfill government needs (cost savings identified and performance improved) - Parts reliability issues identified and corrected early 	<ul style="list-style-type: none"> - Elimination of bullwhip effects when forecasting for production or procuring parts - More efficient management of enterprise capital allocation when producing or procuring parts - Improved supply chain coordination between supplier(s) and end user(s) - Reduced inventory holdings, disposal actions, and facility and personnel requirements - Improved Diminishing Manufacturing Sources and Material Shortages (DMSMS) visibility - Improved parts reliability planning and awareness - Improved parts availability - Improved forecasting accuracy - Improved production resource utilization, better leveling of resources, and lowered obsolescence

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Reliability growth is typically not a part of contractor logistics support (CLS), so there is no disciplined approach to continuously improving parts reliability; more repairs generate more revenue, so there is no incentive to improve reliability or maintenance process efficiency 	<ul style="list-style-type: none"> - Limited incentives for supplier to improve parts reliability in CLS construct - Sharing of classified information (e.g., ops plans, component/configuration data, etc.) - Compatibility of supplier and government systems - Cost of integrating supply chain management systems - Establishment of long-term contractual relationships in a Department of Defense (DoD) acquisition/ contracting environment that promotes competition, shorter term contracts, socio-economic targets, etc. - DMSMS engineering analysis for alternative or replacement parts should involve Government oversight and multiple options for consideration

Financial/Performance Metrics:

- Return on Net Assets (RONA): Increase by 15%
- Order fill rates: Greater than 90%
 - o Companies doing frequent (weekly or better) S&OP show greater than 90% in their order fill rates versus 50% for those companies where S&OP process is done quarterly
- Customer service levels: 97% on-time and complete
- Average cash conversion cycle: 15 days
- Average forecast accuracy at the product family level: 86%
- Forecast accuracy improvements
- Smoother ordering patterns
- Increased sales revenues
- Decrease in coupling inventory levels (i.e., safety stock)
- Reduction in cost of goods sold (COGS) based on better insight into end consumer demand, more accurate forecasts, and less disruption in/more stable production schedules

Based on Aberdeen Group research, these are the best in class companies implementing S&OP versus others:

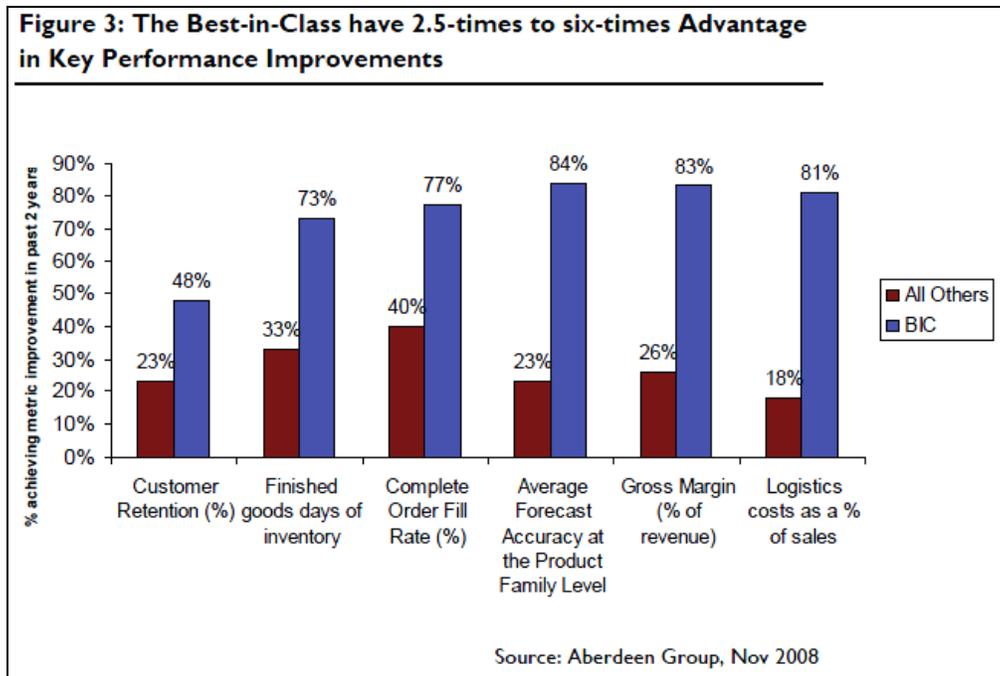


Figure 1. Key Performance Improvements Comparisons

Industry Techniques/Tools:

- Advanced supply chain Enterprise Resource Planning (ERP) modules
- Supply chain integration systems
- Electronic Data Interchange (EDI) (to enable data exchange)
- Monthly S&OP updates and reviews (at product family level)

- Service level analysis
- Inventory analysis and capacity planning
 - o Initial provisioning
 - o Spares determination, including safety stock
- Forecasting tools
 - o Advanced Planning and Scheduling (APS) systems
- Digital dash boarding/decision support systems
- Business process flows
- Data analysis
- Database design

Industry Implementation Approach:

- Implement S&OP practice as a strategic activity to improve forecasts and manage capital efficiently. Successful organizations are 50% more likely to implement advanced demand sensing and management capabilities. Leading companies focus on using point-of-sale information and new technologies, including repositories for collecting and analyzing demand signals from customers, to approach real-time demand sensing and are ensuring that their sales organizations are continuously engaged in this process.
- Manage constraint planning and the ability to consider major constraints during supply/demand balancing. Because the process may be complex, integrated planning tools are used to manage the planning process.
- Implement solutions that can perform scenario analysis and capacity planning and link with advanced planning and scheduling tools.
- Synchronize organizational metrics among procurement, finance, and supply chain functions, based on meeting the S&OP plan.
- Use weekly demand planning practice to better forecast production or maintenance schedules.
- Leverage negotiation with suppliers and manufacturers to coordinate production capacity and make on-time deliveries.
- Leverage buying power with suppliers by smoothing inventory levels, reducing risk for supplier to increase capacity.
- Establish a clear contractual relationship based on dependency of service/product that can extend from a joint venture, long-term contract, strategic alliance, equity partnership, etc.
- Consider functional vs. innovative products based on product variety, product life cycle, forecast accuracy, risk of obsolescence, and cost of lost sales.
- Develop a tightly-integrated supply chain with point-of-sale, customer inventory systems, and business transformation processes.
- Effectively manage supply/demand plan visibility.
- Manage change in the demand signal that instantaneously “reconfigures” the production and supply plans.
- Ensure that the output of the S&OP plan drives the income statement and balance sheets of companies. The S&OP process should feed into the financial planning and budgeting process.

Industry Specialties that Implement this Commercial Best Practice:

Logistics Planners, Supplier Business Integrating Planners, Contract Managers, Procurement Managers, Operations Managers, Procurement Planners, Chief Operating Officers, Chief Financial Officers, Chiefs of Supply Chain, Strategic Planners, Operations Planners, Financial Budget Forecasters, Information Technology (IT) Systems Engineers, Database Administrators

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The implementation of this best practice facilitates improved supply chain responsiveness, reduced operational costs, and more effective planning.

- Establish business partnership arrangements with suppliers to encourage collaboration and investment in interoperable IT systems and tools.
- Negotiate financial incentives tied to supplier responsiveness.
- Develop organizational-level performance metrics and incentives that encourage collaboration among departments and functions.
- Provide educational opportunities that describe the benefits of collaboration and synchronization, which include:
 - o Expected improvements in forecast accuracy and the value of constraint planning tools
 - o Improved resource planning
 - o Reduced cost and overstocking
 - o More efficient capital planning
 - o Reduced risk as inventory levels can be smoothed.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Logistics Specialist

Others: Financial Manager; Contracting Officer

Applicable Product Support Elements (PSEs):

- Sustaining and System Engineering
- Supply Support
- Maintenance Planning and Management
- Support Equipment/Automatic Test Systems
- Technical Data
- Packaging, Handling, Storage and Transportation (PHS&T)

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 4.2 Support Equipment Replacement
- 4.4 Other Sustainment Support

3.1.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Identify specific collaboration metrics requirements based on organizational guidance and strategy. Some of the metrics under study may include: RONA, order fill rates, customer service levels, average cash conversion cycle, and average forecast accuracy at the product family level.
- Advocate contractor compliance with utilizing USAF APS to forecast spares requirements. Systems integration such as this provides requirements computation in line with USAF requirements methodology.

Request for Proposal (RFP) Development Phase:

- Engage with appropriate IPTs and other functional and supplier stakeholders to ensure synchronized weekly requirements for the next twelve month rolling forecast or for the time of longest lead item, whichever is longest.
- Articulate specific collaboration requirements to industry, to include applicable requirements/metrics for forecasting (e.g., 86% forecast accuracy). Other requirements/metrics should be considered, based on the weapon system's procurement strategy.
- Manage constraint planning and identify process re-engineering opportunities such as supply/demand balancing to improve forecasting capability.
- Implement advanced planning and scheduling tools that can perform scenario analysis and capacity planning, and address system interface and investment requirements, including business transformation considerations.
- Articulate desire for long-term strategic partnership with supplier(s) to sustain the procurement life cycle (including consideration for Contractor Supported Weapon Systems (CSWS) processes).
- Include language in the RFP that requires synchronized weekly demand planning in a thorough communication plan, which focuses on executive participation and shared metrics among procurement, finance, and production.
- Ensure contractor processes for weekly demand synchronization are consistently applied throughout the supply chain. Prime contractor vendors and subcontractors should synchronize with the prime's processes to ensure stable and continuous support to the government.

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements for business planning and collaborative forecasting.
- Select supplier/integrator based on RFP requirements and cost proposal using best value. Include as a selection criterion the vendor's capability to successfully integrate data, systems and processes with USAF stakeholders.
- Negotiate integration and interface of data systems based on the requirements.
- Establish a clear contractual relationship with the prime vendor and a memorandum of understanding (MOU) with other stakeholder organizations.

Execution Phase:

- Establish a collaboration agreement by leveraging the prime vendor’s supply/demand synchronization with their supply chain to coordinate production capacity and make on-time deliveries.
- Address and resolve system interface and data access issues.
- Communicate the government’s weekly demand forecasts to the prime vendor to develop a tightly integrated supply chain.
- Manage changes in the demand signal that instantly reconfigure the production and supply plans.
- Exchange metrics between the Air Force and the prime vendor to provide executive visibility to S&OP plan.
- Improve data quality to support S&OP process among the organization’s point-of-sale, manufacturing function, and suppliers (across the supply chain).
- Test, evaluate, and improve the collaboration and synchronization processes to maximize benefit to the partnership and supply chain.

3.1.3 Resources and References

Case Study Abstracts:

VTEC Adopts Customer Driven Real-Time S&OP Planning

Business Problem	Significant improvements
<ul style="list-style-type: none"> - Lack of integration of suppliers and retail replenishment planning with long term S&OP process - Existing process was internally focused, resulting in slow planning cycles - Organization was too distanced from the end customer, resulting in lower customer service levels and increased inventory 	<ul style="list-style-type: none"> - Improved forecast accuracy from 35% to 20% mean absolute percentage error - Reduction in finished goods inventory - Reduction in inventory reserves

Consumer Electronics Manufacturer Transforms into Consumer Driven Organization

Business Problem	Significant improvements
<ul style="list-style-type: none"> - Life cycles were very short in the consumer sector - Needed to adjust to new and more demanding customers - Existing supply chain was too slow, too disconnected, and too manual to support the hyper-competitive consumer sector - Acquisition of other companies resulted in further systems and supply chain integration challenges 	<ul style="list-style-type: none"> - Created a single version of truth for product and sales data - Improved the following metrics: <ul style="list-style-type: none"> o On-time delivery of customer-requested data o Inventory turns o Forecast accuracy at the product family level o Excess and obsolete inventory as a percentage of revenue

Resources Related to this Best Practice:

- The Technology Strategies for Integrated Business Planning Benchmarking Report, Aberdeen Group Report, July 2006
- Technology Strategies for Closed Loop Inventory Management, April 2008
- Sales and Operations Planning: Aligning Business Goals with Supply Chain Tactics, June 2008
- S&OP Process is a Strategic Driver for Improving Business Performance, Aberdeen Group Report, December 2008
- The CPFRR model: <http://www.vics.org/committees/cpfr/>
- The following web sites pertain to collaborative supply chain planning and S&OP:
 - o <http://www50.sap.com/businessmaps/9135A58E8B6542FAAB39F3C805F80CA2.htm>
 - o <http://www.apqc.org/knowledge-base/documents/supply-chain-planning-what-sop-how-it-done-whos-doing-it-well>
 - o http://www.adexa.com/pdf/demandplanningforecasting_cdp.pdf
 - o <http://logistics.about.com/od/tacticalsupplychain/a/sandop.htm>
- The Government Accountability Office/ National Security and International Affairs Division (GAO/NSIAD) Report Best Practices Methodology: <http://www.gao.gov/archive/1995/ns95154.pdf>

Related Policy:

- Under **FAR 11.002**, “agencies shall specify needs using market research in a manner designed to promote full and open competition (Part 6), or maximum practicable competition when using simplified acquisition procedures, with due regard to the nature of the supplies or services to be acquired.” S&OP practices are strategic activities to improve forecasts and manage capital efficiently. Furthermore, S&OP practices help facilitate collaboration and synchronization across the supply chain and throughout the contracting and procurement process. Collaboration and synchronization requires situational awareness and market research helps facilitate awareness of newly available S&OP practices.

3.2 Best Practice #2 – Performance Based Logistics (PBL) Contracting

3.2.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort, including those efforts which may not be performing as expected or in cases where having increased performance would prevent the need to procure additional systems. Performance Based Logistics (PBLs) contracts can be structured to improve costs, performance, reliability, maintainability, flexibility, and scalability during systems sustainment. PBL contracts are especially helpful when improved responsiveness, technology infusion, or obsolescence resolution is needed.

Description: PBLs drive costs down by developing supplier agreements which are outcome-based, long-term in nature, and deliver to a particular service level. Vendors bear the risk of inventory forecasting, metrics management, and obsolescence. The USAF focus is on the component level, moving away from tip-to-tail PBL. Hybrids of indefinite delivery/indefinite quantity (IDIQ) and fixed price contracts can separate risk in performance outcomes. Contracts for items can then be bundled or unbundled, based on the interest of the program manager and Government.

This best practice supports flexibility, scalability, and cost visibility. The flexibility of the contracting vehicle will be determined by capturing the true business “as is” process, converting the “to be” into the point-to-point streamlined ordering process. Reducing the steps it takes to place an order will create faster turn times for receipt of service/product. Scalability is possible based on band contracting (multiple contract line item numbers [CLINs] of the same item with different lot sizes to achieve economic order quantity discounts), which may also provide better execution of contract line item management by establishing the customary and reasonable options to order. Cost visibility can be gained via the structure of newly constructed vehicles through a contract data requirement list (CDRL) or an agreed upon data pull from an enterprise system or client virtual private network (VPN) authorization to review data.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Avoid pass-through costs (using breakout analysis) - Increase profits - Stabilize demand planning - Identify long-term investment opportunities - Incorporate value engineering (allows vendors to bring savings to the table and get rewarded) - Develop long-term contracts (to drive prices down) 	<ul style="list-style-type: none"> - Optimize weapon system readiness - Increase operational reliability - Increase operational availability - Decrease logistics response time - Establish fixed repair costs - Decrease costs per unit of usage - Reduce equipment footprints - Avoid pass through costs (using breakout analysis)

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - An approach to view logistics from an “Enterprise” perspective - Gaining a balance for the organization to break out components and manage them themselves or have vendors manage the items under strategic sourcing initiatives 	<ul style="list-style-type: none"> - Improved logistical support, responsiveness, reliability, technology infusion, and obsolescence resolution - Transfer of risk from the government to the supplier - Enhanced operating efficiency, new investment, access to technical innovation, preservation of workforce skills, and successful regulatory adherence

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Extension of PBL performance parameters to 2nd and 3rd tier suppliers/partners - Increased contract liability - Identifying appropriate off-ramps - Difficulty in obtaining quality data 	<ul style="list-style-type: none"> - Funding is locked in at the PBL level of service, which means the loss of flexibility in buying fewer parts or less supply support when funding is reduced - Amount of time to negotiate both the Performance Based Agreement (PBA) with users and the PBL with the vendor - Determining performance requirements that are converted to deliverable outcomes - Selecting the appropriate, not necessarily the most politically expedient, Product Support Integrator (PSI) in accordance with the guidance of AFI 63-101 - Identifying appropriate incentives (non-monetary = government PSI, monetary = commercial PSI)

Financial/Performance Metrics:

- Days to produce
- Days to deliver
- Levels of output: Products, services, and hybrid of products/service level
- Total ownership cost: Current output divided by total value
 - o Monthly production rate compared to orders
 - o Planned capacity to realized capacity output
 - o Standard problem reporting metrics: Receipt of problem to resolution against a standard industry tolerance
 - Define metrics for these outputs against service levels defined, product mean time to repair, and mean time between failure standards as a system-of-systems approach or as a commodity performance standard.

Industry Techniques/Tools:

- National Contract Management Association (NCMA), PBA best practices
- Analytical Hierarchy Process (AHP) modeling
- Delphi Method

- Monte Carlo simulation
- Life-cycle cost modeling
- Goal-Question-(Indicator)-Measure (GQ[I]M) approach

PBL Management Tools:

- Maintenance report reviews
- Financial report reviews
- Inventory report reviews
- Customer survey summaries

Industry Implementation Approach:

- Frame the opportunity: Establish the need and desired outcome; identify constraints and enablers that create parameters for the project.
- Design the solution: Identify and document the strategy(ies) that will achieve the desired results using input from all stakeholders; dismissing or not including all stakeholders may sink or sub-optimize the impact of the strategy.
 - o Motivate the right behaviors with mutually agreeable metrics, incentives, and penalties.
 - o Share risk between the supplier and the buyer (accomplished during strategy development).
- Test the solution: Develop the business case that demonstrates and measures the results of each of the identified strategies. As a benchmark, the current processes should be documented and measured against the same criteria as the identified strategies. Typically these strategies are measured by cost, benefit, and risk over the expected life of the contract. The entire process is iterative in nature, beginning with framing the opportunity and ending at contract termination.
- Manage the performance: Ensure the contract identifies high-level metrics (recommend six or fewer) that facilitate the achievement of the overarching goals of the agreement. This frees the support provider to do only what is necessary to achieve the desired outcomes. The appropriate systems must be put in place to collect and report these metrics. It is important to remember that when contracting for these services, the focus should be on buying outcomes, not attempting to control how the work is performed.

Industry Specialties that Implement this Commercial Best Practice:

Logisticians, Program Managers, Contracting Officers, Financial Analysts, End Users, Trainers, Acquisition Logisticians, Contractors

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefits are fixed levels of income, increased profits, reduced cost, increased reliability, and early problem detection.

Numerous incentives exist, and only a select few are listed below. For other incentive ideas, refer to the Resource section of this best practice, which provides links and reference names.

- Incorporate fixed-price contracting which guarantees the contractor a fixed level of income. High level metrics free them to modify and improve their equipment and processes to achieve the same or better result at lower costs, thereby increasing profits.
- Seek to utilize contractor-owned inventory. If the contractor owns the inventory (spares or the equipment items), they have the ability to modify and upgrade the inventory when and how they see fit. This can positively affect the reliability of the product, which reduces cost. Earlier changes result in greater profits realized.
- Allow contractor control over operating conditions (operating conditions are typically directed by the government):
 - o Contractors (through failure analysis) can sometimes identify small changes that may reap big benefits.
 - o Allowing a system to continue running may reduce failures.
 - o Changing a maintenance window may allow for the institution of a condition based maintenance approach.
 - o Allowing remote monitoring and administration may aid the contractor in identifying problems before performance is affected.
- Consider a non-cost incentive contract. An award term contract is a methodology to continue using good vendors and stop using non-performers. This is measured via a delivery to ordering ratio coupled with quality product and shipping completion information.
- Consider cost incentive contracting using a cost-type contract with shared cost targets and shared savings.
 - o Cost Plus Incentive Fee and Cost Plus Award Fee contracts can be used for targeted performance with measures of accountability in both cost savings and process improvements.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Program Manager, Logistics Specialist

Others: Contracting Officer, Financial Manager

Applicable Product Support Elements (PSEs):

- Sustaining and System Engineering
- Design Interface
- Supply Support
- Maintenance Planning and Management
- Support Equipment/Automatic Test Systems
- Facilities
- Packaging, Handling, Storage and Transportation (PHS&T)
- Technical Data Management/Technical Orders
- Manpower & Personnel
- Training
- Computer Resources
- Protection of Critical Program Information

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 3.3 Depot Maintenance
- 4.2 Support Equipment Replacement
- 4.3 Sustaining Engineering and Program Management
- 5.1 Hardware Modifications
- 5.2 Software Maintenance

3.2.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Form the core PBL team, consisting of a cost analyst, logistician, contracting officer, and program manager.
- Initialize PBAs to establish the expectations of the end user and allow the identification of the outcomes.
 - o Identify the desired outcome(s) by working with the end customer; establishing the outcomes without this critical input will sub-optimize the end results.
 - o Align accountability with responsibility.
 - o Define how each party will be measured. All parties should share power and have a responsibility to one another; the measures should reinforce their commitment to one another.
- Baseline the system in order to identify appropriate changes and measure success. Consider financial, configuration, and sustainment factors when establishing the baseline.
- Collaboratively develop no more than six clearly-defined, high-level, effective metrics to monitor the program (if possible, include reliability performance improvements).
 - o System availability
 - o Inventory velocity
 - o Cost per flight hour
 - o Repair turnaround time
- Integrate requirements and support.
- Conduct a business case analysis (BCA) to determine the validity of a PBA.

Request for Proposal (RFP) Development Phase:

- Document the solution. Each contract should contain a thorough description of the service to be provided, the responsibilities of the customer, problem resolution management, performance tracking and reporting of metrics, periods of review, fees and expenses, and termination clauses including compensation for termination.
- Pricing should be clearly tied to requirements with a request for a basis of estimate that demonstrates the elements associated with the price. Specifically, the basis of estimate should help the government determine how the benefits are divided between customers and suppliers. Notably, pricing decisions can depend on a product's expected reliability. A new, high-risk aircraft may require a cost-plus contract to protect suppliers, while a mature

- product may use a fixed-price contract. Performance-based contracts transfer resource management risks to suppliers, who must decide the risk premium customers should pay.
- Update the BCA to account for any changes that arise during the development of the RFP.
 - Include in the RFP specified times when contract incentives and metrics will be evaluated for adjustment and improvement.

Proposal Review/Fact Finding/Negotiating Phase:

- Update the BCA to reflect any changes that arise during negotiations.
- Finalize PBAs once all parties are completely involved in developing the solution.

Execution Phase:

- Monitor performance of vendor(s) and stakeholders with pre-determined metrics.
- Evaluate effectiveness of incentives and metrics at pre-determined intervals and determine if desired outcomes are being achieved.
- Document and share lessons learned across all USAF programs.

3.2.3 Resources and References

Case Study Abstracts:

Boeing Supporting the C-17 Aircraft

Business Problem	Business Solutions
<p>Boeing faced several business problems in supporting the C-17 aircraft project:</p> <ul style="list-style-type: none"> - Stakeholder management: A great deal of effort was required to manage stakeholder expectations, given differing viewpoints about long-term sustainment for the C-17. - Performance outcome: A method did not exist that accurately and defensibly modeled how changes to depot sustainment affect aircraft availability. - Data collection: Performance data was of limited value because it was incomplete, unreliable, or nonexistent. - Data timeliness: Most government and contractor organizations supporting the study had difficulty providing data in a reasonable timeframe, causing delays. - Manpower estimates. The government did not have a reliable method for capturing manpower requirements associated with materiel management or product support workload. 	<p>To resolve these issues, a BCA was conducted to capture the current state of depot sustainment for the C-17 and develop and evaluate a baseline plus six alternative depot sustainment strategies (cases). Workload estimates were developed based on historical repair data and flying hours and used to cost out each alternative. The team performed a qualitative analysis of benefits and risks with stakeholders and subject matter experts, which was fed into the combined analysis. The team also developed comprehensive benefit, cost, and risk models to support the analysis. The BCA was developed according to applicable USAF and DoD guidance, which was later critically reviewed and approved by various government departments, including the Air Force Audit Agency.</p>

The Rolls Royce Engine, Pratt Whitney, and General Electric

Business Problem	Business Solutions
<p>Rolls Royce was facing challenges of how a requirements office motivates suppliers and which incentives should be used. They wanted to explore sharing risk to improve performance. Rolls Royce realized that not every supplier contract would require a performance based contract, hence they wanted ensure the effectiveness of the performance based contract model and its effective implementation. Rolls Royce wanted to evaluate the measures that should be used to effectively and efficiently monitor progress, including the measures to use in order to obtain the most information in the least amount of time.</p>	<p>Rolls Royce created a hybrid contract capturing multiple areas of work with separately priced elements, which created both flexibility and efficiency in one vehicle. Rolls Royce established these guidelines for their PBL contracts:</p> <ul style="list-style-type: none"> - The contract should give the supplier the incentive to reduce costs. Rewarding a vendor with more money for good performance makes sense but is only achievable with specific, achievable targets. - The contract should share definable (e.g., service level offerings) and indefinable (e.g., end-of-life prediction) risks. - The contract should include performance measures within a context. The context is determined by a quality assurance surveillance plan listing acceptable quality levels, the surveillance technique for performance, and the term of the surveillance to determine the results against the measure.

Resources Related to this Best Practice:

- DoD 5000.02 PBL policy (<http://www.dtic.mil/whs/directives/corres/pdf/500002p.pdf>)
- Performance Based Logistics: A Program Manager's Product Support Guide (http://www.dau.mil/pubscats/Pages/PBL_Guide.aspx)
- FAR Subpart 37.6: Performance Based Acquisition
- Office of Federal Procurement Policy Memorandum, July 2003
- Under Secretary of Defense for Acquisition, Technology and Logistics (USD[AT&L]) memorandum, May 2007, Proper Use of Award Fee Contracts and Award Fee Provisions
- Office of Management & Budget (OMB) Memorandum, May 2007, Using Performance Based Services Acquisition to meet Program Needs - Performance Goals, Guidance, and Training
- Air Force Instruction (AFI) 63-124: Performance Based Services Acquisition (PBSA)

Related Articles/References for USAF Lessons Learned:

- 2004: *Defense AR Journal*, "The Defining and implementing Performance-Based Logistics in government".
- 2006: "USAF Awards Northrop Grumman \$254 Million in Joint STARS Contracts".
- 2010: *Flight Global*, "USAF Shakes Up Maintenance Repair and Overhaul [MRO] Policy for C-17 and F-22 Aircraft".
- August 2004: Lessons Learned Performance Based Logistics R-TOC Forum
- Constructing Successful Business Relationships – Innovation in Contract Incentives; Science Applications International Corporation under Contract DASW01-95-D-0076,

Deputy Assistant Secretary of the Army.

<https://www.acquisition.gov/sevensteps/library/DOAconstructing.pdf>

Related Policy

- **HQ AFMC PBL Policy (May 2008) and the Defense Acquisition Guide (DAG)—DoD 5000.01 (Section E1.1.17):** The USAF PBL Policy and DAG support the use of PBL sustainment agreements, which are negotiated agreements between major stakeholders that formally document the performance and support expectations and commensurate resources to achieve the desired performance outcomes, whether provided by commercial or organic support providers. The DAG also supports PBL strategies that “optimize total system availability while minimizing cost and logistics footprint” and the use of...“sustainment strategies, including the best use of public and private sector capabilities through government/industry partnering initiatives, in accordance with statutory requirements.”
- **AFI 63-124, AF Performance-Based Service Acquisition Policy, and FAR Subchapter B, Part 7, Acquisition Planning:** The development of a PBL implementation plan is an extension of the acquisition strategy required under AFI 63-124.
- **AF Policy Directive 63-1, Acquisition and Sustainment Life Cycle Management (implemented by AFI 63-101, Acquisition and Sustainment Life Cycle Management):** Value engineering practices support PBL contracting and planning by assisting the multi-functional team to ensure functional analysis methodologies and objective measures for the operations and sustainment products and services are adequately captured in the acquisition strategy in the contract planning efforts.

3.3 Best Practice #3 – Supplier Performance and Risk Assessment

3.3.1 Analysis and Industry Information

Assumptions: This best practice is applicable to sustainment efforts that involve the delivery of products to the USAF on a regular, repetitive basis and that are not constrained by a sole source agreement. This practice is integral in establishing and communicating expectations to the supplier and includes measurement and issue resolution activities.

Description: The goal of supplier performance and risk assessment is to measure supplier performance against internal and/or external standards, providing feedback to achieve and maintain the performance required to meet the customer's business and competitive needs. Included in this best practice is a Supplier Certification Program (SCP) which defines and maintains a unique network of suppliers capable of delivering a specific product set. The SCP may include establishment of a new supplier or maintaining an existing supplier. It includes the tasks and activities associated with identifying and qualifying suppliers and finalizing sourcing terms and conditions. Supplier selection often carries risk due to financial instability, production constraints, product quality, or other factors. It is imperative that supplier risk assessment focuses on ensuring sustainability of the processes and products supporting the USAF.

This best practice can have a significant impact on cost and performance visibility through more active management of suppliers. It also influences cost control, cost reduction, and risk reduction through improved quality levels.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Improve sustainment contract terms and create competition among suppliers to improve maintenance service levels, lead times, product availability, and product quality - Include advanced quality planning for new product initiatives - Manage raw material and product non-conformance - Improve complaint data analysis and reporting 	<ul style="list-style-type: none"> - Lower total cost of sustainment for the USAF, as well as for the supplier - Continuously improve contract term agreements that drive and maintain high service levels (using performance metrics to drive levels) - Proactively assess supplier manufacturing and quality capabilities, minimizing potential risks and ensuring the effective implementation of USAF quality expectations to achieve on-time, on-target launches and exceptional supplier quality - Create competition among suppliers to improve service levels, lead times, product availability, and product quality
Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Improved supplier service levels - Incentives to reduce costs of operation and maintenance - Improved communication between separate 	<ul style="list-style-type: none"> - The ability to discuss a quality improvement plan with suppliers when a consistent problem is identified or if quality ratings fall below an established level (e.g., 99%)

Industry Benefits	Government Outcomes
<p>profit-and-loss entities at manufacturing sites</p> <ul style="list-style-type: none"> - Inclusion of procurement quality departments in investigations of supplier parts on the manufacturing or service center floor 	<ul style="list-style-type: none"> - Automated activity-based systems that will allow USAF Air Logistics Centers (ALCs) and suppliers (field personnel) to remain in constant communication on supplier performance, facilitating the reporting of service data (e.g., maintenance orders that are filled on time, accepted, or rejected) and access to information that supports readiness planning - Immediate access to up-to-date information about individual suppliers, engineering issues, or purchase order fulfillment - A standard, consistent approach to procurement activities - The opportunity to assess and score suppliers based on cost, affordability, responsiveness, and how they communicate with the ALCs/Product Centers

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Management of multiple suppliers 	<ul style="list-style-type: none"> - Limited competition, due to a lack of technical data (i.e., government has not purchased original equipment manufacturer (OEM) data rights or data is proprietary) - Significant, guaranteed funding to the contractor each fiscal year (under contractor logistics support (CLS) contracts), limiting the flexibility to reduce funding levels without violating the terms of the contract - Varied availability of CLS performance and cost data at individual program offices - Lack of detailed cost and performance data on CLS contracts, severely limiting the ability to provide improved tools or guidance to cost estimators - Incentives for contractors to make investments for better performance when contract lengths are becoming shorter - Constrained environment leads to sole sourcing situations and therefore does not provide the opportunity to establish a well-rounded and effective SCP - Management of multiple suppliers

Financial/Performance Metrics:

Supplier performance assessment targets improvements in cost, quality, and cycle time by suppliers, resulting in on-time deliveries of products at a lower cost with less defects or

damage. It also reduces the internal costs of inspections, material handling, and scrap processing. Expected results include:

- Reduced inspection costs
- Higher quality level
- Lower returned material costs

Specific metrics for performance assessment may include:

- Percent on-time delivery
- Percent damaged shipments
- Percent damaged products

Strategic measures may include:

- Assessing component price vs. financial/operational impact to identify service level or dual strategic sourcing strategies
- Measuring resiliency: Percentages of standard components, non-standard parts with substitutable components, single-sourced components, and sole-sourced components

Industry Techniques/Tools:

- Performance management systems
- Balanced scorecards
- Benchmarking tools
- Risk-sharing contract strategies
- Supplier risk and resilience scorecard

Industry Implementation Approach:

- Implement measurement systems that move the organization from reactive to proactive behavior (using leading, as opposed to lagging, indicators). These systems should be used not only to fix problems but also to assess risk and prevent new problems from occurring.
- Keep the performance measurement simple so that it is easily used and understood. The measurement system should reflect the organization's business units' stages of maturity. During periods of extreme growth or change, a complex system may be too cumbersome to be maintained or communicated effectively.
- Include executive support and training with any major initiative, including adopting and sustaining a measurement system.
- Utilize scorecards to support measurement of supplier performance and complement those scorecards with teams that help tier 1 suppliers improve their operations and reduce risk within their own components, manufacturing sites, and suppliers. Scorecard results can be used to:
 - o Rate suppliers according to the likelihood that they will default on future commitments, such as on-time delivery and product quality, because of financial problems or labor disruptions.

- Motivate the buyer (organization) to procure additional inventory in advance of a projected bankruptcy, to develop a dual sourcing strategy for high risk suppliers, or to search for an alternate supplier.
- Help identify gaps in the supplier’s risk management strategies by analyzing the current state of the company’s risk mitigation processes and comparing it to stated goals.
- Analyze a supplier’s behavior using financial information about public companies and correlating data with supplier performance such as lead time or service level.
- Adopt supplier performance metrics used by best of breed organizations and that focus on cost and capability as key improvement areas.
- Improve contract service level agreements using performance metrics such as those indicated above.
- Establish benchmarks for each supplier service.
- Establish a reward system for suppliers based on their contribution to improving organizational performance.
- Initiate a supplier performance and quality assessment program for all services/parts procured.
- Use a standardized supplier performance rating process.
- Develop a dual-sourcing strategy that shields the organization should supplier performance negatively affect the sustainment of an operation.
- Conduct candid performance reviews with suppliers to ensure a successful relationship, focusing on two important attributes: a quantitative, data-driven scorecard and the inclusion of senior management from both the organization and supplier.
- Conduct an assessment of the significance of supplier performance/need. Review suppliers who receive the top 10-20% of funding, categorize them as direct or indirect suppliers, and rank them (e.g., low, medium, high) based on the factors below.

Factor	Score
Is the product or service strategic to the company?	
Is your firm highly dependent on the supplier?	
Are switching costs an issue?	
Is the supplier considered critical to the business?	
Does the supplier provide a high-cost or high-risk item?	
Is the supplier sole or single source?	
Are there any current performance issues, such as in service, quality or responsiveness that SPM could help measure, monitor and address?	
Does the supplier impact either internal or external stakeholder satisfaction?	
Are there MWBE (Minority and Women’s Business Enterprise) or “Green” considerations?	

Figure 2. Factors for Ranking Suppliers

Other considerations for choosing a measurement system and gaining more insight into supplier performance are:

- Would the supplier add more value if its performance improved? (a cost consideration)
- Would the supplier help the organization become more competitive in cost, quality, technology, or responsiveness?
- Does the supplier pose or create risks that need to be reduced or eliminated?

In reviewing sources of performance information, the following should be considered:

- Are there currently means for collecting the information, such as questionnaires, surveys, data feeds? Do data collection tools need to be developed? (Ensure current standard/mandatory information/data sources are considered before new development is initiated.)
- How accurate are current information sources? Do they need manual manipulation, cleansing, or adjusting? If so, what are the resource requirements?
- How credible are the information/data sources? Is the information likely to cause disputes with suppliers or stakeholders? (If data integrity becomes an issue, then supplier performance measurement can be derailed.)
- What methods will work best within the organization's business units? If asked to give feedback on suppliers, will internal stakeholders do so regularly and reliably?
- Is accurate and relevant supplier performance information available?
- Should different scorecards be used for different supplier segments? (The organization may wish to measure strategic suppliers in detail, but custom suppliers only in service and reliability.)

Industry Specialties that Implement this Commercial Best Practice:

Procurement Managers, Contract Managers, Operations Managers, Quality Control Managers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefit is the effective reporting, use, and management of key performance indicators and the continuing development of well-trained personnel.

- Implement a balanced scorecard system that is easy for USAF personnel to use.
- Determine the right number and type of measures that will be used at each level or for each role within the organization.
- Use technology appropriate to the organization and to the task of collecting, analyzing, and reporting metric data. Identify measurement solutions developed for a targeted audience that will make use of the information for decision making.
- Capture and report measures using basic Microsoft® tools, ensuring individuals can contribute to or benefit from the scorecard system without requiring the development of new skills.
- Make education opportunities available that describe the measurement systems and the benefits for operations and financial management.
- Encourage suppliers to work with the USAF organization to identify continuous improvement initiatives, develop tools, determine incentives, and implement best practices.

- Consider rewarding participating suppliers that are performing at or above desired levels with continued contracts.
- For suppliers not participating in continuous improvement initiatives, best practices, or meeting performance standards, consider applying restrictions or limiting work.

Government Functional Specialties Responsible for Implementing this Commercial Best Practice:

Primary: Logistics Specialist

Others: Contracting Officer

Applicable Product Support Elements (PSEs):

- Supply Support
- Maintenance Planning and Management
- Support Equipment/Automatic Test Systems
- Packaging, Handling, Storage and Transportation (PHS&T)

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 4.2 Support Equipment Replacement

3.3.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Assess the significance of supplier service/product performance by evaluating component price and lead time against financial/operational impact. Use leading indicators to assess risk levels and identify focus areas to prevent problems.
- Develop a framework and performance measurement strategy to achieve measurable improvement and cost reduction related to supplier service/product quality. Communicate this framework to management and stakeholders.
- Develop a supplier rating strategy (scorecard) with new and existing suppliers. Include frequency and methods of assessment and associated incentives for high performance.
- Develop a benchmarking strategy (industry and/or internal, as appropriate) for each service or product procured, and identify the best in class organizations to be benchmarked against.
- Identify technology enablers to manage suppliers' service/product performance.
- Conduct a market survey on potential suppliers for hard-to-find and diminishing parts.
 - Review performance metrics in supplying these parts.
 - Gather data to determine acceptable cost and metrics for delivery of the parts.

Request for Proposal (RFP) Development Phase:

- Set up supplier performance and quality assessment programs for all services/parts procured. Consider having suppliers implement a Customer Relationship Management (CRM) process to:
 - o Aid in tracking established and agreed-upon performance metrics, and
 - o Report and evaluate performance data.
- Identify and require appropriate service level agreements.
- Ensure expectations, strategies, and performance requirements identified in the requirements phase are included in the RFP.
- Ensure minimum requirements for flow-down of supplier performance assessment systems are included in the RFP. Prime contractor vendors and subcontractors should synchronize with the prime contractor’s processes to ensure stable and continuous support to the government.
- Develop weekly, monthly, or quarterly risk and performance review reports.
- Develop a quality service scorecard report.
 - o Consider using Earned Value Management as a fair assessment tool.

Proposal Review/Fact Finding/Negotiating Phase:

- Assess supplier service and product quality capabilities to minimize potential risks, ensuring the supplier’s ability to achieve on-time and on-target delivery.
- Ensure the contractor’s supplier performance assessment system is consistent throughout the supply chain and meets minimum RFP requirements.
- Negotiate mutually beneficial performance incentives.
- Use the Contractor Performance Assessment Reporting System (CPARS) when considering contractors/suppliers.

Execution Phase:

- Execute weekly, monthly, or quarterly risk and performance review reports.
- Execute the quality service scorecard report.
- Implement a recognition system that rewards suppliers who perform well based on established metrics.
- Provide feedback on contractors in CPARS.
- Share lessons learned with DoD and industry.

3.3.3 Resources and References

Case Study Abstracts:

Cisco Managing Their Supplier Risk

Business Problem	Business Solutions
Cisco outsources most of its manufacturing activities. The firm faced significant risk in managing its suppliers.	Cisco implemented a resilience scorecard for products already in the market, which was updated on a quarterly basis. For new products, they update the scorecard at key

Business Problem	Business Solutions
	milestones during the product development life cycle.

Toyota Aisin Fire Case on Supplier Flexibility

Business Problem	Business Solutions
<p>Aisin Seiki was the sole supplier of 98% of the brake fluid proportional valves (P-valves)—inexpensive but vital parts—used by Toyota. A fire stopped production at Aisin’s main factory; an initial evaluation estimated two weeks to restart production and six months to complete recovery. Toyota was facing strong demand and plants were operating at full capacity with only two to three days of stock. Every production day lost at the Aisin factory resulted in significant sales losses for Toyota.</p>	<p>Toyota immediately initiated a recovery effort involving many of its suppliers, restructuring the P-valve supply chain (e.g., blueprints of the valves were distributed among many of Toyota’s suppliers). Existing machinery was modified to build the valves according to Aisin and Toyota’s specifications, and new equipment was acquired. Within days, firms with little experience producing P-valves were manufacturing and delivering parts to Aisin, where they were assembled and inspected before shipment to Toyota. This collaboration effort involved 200 of Toyota’s suppliers. Owing to its flexibility, Toyota was able to stop the value chain immediately upon detecting a problem and effectively dealt with the challenge.</p>

Resources Related to this Best Practice:

- “Effectively Managing Performance Measurement Systems Benchmarking”, Report from The American Productivity & Quality Center (APQC) Publication
- Supply Chain Operations Reference (SCOR) Model
- “Measurement in Practice”, from APQC
- Booz Allen Hamilton white papers in “Supplier Performance Management”
- “Understanding and Growing Supplier Performance”, Published by Supply & Demand Chain Executive
- Operations Rules: Delivering Customer Value through Flexible Operations, by David Simchi-Levi, The MIT Press, 2010

Related Policy:

- The following **FAR Subparts** support the use of standardized supplier performance ratings, and potentially support implementing a Supplier Certification Program:
 - o Subpart 11.4—Delivery or Performance Schedules
 - o Subpart 32.10—Performance-Based Payments
 - o Subpart 37.6—Performance-Based Acquisition
 - o Subpart 42.15—Contractor Performance Information

- The following sections under **AFI 63-124, AF Performance-Based Service Acquisition Policy**, promote the use of performance assessments, and more specifically the use of CPARS:
 - o Section 2.6.2 – Providing the health of services acquisitions to senior leadership annually
 - o Section 2.8.11 – Assessing and managing contractor performance data, to include submitting CPARS reports.

3.4 Best Practice #4 - Vendor Managed Inventory

3.4.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that would benefit from a strategic supplier relationship to support USAF weapon systems, subsystems, and components to provide more scalability and potential cost reduction in inventory management. Vendor Managed Inventory (VMI) with a supplier or integrator can result in significant advantages for both the supplier and the customer through improved forecasting, reduced inventory investment, and improved stock availability. VMI can be implemented on a larger scale using an integrator as the face-to-face supplier. It can also be implemented with a single supplier and narrowly focused on a commodity or component. Using VMI for remanufacturing (spares) management may be challenging; however, this may be accomplished via development of a business model designed specifically for the USAF and its weapon systems.

Description: VMI is a means of optimizing supply chain performance by making the supplier responsible for maintaining the customer's required inventory levels. In support of the USAF, the supplier would have access to relevant inventory data and would be responsible for generating requisitions for stock replenishment or shipments to the using organization (e.g., flightline maintenance and repair shops) to satisfy a defined customer service level. In other words, the supplier generates the order, not the customer. To enable the VMI concept, the supplier receives data (usually via electronic data interchange [EDI]) that provides visibility of USAF inventory transactions and stock levels. The supplier can view the status of every relevant item in the customer's inventory, as well as true point-of-sale data. The supplier is then responsible for creating and maintaining the inventory plan to support the USAF end-product users. VMI typically operates on a smaller scale than is seen in Contractor-Supported Weapon Systems (CSWSs), focusing on components or commodities, as opposed to the entire weapon system.

This best practice can have a significant impact on improving asset visibility across the organization's inventory due to data sharing. It also reduces the total cost of ownership by reducing USAF managed inventory levels and avoiding infrastructure investments due to reduced inventory footprint through optimization. VMI provides for scalable inventory so that current and future needs are met without assuming excess inventory costs.

Industry Objectives	Government Objectives
- Improve customer service	- Improve system availability
- Enable better data integrity and visibility	- Integrate supply chain with strategic

<ul style="list-style-type: none"> - Enable broader supply chain visibility - Improve forecasting - Create collaborative relationships with suppliers - Develop well-established strategic relationships with customers - Optimize supply chain performance through suppliers' management of their customers' inventory 	<p>suppliers supporting key war fighting capabilities</p> <ul style="list-style-type: none"> - Reduce total cost of ownership - Reduce inventory - Collaborate on forecasting, requirements determination, and other supply chain management functions
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Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Collaboration and unity of purpose, resulting in better service to the end user - Alignment of supplier and customer business objectives - Increased sales - Improved data integrity due to linked data interfaces - Enhanced forecasting through improved visibility of point-of-sale data - Identification of customer priorities and improved fill rates through stock-level visibility - Improved supply chain planning with centralized forecasting - Reduction of both on-hand inventory and stock-outs, due to increased supply chain visibility and collaborative planning - Fostering of strategic long-term partnerships with customers 	<ul style="list-style-type: none"> - True collaboration and unity of purpose with key suppliers - Establishment of shared business objectives with key suppliers - Reduction of supply chain planning and inventory costs by sharing responsibility with the supplier - Improved supply chain planning for key commodities through centralized forecasting and improved demand visibility - Improved percentage of orders satisfied with on-hand stock (issue effectiveness) - Reduction of required investment in inventory and warehouse infrastructure - Development of strategic partnerships with industry

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Stable funding stream - Regulatory requirements promoting competition and short-term contracts - Lack of flexibility among EDI transactions that support VMI, limiting collaboration in planning for unpredictable demand flow - Dedicated resources for a single customer - Difficulty obtaining required inventory and supply chain data needed to effectively manage the inventory - Determination of acceptable levels of service for both parties - Compatibility of supplier and customer supply chain management systems - Cost of integrating supply chain systems 	<ul style="list-style-type: none"> - Cultural issues (e.g., loss of control, perceived loss of jobs, skepticism) - Increased risk of mission impact during contingencies, fleet-wide component replacements, and other high-demand scenarios because of lower inventory levels - Characterizing requirements during surge and other unstable demand scenarios - Reliance on a single source of supply - Sharing classified/sensitive information (e.g., ops plans, component data) - Determining acceptable levels of service for both parties - Monitoring supplier performance to maintain agreed-upon service levels - Compatibility of supplier and USAF supply chain management systems - Cost of integrating supply chain systems

Industry Challenges	Government Challenges
	<ul style="list-style-type: none"> - Remanufacturing environment of weapon systems and balancing inventory costs with probability and cost of failure - Limitations on length of service contracts may discourage vendors from participating in VMI

Financial/Performance Metrics:

- Issue effectiveness (percent of customer requests that were satisfied with on-hand stock)
- Average days on backorder
- Not Mission Capable - Supply (NMCS) rate (percent of time a weapon system is unable to perform its mission due to a lack of required parts)
- Buyer inventory value (lower inventory value)
- Warehouse space utilization
- Days awaiting parts (AWP)

Industry Techniques/Tools:

- EDI
- Collaborative Planning, Forecasting, and Replenishment (CPFR) tool
- VMI toolkit
- Radio frequency identification (RFID) infrastructure

Industry Implementation Approach:

- Examine potential systems, subsystems, components, or commodities for collaborative inventory management.
- Perform market research to identify suppliers that are successfully engaged in VMI strategies. Based on market research, determine the merits of establishing multiple VMI arrangements with various suppliers versus establishing a single VMI agreement with an integrator.
- Issue a solicitation and select a single supplier, multiple suppliers, or a single integrator (as appropriate) to manage inventory for the system, subsystem, component, or commodity.
- Establish a VMI agreement with the supplier, suppliers, or integrator. Establish service level metrics to monitor and assess supplier performance.
- Address and resolve system interface, data access, and other issues that may hamper the effectiveness of the VMI arrangement. Transition inventory from the organization to the supplier, as required. Update records to reflect inventory status changes.
- Implement change management to minimize the cultural and business operational challenges related to contractor management of inventory formerly managed by the organization.
- Measure and evaluate the effectiveness of the VMI arrangement, implementation process, and systems in order to continuously improve performance.

Industry Specialties that Implement this Commercial Best Practice:

Supply Chain Planners, Procurement Managers, Contracting Managers, Information Technology (IT) Systems Engineers and Specialists, and Budget and Financial Managers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefits realized are that the products are replenished at the right time, which result in improved order fulfillment and an increased ability to meet service level agreements.

- Establish business partnership arrangements with suppliers with stable funding to encourage collaboration and investment in IT systems, tools, and integration.

Government Functional Specialties Responsible for Implementing this Commercial Best Practice:

Primary: Supply Chain Manager Logistics Specialist

Others: Financial Manager, Contracting Officer

Applicable Product Support Elements (PSEs):

- Supply Support
- Maintenance Planning and Management

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 4.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Identify specific collaboration requirements (e.g., data security, necessary service levels and performance measures [according to identified criteria], data requirements, and system interfaces) that would be necessitated by a VMI agreement.
 - o Include serialized item management (SIM).
- Conduct market surveys on potential suppliers for hard-to-find and diminishing parts.
 - o Review performance metrics in supplying these parts.
 - o Gather data to determine acceptable cost and metrics for delivery of the parts.
- Develop a strategy or business model to allow for successful VMI in a remanufacturing environment. Include development of key performance metrics to be used with vendors and stakeholders.

Request for Proposal (RFP) Development Phase:

- Engage with appropriate Integrated Product Teams (IPTs) and other stakeholders to validate requirements.

- Articulate specific VMI requirements, to include data sharing and inventory management system integration requirements.
 - o VMI requirements should include communication planning, ensuring that strategic and operational decisions have equitable and intended consequences at the tactical level.
 - o Include a statement that allows for flexibility when USAF systems are replaced, changed, or are upgraded.
- Conduct research to determine market capabilities to support the VMI requirement.
- Articulate the desire for a well-established strategic partnership with selected vendor(s).
- Using the market research results, define the acquisition strategy (i.e., single supplier, multiple suppliers, integrator) as it relates to VMI.
- Ensure expectations, strategies, and performance requirements identified in the requirements phase are included in the RFP.

Proposal Review/Fact Finding/Negotiating Phase:

- Down-select and validate supplier/integrator capabilities to support a VMI arrangement.
- Select supplier/integrator that proposes the best-value VMI arrangement.
- Formalize a VMI agreement.

Execution Phase:

- Identify and resolve system interface, data access, and other issues that may impact successful implementation of the VMI arrangement.
- Implement change management activities with applicable USAF agencies prior to VMI implementation.
- Implement the VMI arrangement for the relevant systems, subsystems, commodities, or components.
- Monitor and evaluate the effectiveness of the VMI arrangement; implement processes, systems, and other changes to continuously improve performance.
- Document lessons learned from the VMI arrangement; consider other opportunities for VMI support to the USAF.

3.4.2 Resources and References

Case Study Abstracts:

Datalliance Study of 65 VMI Relationships

Business Problem	Business Solutions
Datalliance study on VMI relationships identified major drivers for a vendor-managed relationship: <ul style="list-style-type: none"> - Poor inventory availability - Lost sales opportunities - Inactive inventory. 	Suppliers partnered with distributors to hold and manage their inventory. As a result: <ul style="list-style-type: none"> - Sales increased 47% over two years - The right products were available at the right time - Inventory turns increased 38% over two years - Inventory stock-outs dropped 45% over two years (41% in the first year).

Walmart and Proctor & Gamble (Disposable Diapers)

Business Problem	Business Solutions
<ul style="list-style-type: none"> - Opportunity to improve stock availability on high-demand commodity - Desire to improve market share (Proctor & Gamble) - Non-optimized inventory due to a disconnect between supply and demand 	<p>Walmart identified VMI as the right practice to manage replenishment of one of its most frequently used products. Partnering with Proctor & Gamble to generate visibility of stock and the ability to replenish products at their distribution centers yielded:</p> <ul style="list-style-type: none"> - Improved stock availability - Higher market share - Improved inventory turnover.

Kmart

Business Problem	Business Solutions
<ul style="list-style-type: none"> - Difficulty in accurately forecasting the amount it would need to sell - Opportunity to improve stock availability - Non-optimized inventory due to the product mix being ordered 	<p>Kmart leveraged the VMI practice to maintain stock availability and manage their seasonal products. Results included:</p> <ul style="list-style-type: none"> - Improved stock availability—customer service measures rose from high 80% to high 90% - Inventory turns on seasonal items rose from 3% to 10–11% - Inventory turns on non-seasonal items rose from 12–15% to 17–20%.

Resources Related to this Best Practice:

- VMI Tool Kit description: <http://www.smisupplychain.com/tools/tools.html#96>
- Illustration of the TrueVUE RFID platform specifically designed to support VMI arrangements: <http://www.vuetechnology.com/solutions/vendor-managed-inv.aspx>.
- Datalliance study of VMI effectiveness for 65 location relationships that have implemented VMI for at least two years: http://www.datalliance.com/businessresults_2year.pdf
- Advantages of VMI in the apparel industry and case study results for Kmart, Walmart, Proctor & Gamble, and Fred Meyer: http://www.just-style.com/analysis/vmi-in-apparel-manufacturing_id92751.aspx
- Case study on a multi-agent framework for third party logistics in electronic commerce: http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V03-4G7DYPH-3&_user=10&_coverDate=08%2F31%2F2005&_rdoc=1&_fmt=high&_orig=search&_origin=search&_sort=d&_docanchor=&_view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=d21c0fb767032572a3aa58b1d9f38040&searchtype=a

Related Policy:

- Under Section 3.6.3 of **AFPAM 63-128, Guide To Acquisition and Sustainment Life Cycle Management**, the USAF supports VMI as a practice under supply support by promoting “the development of a provisioning strategy and plan that balances best value, production, reliability, the industrial base, procurement lead times, availability of vendor

provided spares, and the adequacy of commercial data needed to identify replacement parts” and states that “provisioning must be completed on all support equipment acquisitions.” The implementation of the VMI practice needs to also comply with existing “enterprise identifiers”—codes that have already been uniquely assigned to an enterprise (the manufacturer, vendor, etc.) responsible for assigning item unique identifiers to an item (Section 8.1.2.3).

- **“Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending” (A Memorandum for Acquisition Professionals by Dr. Ashton Carter, 14 Sep 2010):** VMI is a practice that helps (in accordance with the memo) to “incentivize productivity and innovation in industry” by “rewarding contractors for successful supply chain and indirect expense management.”
- Under **DFARS clause 252.211-7003, Item Identification and Valuation, DFARS clause 252.211-7007, Item Unique Identification of Government Property** and the **FAR 45 Inventory Accountability (of Government Property) clause 52.245-1**, the procedures for “reporting and updating of Government-Furnished Equipment in the DoD Item Unique Identification (IUID) Registry” is described. This includes reporting any changes in the status or disposition of items “consumed or expended, reasonably and properly, or otherwise accounted for, in the performance of the contract as determined by the Government property administrator, including reasonable inventory adjustments.” The practice of using of a VMI environment or system improves asset visibility across an organization’s inventory due to data sharing and automated inventory reporting overseen by the supplier—a practice that is in compliance with the DFARS and FAR clauses above.

3.5 Best Practice #5 - Joint Service Agreements (JSA)

3.5.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that requires cooperation among governmental agencies to purchase, share, or exchange goods and services. Joint Service Agreements (JSAs) with source suppliers seek to reduce costs and improve service through economies of scale and elimination of duplicated services.

Description: JSAs are collaborative planning mechanisms that document the roles and responsibilities of the parties to the agreement, services to be provided, and the acceptable service levels. JSAs require multiple organizations to work together to purchase, share, or exchange a sustainable level of service. This applies in situations where organizations have similar needs and wish to collaborate as a means of reducing costs and providing an improved level of service. The JSA is not a partnership; it is instead an agreement for a period of time that defines the working relationship between the parties. Subject matter experts at the working level form Integrated Product Teams (IPTs) who use market practices and mission needs to explore the most effective way to execute working details of the agreement, such as testing/technology changes and evolutionary development, budget planning and execution (headed by the program control or finance function), and other specialty interests for the type of mission being met. These working details would be included as attachments to the JSA;

however, the IPT acts in an advisory role according to direction in the JSA, unless the JSA empowers executive responsibility within the charter.

A JSA is particularly effective for two or more organizations whose combined contract needs exceed \$10M. The JSA defines how each party will participate in the purchasing process and how responsibilities, costs, risks, and benefits are to be shared. Industry’s use of JSAs can be restricted by antitrust regulations but are widely used internationally. JSAs are a means of leveraging resources for cost savings, improved service, and product innovation. The parties to a JSA will define the market landscape and how each party will participate in delivering service for that market via the IPTs and through the practices defined and codified within the contract vehicles and across agencies.

This best practice can have a significant impact on cost and risk reduction because costs, risks, and benefits are shared among the parties; it also enables economies of scale that may not have been possible otherwise. The joint agreements allow for more flexibility, as they can leverage necessary resources when requirements change. Additionally, the collaborative environment associated with JSAs drives cost visibility as all parties will monitor and track associated costs.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Leverage existing capabilities and contracts to increase sales volumes with minimal development costs - Build on existing customer relationships - Provide a comparable product or service at a lower price point - Optimize cost, capacity, flexibility, and cycle time 	<ul style="list-style-type: none"> - Leverage existing agreements across the military services to take advantage of economies of scale - Reduce duplication of services across organizations - Provide service with collective capability that could not be delivered individually - Provide services to a larger customer base at a lower cost - Pool demand to reduce variability and improve service - Leverage industry and DoD joint capabilities towards cost savings and resource optimization - Make better use of government contracting and other expertise by centralizing the purchasing process

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Defines the levels of flexibility or resource upside available within stated lead times and agreed upon conditions - Enables collaborative delivery of products at a reduced cost - Enables providing service to an expanding customer base - Improves service levels - Distributes infrastructure costs 	<ul style="list-style-type: none"> - Allows leveraging of existing capabilities, resources, or assets within the defense community - Improves utilization of resources to include personnel, equipment, and facilities (by pooling demand) - Develops more focused contracting expertise and other core competencies by centralizing contracting activities

Industry Benefits	Government Outcomes
	<ul style="list-style-type: none"> - Reduces redundant service contracts within the USAF - Optimizes core competencies and related scarce human resources - Reduces costs through economies of scale and the elimination of duplicate services such as: <ul style="list-style-type: none"> o Logistics network optimization (to include warehouse and maintenance facility sharing) o Spare parts and other product rationalization (reduced variety) through standardization o Increased flexibility to align the logistics infrastructure to customer needs o Increased opportunities for mode switching (truck to rail, rail to ship, etc.) o Business intelligence and warehouse activity automation - Encourages propagation of best practices across organizations

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Discouragement of competition when the JSA partners create a single source for a customer buying segment - Patents, trade secrets, or “secret formulas” may interfere with collaborative efforts - Potential regulatory issues - Assuming additional risk and responsibility through partnerships 	<ul style="list-style-type: none"> - Limited flexibility to reduce funding levels without violating the terms of the contract (contractor logistics support contracts often guarantee a large amount of funding to the contractor in each fiscal year) - Inherent organizational difficulty in providing joint activity across services - Base Closure and Realignment (BRAC) can discourage teaming when organizations are forced to compete for business and potentially accept funding reductions - Methods of routine coordination and communications may not exist - Hesitancy to relinquish some control - Different parties to the JSA may have different service level agreements - No prior experience with sharing personnel, equipment, and facilities across organizations

Financial/Performance Metrics:

- Improved service levels based on industry standards and service requirements
- Cost Avoidance
- Cost savings for joint service capability

- Reduced capital expenses in dollars
- Contract Actions
- Pipeline Spares Reduction
- Reduced labor and labor related costs
- Increased utilization of resources
- Increased production capacity
- Optimized operations
- Improved interoperability
- Collaborative planning efficiency

Industry Techniques/Tools:

- Strategic business integration planning
- Market analysis
- Competitive analysis
- Sales and market planning
- Product planning
- Quality assurance surveillance plan (QASP)
- Trust models

Industry Implementation Approach:

- Identify potential JSA partners by identifying common needs between organizations.
- Leverage JSAs with suppliers to define the necessary levels of flexibility or resource availability within stated lead times and agreed upon conditions.
- Utilize JSAs with source suppliers to share responsibilities and costs of returns.
- Implement communication plans to enable clear communication and role management in collaborating with the vendor. This typically includes using a quality control plan as an input to the QASP and managing transparency with actions and intentions for executing mission objectives.
- Maximize existing JSAs to reduce cost and improve performance.

Industry Specialists that Implement this Commercial Best Practice:

Logisticians, Program Managers, Contracting Officers, Financial Analysts, End Users, Trainers, Quality Control Engineers, Contractors, Lawyers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The use of this best practice benefits industry through shared risk and responsibility, production and inventory cost savings, and increased business volume.

- Share risk and responsibility (cost, forecasting, capital planning, etc.) for balancing supply and demand.
- Encourage benchmarking of costs for fixed-price contracts (as part of the contracting process) to ensure that the contracted price benefits both the customer and the supplier while maintaining appropriate service and quality levels.
- Incorporate price breaks and other vendor concessions within contract language.

- Include contract provisions for sharing the benefits from agreed upon process improvements.

Government Functional Specialties Responsible for Implementing this Commercial Best Practice:

Primary: Contracting Officer

Others: Program Manager, Financial Manager, Supply Chain Manager, Industrial Engineer

Applicable Product Support Elements (PSEs):

- Sustaining and System Engineering
- Design Interface
- Supply Support
- Maintenance Planning and Management
- Support Equipment/Automatic Test Systems
- Packaging, Handling, Storage and Transportation (PHS&T)
- Technical Data Management/Technical Orders

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 3.3 Depot Maintenance
- 4.2 Support Equipment Replacement
- 4.3 Sustaining Engineering and Program Management
- 5.1 Hardware Modifications
- 5.2 Software Maintenance

3.5.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Develop an IPT comprised of subject matter experts to explore the most effective way to execute working details of a JSA.
 - o This may include Commodity Council members, but should include others as needed, especially if the JSA expands beyond the USAF and includes other Services or Agencies.
 - o The IPT should determine responsibilities of all parties of the JSA to ensure all necessary actions are taken to develop and manage the JSA.
- Conduct a make/buy assessment for the product.
- Determine the volume and schedule of the quantities needed.
- Decide who will be involved in receiving and inspecting the items.
- Develop a team to evaluate the risks by determining what is known and unknown during the requirements development phase.
- Conduct an economic analysis to support the analysis of alternatives necessary to establish a basis for the strategy going forward.

- Define performance measures to be used in the evaluation of key performance parameters and the attributes of key systems.
- Determine the appropriate type of contract (e.g., cost versus fixed-price).
- Investigate market practices to establish design timelines needed to develop a “proof of principal” item.
- Develop test criteria to demonstrate that success is achieved prior to implementing the contract.
- Partner with industry to speed the process of developing standards, special test conditions, and requirements for inspection and acceptance criteria for the products/services.
- Evaluate product/service availability within the commercial marketplace, to include government-wide area contracts and surplus.
- Evaluate constraints and market practices to produce an independent cost estimate along with the analysis of alternatives.

Request for Proposal (RFP) Development Phase:

- Research the needs of other USAF organizations, Agencies, and Services to determine if they are procuring similar items or services (review procurement forecasts, existing solicitations, pre-RFPs, contracting websites such as FedSources and FedBizOps, etc.).
 - o If common parts or services are being procured, work with other organizations to collaborate on requirements and JSA development.
 - o If uncommon parts or development of a new innovation are needed, research other organizations’ needs to identify any similarities in requirements. If similarities exist, collaborate on a JSA that will benefit all parties and ensure requirements of all parties are met.
- Ensure the Program Office provides requirements in complete documents; i.e., ensure specific requirements are communicated in the following:
 - o Purchase description
 - o Capability design document
 - o Concept of operations
 - o Test evaluation and master plan
 - o Systems engineering plan.
- Provide the inspection and acceptance criteria.
- Develop a risk management plan.
- Develop a business case or business lifecycle planning document and provide a summary to further explain requirements.
- Emphasize (in a source selection plan) which requirements are most urgent, evaluation criteria, and special information or instructions to offerors (e.g., award fees, quality assurance surveillance plans, target cost/schedule depictions for cost sharing initiatives, required service levels, etc.).
- As part of the solicitation requirements, include an integrated baseline review, which is the depiction of the system of reporting. Requiring vendor certifications of existing systems capable of defining work elements, budgeting and forecasting, and controlling spending will likely limit the vendor responses.
- Order only what meets the “so what” test; consider the impact if the Government does not receive the information.
- Use a work breakdown structure to establish the timeframe for information reporting.

- Create an integrated master plan for measuring product delivery and availability.
- Allow industry to recommend best practices with respect to reporting formats and ensure the data called out in the contract data requirements list (CDRL) is clear, usable, and necessary.

Proposal Review/Fact Finding/Negotiating Phase:

- Create a basis of estimate to acquire information and processes needed to assess the offerors.
- Involve certified experts in product development from inception (pre-award) through contract award and the integrated baseline review.
- Resolve legal issues using legal experts.
- Use certified subject matter experts to evaluate market risks and negotiate in the best interests of the Government.
- Rely on technical experts for validating requirements levied on the vendors.

Execution Phase:

- Share communication and role management processes at the post award orientation.
 - o Reporting forms, methods, and schedules should be discussed, with updates and turn times for reviews, communication, and point-to-point interfaces established.
 - o Contract updates, changes, and modifications should be socialized within a week of the need for the change, and should describe the cause of the change and its expected impact.
- Discuss unavailable (but necessary) data and determine options to mitigate the impact.
- Formalize IPT communication channels, levels of management, and reporting procedures. Identify appropriate subject matter experts to participate on or be available to support the IPT.
- Review the vendor’s quality control plan (via the QASP, if available); quality must be addressed to understand inherent success and risk factors.
- Continuously assess plans that are affected by varying business rules across functional teams. Consideration should be given to overall business impacts (cost, revenue, quality, customer service, etc.).

3.5.3 Resources and References

Case Study Abstracts:

ACTE and BTM Reach Landmark Agreement in Joint Service Venture

Business Problem	Business Solutions
Business Travel Market (BTM) was facing tough competition in the European travel market.	The Association of Corporate Travel Executives (ACTE) and BTM reached a landmark agreement that named ACTE as the exclusive provider of educational content for BTM's conference, while BTM would exclusively manage the execution of the soon-to-be-transformed TransACTE program.

Business Problem	Business Solutions
	<p>BTM has quickly become one of the most successful and innovative travel trade shows in the United Kingdom by developing Europe's only fully-hosted program for corporate travel buyers.</p> <p>The TransACTE program is already radically different from traditional business travel industry trade shows. It offers an opportunity for vendors to maintain a visible presence and presents networking opportunities in a trade show-like atmosphere, but without the expense of transporting theme-related booths.</p> <p>The BTM format inside TransACTE provided the right mix of rich content and a dynamic networking environment unique to BTM.</p>

Swaps in the Chemical Process Industry

Business Problem	Business Solutions
<p>The chemical process industry routinely ships bulk commodity goods long distances at great costs. Agreements with other companies are used to reduce logistics costs.</p>	<p>A European manufacturer agreed to provide a specified quantity and quality of product in exchange for a similar quantity of a comparable product from a U.S. based manufacturer. As a result, both parties save on trans-Atlantic shipping to their customers and can increase manufacturing utilization.</p> <p>Under a swap agreement between the oil companies Transnet and Rosneft, refineries from each company are supplied from the other company's oil field. The result is a savings of \$50 million a year in logistics costs.</p>

SEMATECH Consortium

Business Problem	Business Solutions
<p>The cost of technological development to compete in the electronics industry is prohibitive. Industry must use caution in entering cooperative agreements, so as not to violate antitrust regulations.</p>	<p>The SEMATECH Consortium brings together several companies in the semiconductor industry to leverage resources, increase productivity, and lower costs. Rather than each member company funding solutions individually, SEMATECH allows members to focus their resources on their own competitive advantage, with research and development (R&D) successes shared across the consortium when appropriate. In this manner, R&D costs of ultimately unworkable solutions are reduced and the learning curve for new</p>

Business Problem	Business Solutions
	processes is lessened.

Resources Related to this Best Practice:

- Supply Chain Brain: <http://www.supplychainbrain.com/content/index.php>.
- Your Oil and Gas News: http://www.youroilandgasnews.com/news_item.php?newsID=17983.
- SCOR Model V. 10, Supply Chain Council
- SEMATECH: <http://www.sematech.org/>

Related Policy:

- **Defense Acquisition Guidebook 5.4.3.4.4.** Inter-service servicing agreements take advantage of joint capabilities by drawing support from other DoD components and allies.

3.6 Best Practice #6 - Consideration of Supplier’s Inventory Position

3.6.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that would benefit from a strategic supplier relationship to support USAF weapon systems, subsystems, and components. A shared inventory strategy with a supplier or integrator can result in significant advantages for both the supplier and the customer through improved forecasting, reduced inventory investment, reduced stock-outs, and a collaborative supplier-customer relationship, all of which can lead to cost and risk reduction. The practice of shared inventory is scalable as it can be implemented on a larger scale using an integrator as the face-to-face supplier, or it can be implemented with a single supplier and narrowly focused on a commodity or component.

Description: This best practice is a means of optimizing supply chain performance through collaboration with a supplier (or suppliers) via shared inventory. The customer and supplier share inventory data to provide total inventory visibility for a commodity or segment of inventory. The supplier agrees to reserve a portion of its inventory for the customer in order to support operations and maintenance production. This best practice is particularly advantageous in supporting unplanned demand spikes, such as wartime and humanitarian contingencies. The shared inventory concept would involve a collaborative relationship with key suppliers and a digital linkage, i.e., electronic data interchange (EDI), between the supplier and customer to improve collaboration.

This best practice can have a significant impact on scalability because shared inventory allows the Government to obtain exactly what it needs, even as those needs may vary over time.

This scalability in turn supports cost reduction by essentially optimizing inventory levels and eliminating carrying costs.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Broaden supply chain visibility - Improve demand forecasting - Develop a collaborative, strategic relationship with the customer 	<ul style="list-style-type: none"> - Improve data integrity and visibility - Share risk of obsolescence and unused inventory - Establish an integrated supply chain with strategic suppliers supporting key warfighting capabilities - Reduce total cost of ownership by shifting some costs to the supplier - Reduce inventory - Develop a collaborative relationship with the supplier by establishing collaborative forecasting, requirements determination, and other supply chain management functions

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Collaboration and unity of purpose to provide better service to the customer - Improved data integrity, if linking data systems - Improved inventory management and collaboration with centralized forecasting - Fostering of strategic partnerships with the customer 	<ul style="list-style-type: none"> - Collaboration and unity of purpose with a key supplier - Establishment of shared business objectives with a key supplier - Improved data integrity, if linking data systems - Reduction of supply chain planning and inventory costs, with responsibilities shifted to the supplier - Reduced investment in inventory and warehouse infrastructure - Development of strategic partnerships with industry

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Making on-time deliveries for time-sensitive requirements, e.g., contingency scenarios - Risk of non-availability of dedicated inventory due to unexpected issues to other customers - Compatibility of supplier and customer systems - Costs of integrating supply chain systems 	<ul style="list-style-type: none"> - Potential delays in delivery or production, particularly during contingency scenarios - Increased risk of mission impact during contingencies, fleet-wide component replacements, and other high-demand scenarios - Risk of non-availability of dedicated inventory from the supplier due to unexpected issues to other customers - Characterizing requirements during surge and other unstable demand scenarios - Reliance on a single source of supply - Dependence on supplier's materiel management policies/practices, e.g., forecasting

	<ul style="list-style-type: none"> - Sharing classified information, e.g., ops plans, component data - Determining acceptable service levels for both parties - Monitoring supplier performance to maintain agreed-upon service levels - Compatibility of supplier and USAF supply chain management systems - Costs of integrating supply chain systems - Suppliers may be hesitant to invest in systems that link with the USAF's supply chain - Dealing with the contractor's proprietary rights concerns
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Financial/Performance Metrics:

- Average backorder days
- Issue effectiveness (percentage of requests filled from inventory)
- Total Not Mission Capable-Supply (NMCS) percentage
- Inventory value
- Number of line items/units in inventory
- Warehouse space utilization
- Number of days in Awaiting Parts (AWP) status

Industry Techniques/Tools:

- EDI
- Collaborative Planning, Forecasting, and Replenishment (CPFR) tool
- Shared Inventory Module (SIM)

Industry Implementation Approach:

- Examine potential systems, subsystems, components, or commodities for collaborative inventory management potential.
 - o Identify higher volume or mission critical suppliers where the cost savings or service improvement potential justifies the cost of collaboration.
 - o Perform market research to identify suppliers that are successfully engaged in shared inventory strategies.
 - o Based on market research, determine the merits of establishing multiple shared inventory arrangements with various suppliers, versus establishing a single shared inventory agreement with an integrator.
- Issue a solicitation and select a single supplier, multiple suppliers, or a single integrator to manage dedicated inventory to support the system, subsystem, component, or commodity. Establish a shared inventory agreement with the supplier, suppliers, or integrator.
- Establish required service levels with metrics to measure supplier performance.
- Address and resolve system interface, data access, and other issues that may hamper the effectiveness of the shared inventory arrangement.

- Transition inventory to the supplier, as required. Update customer inventory records to reflect changes in the status of inventory, including inventory balances and adjusted/safety stock levels.
- Modify stockage formulas to recognize the availability of supplier-managed shared inventory.
- Measure and evaluate the effectiveness of the shared inventory arrangement. Implement processes, systems, and other changes to continuously improve performance.

Industry Specialties that Implement this Commercial Best Practice:

Supply Chain Planners, Procurement Managers, Budget and Financial Managers, Administrative Contract Officers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefit is the replenishment of products at the right time, resulting in improved order fulfillment and increased ability to meet service level agreements.

- Establish longer-term business partnership arrangements with suppliers with stable funding to encourage collaboration and investment in information technology (IT) systems, tools, and integration.
- Consider using the supplier's inventory management system without an interface to the customer's system to reduce costs and attract more potential suppliers. (Note: In a case study example described below, Ameren chose to forego systems integration with suppliers by negotiating fixed quantities of dedicated stock with its suppliers and entering those quantities in its inventory management formulas to adjust reordering points/quantities.)

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Logistics Specialist

Others: Financial Manager; Contracting Officer

Applicable Product Support Elements (PSEs):

- Supply Support
- Maintenance Planning and Management

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 4.2 Support Equipment Replacement

3.6.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Choose target system/subsystem/component for a collaborative supply chain relationship based on volume, criticality, or need for improved service. The D200F: Applications, Programs & Indentures (API) system might be a suitable database for choosing appropriate items.
- Identify specific collaboration requirements, e.g., data/operations security, service levels and performance measures (according to identified criteria), data requirements, and system interfaces.
- Establish required service levels with metrics to measure supplier and stakeholder performance.
- List advantages and disadvantages to approved purchasing systems and government property management systems.
- Delineate actionable roles and responsibilities.
 - o The administrative contracting officer (ACO) for industry partners is integral in adapting processes and assessing the capability of a vendor/supplier system to meet necessary volumes of product outputs. The ACO's experience and access to information, including the purchasing plan, will help to assess any gaps and the practices the Government can successfully rely on for obtaining information and product/service movement.

Request for Proposal (RFP) Development Phase:

- Engage with appropriate Integrated Product Teams (IPTs) and other stakeholders to validate requirements and ensure synchronization.
- Identify, document and clearly communicate specific shared inventory requirements to industry, including data sharing, inventory management system integration, and reporting.
 - o Include a statement that allows for flexibility when USAF systems are replaced, changed, or upgraded.
- Identify the expected investment needed to enable collaboration with the USAF.
- Draft a shared inventory agreement, including a level of depletion cutoff. A shared inventory agreement can be evaluated in the pre-award phase as part of a survey of vendors/providers. The survey should operate as a request for information (RFI), soliciting information concerning stocking levels, attitudes towards shared stocking and prepositioning, and inventory capacity and reserves. Additionally, an industry day can be conducted to encourage responses, help shape the agreement, and address issues openly to allow for an exchange between customers and suppliers.
- Conduct research to determine the market's ability to support the shared inventory requirement (including commercial availability using General Services Administration (GSA) sources). Identify specific suppliers that have been successful in shared inventory strategies.
- Articulate the desire for strategic partnerships, requiring standards established in approved systems/agreements. When these standards are not available, additional reporting and assessment activities will need to be incorporated.
- As part of an industry day or RFI, ask vendors to demonstrate how their quality control plans and internal systems can meet reporting requirements for production, reserves, and emergencies and contingency planning. Additionally, request statements as to current or previous certifications.

- Include clauses for inspection and acceptance, addressing requirements for item quality, cost, performance, and production lead time. Long lead time items should be identified and listed to clearly identify reserve requirements and/or special test equipment that may be needed within the supply chain. Ensure participation in metrics data collection and reporting.
- Include a requirement for offerors to address how they would support surge or contingency operations.

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements. Because the availability of ready reserves is paramount when considering this best practice, this review must focus on corporate practices and reporting through configuration management plans (e.g., avoiding obsolescence from bin reserves left in place, delivering items appropriately (first-in, first-out), and optimizing replenishment cycles).
- Consider use of the Defense Contract Audit Agency (DCAA). They can provide pre-award surveys to determine a supplier's capability to fulfill the terms of a contract. Use of this service and other DCAA services can provide assessment and negotiation support.
- Select supplier(s)/integrator(s). Selection criteria should focus on inventory controls and capacity and the consideration of multiple awards, as the more vendors participating with ready reserves, the better the likelihood of meeting capacity needs and mitigating fluctuations in the market. Conversely, if only a single vendor qualifies, it may be in the best interest of the Government to develop sourcing using a leader/follower contract strategy and support development of the source.
- Ensure the selected proposal addresses the need to support surge or contingency operations through the use of a ready reserve of critical inventory earmarked for those scenarios.

Execution Phase:

- Establish a shared inventory agreement, including a level of depletion cutoff. The appropriate cutoff level is imperative and should be established during the requirements determination or RFP phase.
 - o If inventory reserves cause a production runoff or delayed release of inventory, prices could be affected.
 - o Management controls and incentives to ensure items meet configuration standards must be strictly enforced.
 - o Any changes in volume levels may cause the need to re-evaluate requirements or create the basis for a protest.
- Address and resolve system interface, data access, and other issues that may hinder successful implementation of the shared inventory arrangement.
- Implement change management activity with applicable USAF agencies prior to establishing shared inventory agreements.
- Implement the shared inventory arrangement for the relevant systems, subsystems, commodities, or components.
- Measure and evaluate the effectiveness of the shared inventory system, incorporating practices for inspection of configured items and stocking levels. Ensure the arrangement

includes incentives to implement processes, systems, and other changes that will continuously improve performance of outputs and maintain the appropriate levels of reserves.

- Based on the success of the shared inventory arrangement and considering lessons learned, consider other opportunities for shared inventory support to the USAF.

3.6.3 Resources and References

Case Study Abstracts:

Ameren Missouri Storm Damage Materiel

Business Problem	Business Solutions
<p>Ameren experienced severe demand spikes for wire and cabling during major storms, particularly ice storms. Maintaining inventory to respond to these rare occasions would lead to tying capital to inventory as well as increase inventory costs; however, Ameren needed to be prepared to respond rapidly when additional supplies were required. The main concerns were inactive inventory, excess inventory, and unplanned demand spikes.</p>	<p>Ameren reached an agreement with two key suppliers, whereby those suppliers would hold inventory that would be dedicated to Ameren during a storm surge scenario. Although this inventory was reserved for Ameren Missouri, it was shared and therefore available to other customers during normal operations. But in anticipation of demand spikes, this additional inventory would be held for Ameren, essentially replacing inventory they would keep on the shelf above normal safety stock to respond to spikes in demand. As a result, Ameren was able to reduce inventory and reduce obsolescence risk.</p>

Sony’s “Project One” to Implement Shared Inventory Business in Europe

Business Problem	Business Solutions
<p>Sony was facing the challenge of having to deal with availability of their products to consumers. Increased competition generated a need to show differentiators among similar products, and short product life cycles often resulted in severe price erosion. Thus, the challenge was to reduce product cost.</p>	<p>Sony implemented a shared inventory supply chain model with five business groups. The model included the dismantling of the planning and procurement department of Sony Benelux and the transfer of stock ownership from Sony Benelux to Sony Europe. Since implementing this model, Sony has experienced:</p> <ul style="list-style-type: none"> - Reduced inventory levels and costs - Improved supply chain velocity - Improved product availability and delivery reliability.

Resources Related to this Best Practice:

- SCOR Reference Model
- Sony-Europe inventory sharing case study:
http://www.mielooandalexander.com/download/reference_case/M&A_reference_case_sony_shared_inventory.pdf

- SIM to implement inventory sharing strategies: <http://www.dydacomp.com/shared-inventory.asp>

Related Policy:

- **AFPAM 63-128, Guide To Acquisition and Sustainment Life Cycle Management.** This pamphlet “provides guidance and recommended procedures for implementing Integrated Life Cycle Management” for USAF systems. Under section 8.2.6, “the PM is responsible for requiring unique identification of all program assets through controlled inventory practices.” Exercising a shared inventory strategy practice would support this inventory requirement.
- **AFMAN 23-110, USAF Supply Manual.** This instruction provides overarching materiel management policy guidance for USAF materiel managers at all echelons. Its purpose is to establish “...a uniform system of stock control throughout the USAF by prescribing standardized procedures for the requisition, purchase, receipt, storage, stock control, issue, shipment, disposition, identification of and accounting for supplies by Air Force organizations.” This suggests the inclusion of a shared inventory strategy as a best practice to support cost reduction.
- **DoDD 4140.1-R, DoD Supply Chain Materiel Management Regulation.** Under Section C1.3.1.5 of DoDD 4140.1-R, one of the DoD Supply Chain Materiel Management Goals is to “maintain materiel control and visibility of the secondary inventory down to and including retail inventories.” This policy supports a shared inventory strategy practice in its approach to reduce supply chain costs by optimizing supply chain performance through collaboration with suppliers via shared inventory along the entire supply chain. In addition, under section C3.1.1.2.4, the use of “management systems to maintain visibility and control over acquisitions from identifying the need through receiving the materiel” and the use of a “Supply System Inventory Report” is suggested, which supports the recommended best practice of a shared inventory strategy to support cost and risk reduction.

3.7 Best Practice #7 - Contracting for Capable-to-Promise

3.7.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that allows the organization to accurately commit to customer orders and forecasts. Additionally, it automatically allocates demand to specific production facilities based on customer delivery date, manufacturing capacity, and business policies. Service level agreements (SLAs) and contracts that incorporate this practice provide the ability to be more flexible in meeting changing demands.

Description: Organizations are maturing relationships with suppliers from "Available-to-Promise" (ATP) to "Capable-to-Promise" (CTP) as they integrate their processes and technologies. ATP allows delivery promises to be made and customer orders and deliveries to be scheduled accurately. CTP extends ATP functionality to include consideration of the

available manufacturing capacity, which allows better utilization of manufacturing assets and improved customer service. ATP and CTP provide a guarantee that the provider will deliver the service or product. This allows the USAF to have improved visibility into contracted capability and anticipate when performance standards may be achieved or not met. USAF sustainment planners are then able to apply risk mitigation measures, when needed, or take other applicable actions to ensure products and services provisioning remains uninterrupted.

This best practice will impact the flexibility and scalability of the organization (or its suppliers) as it allows for adjustment to their production or service schedule to meet changing market demands. It also reduces risk by providing insight into the delivery capability in addition to traditional contract performance monitoring.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Enable forward-looking visibility into what is available, as well as what can be produced, in order to promise orders based on market demand changes - Provide good customer service while operating in the most profitable, cost efficient manner possible - Avoid inaccurate promises that can result in lost customers - Utilize all feasible demand channels to find the most cost effective, available supply 	<ul style="list-style-type: none"> - Utilize all available sources of supply to meet demand and reduce costs - Reduce the risk that an order will not be fulfilled - Increase supply chain agility through an improved ability to respond to significant demand variability

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Shorter order fulfillment cycle times that can be reduced from days to hours or even minutes - Increased fulfillment accuracy from across the full spectrum of available inventory, manufacturing capacity, and all demand channels - Increased order fill rate due to the use of all available inventory and capacity - Increased customer satisfaction through improved order fulfillment and fewer missed or incomplete orders - Reduced inventory since all available inventory and capacity is being utilized - Reduced order fulfillment costs through reductions in errors and administrative burden - Improved production utilization by better matching of available manufacturing capacity to demand - Decreased stock-outs by improving inventory 	<ul style="list-style-type: none"> - Improved supply availability through full use of available suppliers - Improved on-time delivery - Reduced stock-outs since all available inventory and capacity are being utilized - Reduced overall fulfillment costs - Increased ability to prioritize orders so that critical orders are more consistently met

Industry Benefits	Government Outcomes
visibility and making use of all available inventory and production capacity - Minimized demand change disruptions on production by rescheduling or making other adjustments more quickly	

Industry Challenges	Government Challenges
- Integrating with third-party suppliers - Integrating with production planning and scheduling systems - Using inadequate production planning and scheduling systems, which impedes the effective operation of CTP systems	- Integrating CTP into contracts in a way that can be implemented - Coordinating the CTP systems from many suppliers - Developing policies that can be effectively implemented in contractor CTP systems - Including terms and conditions that ensure exceptions are vetted and approved prior to award - Finding a pool of suppliers with the capability to meet the conditions and requirements of CTP - Managing the supplier's constraints with respect to CTP and engaging in negotiations to reach an acceptable agreement between both parties - Encouraging a sole source supplier to meet conditions of CTP

Financial/Performance Metrics:

- Reduced working capital
- Reduced inventory levels
- More efficient ordering patterns
- Higher order fill rates
- Shorter order to delivery cycle times
- Improved on-time delivery
- Availability of components
- Portion of resource time not allocated to any customer's order or job

Industry Techniques/Tools:

- CTP modules in Enterprise Resource Planning (ERP) Systems such as i2, SAP and Oracle
- Stand-alone CTP systems from Aspentech, Adexa, and other vendors
- Business process modeling and analysis
- Production scheduling tools
- Demand planning tools

Industry Implementation Approach:

- Integration of the three parts of order fulfillment—demand planning, allocation planning, and demand fulfillment—for effective CTP system implementation.
 - o Implementation of advanced planning and scheduling systems with a CTP system implementation can increase the benefits achieved.
- Business rules are developed and implemented in CTP systems which define how to segment customers and allocate available manufacturing capacity and inventory.
- Typical information technology (IT) project steps are applied: requirements development, design, implementation, verification, and maintenance.
- Contract with suppliers to ensure SLAs will allow the organization to leverage their flexibility in handling new orders by adjusting their production schedule.
 - o Impacts from changes in targeted and ordered service outputs should not affect service level standards for turn times. Additional benchmarked turn times and standards will typically be included over the life of the contract. As additional service levels are considered, the costs and impacts of added levels must be weighed and benchmarks adjusted. However, the data can be skewed if the changes are not re-baselined and the volumes not reported as adjusted based on the events driving the change.
 - o Socializing the need and outcome throughout the team will help with change management. A minimum service level output validates the vendor's offerings with measures that will continue to keep an operational technician base "tuned-in."
 - o Variability in output will need to be addressed in the beginning as a strategy for capacity, competencies employed, and retaining talent (e.g., the costs for availability of specialists and any tailored performance objectives necessary to meet the long-term objective).
 - o Outsourcing versus in-sourcing strategies can be considered and measured using metrics for training and certifications to complete the work necessary, measured against the SLA standard imposed.

Industry Specialties that Implement this Commercial Best Practice:

Logisticians, Financial Analysts, End users, IT Systems Engineers, IT Project Managers, Trainers, Procurement Managers, Marketing Personnel, Customer Service Representatives

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefit is improved customer service levels, cost reduction, and stronger relationships.

- Make better use of available inventory and capacity in order to reduce or eliminate demands that require overtime shifts or running equipment through scheduled maintenance cycles.
- Work with suppliers to implement effective systems that are compatible with their systems and processes.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Program Manager, Logistics Specialist, Industrial Engineer
Others: Contracting Officer, Financial Manager

Applicable Product Support Elements (PSEs):

- Sustaining and Systems Engineering
- Design Interface
- Supply Support
- Maintenance Planning and Maintenance
- Packaging, Handling, Storage and Transportation (PHS&T)
- Technical Data Management/Technical Orders

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 3.3 Depot Maintenance
- 4.2 Support Equipment Replacement
- 4.3 Sustaining Engineering and Program Management
- 5.1 Hardware Modifications
- 5.2 Software Maintenance

3.7.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Develop Key Performance Indicators (KPIs) that will be used to measure improvements related to the implementation of CTP systems (reference performance metrics section above).
- Define the methodology and metrics that will be used to evaluate proposals.
 - o Apply sample tasks to market changes using seasonal models with special service constraints.
 - o Address objectives for tailored equipment and adaptations of commodity pricing to respond to changes from supplier bottlenecks or embargoes.
 - o Using simulation models, test potential solutions vendors would offer in response to these conditions, creating changes from the original assumptions.
 - o Provide the acceptable range of service level thresholds and how it is derived.
- Identify the requirements for CTP systems at a high level so that suppliers can develop the detailed requirements needed to proceed with implementation.
- Identify any technologies and approaches that will meet the requirements for CTP implementations.
- Determine how the contracting agency will make use of CTP systems from multiple contractor organizations.
- Define any integration requirements with the IT systems of the contracting agency.
 - o Address requirements for contractor ERP systems to interface with government ERP systems, if available.
 - o Include requirements for a communication plan with the contractor to effectively communicate relevant data to the government program office and other stakeholders if no government ERP system is in place to support the program or if the contractor ERP system will be unable to effectively interface with government systems.

Request for Proposal (RFP) Development Phase:

- Identify and require appropriate SLAs using KPIs established for performance measures.
 - o Allow industry to provide comments on proposed KPIs via an industry day, request for information, or draft RFP.
 - o Include additional measures as applicable to meet the mission.
- Develop a framework, a performance measurement strategy, and market condition scenarios to evaluate improvement and cost reduction related to supplier order fulfillment improvement initiatives.
 - o Using a sample task order (sample may resemble actual task that will be contracted), have industry provide its responses to these scenarios with respect to the supplier's methods for adaptation and flexibility.
 - o Use up to three sample tasks to depict the Government's assessment of seasonal conditions, market changes, and scenarios posed.
- Identify the expected investment needed to enable collaboration with the USAF.
- Develop a supplier rating strategy and scorecard with new and existing suppliers.
- Develop a benchmarking strategy for KPIs. Identify best in class examples to benchmark against.
- Identify technology enablers to manage supplier performance.
- Allow for minimum-maximum order quantities for best value solutions through multiple awards or SLAs.
 - o A "winner-take-all" award to only one supplier may limit the benefits of the CTP acquisition strategy, unless that supplier has a network of other suppliers that the CTP system can access.
 - o Variability in responses may identify process improvements that the Government can incorporate across the program.
 - o Combined solutions from the sample task order responses that demonstrate scalability, flexibility, and cost visibility with capacity planning and quality output should be rewarded in volume orders (i.e., the best value).
 - o Evaluation criteria should map to the intended best value of single source or multiple sources for the approach.
- Encourage collaboration through incentives for quantity output, quality and configuration control reporting, and sharing of technical data.
 - o Establishing metrics and requiring a quality control plan while providing, during the solicitation or RFI phase, the Government's draft Quality Assurance Surveillance Plan (QASP) will help vendors understand what the Government requires in outputs, volume, and surveillance techniques for the required product and/or service output.

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government evaluation criteria and sample task orders.
- Use past performance to evaluate customer satisfaction and results.
- Determine USAF investment or actions required to implement proposals.
- Select the proposals that meet the sample conditions, have demonstrated current CTP systems in use through past performance examples, or have a credible project plan to implement a CTP system.

Execution Phase:

- Develop periodic reporting requirements to track KPIs (final QASP provided based on vendor quality control plans) and any processes discovered that glean better outputs from the sample responses.
 - o At a post-award conference, share the conditions expected in general terms so as not to tie trade secrets to one offeror’s solution.
 - o Establish data reporting terms, a program master schedule, and an integrated master plan depicting volume thresholds.
- Identify and resolve system interface, data access, and other issues that may impact implementation of CTP systems.
- Implement the processes or systems required to make use of supplier CTP systems.
- Monitor and evaluate the effectiveness of the CTP systems to identify process improvements to be implemented.
- Identify and employ production scheduling and demand planning tools and techniques as needed to support CTP systems.
- Share lessons learned with DoD and industry.

3.7.3 Resources and References

Case Study Abstracts:

Swift & Company Implements CTP

Business Problem	Business Solutions
<p>Swift & Company is a diversified protein processing business with product lines such as boxed beef. Tight margins mean that optimizing cattle procurement and product mix is essential to the success of the business. In the past, orders were often missed or shipped late. Managers realized they were trapped in a production-push business model which did not work for an industry with such volatility and velocity. A better method of order fulfillment to align production with demand was needed.</p>	<p>Swift & Company implemented a CTP supply chain solution from Aspentech that was linked to improved scheduling tools and practices. The system improved on-time performance and allowed Swift & Company to schedule and produce the products its customers actually wanted rather than having to discount production that did not match customer needs. The audited benefits in the first year of full implementation included:</p> <ul style="list-style-type: none"> - Optimized product mix: \$12,000,000 - Reduction in orders lost because of system problems: \$20,000 - Reduction in price discounting: \$560,000 - Reduction in temporarily lost customers: \$160,000

SSAB Plate Implements CTP

Business Problem	Business Solutions
<p>SSAB Plate of Sweden is a producer of high strength steel. Demand was exceeding supply, which led the company to seek ways to increase output. Part of the approach was</p>	<p>The demand fulfillment process was used to give accurate and fast order promising based on the allocations determined in the master planning process and on a set of customer</p>

Business Problem	Business Solutions
<p>to use CTP combined with advanced planning and scheduling to segment customer demand as well as make better use of production capacity.</p>	<p>priority rules. The CTP fulfillment process supports search for supply in three dimensions: time, seller, and product. The i2DF demand fulfillment module was used along with proprietary systems to implement CTP. As a result, SSAB Plate was able to give a delivery promise to their customers within minutes. The company's on-time delivery rate has remained stable while demand has nearly doubled.</p>

United Technologies Corporation (UTC) Implements Automated Procurement with SAP and IBM

Business Problem	Business Solutions
<p>United Technologies Corporation (UTC) supports businesses such as Sikorsky helicopters and Pratt & Whitney aircraft engines. UTC identified the need to standardize its procurement processes to gain more control over them. This required transforming its purchasing model on a company-wide scale, while minimizing cost and disruption within the business.</p>	<p>UTC selected IBM as the systems integrator to implement SAP along with supporting applications. While reducing costs was an important goal, the more fundamental goal was to achieve greater control and visibility within the procurement process. The foundation solution is the complete outsourcing of all hardware and applications as well as application maintenance and support. The key benefits UTC experienced included:</p> <ul style="list-style-type: none"> - 80% (expected to reach 90%) of procurement transactions requiring no buyer involvement - Savings in excess of \$250 million from its total indirect procurement transformation program

Bombardier Aerospace Parts Logistics Improvements with SAP

Business Problem	Business Solutions
<p>Bombardier Aerospace, a manufacturer of commercial and business jets, experienced rising inventory levels and unpredictable demand in its parts logistics organization. Bombardier needed to operate effectively within a dynamic and uncertain environment. This required insight into unpredictable and sporadic demand from a multitude of sources including customers and field maintenance events. The objective is to deliver the right part to the right location at the right time.</p>	<p>Bombardier implemented SAP's 1st global solution for spare parts planning integrated with spare parts inventory and global ATP functionality for the aerospace and defense industry. The expected benefits were:</p> <ul style="list-style-type: none"> - Reduced service inventory growth by 15%, with increased service levels - Maintenance of optimal inventory levels in the distribution network to fulfill global ATP targets - Integration of the superseding of parts fully into forecasting, planning, and execution functions

Business Problem	Business Solutions
	<ul style="list-style-type: none"> - Ability to provide a single integrated platform for engineering, customer service, and supply chain operations.

Resources Related to this Best Practice:

- Adexa, “Order Fulfillment Solution White Paper,” <http://www.adexa.com/PDF/OrderFulfillment.pdf>.
- i2, “Demand Fulfillment Solutions Sheet” http://www.i2.com/assets/PDF/SNS_demand_fulfillment_sns7488.pdf.
- Bixby, Ann, Brian Downs and Mike Self, January-February 2006. “A Scheduling and Capable-to-Promise Application for Swift & Company,” *Interfaces*, Vol. 36, No. 1, pp. 69-86.
- Cederborg, Ola and Martin Rudberg, 2009. “Customer Segmentation and Capable-to-Promise in a Capacity Constrained Manufacturing Environment,” 16th International European Operations Management Association Conference: http://www.iei.liu.se/prodek/pic/filarkiv_forskning/Conferences/1.118637/CederborgandRudbergEurOMA2009.pdf.
- IBM, 2004, “United Technologies: Outsourcing Procurement Yields High Efficiency and Tight Spending Control,” Case Study ODB-0108-00.
- SAP, 2009, “Bombardier Aerospace: Parts Logistics Flies Right With SAP® Business Suite Software,” SAP Customer Success Profile, Aerospace and Defense.

Related Policy:

HQ AFMC PBL Policy (May 2008): The Government’s willingness to allow the contractor to utilize all available sources of supply to meet demand, reduce cost, and reduce the risk that an order will not be fulfilled through the CTP practice while achieving the same expected positive “outcome” is an effective practice supported under USAF’s PBL Policy.

3.8 Best Practice #8 - Supply Chain Cost Visibility

3.8.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that requires supply chain costs be reduced or monitored. This practice addresses the objectives of viewing product/item cost impacts along the entire supply chain. The intent is to understand cost drivers and manage them in near real-time.

Description: As manufacturing and distribution functions have enhanced collaboration with suppliers and other partners, supply chains have become much larger and more complex, driving the need to monitor and manage them more closely. This capability is difficult within a single organization and becomes increasingly more so across multiple organizations, requiring integrated systems, but the result is increased flexibility to react and manage cost drivers in the supply chain. Supply chain costs cannot be effectively reduced or controlled if they are not effectively measured and monitored. The starting point for cost visibility is master data management. Supply chain cost visibility also requires that organizations assign and report

costs to the correct activities, rather than aggregating costs into overhead accounts. Having supply chain cost visibility across organizations will require mapping of cost data from one system to another since consistency in systems and processes across organizations is unlikely. Achieving real-time supply chain cost visibility is a long-term activity. Business process improvements and the application of costing tools can be used to achieve many of the benefits of supply chain cost visibility. Once the data is gathered and made available, the next step is to make use of this data through cost-to-serve (C2S) analytics. Systems also need to automatically trigger alerts when, for example, safety stocks begin to diminish. C2S analytics also provide a breakdown analysis for the cost of logistics, inventory, production, etc.

This best practice focuses on improving visibility by allowing access to customer information focused on providing cost and status information across the supply chain. This visibility then supports cost reduction through improved management of supplies and resources based on improved awareness. This best practice also supports flexibility through an improved capability to react to events and changes within the supply chain through understanding of current status.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Benchmark costs to provide a basis for seeking bids and tracking the progress of process improvement activities - Identify the key cost drivers for which cost reduction and process improvement activities may be focused - Identify events that are driving up costs so that they may be addressed in a timely manner - Monitor C2S clients and benchmark their supply chain costs (logistics, sourcing, and production) against other clients served, and identify opportunities for savings and optimizing resources to reduce supply chain costs 	<ul style="list-style-type: none"> - Assess cost requirements for contracts based on industry benchmarks, and then use to evaluate bids - Monitor operations costs against benchmarked costs to ensure appropriate earned value levels are reported accurately and in a timely manner - Identify problems with contracts in a timely manner to allow action to be taken to correct the identified problems - Analyze operations to ensure that costs are within industry limits, and take corrective action if higher than expected operations costs are experienced

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Global vision with a single system of record, which facilitates global thinking and ensures that local cost reductions are not detrimental to the overall enterprise - Increased profitability resulting from access to data and analyses that reveal partnerships that can be better leveraged and processes that can be improved - Efficient supply chain collaboration through greater visibility for the end-to-end supply chain, supporting better decisions regarding outsourcing, material costs, vendors, and service costs - Consistent baselines for enterprise 	<ul style="list-style-type: none"> - Improved management of contracts by monitoring key performance indicators (KPIs) of the prime integrator, measuring cost efficiencies and supplier metrics, and meeting key outputs required so performance reduction does not occur - Reduced supplier costs through more complete and consistent comparisons of supply costs - Identification of primary cost drivers for focused process improvements, to include long lead items - Improved management and monitoring of supply chain costs, using comparisons to

Industry Benefits	Government Outcomes
<p>performance management</p> <ul style="list-style-type: none"> - Improved accountability and organizational effectiveness, obtained through early detection of disadvantageous financial trends - Identification of the best clients, who should be the focus of customer satisfaction initiatives (e.g., priority in delivery, discounts, or making adjustments to pricing their service) through C2S analysis of profit margins - Decreased time-to-market due to increased flow of cost information which reduces delays at each decision point 	<p>identify offset opportunities for optimizing sourcing, production, packaging, shipping, or transportation costs; this analysis can be used as part of the decision support system for management to identify opportunities of savings in their supply chain network</p>

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Information access and availability from isolated systems - Data consistency and accuracy - Resource and economic constraints that may limit cost visibility - Outsourced manufacturing that results in reduced cost visibility; renegotiation of outsourced relationships may be required to achieve cost visibility - Timely information and analysis that may be limited due to the large quantities of data to be captured 	<ul style="list-style-type: none"> - Negotiation/implementation of necessary changes that stem from contract execution outcomes - Integration of disparate information technology (IT) systems (e.g., external networks and supply chain collaboration tools inputting data into government systems) to provide the event data for supply chain costs - Effective use of the large volume of metadata from many different sources

Financial/Performance Metrics:

- Profit margin performance based on efforts to monitor C2S or cost optimization
- Logistics costs, such as transportation costs, packaging, warehousing costs, and working capital (includes inventory)
- Inventory turns
- Stock-outs
- On-time delivery
- Maintenance costs
- Development-to-delivery turn time
- Ratio of actual spend to planned spend

Industry Techniques/Tools:

Useful tools for monitoring and managing supply chain cost visibility include:

- Monthly project reports
- Earned value management systems
- Cost reporting elements in surveillance systems

Techniques for defining logistics costs in a consistent manner include:

- C2S methodology
- Total Landed Cost (TLC) models
- Total cost of ownership
- Enterprise Resource Planning (ERP) systems
- Master Data Management (MDM)

Supply chain cost visibility is often implemented in the context of overall supply chain visibility improvements. The global companies surveyed by Aberdeen Group (2008) identified the following actions for improving their IT capabilities for supply chain visibility which typically includes cost visibility. The percentages shown represent the proportion of survey respondents who identified the action.

- Improve data quality and timeliness of status messages (59%)
- Enhance analytics capabilities (55%)
- Add warning alerts if actual events deviate from plan (46%)
- Add escalation policies to help manage alerts (39%)
- Incorporate additional status events (36%)
- Increase the number of trading partners providing status information (33%)
- Add radio frequency identification-enabled visibility (24%)
- Incorporate resolution advice or workflow (e.g., expediting advice, automated RFP for spot rates on transport) (22%)
- Add financial settlement or financial triggers (20%).

Analytics is of particular value. This includes dashboards that track KPIs (such as actual spend compared to planned spend), alerting and messaging applications, and tools that allow supply chain personnel to access the available cost data.

Industry Implementation Approach:

A phased approach is taken to gain incremental improvements as implementation proceeds. This is necessary because full supply chain cost visibility on a near real-time basis requires integrated ERP systems which can take years to implement, although such projects can be planned to provide incremental improvements.

- The initial step is to develop tools and procedures that consistently estimate costs and identify major cost drivers.
- Implementing systems that automate cost visibility along with supply chain visibility is a strategic undertaking that requires upper management support and involvement. To implement enterprise-wide supply chain visibility:
 - o The overall strategy must be clearly defined and communicated. One approach is to implement an ERP management system that has a price management module or a customized management cost report for each service/product. Another approach is to integrate best-in-class solutions into a more custom ERP system.
 - o MDM should be included in an integrated system. Consistent and reliable data must be defined.

- Data integration across organizations is required. While consistent systems and data are unlikely, suppliers and other supply chain partners must agree on data standards and integration requirements.

Industry Specialties that Implement this Commercial Best Practice:

Logistics Planners, Procurement Managers, Procurement Planners, Chief Financial Officers, Strategic Planners, Financial Analyst, Budget Forecasters, IT Systems Engineers, Database Administrators, Software Engineers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefit to industry lies in improved understanding of supply chain costs. A comprehensive view of disaggregate costs across the supply chain provides insight that allows for more focused process improvement and cost savings efforts.

- Establish business partnership arrangements with suppliers to encourage collaboration and investment in IT systems and tools that will encourage the supplier to work with the Government in obtaining increased cost visibility.
 - Contracts that share the cost of implementing system upgrades provide cost savings, as these upgrades will be dependent on the types of systems the government agency is using.
 - Consistent methods of estimating and reporting costs (independent of systems implementations) can provide cost visibility benefits.
 - Estimated costs will reveal major cost drivers that can be the focus of process improvement efforts.
 - Reliable cost estimates allow benchmarking to identify weaknesses in the current supply chain.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Logistics Specialist, Financial Manager
Others: Contracting Officer

Applicable Product Support Elements (PSEs):

- Supply Support
- Maintenance Planning and Management
- Sustaining and System Engineering
- Technical Data Management/Technical Orders
- Manpower and Personnel
- Training
- Computer Resources
- Protection of Critical Program Information

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material

- 3.1 Organizational Maintenance
- 3.3 Depot Maintenance
- 4.2 Support Equipment Replacement

3.8.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Engage with appropriate Integrated Product Teams (IPTs) and other functional and supplier stakeholders to ensure requirements are complete, accurate, and synchronized.
- Define cost elements, reporting procedures (format and frequency), and methods of transmitting the data.
- Develop requirements for any new tools or implementation methods necessary to support the costing requirements.
- Develop KPIs that will be used to assess conformance to requirements.
- Define the master data management requirements, including data security.

Request for Proposal (RFP) Development Phase:

- Conduct research to further define and validate the cost elements to be reported.
- Define any system interface requirements for the transfer of data.
 - o Include a statement that allows for flexibility when USAF systems are replaced, changed, or are upgraded.
- Articulate the overall process improvement objectives and benefits for the potential supplier.
- Define the methods to be used to transfer cost data.
- Identify any specific costing tools or methodology to be used.
- Articulate the benchmarks to be used for evaluation.

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate the proposals against standard benchmarks.
- Screen suppliers for the capability to meet integration and data needs.
- Negotiate the requirements for actual implementation of the required data access.

Execution Phase:

- Implement reporting requirements; establish guidelines and limitations for reporting cost increases as well as requirements for the contractor/supplier to report these increases.
- Identify and resolve system interface, data access, and other issues that may impact successful implementation.
- Develop and test system interfaces as required.
- Evaluate and validate cost data to ensure it is accurate, complete, and timely.
- Develop lessons learned to improve cost visibility.
- Link cost analyses across the supply chain to process improvement efforts.

3.8.3 Resources and References

Case Study Abstracts:

Masco Uses a TLC Tool to Compare Suppliers

Business Problem	Business Solutions
<p>Masco Corporation is one of the world’s largest manufacturers of brand-name products for the home improvement and new home construction markets. Due to the wide range of supply chain costs, it was difficult for Masco to determine which supplier(s) yielded the lowest overall expenditures, as different suppliers offered better prices or rates in different aspects of the supply chain.</p>	<p>Masco implemented a TLC model for comparing suppliers. The model was comprehensive and included numerous types and levels of cost, from setup costs through transportation and warehousing costs (with inflation). Masco implemented this method using a template that automates some of the calculations, such as expected average inventory and dutiable value. The final output is TLC by product and supplier, which includes net present value (NPV) based on the expected life of products and multiyear cost charts that incorporate growth and inflation rates. This process allowed Masco to clearly define costs and compare suppliers on a consistent basis. The template tool also allowed Masco personnel to perform “what-if” analyses to identify lower cost options such as splitting demand between suppliers and looking at sensitivity to demand volatility.</p>

Hewlett-Packard Applies Optimization Tools to Minimize Total Supply Chain Costs

Business Problem	Business Solutions
<p>Hewlett-Packard (HP) introduces thousands of new products every year to keep pace with advances in technology. The older units lose value quickly in a very competitive environment; therefore, HP must optimize the supply chain to reduce costs while maintaining service levels whenever possible. Costs such as material devaluation, scrap, write-offs, and fire-sale discounts have become the single biggest detriment to profitability. Global cost visibility and global profitability became an issue as each organization within HP conducted their own analyses.</p>	<p>HP introduced an approach that took global costs into account; the impacts of potential supply chain improvements were identified through the use of a sophisticated optimization model. However, costs first had to be identified and calculated in a consistent and accurate manner before being used as model inputs. HP’s costing method divides the total supply chain costs for each supply chain configuration scenario into variable, fixed, and inventory-driven costs. Some improvements were identified and implemented following this optimization and cost visibility analysis. Some key results were:</p> <ul style="list-style-type: none"> - The digital camera business reduced inventory levels by over 30% and reduced total supply chain costs by over 5%. The five-year NPV of savings is over \$50 million. - The inkjet supplies business switched some air-freight shipments to sea shipments. This process improvement gave the business an annuity stream

Business Problem	Business Solutions
	of more than \$20 million per year, which goes directly to the bottom line.

Resources Related to this Best Practice:

- Tohamy, Noho, April 11 2006, “The State of Global Supply Chain Management,” Forrester Research.
- Aberdeen Group, November 2008, “Software Technologies for Global Supply Chain Visibility: Year-over-Year Dynamics.”
- Continental Corporation Case Study:
http://www.jda.com/file_bin/casestudies/ContinentalTire_casestudy_030910.pdf.
- Newberry, Case, January/February 2010, “Stronger Partners for Stronger Supply Chains,” APICS magazine.
- APICS Best Practices, “Total Cost Management and the Financial Supply Chain”.
- Billington, Corey, et. al., January-February 2004, “Accelerating the Profitability of Hewlett-Packard’s Supply Chains,” Interfaces, Vol 34, No. 1, pp. 59-72.

Related Policy:

DoDD 4140.1-R, DoD Supply Chain Materiel Management Regulation: Under Section C1.3.1.5 of DoDD 4140.1-R, one of the DoD Supply Chain Materiel Management Goals is to “maintain materiel control and visibility of the secondary inventory down to and including retail inventories.” This policy supports the supply chain cost visibility practice in its approach to reducing supply chain costs by ensuring product/item cost impacts can be seen and cost drivers understood more easily along the entire supply chain. In addition, under section C3.1.1.2.4, the use of “management systems to maintain visibility and control over acquisitions from identifying the need through receiving the materiel” is suggested, which supports the recommended best practice of master data management as the starting point for cost visibility across the supply chain.

3.9 Best Practice #9 - Selecting Global Suppliers

3.9.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort involving the selection of global suppliers. Within this context, companies do not compete in isolation; instead they compete against networks of companies. Complexity is prevalent everywhere, causing the development of information exchanges for throughput of end-to-end transactions, from requirements planning to delivery to disposal.

Description: The best practices associated with selecting global suppliers now involve social, cultural, and trade practices to create relationships and involve evaluation of global suppliers based on competency, speed to delivery, and quality to provide component end items consolidated into a product. This best practice addresses:

- 1) The changes in organizational structures dealing with the complexity of finding suppliers
- 2) The determination of objectives of supplier practices for social and trade compliance
- 3) Exchanges involving country-of-origin trade practices (defined as substantial transformation found in the Trade Agreements Act [TAA]), manufacturing labor practices, and “fair trade”
- 4) The evaluation of the feasibility of sourcing goods and services from a global supplier chain or network.

Actions such as supplier selection via data exchange, listing requirements, and requesting capabilities beforehand establish efficiency for faster return ordering chains. The entire transaction is completed within a business collaboration network (BCN) system. The ordering capacity is faster within this network and global supplier compliance issues are addressed by international terms and sourcing certifications found within exchanges in this protected network.

This best practice will impact contract flexibility and scalability as it enables outreach to a larger network of suppliers. Additionally, with competition and such a large network of suppliers, the USAF can experience reduced costs as well as greater efficiency if certain actions are taken.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Improve product availability through resource sustainment contract term agreements for continuous supply opportunities - Achieve better pricing through resource competition, resulting in lower product costs, improved maintenance service levels, improved lead times, improved availability of products in various customer markets, and better product quality 	<ul style="list-style-type: none"> - Comply with import/export and trade agreements - Reduce the risk of procuring from a sole source by extending the supplier network - Obtain reliable, predictable service levels from available suppliers

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Migration of supplier diversity programs beyond the United States due to similar demographic, economic, and political forces elsewhere in the world - Improvements in supplier service levels and promotion of competition, enhanced efficiency, and reduced cost - Adoption of integrated management strategies, whereby a set of facilities in different countries are treated as a part of the same supply chain 	<ul style="list-style-type: none"> - Compliance statements and certifications, transfer of risk to vendor with trade agreements, and any applicable exemptions for category exclusions - End product supportability from similar part adaptation and continuous resourcing through distributed supplier networks - Real-time document changes that result from global exchanges and transaction results - Markets should bear the “reasonable” price and suppliers should be viable within the competitive forces available

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Control of proprietary information and reengineering output - Reliability of commitments and delivery - Difficulty evaluating and managing new sources - Longer than expected lead times - Regulatory and sourcing issues in origin country - Quality issues - Risks within global exchanges, including: <ul style="list-style-type: none"> o Exchange rate fluctuations o Macro-economic changes o Transportation link failure o Supply deviation o Supplier bankruptcy o Demand uncertainties o Factory shutdowns 	<ul style="list-style-type: none"> - Point of origin unclear from multi-tiered suppliers (validation of source is necessary for TAA compliance and export/import of end item use) - Acquisition of enough technical data early in the planning stages to understand the manufacturing and supply resource issues and country of origin for valid and invalid suppliers - Validation of mandatory supplier schedules, except for exemptions where listed, but also practicing transparency at all times - Understanding of total throughput models within industry practice areas of the supply chain to establish discriminators for selection (quality, standard warranties, shelf life, materials used, processes used that are beneficial/damaging/polluting) - Achieving clear titles in an international environment can be difficult, requiring extra care to ensure Government has not only clear title, but also the data necessary to support and sustain international products and services

Financial/Performance Metrics:

Global suppliers’ financial stability can be measured in terms of length of service provided, past performance for similar work, volume, end user references, and financial reports. Metrics associated with selecting a global supplier include:

- Country of origin source/component source location (point of origin certificate) per end item or lowest level repairable.
- Volume of orders to deliveries per term and turn times affiliated with these orders.
- Retention metrics of specialized personnel
 - o If the industry turnover rate is 12%, a vendor with a turnover rate of 30% would not be maintaining skilled levels of personnel and may have management or leadership issues.
- Return rates, acceptance criteria, and quality control
 - o Request return rates and refusal rates of items shipped per vendor and associated remedies (depicting no problems is a sign of hiding as all suppliers have had delivery issues with shipping, instructions, carriers, or business challenges). Asking for the solutions and management workarounds will demonstrate the culture and business approach to managing normal operational challenges.
- Cost control
 - o Using past performance, request contracts that have been exceeded in performance and cost and assess whether global suppliers decided to overrun a contract to

deliver higher quality service/products and did not keep an eye toward both measures of accountability.

- Straight volume
 - o Total number of orders of product/service for similar work performed.
 - o Request volume of orders today compared to three years ago and the changes that were implemented to evaluate volume changes with the orders received versus those completed three years ago, two years ago, and one year ago.
- Within proprietary global supplier server networks, obtain access or demonstrated certifications of supplier trade agreement compliance demonstrating International Traffic in Arms Regulations (ITAR) and export/import license terms, security controls, and bills of lading demonstrating country of origin and validated supplier country of origin.
- Contractually-established metrics (completed behavior) across multiple contracts can be aggregated by suppliers to show improvements in production rates for similar items. The performance outputs in the last five years of at least five of the following metrics (per item) would be discriminators for manufacturing and product performance and would demonstrate business process improvement (or lack of improvement):
 - o On-time delivery
 - o Mean Time Between Failures (MTBF)
 - o Mean time between removal
 - o Mean Time to Repair (MTTR)
 - o Establishing a program (failure mode effects analysis)
 - o Mean time between critical failure
 - o Time on wing
 - o Repair turnaround time
 - o Production lead time
 - o Training times and availability
 - o Technical data updates
 - o Asset availability
 - o Transportation times
 - o Backorder age
 - o Backorder rates
 - o Requisition response time
 - o Fill rate
 - o Inventory turnover rate.

Specific operational goals and standards to be defined:

- At the point of delivery, MTTR/MTBF guidelines should be known prior to acceptance of the end item for serviceability.
- Specific time phased life cycle descriptions should be provided to the acceptance location:
 - o Do not allow any transfer of equipment without clear title or role management invoked, which is clear operational-defined responsibility (Government and point-to-point business contacts declared, and point-of-entry if a transfer agent for service of maintenance is invoked).
 - o As with an economic trend (e.g., seasonal outputs based on end-of-life, demand cycle availability, resources, economic rate fluctuations), scaling it to an index will help reduce risk and profit issues to adapt to fluctuations in commodities markets, currency rates, and general economic principals.

Industry Techniques/Tools:

- Surveillance plans, or quality assurance surveillance plans
- Source surveys or end item user surveys
- On-site inspections
- Drawing from local resources near practicing facilities in country
- Global source selection teams, including requirements managers, supply chain managers, purchasing managers, legal, quality and test managers, project leaders, and engineers
- BCNs

Industry Implementation Approach:

- Perform a detailed system search on global suppliers able to provide the product or service based on price, volume, and speed to deliver, taking into consideration export and ITAR regulations, certifications, and statements of assurance.
- Institute a process by which global suppliers and their capabilities are determined based on past performance, volume indexes, and point of origin.
- Assess global supplier supply chains under uncertainties and risk potential. With the advent of the Internet, expanding information technology, and trade expansion, firms have evolved to be truly global by adopting integrated management strategies, whereby a set of factories in different countries are treated as a part of the same supply chain. This makes the supply chain highly vulnerable to external random events that create deviations, disruptions, and disasters. Redundancy and flexibility can mitigate loss under such random events.
- Assess procurement of logistics/transportation services. Shippers usually procure transportation services from carriers using periodical contracts. Multiple vendor auctions (reverse auctions) have been found useful in industrial procurement and also in procuring transportation services. One of the issues that has received less attention is the robustness of the winner determination in the auctions. The carriers are subject to the usual uncertainties of bankruptcy and capacity unavailability, and the logistics network as such is vulnerable to disruptions.

Industry Specialties that Implement this Commercial Best Practice:

Procurement Managers, Supply Chain Coordinators, Repair Technicians, Testing/Technical Engineers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefits to industry are increased participation, gained relationships, reduced prices, and shared gains.

- Prevent new members from joining networks without first assessing if the potential new member can certify to compliance standards.
- Implement cash incentives to encourage the supplier to invest in the outsourcing relationship.
 - o Cash incentives serve as a balance to service level agreement penalties.

- Incentives should only be used if the extra effort on the supplier's part benefits the buyer's business.
- Where measurable extra performance is achieved, global suppliers can receive cash incentives. Checking how the expectations were exceeded is important to ensure parameters of social consciousness were not abandoned.
- Leverage the advantage of the risk-reward ratio.
 - Vendors may take part in helping their buyers develop new web applications, earning return from any realized profits.
 - In addition to helping bring a new product to market, vendors are also helping customers to streamline their businesses in return for a percentage of the savings.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Contracting Officer, Program Manager

Others: Industrial Engineer, Financial Manager, Logistics Specialist

Applicable Product Support Elements (PSEs):

- Supply Support
- Maintenance Planning and Management
- Support Equipment/Automatic Test Systems
- Packaging, Handling, Storage and Transportation

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 4.2 Support Equipment Replacement

3.9.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Ensure the use of global suppliers is in compliance with the TAA.
 - Assess the impact of the Buy America Act and exemptions in the TAA.
 - Validate trade lists within ITAR and export/import areas for investigation of end item use within the United States, and whether composite materials can comprise end items (these percentages can vary in tolerances for particular end items).
- Identify any potential title issues that may arise with the proposed contract and ensure they can be overcome.
- Consolidate or list international benchmarks and specifications/standards, which should encompass all considered outputs.
- Describe any government constraints required within the environment in order for global suppliers to understand practice areas and outcomes associated with success.
- Determine inspection and acceptance methods with site-specific points of contact identified, and identify any conformance forms or conditions required in written form.
- Consider language requirements of an export/import country of origin.

- Consider currency measurements and limitations (weekly, bimonthly, monthly for averaging of currency exchange values).
- Determine the test and inspection requirements.

Request for Proposal (RFP) Development Phase:

- Conduct research to determine a candidate list of targeted suppliers.
- Describe specifications, volume outputs by schedule, and surveillance techniques, as well as facility limitations or access instructions if any meetings or face-to-face discussions are to be held.
- Describe a schedule and implementation plan relative to the problem or mission being addressed and the aspects of the service or product offering being sought.
- Clearly define any specialists and unusual requirements, specifications, or needs that are government-oriented in international commercial terms. A universally recognized set of definitions of international trade terms has been developed by the International Chamber of Commerce and defines the trade contract responsibilities and liabilities between the buyer and seller. The exporter and the importer need not undergo a lengthy negotiation about the conditions of each transaction.
- Request that the relationships and responsibilities between the prime contractor and supplier(s) be included in the response to the solicitation. Role management and understanding of key performance outputs is crucial for mapping performance issues after award, irrespective of the source. Networks of available resources may become realized through the requirements and review phase for the Government to establish both strategic sourcing and price anomalies among suppliers.
 - o Consider requesting a subcontractor/vendor management plan from the prime contractor that will ensure that technical and contract compliance requirements flow down to the vendor.
- Address the critical characteristics of the category and supplier. This includes:
 - o Immediate disqualifiers
 - o Minimum set of “must-haves”
 - o Critical capabilities
 - o Qualifiers versus differentiators
 - o Special items print capability
 - o Digital versus analog
 - o Experience with incumbents
 - o Industry reputation.
- Provide shipping and packaging forms for disclosure of limitations and constraints.

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate offers based on criteria ordered in the solicitation. Depending on the pricing model, the Government should conduct fact finding based on the pricing elements required.
- Based on the ordering nomenclature, standards and terms, any exceptions, conditions that are not compliant with DoD receiving, or acceptance procedures will need to be assessed for consideration.
 - o If applicable, ensure that Government has clear title and the data necessary to support and sustain international products.

- Ascertain past performance and proof of capacity per service/product ordered.
 - o If it is a best value selection, determine the conditions with which the best value determination assessment is made.
 - o If it is a point-to-point specialized supplier service level agreement, evaluate the terms against the commercial acceptance and standards established for each practice and benchmark prior to award.
- Review the part or technical data package addressed and validate against a basis of estimate (recommend an option contract line item number for each year of the term of the contract for flexibility and scalability).
- Review the manufacturing processes and time to perform and measure against performance expectations.
- Evaluate the production run quantities and specifications and compare to acceptable measures.
- Evaluate the adequacy of technical data and determine the cost of tooling for new suppliers should a termination be required.
- Use objective criteria to frame and evaluate the progress in negotiations against organization goals. See the example below:

Table 4. Example of Multi-Dimensional Negotiations

Negotiation Area	Description
Scope of supply and Services	<ul style="list-style-type: none"> ▶ Supplier will provide all-in-scope commodities ▶ Each of the Minimum Service Requirements (MSR) must be met in full (e.g. 95% Fill rate, 2 day delivery window) ▶ Termination clauses/duration of agreement to be determined
Pricing	<ul style="list-style-type: none"> ▶ Existing items - Based on our sourcing objectives and our review of current market prices, we have developed target prices for each high value/high usage ("A") item ▶ Low value/Low and No Usage ("B"&"C") items and New items - A cost plus arrangement will be used
Inventory Sellback	<ul style="list-style-type: none"> ▶ Inventory buyback beginning in 2006 ▶ For low unit value items with turns over 1X, work-off rather than sell-back is an alternative
SKU Rationalization	<ul style="list-style-type: none"> ▶ Part count reduction programs with centralized tracking of item code (caption) redundancies by supplier
Continuous Improvement	<ul style="list-style-type: none"> ▶ Supplier to manage a performance improvement program with measurable cost savings targets, project leaders and milestone plans ▶ Gain/Risk sharing to be part of agreement (e.g., material productivity/substitution savings) ▶ Performance goals will be set and tracked (e.g., material cost, inventory reduction, service/delivery, etc)
Implementation Plan and Timing	<ul style="list-style-type: none"> ▶ Supplier must dedicate local and corporate resources to achieve critical mass in the implementation ▶ Supplier should expect to begin implementation no later than XX/06 ▶ Implementation plan to be jointly developed by supplier and WSRC ▶ Supplier and WSRC must commit necessary resources to implementation and management of ongoing IS relationship
Systems Support	<ul style="list-style-type: none"> ▶ EDI and data transfer capability compatible with WSRC ▶ Technical discussions to be held early in negotiations to refine system requirements and functionality
Compliance	<ul style="list-style-type: none"> ▶ Compliance with OSHA Standards ▶ Compliance with ISO9002

Execution Phase:

- Validate meeting of requirements at the point of inspection. Standards and agreements issued will have to be measured against certificates and processes/practices established.
- Validate and address any variances through agreement updates, reworks, or compensation.

- Consider hiring a neutral third party to audit the supplier’s work, and then disburse all payments according to the outsourcing contract.

3.9.3 Resources and References

Case Study Abstracts:

Baxter’s Evaluation Cycle Before Trading With Any Global Suppliers

Business Problem	Business Solutions
<p>Baxter needed to assess factors to manage suppliers globally for sustainment, trade agreements, and compliance measurement. Criteria to manage supplier performance needed identified.</p>	<p>In 2009, Baxter launched its new Global Supplier Sustainability Program to help the company's Global Purchasing and Supplier Management organization integrate sustainable practices into its policies and procedures in acquiring over 100 global diverse suppliers. The program focused on the following:</p> <ul style="list-style-type: none"> - Green supply chain: The procurement of products and services having a reduced environmental impact. - Material compliance: Baxter created the only medical carbon certification. - Supplier environmental, health, and safety audits: Ensuring that suppliers meet Baxter standards in their manufacturing operations. - C-TPAT (Customs-Trade Partnership against Terrorism) Program: collaborating with Government and other businesses to strengthen international supply chain and U.S. border security. - Supplier standards: Baxter's Supplier Quality Standard and Ethics and Compliance Standards for Baxter Suppliers provide a framework for consistent supplier evaluation and selection, as well as define policies and expectations for ethical behavior when doing business with Baxter. Baxter evaluates and approves all suppliers before purchasing any materials, components, products, or services.

Hewlett-Packard Supplier Trade Responsibility

Business Problem	Business Solutions
<p>Hewlett-Packard (HP) needed to standardize its supply compliance behavior and also determine practices and how international terms translate into one manageable</p>	<p>HP created an operational requirements template to be used with individual suppliers to review and sign for compliance. Operational controls and definitions were created to</p>

Business Problem	Business Solutions
<p>agreement to establish a standard. The decision becomes a tradeoff between country locality closest to the factory and approved country source for real-time delivery.</p>	<p>address:</p> <ul style="list-style-type: none"> - General trade requirements (including authorization, terms of sale, records, and incidents) - Classification - Export - Customs - Export and import documentation - General shipping - Anti-terrorism security measures. <p>In its agreements, HP determined that the supplier is responsible for implementing the sales terms negotiated with HP that define the supplier's responsibilities, which may include, but are not limited to, the following:</p> <ul style="list-style-type: none"> - Warehouse labor at point of origin - Export packing - Loading at point of origin - Inland freight to origin port - Port receiving - Loading on vessel - International freight/transport - Customs clearance at destination port - Delivery to final destination.

Resources Related to this Best Practice:

- Walmart Supplier Sustainability Assessment: 15 Questions for Suppliers
<http://walmartstores.com/Sustainability/9292.aspx>
- Managing Supplier Performance , Baxter Sustainability Report 2009
<http://sustainability.baxter.com/>
- Hewlett Packard's HP Trade and Logistics Compliance Operational Agreement template 11 JUN 2010, EX-MF880-00 <https://h20168.www2.hp.com/supplierhandbook/EX-MF880-00.pdf>
- Booz Allen Hamilton Selecting Global Sourcing Approach
- Global Sourcing Research 2009, American Productivity & Quality Center (APQC)
<http://www.apqc.org/knowledge-base/documents/global-sourcing>

Related Policy:

- **Defense Acquisition Guidebook (Section 11.2.3) and DoD Directive 2010.9 (Use of Acquisition and Cross-Servicing Agreements):** Acquisition and Cross-Servicing Agreements (ACSAs) are bilateral international agreements that allow for the provision of cooperative logistics support under the authority granted in Title 10 US Code Sections 2341-2350. They are governed by DoD Directive 2010.9, "Acquisition and Cross-Servicing Agreements" and implemented by Chairman of the Joint Chiefs of Staff Instruction 2120.01, "Acquisition and Cross-Servicing Agreements." ACSAs are intended to provide an

alternative acquisition option for logistics support in support of exercises or exigencies, which includes the option to select suppliers overseas.

- **DoD 5000.02 Enclosure 10 “Program Management”—International Cooperative Program Management:** Under DoD 5000.02 Enclosure 10, Program Managers (PMs) shall pursue opportunities throughout the acquisition life cycle that enhance international cooperation and improve interoperability. Selecting suppliers from foreign nations likely enhances international cooperation in foreign relations. Also, foreign suppliers may provide more advanced interoperable solutions than conventional domestic suppliers.
- **FAR 11.002:** Under FAR 11.002, “Agencies shall specify needs using market research in a manner designed to promote full and open competition (Part 6), or maximum practicable competition when using simplified acquisition procedures, with due regard to the nature of the supplies or services to be acquired.” By promoting supplier competition through the consideration of selecting suppliers globally by an agency conducting its own market research, the markets should bear more “reasonable” prices and the suppliers should be more “viable” within the competitive forces available.
- **Trade Agreements Act of 1979:** The Trade Agreements Act essentially provides that the Government may acquire only U.S.-made end products, or those from designated countries.
- **Berry Amendment Compliance for Specialty Metals (Title 10 US Code 2533a) and DFARS 252.225-7014 (“Noncompliance with the Preference for Domestic Specialty Metals Clause”):** The Berry Amendment generally restricts the DoD’s procurement of “specialty metals that are not melted in the United States.” The amendment has several exceptions that are implemented in DFARS 252.7002-2 and foreign suppliers should become familiar with them. The applicability of any exception should generally be determined prior to issuance of the solicitation, order, or contract award. For contracts that include DFARS clause 252.225-7014, contractors (suppliers) are required to deliver end items that comply with the clause, which are evaluated by the Defense Contract Management Agency (DCMA). Overall, the contractor (to include suppliers both foreign and domestic) remains liable for any noncompliance with Title 10 US Code 2533a as implemented in DFARS 252.225-7014.
- **Title 41 US Code-Buy American Act--“Public Contracts”: Chapter 3 (“Procurement of Supplies and Services by Armed Services”):** In certain Government procurements, the requirement purchase may be waived if the domestic product is more expensive than an identical foreign-sourced product by a certain percentage, if the product is not available domestically in sufficient quantity or quality, or if doing so is in the public interest.
- **DFARS Clause 252.225-7001 (Buy American Act and Balance of Payments Program):** As prescribed in [225.1101\(2\)](#), use the following clause: Buy American Act and Balance of Payments Program (Jan 2009) (a) *Definitions*. As used in this clause: (6) ‘Qualifying country’ means any country set forth in subsection [225.872-1](#) of the DFARS. DFARS 225.872 Contracting with qualifying country sources. DFARS 225.872-1 General. (a) As a result of memoranda of understanding and other international agreements, DoD has

determined it inconsistent with the public interest to apply restrictions of the Buy American Act or the Balance of Payments Program to the acquisition of qualifying country end products from designated qualifying countries.

3.10 Best Practice #10 - Sourcing Technical Data Access

3.10.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that involves continuing equipment service, training, repairs, and maintenance. Organizations are faced with the challenge of acquiring technical data from Original Equipment Manufacturers (OEMs) to maintain and evaluate products organically for long-term use.

The program management team should decide to either acquire the technical data or identify other strategic procurement sources to mitigate the risk of not having the data required for the life cycle of a product. This will allow retention of the necessary internal knowledge and expertise to ensure optimal readiness for the warfighter. This practice provides a decision process for acquiring technical data based on a technical and economic evaluation of the sourced product.

Description: This best practice addresses the strategic sourcing decision to acquire technical data required for long-term agreements by using various commercial industry practices that leverage options such as subscription licensing. This best practice provides examples of methods and timeframes for obtaining data. Trends show increased collaboration among industry partners across supplier networks to provide the organization access to similar types of technical data that the USAF requires for organic maintenance. To enable this, industry uses licensing agreements and fee structure conditions to manage Intellectual Property (IP) amid supplier networks. While this practice tends to focus on the acquisition of large products/systems designed for the exclusive use of a single user, there can be significant benefits in acquiring technical data for commercial-off-the-shelf or commercially derived equipment as well.

By obtaining technical data rights, the USAF may be able to reduce costs by performing repairs organically throughout the life cycle of the equipment and can maintain flexibility by having several maintenance sourcing options, including managing maintenance activities and personnel internally.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Make an acquisition decision based on the organization core business competencies and capital investment decisions - Generate technical data ordered with service level agreements, product ordering agreements, and sustainment agreements for depots - Emphasize maintaining control and expertise on outsourced functions 	<ul style="list-style-type: none"> - Make a strategic investment decision at the beginning of a product life cycle to acquire technical data for critical assets - Obtain operational information and technical data for product life cycle support - Maintain the flexibility to use organic maintenance sources - Have the flexibility of partnering with suppliers other than the OEM to support the

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Focus on cost reduction - Maintain in-house expertise to manage suppliers - Manage knowledge and processes - Share strategic plans openly, relating back to core functions and outsourcing decisions - Conduct multidimensional make/buy analyses, where both product and function perspectives are considered - Maintain data access for core products which are required to be provided by the OEM - Use knowledge to mitigate risk and make good decisions 	<ul style="list-style-type: none"> - maintenance and upgrade of original assets - Focus on life cycle costs and support

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Full access to technical data, with a goal of long-term supplier relationships - Understanding future product roadmaps to design for reuse and sharing or compatibility (looking forward, not backward) - Improved flexibility in maintenance sourcing, allowing for reduced cost options 	<ul style="list-style-type: none"> - Improved mission readiness - Assessment of critical investments in systems —Competition – smart buyer cost reductions through organic maintenance sourcing options instead of sole reliance on OEMs - Reduced maintenance lead times due to increased availability of critical information

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Configuration control - Risk of loss - Liability for performance loss - Collaboration and trade space for development of technology - Capacity and subject matter experts (SMEs) for repairs - Sustainment and maintenance 	<ul style="list-style-type: none"> - Government IP transfer and management as it relates to manufacturing and logistics is often not recognized as a core function - Extension of the service life term of an asset - Workforce skill gaps to support the product throughout the life cycle - Dependence on single source suppliers for data access - Ability to secure sufficient technical data during systems acquisition

Financial/Performance Metrics:

- Return on Investment
- Cost of acquiring data versus benefits to the life of a critical product item
- Product life cycle cost: May be supported through analysis of product placement and ownership
- The Design for Affordability (DFA) cost categories outline a series of financial and performance metrics that should be considered for use in conjunction with this best practice, as shown in the following figure:

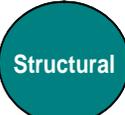
Category	Example Performance Drivers			
 <p data-bbox="451 289 594 386">Match offerings' full lifecycle costs to customer value</p>	<ul style="list-style-type: none"> ▶ Effectiveness of design for manufacture ▶ Outsourcing product development of modules/subsystems to capable suppliers 	<ul style="list-style-type: none"> ▶ Logistics response requirements to meet customer service policies 	<ul style="list-style-type: none"> ▶ Design for reliability, maintainability and serviceability ▶ Life of technology supported ▶ Remote diagnostics functionality 	
 <p data-bbox="456 485 589 606">Optimize network and assets for high capability, least cost</p>	<ul style="list-style-type: none"> ▶ Greater use of low factor cost geographies where supply capability exists ▶ Labor strategy to address union wages and benefits 	<ul style="list-style-type: none"> ▶ Network configuration for equipment and parts ▶ Use of outsourced warehousing and 3PL services 	<ul style="list-style-type: none"> ▶ Use of service agents versus in-house ▶ Service strategies by product segment: dispose; send to center; send rep 	
 <p data-bbox="444 701 602 823">Reduce complexity - tailor transaction costs for customer segments</p>	<ul style="list-style-type: none"> ▶ Simplified planning approaches ▶ Supply chain stability ▶ Enhanced information technology systems functionality 	<ul style="list-style-type: none"> ▶ Functionality and cost of warehousing and logistics systems ▶ Information technology systems functionality 	<ul style="list-style-type: none"> ▶ Work flow and scheduling approach ▶ Use of remote trouble shooting / self-help 	
 <p data-bbox="440 905 610 974">Automation & drive continuous improvements</p>	<ul style="list-style-type: none"> ▶ Supply base year-on-year productivity in line with market requirements ▶ In-house lean flows and lean support 	<ul style="list-style-type: none"> ▶ Level of parts return from the field ▶ Negotiated freight rates 	<ul style="list-style-type: none"> ▶ Parts availability ▶ Service rep utilization 	

Figure 3. Financial and Performance Metrics Outlined by DFA Cost Categories

Industry Techniques/Tools:

- Product life cycle management tools
- DFA
- Business case analysis
- The Inherent, Structural, Systemic, Realized (ISSR) cost driver framework:
 - o Inherent costs, driven by the platform design
 - o Structural costs, driven by how the product is made
 - o Systemic costs, driven by how production is managed
 - o Realized costs, driven by the actual work practices

Industry Implementation Approach:

- Assess strategic priority and risks. The organization must assess and prioritize its strategies for acquiring products and determine how to best maintain and manage the product throughout its life cycle.
 - o Evaluate where in the value chain the product will operate.
 - o Consider the strategic importance of the asset acquired, such as:
 - Criticality to the business
 - Likelihood of providing a lasting advantage.
 - o Understand value provided to the customer.

- Assess the associated risks of not acquiring the technical data, including:
 - Impact on customers
 - Reliance on suppliers to provide immediate repair during downtime
 - Lack of access to the OEM drawings and supplies
 - Lack of suppliers capable of providing maintenance
 - Lack of workforce expertise that can support asset maintenance.
- Conduct an economic analysis and draw conclusions. Decisions have to then be validated by conducting an economic analysis of the cost of acquiring the technical data.
 - Perform a complete assessment of the long term cost of acquiring the technical data:
 - Use the ISSR framework to fully understand and evaluate current and future costs of acquiring data
 - Include financial valuation of quality of services to assess best value
 - Value changes in life cycle reliability and downtime
 - Conduct a long-term net present value calculation on the cost of acquiring the data.
- Assess the organization’s internal capabilities to manage OEM technical data for maintenance, repair, and upgrades; base this assessment both on competencies and cost feasibility, considering the following:
 - Are the workforce and skills necessary to maintain the end item available?
 - Will the organization be able to manage the risk by strengthening the OEM relationship rather than owning the data?
- Assess the feasibility and capability of making changes to the technical data based on upgrades, product modifications, and organizational configuration control. The organization must understand that in many cases it is difficult to obtain trade secrets or IP rights. Product customization must be considered with respect to upgrade management. Moreover, building and maintaining a relationship with the OEM/supplier is crucial to maintain support options throughout the planned life cycle of the product.

Industry Specialties that Implement this Commercial Best Practice:

Design Engineers, Contract Manager, Acquisition and Procurement Manager, Lawyers, Manufacturing Engineers, Supply Chain Managers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefit to industry lies in information sharing with the Government, including greater involvement in the integrated product team’s planning for spares, thus improving forecasts and reducing inventory through lowered uncertainty.

- Designate industry partner as preferred supplier if technical data documentation is provided.
- Accept reasonable value-based fee strategies based on maintenance requirements.
 - Accepting supplier contracts using this structure enables improved forecasting and better utilization of resources for the supplier as a set fee is agreed upon for a particular time period and/or set of requirements.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Logistics Specialist, Contracting Officer, Industrial Engineer

Others: Systems Engineer

Applicable Product Support Elements (PSEs):

- Sustaining/System Engineering
- Design Interface
- Supply Support
- Maintenance Planning and Management
- Technical Data Management/Technical Orders

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 3.1 Organizational Maintenance
- 3.3 Depot Maintenance
- 4.3 Sustaining Engineering and Program Management
- 5.1 Hardware Modification
- 5.2 Software Maintenance and Modifications

3.10.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Ensure that the pursuit of technical data rights is supported as an enterprise-level decision.
- Identify the type of technical data needed (Engineering, Supply, Maintenance).
- Determine the level of technical data required (level 2 or level 3 data).
- Identify technical data requirement (access, procurement, licensing).
- Ensure that data access requirements are specific, focusing on the right data.
- Identify specific cost drivers that will be used to assess acquiring the technical data as outlined in the ISSR framework.
- Identify the need to acquire technical data for commodity products.
- Understand and address the difference between buying a product versus buying a design.
- Based on required technical data, determine how to safeguard proprietary data for supplier assurance during negotiation.
- Conduct analysis of warranties—both existing and what is available for desired weapon system procurement—to determine required level of repair and required access to technical data.

Request for Proposal (RFP) Development Phase:

- Address technical data options with the supplier/OEM including levels of data, format, and configuration control.
- Include DoD mandates for acquiring data access so that respondents address how their strategy meets these requirements.

- Ensure proposals for technical data rights include clauses that require OEMs to share data with other suppliers as designated by the Government to support operations and maintenance activities.

Ensure proposals include data rights for the Government to have access to and use of technical data throughout the life cycle of the equipment

Proposal Review/Fact Finding/Negotiating Phase:

- Negotiate terms for access to, use of, and revision of technical data.
- Negotiate terms of technical support with the OEM throughout the product life cycle.
- Identify a supplier network that the OEM will recognize as support for their products should the Government wish to award service support contracts to multiple sources.

Execution Phase:

- Consider option contract line item numbers for the purchase of technical data to increase flexibility for future data rights.
- Ensure the vendor has provided information regarding how the data can change over the life of the contract.
- Maintain lessons learned and focus on knowledge management.
- Place technical data under security and configuration management control.
- Incorporate technical data management practices into organic maintenance processes.

3.10.3 Resources and References

Case Study Abstracts:

Boeing – Intellectual Property Management License Definitions

Business Problem	Business Solutions
<p>The use of Boeing proprietary information is often needed to design and/or install product modifications, particularly engineering products and services. Engineering analysis and technical data could only be obtained through a Boeing Technical Services and Modifications group using a technical consulting agreement (TCA). Value-based fees were calculated per event, as defined using a template and agreed to in the TCA. Because different information sometimes became necessary after the agreement was reached, Boeing needed standard processes to address the issue. Boeing protected itself by only sharing data within certain technical limitations, and so had to establish data controls.</p>	<p>Boeing standardized the approach requiring the following in the agreement:</p> <ul style="list-style-type: none"> - A minimum of \$200M insurance - A value-based use fee established using project requirements - Consulting service fees for engineering expertise billed separately. <p>Agreements were limited as follows:</p> <ul style="list-style-type: none"> - Manufacture and distribution of Boeing proprietary parts were not allowed. - Value-based use figures were calculated using a proposal based on the type of modification being performed, the number of airplanes affected, the value to market, and similar factors. - With concurrence from Boeing, the initial operational capability (IOC) license may be amended to include additional airplanes and

Business Problem	Business Solutions
	<p>other models when necessary to support the business plans of the licensee.</p> <ul style="list-style-type: none"> - Sharing limitations of design data is not permitted at any time. However, Boeing's Technical Services group will, upon request, propose a consulting agreement providing analysis of the information to support the modification program once the IOC license is in place. - Boeing proprietary information may be provided to the licensee's subcontractors and suppliers in support of the airplane modification. However, subcontractors must sign a contractor confidentiality agreement before receipt of any Boeing proprietary information. - Anyone who requests information directly from Boeing will be required to sign a license agreement. In most cases, the licensee will be the organization responsible for engineering the modification and obtaining certification from the local regulatory authorities.

In addition, Booz Allen and SAF/IEL conducted site visits to Caterpillar, American Airlines, and Toyota to support development of a USAF sustainment strategic plan to determine industry best practices for process sourcing decision models. The industry SMEs described their sourcing strategies pertaining to acquiring technical data rights during the interviews; the relevant outcomes of those interviews follow.

Caterpillar

- Define core functions (design engineering, purchasing, supplier selection, dealer relationships, and final assembly/test) that require data access.
- Ensure that the organization houses the appropriate functions to the acquisition of technical data rights.
- Utilize a centralized purchasing team, which includes engineers, to determine the need to acquire data.
- Base any outsourcing decisions on business case analyses to identify the cost of acquisition, including acquiring blueprints.

American Airlines

- Determine the expected total cost of acquiring data.
- Contractually require manufacturer (OEM) and internal teardown reports; track the information by serial number.
- Ensure an engineering function is included in the decision process.

- Incorporate appropriate language in contracts to address relevant certification from outside agencies (e.g., Federal Aviation Administration).
- Consider short-term component repair contracts which allow for frequent revisiting of the outsourcing decision relative to data rights and access.
- Consider having OEMs provide maintenance on new aircraft, allowing for American Airlines to better understand maintenance requirements and data acquisition costs before developing a sourcing business case.

Toyota

- Identify ideal costs of acquiring data and continuous improvements.
- Develop a thorough understanding of cost structure, supplier capabilities, and manufacturing processes to avoid the risk of having to acquire additional data at later stages of the product life cycle.
- Understand the future product roadmap to design for reuse and sharing/compatibility.
 - o Decisions must be forward-looking with regard to acquiring data.
- Base the outsourcing/technical data acquisition decision on knowledge of the engineering and design of the product.
- Maintain engineering functions in-house to manage the knowledge base, mitigate risk, and support good decision-making with respect to technical data.

Resources Related to this Best Practice:

- ISSR framework explained in “Development of an Air Force Sustainment Strategic Plan – Determination of an Industry Best Practice Process Sourcing Decision Model.” Study developed by Booz Allen & Hamilton.
- Pricefighter Services (includes information on technical data package reviews) https://www.navsup.navy.mil/navsup/ourteam/navicp/prod_serv/aviation.

Related Policy:

- **FAR Subpart 227.7103-2 (Rights in Technical Data and Acquisition of Technical Data):** It is standard practice for the Government to retain unlimited rights to all technical data developed under a contract. Unlimited rights means right to use, modify, perform, display, release, or disclose technical data in whole or in part, in any manner and for any purpose whatsoever, and to have or authorize others to do so. If there is an exception to this, it should be in the contract and stated here. **FAR Subpart 227.7103-2 Section (b)(1)** states:

“Data managers or other requirements personnel are responsible for identifying the Government's minimum needs for technical data. Data needs must be established giving consideration to the contractor's economic interests in data pertaining to items, components, or processes that have been developed at private expense; the Government's costs to acquire, maintain, store, retrieve, and protect the data; re-procurement needs; repair, maintenance and overhaul philosophies; spare and repair part considerations; and whether procurement of the items, components, or processes can be

accomplished on a form, fit, or function basis. When it is anticipated that the Government will obtain unlimited or government purpose rights in technical data that will be required for competitive spare or repair parts procurements, such data should be identified as deliverable data items. Reprocurement needs may not be a sufficient reason to acquire detailed manufacturing or process data when items or components can be acquired using performance specifications, form, fit and function data, or when there are a sufficient number of alternate sources which can reasonably be expected to provide such items on a performance specification or form, fit, or function basis.”

- Under **FAR Subchapter E-Part 27 (Patents, Data, and Copyrights)**, it states “the Government acquires unlimited data rights except for copyrighted work...and data (except as may be included with restricted computer software) that constitutes manual, or instructional and training manuals for installation, operation, or routine maintenance and repair of items, components, etc.”
- In **“Acquiring and Enforcing the Government’s Rights in Technical Data and Computer Software Under Department of Defense Contracts: A Practical Handbook For Acquisition Professionals”**, it states that “before discussing the ‘what’, ‘how’ and ‘when’ relative to acquiring rights in technical data and computer software, one also needs to understand certain fundamental concepts about those “rights”, such as the difference between the Government owning the delivered physical medium on which the technical data or computer software resides and the Government’s right to use, release, and disclose that technical data or computer software to other than Government employees. The handbook also states that “the DoD rarely (if ever) acquires title or ownership to technical data or computer software under its contract –even if it funded 100% of the development of that technical data or computer software.” Instead, the DoD acquires a license to use, release or disclose that technical data or computer software to persons who are not government employees.

3.11 Best Practice #11 – Concurrent Engineering

3.11.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that incorporates life cycle considerations into the purchase of products to reduce the overall product cost and development time. This best practice is particularly applicable to weapon systems and other systems in which maintenance and operation of the system is a large portion of the total life cycle costs. This best practice is also valuable when making modifications or upgrades to existing systems.

Description: Concurrent engineering is a strategy used to tightly link sourcing into the product development make/buy decision process (outsourcing versus in-sourcing). The first premise is that all elements of a product’s life cycle—from functionality, sourcing, manufacturing, maintainability, testing, reliability, to environmental impacts (to include final disposal and recycling)—should be taken into consideration in the early design phase. Further,

representatives from different functional departments should support the design team throughout the life of the project. The second concept is that the preceding design activities should all be occurring at the same time (concurrently), which can reduce the product development time.

This best practice focuses on cost reduction through reduction of the overall product cost during its life cycle, from functionality through disposal. Additionally, efficiency can be achieved via decreased product development time through concurrent design activities.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Reduce development time to allow products to be introduced into the market more quickly - Reduce costs associated with product development - Improve customer satisfaction by delivering more reliable and higher quality products 	<ul style="list-style-type: none"> - Reduce the life cycle costs of purchased products and weapon systems - Improve the maintainability and reliability of systems, which will then improve availability - Collaborate with the original equipment manufacturer (OEM) to align the government product life cycle strategy to the product design and to develop a technical knowledge base within the Government around the product developed

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Faster time to market - Increased accuracy in predicting and meeting project plans, schedules, timelines, and budgets - Higher reliability in the product development process - Shorter design and development process with accelerated project execution - Ability to recognize necessary design changes early in the development process, leading to a reduction of the number of design changes and re-engineering efforts at later phases in the development process - Faster reaction time in responding to rapidly changing conditions/requirements - Improved competitive position as a result of producing products that meet the customer's needs 	<ul style="list-style-type: none"> - Reduced costs associated with maintaining and operating systems - Increased availability of systems - Longer life for systems, resulting in reduced purchases - Reduced complexity for maintenance and systems support - More accurate and in-depth configuration management - Improved data on maintenance operations and parts/system performance - Reduction in unscheduled maintenance - Smaller maintenance and logistics footprint - Improved supply/maintenance responsiveness - Reduction of the need for unique support equipment

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - An increase in the cost of the design process may be required - Significant changes to the design process may be required if concurrent engineering is not currently practiced - The addition of other stakeholders in the design process is required - The design of expensive and complex 	<ul style="list-style-type: none"> - Potential increase to the initial purchase price due to incorporating design efforts geared toward reducing overall life cycle costs may be necessary - New systems and processes may be required in order to accrue benefits - Government may have to participate in the design process to ensure that the full life

Industry Challenges	Government Challenges
<p>systems may require a consortium that makes the coordination required for concurrent engineering more difficult to achieve</p>	<p>cycle costs are considered</p> <ul style="list-style-type: none"> - Different environments and uses of a product need to be taken into account, as life cycle is largely affected by these factors - Specific and achievable performance metrics (e.g., availability) will have to be developed as part of the contracting process

Financial/Performance Metrics:

- Reduced maintenance and operating costs
- Increased product availability
- Extended life of products
- Reduced product development time

Industry Techniques/Tools:

- Automated information sharing systems Business case analyses CBM+RCM, MSG-3, Failure Mode &Effect Analysis, DMSMS management systems

Industry Implementation Approach:

- Contracting organization
 - o Incorporate performance requirements including maintainability and reliability into contracts, with payments linked to performance metrics.
 - o Monitor reliability and other contract performance metrics to obtain compensation from the supplier should performance not meet requirements.
 - o Perform audits of the facilities and processes of contracted organizations to ensure contract required management systems are in place and working properly.
 - o Review quality management system reports or perform acceptance testing and quality control testing.
 - o Implement maintenance management systems to allow maintainability metrics such as availability to be obtained (based on actual experience).
- Supplier organization
 - o The project leader controls the resources necessary to produce the design rather than “borrows” resources from various functional departments.
 - o Personnel are brought together from different functional departments and are assigned to the design team for the life of the project.
 - o Design teams are as small as possible to reduce coordination time and effort.
 - o Design issues and trade-offs are addressed as early in the design process as possible.

Industry Specialties that Implement this Commercial Best Practice:

Project Managers, Procurement Managers, Functional Specialists (Electrical Engineers, Mechanical Engineers, Design Engineers, etc.), Financial Analyst, Maintenance Managers, Supply Chain Managers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefit is enhanced contracting opportunities, additional revenue, and reduced time and cost via collaboration.

- Demonstrate a willingness to pay more in initial costs where life cycle costs are reduced for maintainability/reliability.
- Integrate a government team with the OEM to better facilitate requirements and reduce cost and time of development by communicating results faster.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Systems Engineer

Others: Industrial Engineer, Contracting Officer, Logistics Specialist

Applicable Product Support Elements (PSEs):

- Sustaining and System Engineering
- Design Interface
- Supply Support
- Maintenance Planning and Management
- Support Equipment/Automatic Test Systems
- Technical Data Management/Technical Orders

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 3.3 Depot Maintenance
- 4.2 Support Equipment Replacement
- 4.3 Sustaining Engineering and Program Management
- 5.1 Hardware Modifications
- 5.2 Software Maintenance

3.11.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Perform market research to identify solutions that incorporate the consideration of maintainability, reliability, and availability into contracts.
- Evaluate performance requirements and actual performance to determine required availability, reliability, and other metrics associated with the use of the system.
- Link requirements for design-for-maintainability and design-for-environment to the necessary maintenance processes, facilities, and tools. Consider the following:
 - o Measures to reduce maintenance costs, man-hours, tools, logistics, costs, skill levels, and facilities
 - o Interchangeable modules and units
 - o Ease of access and maintenance

- Monitoring and diagnostic systems
- Environmental considerations to include part modularity, toxicity of materials, ease of disposal, and ease of recycling and remanufacturing.
- Develop a supplier rating strategy that includes the life cycle phases that are of interest beyond just the initial purchase.
- Determine the acceptance criteria for inspection and testing of the purchased equipment.
- Conduct an economic analysis to determine the savings that can be achieved by consideration of design-for-maintainability and other operating considerations. This analysis can then be used to determine how much more can be paid in initial costs and still have lower overall life cycle costs.
 - Condition based maintenance (CBM) features (see BP #12) can cost more initially but, due to decreased maintenance, may result in overall savings. CBM features minimize maintenance with appropriate use of embedded diagnostics; improved maintenance, analytical, and production technologies; automated maintenance information generation; trend-based reliability and process improvements; and integrated information systems providing logistics system response based on equipment maintenance condition.
- Specify the documentation, training, and other requirements needed to effectively operate and maintain the purchased equipment.
- Identify appropriate subject matter experts to participate on or be available for integrated product teams (IPTs).

Request for Proposal (RFP) Development Phase:

- Provide the pre-determined inspection and acceptance criteria.
- Develop a risk management plan, which includes identifying areas of risk, quantifying costs of risk, planning mitigation strategies, and communicating the risks and strategies to the IPT and management.
- Develop the business case to justify (if necessary) higher purchase costs which will then result in lower overall life cycle costs.
- Use the market research results to define the acquisition strategy and issue a solicitation to industry.

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements. Consider solutions that incorporate maintainability, reliability, and availability into their contracts.
- Assess the supplier's ability to deliver in order to achieve availability and other life cycle considerations.

Execution Phase:

- Implement a maintenance management system which will allow availability and other operational requirements to be monitored.
- Develop and implement weekly, monthly, or quarterly risk and performance reports.
- Formalize government-vendor IPT communications channels, levels of management, and reporting procedures.

- Continuously assess the impacts of varying business rules across functional teams. Consideration should be given to cost, availability, quality, customer service, development lead times, etc.
- Document lessons learned for contract renegotiation or other future contracts.
- Ensure that operational, supply, and maintenance perspectives are all considered in the design phase.

3.11.3 Resources and References

Case Study Abstracts:

Concurrent Engineering by Automobile Manufacturers

Business Problem	Business Solution
<p>Automobile manufacturers faced increasing market demands for reduced product development time and better quality. Traditional design methodologies also resulted in large numbers of expensive engineering change orders.</p>	<p>Japanese automobile manufacturers have been using concurrent engineering for some time. In the 1980's a study of concurrent engineering was conducted as part of MIT's International Motor Vehicle Program. The table below shows a comparison of companies that used concurrent engineering practices and those that did not. The key features of success were:</p> <ul style="list-style-type: none"> - Teamwork: Small teams were assembled that were dedicated to the development project for its life. - Communication: Critical design issues and trade-offs were resolved as early in the process as possible. The number of people involved was highest at the outset of a design project in order to address such critical issues. - Simultaneous Development: Die development time was taking two years for some manufacturers. By contrast, Japanese manufacturers such as Honda began die production at the same time they started body design. Die designers and body designers were in direct contact with each other. This resulted in a 50% reduction in time. This process requires fewer tools, lower inventories, and less human effort. Many American and European producers have now adopted concurrent engineering practices.

Table 5. Product Development Performance by Regional Auto Industries, Mid 1980s¹

	Japanese Producers	American Producers	European Volume Producers	European Specialist Producers
Average Engineering Hours per New Car (millions)	1.7	3.1	2.9	3.1
Average Development Time per New Car (in months)	46.2	60.4	57.3	59.9
Number of Employees in Project Team	485	903	904	
Number of Body Types per New Car	2.3	1.7	2.7	1.3
Average Ratio of Shared Parts	18%	38%	28%	30%
Supplier Share of Engineering	51%	14%	37%	32%
Engineering Change Costs as Share of Total Die Cost	10-20%	30-50%	10-30%	
Ratio of Delayed Products	1 in 6	1 in 2	1 in 3	
Die Development Time (months)	13.8	25.0	28.0	
Prototype Lead Time (months)	6.2	12.4	10.9	
Time from Production Start to First Sale (months)	1	4	2	
Return to Normal Productivity After New Model (months)	4	5	12	
Return to Normal Quality After New Model (months)	1.4	11	12	

Clarke Chapman Ltd Inclusion as a Supplier with Its Contractor

Business Problem	Business Solution
Clarke Chapman Ltd. (CCL) was a supplier of materials handling equipment to ports and terminals, shipping and offshore operations, the rail industry and more. The materials handling industry was becoming increasingly competitive with customers in some cases requiring additional services beyond the purchase of equipment.	CCL won a contract with the Argentina-based SIDERAR steel works to modernize port facilities to include new materials handling equipment and refurbishment of existing equipment. The contract also required CCL to maintain and operate the port. A key feature of the winning bid was the innovative financial package which staged payments to CCL with the inclusion of the requirements for guaranteed availability of equipment. Failure to meet the requirements of the contract resulted in penalties. The ability to satisfy the terms of the contract and earn profits (and avoid penalties and losses) was therefore inextricably linked to the design organization and conduct of maintenance to ensure equipment availability and to help control

¹ Source: The Machine that Changed the World, pg. 119

Business Problem	Business Solution
	operational costs. CCL recognized that the realization of the full potential of design for maintainability frequently requires a re-conceptualization of the total project and its sub-components. This case study emphasizes the importance of integrating maintainability in to all aspects of the project: strategic, planning, and operational.

Resources Related to this Best Practice:

- Womack, James P., Daniel T. Jones, and Daniel Roos, 1990. *The Machine That Changed the World*, Free Press, New York.
- Ivory, C. J., A Thwaites, and R Vaughan, September 2001, “Design for Maintainability: The Innovation Process in Long Term Engineering Projects,” paper prepared for the Future of Innovation Studies Conference, Eindhoven Centre for Innovation Studies, Eindhoven University of Technology, the Netherlands.
- Deputy Under Secretary of Defense for Logistics and Material Readiness, November 25, 2002, “Memorandum for Secretaries of the Military Departments: Condition Based Maintenance Plus.”

Related Policy:

- **AFI 63-101 (Acquisition and Sustainment Life Cycle Management, Section 2.16.6):** Concurrent engineering may include CBM considerations, which is supported by AFI 63-101 during design in order to minimize maintenance.

3.12 Best Practice #12 - Contract for Condition Based Maintenance

3.12.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort of a high-valued or critical asset that requires repetitive and predictive maintenance. This best practice addresses the objectives of improved system availability with higher levels of reliability at a reduced sustainment cost.

Description: Condition Based Maintenance (CBM) is a set of maintenance processes and capabilities derived, in large part, from real-time assessment of a weapon system’s condition obtained from embedded sensors and/or external tests and measurements using portable equipment. The goal of CBM is to detect anomalies or conditions of a future failure and then decide the correct time to intervene and provide maintenance. Condition Based Maintenance Plus (CBM+) focuses on inserting, into both new and legacy weapon systems, technology to support improved maintenance capabilities and business processes. This technology can be sensors that are part of the design and/or test equipment applied to the systems to be maintained. Use of the collected data involves integrating and changing business processes to dramatically improve logistics system responsiveness. Under consideration are capabilities

such as enhanced prognostics and health management and enhanced diagnostics techniques, failure trend analysis, electronic portable or point-of-maintenance aids, serial item management, automatic identification technology, and data-driven interactive maintenance training. The ultimate intent of this initiative is to increase operational availability and readiness throughout the weapon system life cycle. CBM+ will help predict a system's remaining operational life span, support operator decision-making, interface with control systems, aid maintenance repairs, and provide feedback to the logistics support and system design communities.

Implementation of this best practice can result in reduced sustainment costs of a system as well as improved efficiency, as maintenance scheduling and practices will be more predictable.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Improve system reliability - Improve system availability - Reduce life cycle cost - Improve visibility to assets' condition and allow for more accurate prediction of failure (leads to reduced cost of repair) 	<ul style="list-style-type: none"> - Increase aircraft/system availability - Increase aircraft/system reliability - Reduce life cycle costs - Increase mean time between failures (MTBF) - Extend weapon system's life - Use available personnel more effectively - Reduce unscheduled maintenance, which can improve mission performance and reduce accident risk to personnel

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Reduced maintenance costs - Fewer maintenance operations and chances for human error - Enhanced prognostic/diagnostic techniques and failure trend analysis - Reduced equipment downtime - Potential for financial incentives linked to system performance 	<ul style="list-style-type: none"> - Reduced maintenance costs - Fewer maintenance operations and chances for human error - Enhanced prognostic/diagnostic techniques and failure trend analysis - Reduced equipment downtime - Workforce with knowledge, skill sets, and tools for timely maintenance of complex systems - Use of technologies that improve maintenance decisions and integrate the logistics processes - Increased maintenance efficiency and productivity - Early detection of faults, which will result in reduced damage to equipment - Improved repair and maintenance operations with better spare parts management - Establishment of a knowledge database related to the working conditions of equipment and components - Increased control over when maintenance occurs so that safety conditions can be improved, resulting in a reduction in the risk of accidents

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Unavailability of appropriate sensors and test equipment - Implementation of the business processes to make use of the available data - Expense of implementing CBM on existing systems - Resistance of equipment suppliers to CBM design variations required by customers - Upfront investment in diagnostic capability for test equipment and end items 	<ul style="list-style-type: none"> - Consideration of increased cost as part of the contract terms - Resistance to change from preventive maintenance to predictive maintenance - Difficulty in influencing the design process so that maintainability is considered, including the design of the necessary embedded sensors - Unavailability of commercial-off-the-shelf (COTS) diagnostic equipment suitable for the equipment that is being maintained - Unavailability of COTS systems to accumulate and analyze the collected sensor data - Lack of personnel with the specialized skills needed to implement CBM

Financial/Performance Metrics:

- Improved system reliability:
 - o MTBF (number of hours between failure of systems, subsystems and components)
 - o Break rate (% of aircraft with a grounding discrepancy per total number of sorties)
- Improved system availability:
 - o Aircraft availability (% of fleet available)
 - o Fully mission capable rate (% of possessed aircraft fully mission capable)
- Reduced life cycle cost:
 - o Maintenance cost per flying hour

Industry Techniques/Tools:

- Prognostic/diagnostic test equipment
- Embedded prognostic/diagnostic sensors in systems and subsystems
- Acquisition measurement systems to characterize working conditions and equipment behavior
- Analysis and diagnostic tools to allow access and use of collected data

Industry Implementation Approach:

- Analyze equipment to identify the measured parameters that correlate with failures (e.g., pressure, temperature).
- Determine higher level descriptors that are calculated based on equipment measurements (e.g., long-term average and standard deviation of a harmonic).
- Perform market research to identify available sensors, diagnostic equipment, and online monitoring systems.
- Identify or develop requirements for database systems to retain long-term data which is then used for maintenance process improvements. Such systems are particularly useful for

managing aging equipment to include increased maintenance demands and the identification of replacement timing.

- Select equipment suppliers that conform to CBM requirements.
- Hire and train maintenance personnel, control engineers, and others to effectively make use of the CBM technology and processes.

Industry Specialties that Implement this Commercial Best Practice:

Contracting, Maintenance Personnel, Quality Control, Control Engineers, Reliability Engineers, Information Technology Systems Engineers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefit is that the supplier can obtain greater revenue at the onset of a contract and is more cognizant of expected costs to be accrued over the life of the contract.

- Allow higher initial costs for equipment and systems that are designed for maintainability to include CBM.
- Extend contracts beyond the initial purchase to include the performance of maintenance.
- Include maintainability metrics and other requirements in contracts and provide rewards for achieving these metrics and requirements.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Logistics Specialist, Industrial Engineer
Others: Program Manager, Systems Engineer

Applicable Product Support Elements (PSEs):

- Supply Support
- Maintenance Planning and Management
- Support Equipment/Automatic Test Systems
- Technical Data Management/Technical Orders

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 3.1 Organizational Maintenance
- 3.3 Depot Maintenance
- 5.2 Software Maintenance

3.12.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Define requirements for CBM in systems engineering and sustainment strategies.
- Develop metrics, such as availability, mean time between unscheduled maintenance, mean time to repair, and maintenance man-hours, to drive desired performance.

- Conduct economic analysis to determine initial costs and other costs that can be supported with improved maintainability resulting from CBM.
- Conduct market research to identify applicable COTS equipment and systems that meet requirements.
- Team with industry to include CBM practices in the design phase of equipment and systems. This teaming must include review of the operational impacts of design changes associated with CBM. For existing systems, team with industry to design or select external or add-on evaluation equipment needed to implement CBM.
- Define training and documentation requirements.
- Identify sources that incorporate prognostic health management systems in their products to predict failures of critical system components.

Request for Proposal (RFP) Development Phase:

- Engage with appropriate integrated product teams and other stakeholders to validate requirements and ensure synchronization.
- Document the solution to include measurements to be taken, analyses to be performed, and interfaces for maintenance personnel and operators.
- Identify the expected investment needed to meet CBM requirements.
- Incorporate CBM requirements into contracts and use CBM as selection criteria.
- Provide financial incentives for achieving system availability improvements or targets.
- Establish clearly defined reporting requirements.

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements and measures established for systems engineering and sustainment strategies (from Requirements Identification/Development Phase).
- Select maintenance providers who can support the CBM strategy based on best value.

Execution Phase:

- Execute defined reporting requirements.
- Address and resolve system interface, data access, and other issues that may hinder successful implementation of CBM.
- Train or hire personnel so that resources with the appropriate skills are available to implement CBM.
- Identify best practices for dissemination.
- Assess contractor performance against previously-identified performance metrics.
- Review and modify performance metrics based on collected data and analyses.
- Share CBM lessons learned with DoD and industry.

3.12.3 Resources and References

Case Study Abstracts:

Desert Basin Generating Station, Salt River Project

Business Problem	Business Solution
<p>The desert basin generating station for the Salt River project had the multifaceted goal of continually improving performance by maximizing availability and startup reliability, along with reducing costs. With 250-300 starts per unit per year, personnel were increasingly challenged with ensuring the plant's availability and determining when to best capture opportunities to serve load and take advantage of wholesale power markets. The plant's biggest costs were fuel and maintenance. The problem presented was how to both reduce these costs and optimize reliability and availability.</p>	<p>Plant personnel realized that to address this goal they needed to invest in software to help detect and diagnose emerging equipment and process problems early. Since no single solution existed, several analytic and diagnostic tools were integrated into a powerful package. Included in this tool set were:</p> <ul style="list-style-type: none"> - PI System[®](OSIsoft LLC), a data collection and historian system - Tiger[®] (Turbine Services Ltd), a knowledge-based turbine condition monitoring system - Power Diagnostics[®] (Siemens Energy), which monitored the gas turbines via a high-speed data connection and reviewed the results daily at the Power Diagnostic Center - Alarm management system (Matrikon Inc), which allowed synchronized review of all alarms and events from one interface that was able to be accessed both locally and remotely - EPI*Center (SmartSignal Corp)², a predictive diagnostic tool that helped eliminate equipment failure and avoid surprises - SmartSignal CycleWatch[™] (SmartSignal Corp)³, which allowed the plant to investigate deviations encountered during startups and thereby increase reliable starts in the gas turbines - EtaPRO[™] (General Physics Corp), a performance monitoring system that searched for system losses and quantified the impact of failures on capacity and heat rate. <p>The plant used a stepwise approach as opportunities arose and found that, in concert, these systems were able to provide strong value relative to their costs. Benefits included:</p> <ul style="list-style-type: none"> - Expanded troubleshooting capabilities. Both in-house and external experts were able to easily log on to monitoring systems. - Optimized planning. The sooner a deviation was noted, the sooner it could be addressed. - Improved outage planning and reduced forced-outage rates. - Maximized resources. The software solutions made it easier for maintenance staff to

² SmartSignal and EPI*Center are registered trademarks of SmartSignal Corporation.

³ SmartSignal and SmartSignal CycleWatch are registered trademarks of SmartSignal Corporation.

Business Problem	Business Solution
	<p>maximize their efforts. Overall, maintenance costs were lowered and reliability and uptime were increased. The cost of the tools has been saved many times over.</p>

Dingo Maintenance Systems

Business Problem	Business Solution
<p>Mining, primary metals, power, and transportation industries worldwide need turnkey programs that enable an asset-intensive operation to rapidly implement a condition based maintenance program using oil analysis.</p>	<p>Dingo’s value proposition delivers significant maintenance cost savings that can be realized almost immediately. They tout yearly savings for medium to large operating mines of \$1.1M to \$2.6M. This is accomplished through a fully functional CBM system that saves maintenance costs in the following areas:</p> <ul style="list-style-type: none"> - Reduction in additional costs related to component failures - Extension of component life - Optimization of oil change intervals - Increase in successful warranty claims - Reduction in maintenance and repair contract costs - Reduction in labor required to maintain components and lubricants.

CBM Construction Equipment, John Deere

Business Problem	Business Solution
<p>Although preventive maintenance has proven to prevent some failures, many machines still experience premature and/or major failures. Unanticipated failures and emergency repairs had a negative effect on uptime and did not match John Deere’s value proposition of:</p> <ul style="list-style-type: none"> - Maximum productivity - Maximum uptime - Lowest daily operating costs. 	<p>John Deere has instituted a CBM strategy for its construction equipment. They offer a special “Customer Personal Service” program that includes a fluid analysis program that can identify issues before they begin. This is coupled with a special oil filter that can inject additives back into the oil that were lost in the filtration process. The oil analysis program recommended for the CBM program contains information about wear metals, additives, contamination, and physical properties. As a result, fluid life, component life, and equipment life can be safely extended beyond original equipment manufacturer recommendations. The result of this CBM program for the customer is longer equipment life at a lower cost with higher availability. The result for John Deere is improved customer satisfaction and loyalty.</p>

Resources Related to this Best Practice:

- Combined Cycle Journal, First Quarter 2010, Desert Basin Project
- Dingo Maintenance Systems: <http://www.dingo.com/>.
- John Deere, www.deere.com

Related Policy:

- **Memorandum from the Under Secretary of Defense for Logistics and Material Readiness on Condition Based Maintenance Plus (25 Nov 2002):** Under the DoD CBM+ Memorandum, it states that CBM be “implemented to improve maintenance agility and responsiveness, increase operational availability, and reduce life cycle total ownership costs (TOC)”. Overall, this Memorandum supports the CBM best practice being utilized by the commercial sector, and even supports the use of the technologies, tools, and procedures that the commercial sector uses to execute its CBM strategy.
- **Department of Defense Instruction 4151.22 (Condition Based Maintenance Plus for Materiel Maintenance):** It is DoD policy that “CBM be included in the selection of maintenance concepts, technologies, and processes for all new weapon systems, equipment, and materiel programs based on readiness requirements, life-cycle cost goals, and RCM-based functional analysis.” In addition, it is DoD policy that “CBM technologies, processes, and enablers be incorporated as part of organic maintenance capabilities, as well as by incorporation into contracts in commercially-supported systems or programs.” These policies under DoD Instruction 4151.22 directly support and promote the implementation and use of CBM as a best practice.
- **AFI 63-101 (Acquisition and Sustainment Life Cycle Management, Section 2.16.6):** Overall, AFI 63-101 supports the practice of CBM+ by stating that the USAF’s Deputy Chief of Staff for Logistics, Installations and Mission Support (HQ AF/A4/7) will “ensure CBM+ concepts and functions are developed and implemented as applicable.”
- **Condition Based Maintenance Plus DoD Guidebook:** During the initial acquisition process, significantly greater emphasis is being placed on the responsibility of DoD program managers for providing sustainment support over the total life cycle. For example, program managers (PMs) are required by DoD Instruction 5000.02 to “optimize operational readiness through affordable, integrated, embedded diagnostics and prognostics, automatic identification technology; and iterative technology refreshment.” This requires the PMs to take responsibility for CBM+ implementation, and translates into specific requirements that should be included in key performance parameters that document the implementation throughout a system’s life cycle. Additional guidance for PMs for the full range of acquisition life-cycle activities, including development of CBM+ capabilities, is contained in the Defense Acquisition Guidebook, Paragraph 5.2.1.2.
- **DoD Directive 4151.18 (Maintenance of Military Materiel):** This DoD Directive requires minimizing requirements for support equipment, including test, measurement, and diagnostic equipment. Maintenance programs for military materiel must utilize diagnostics,

prognostics, and health management techniques in embedded and off-equipment applications when feasible and cost effective. Maintenance programs must provide the organic maintenance workforce with the range of technological tools necessary to enhance capabilities (e.g., interactive technical manuals, portable maintenance aids, access to technical information, and serial item management), to properly equip the workforce and to provide adequate technical and managerial training.

- **Logistics Enterprise Architecture (LogEA) Concept of Operations (CONOPS), Section 9.2.1:** Under **Section 9.2.1 (Maintenance and Production Planning)**, it states, “Enterprise visibility into condition based maintenance capabilities across all levels of maintenance will enable central planning functions to optimize repair throughput across the enterprise.” Furthermore, acquisition programs need to consider aligning their programs under the principles of LogEA.

3.13 Best Practice #13 - Allow Source Suppliers Total Asset Visibility

3.13.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that would benefit from a strategic supplier relationship to support USAF weapon systems, subsystems, and components. Retrograde asset visibility with a contract repair source can result in significant advantages for both the supplier and the customer through improved repair scheduling, reduced repair flow days, and improved stock availability. Retrograde visibility is scalable in that it can be implemented on a large-scale maintenance contract arrangement for a weapon system or on a small-scale repair contract for a single commodity, e.g., landing gears.

Description: The customer and supplier share supply chain forecasting, retrograde management, and event management functionality and responsibility. The supplier has access to the customer’s retrograde data and is responsible for forecasting and generating repair orders and/or replenishment requisitions. The supplier receives electronic data (with minimum human interface—usually via electronic data interchange [EDI] or the Internet) that provides information on the customer’s repairable returns and stock levels. The signal may be generated when the repairable item is turned in as unserviceable or upon actual shipment from the base. This best practice may be implemented in conjunction with Best Practice #4, Vendor Managed Inventory (VMI), if the supplier is also the source of repair.

Implementation of this best practice can lead to cost reduction through improved inventory levels and repair cycles. It is scalable in that it can be applied to contracts of any size. Additionally, through collaboration and improved asset visibility, efficiency is gained with enhanced surge capabilities and improved repair cycle times (RCT).

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Maintain a collaborative relationship with the customer - Improve resource allocation - Reduce repair flow time 	<ul style="list-style-type: none"> - Maintain collaborative repair forecasting with the supplier (repair source) to improve weapon system support - Reduce RCT and inventory

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Reduce repair parts inventory - Reduce cost and increase revenue 	<ul style="list-style-type: none"> - Improve system mission capability - Reduce cost through improved collaboration and asset visibility in the repair network and supply chain

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Improved forecasting for current retrograde requirements and future return needs - Improved repair scheduling with better data visibility - Improved resource planning with improved scheduling - Advanced disposition of assets based on repair classification/condition, network repair capacity, and source of demand - Increased throughput and revenue 	<ul style="list-style-type: none"> - Real-time capture of reverse supply chain performance - Improved stock availability and issue effectiveness - Improved surge capability with reduced RCT - Reduced supply chain cost with reduced RCT and inventory - Gained process efficiencies and error reductions using an automated process with EDI and minimal human interface

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Maintaining a stable funding stream - Regulatory requirements promoting competition and short-term contracts - Cost of integrating supply chain systems - Difficulty in obtaining required data (e.g., classified/sensitive information) to effectively and proactively manage the repair cycle - Determination of acceptable levels of service for both parties 	<ul style="list-style-type: none"> - Sharing of classified or sensitive information (e.g., ops plans, item and configuration data) - Compatibility of supplier and government systems - Cost of integrating supply chain systems - Determination of acceptable levels of service for both parties - Monitoring of supplier performance to maintain agreed upon service levels - Willingness of supplier(s) to invest in systems integration - Relative priority of reverse logistics to other supply chain segments/issues

Financial/Performance Metrics:

- Percent of units produced versus planned production
- Percent of average number of days in repair versus planned flow days
- RCT: Average number of days
- Percent total not mission capable - maintenance: Percent of possessed systems not fully mission capable due to maintenance requirements
- Percent awaiting maintenance: Discrepancies per possessed aircraft
- Percent awaiting parts: Discrepancies per possessed aircraft
- Percent of maintenance actions started on schedule

Industry Techniques/Tools:

- EDI
- Collaborative Planning, Forecasting and Replenishment tool

- Commercial reverse logistics software (see “Resources Related to this Best Practice” section for specific examples)
- Radio Frequency Identification tools and infrastructure

Industry Implementation Approach:

- Examine a potential subset of items for collaborative repair cycle management.
- If the target set is currently supported by contract maintenance, the following steps apply:
 1. Assess the contractor’s ability/willingness to interface with current systems and gain visibility into retrograde data.
 2. Negotiate a collaborative repair cycle agreement with the supplier, to include levels of service with metrics to measure supplier performance.
 3. Address and resolve system interface, data access, and any other issues that hamper the effectiveness of the collaborative repair cycle arrangement.
 4. Provide supplier access to retrograde and requirements data.
 5. Measure and evaluate the effectiveness of the collaborative repair cycle arrangement and implement processes, systems, and other changes to continuously improve performance.
- If the target set is not currently supported by contract maintenance, the following steps apply:
 1. Perform market research to identify suppliers that are successfully engaged in contract repair and collaborative repair cycle management.
 2. Issue a solicitation and select a supplier to provide contract maintenance services in a collaborative repair cycle management relationship.
 3. Follow steps 2 through 5 above.

Industry Specialties that Implement this Commercial Best Practice:

Supply Chain Planners, Maintenance Managers/Planners, Procurement Managers, Contracting Managers, Information Technology (IT) Systems Engineers and Specialists, Budget and Financial Managers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefit is established partnerships and longer-term arrangements, providing stability and continued profitability. Additionally, through collaboration, benefits are gained in improved forecasting of parts and resources, enabling better planning.

- Establish longer-term business partnership arrangements with suppliers with stable funding to encourage collaboration and investment in IT systems, tools, and integration.
- Choose candidate items that will generate a profitable business volume.
- Improve forecasting and demand planning for high-turnover parts to facilitate maintenance/resource planning.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Logistics Specialist

Others: Industrial Engineer, Contracting Officer

Applicable Product Support Elements (PSEs):

- Supply Support
- Maintenance Planning and Management
- Support Equipment/Automatic Test Systems

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 4.2 Support Equipment Replacement

3.13.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Choose a target system/subsystem/component that is a good candidate for a collaborative repair cycle relationship.
- Identify specific collaboration requirements (e.g., data security, service levels and performance measures, data requirements, and system interfaces).
 - o Item unique identification (IUID) should be used to track items that are government-furnished property that meet certain thresholds.
 - o Data should be made available and be added to information systems to comply with serialized item management (SIM) policies.

Request for Proposal (RFP) Development Phase:

- Engage with appropriate government stakeholders to validate requirements and ensure synchronization.
- Articulate specific collaborative repair requirements, including data sharing and system integration requirements. Consider IUID and SIM policies and requirements and address in the RFP if necessary.
 - o Include a statement that allows for flexibility when USAF systems are replaced, changed, or upgraded.
- Conduct research to determine market capabilities to support the requirement.
- Articulate the desire for a well-established strategic partnership to collaboratively manage the repair cycle.
- Using the market research results, define the acquisition strategy and issue a solicitation to industry.

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements.
- Down-select and validate supplier capabilities for collaborative repair cycle management. Determine which suppliers can support current government systems and policies surrounding data requirements and tracking for maintenance management.

Execution Phase:

- Formalize a collaborative repair cycle agreement.
- Identify and resolve system interface, data access, and other issues that may impact successful implementation of the collaborative arrangement.
- Implement change management activities, as necessary, with applicable USAF agencies prior to implementation.
- Implement the collaborative repair cycle arrangement for the target set of USAF-managed items.
- Monitor and evaluate the effectiveness of the arrangement; implement processes, systems, and other changes to continuously improve performance.
- Document and share lessons learned from the arrangement; consider other opportunities for collaborative repair cycle support to the USAF.

3.13.3 Resources and References

Case Study Abstracts:

Newgistics Advance Return Notification™ (ARN) and Newport News, Inc. & Fredericks of Hollywood

Business Problem	Business Solutions
<p>Both Newport News, Inc. and Fredericks of Hollywood were having difficulty scheduling and planning resources to work and manage returns due to lack of returns visibility.</p>	<p>Both companies implemented the Newgistics ARN software and were able to optimize their receiving processes with improved returns visibility. Newport News was able to better schedule associates and reduce workload spikes by receiving early arrival information. Fredericks of Hollywood was able to improve resource planning and scheduling by having visibility of returns coming to its distribution center.</p>

Mopar and UPS

Business Problem	Business Solutions
<p>Mopar is the source for all original equipment parts for Chrysler, Dodge, Jeep and Ram automotive parts, distributing approximately 280,000 parts and accessories in more than 90 countries. Mopar’s manual returns process had limited inbound visibility, which made it difficult for customers to track the status of shipments. The lack of end-to-end visibility of returns also made it difficult for Mopar to schedule repairs and manage resources, which ultimately made it difficult to keep customers satisfied.</p>	<p>Teaming with UPS, Mopar was able to simplify its international parts returns process for radios and cores. Mopar’s returns now spend less time in transit, with most of Mopar’s international returns having a three- to four-day return time. In addition to reduced transit times for returns, Mopar’s improved inbound visibility yielded a number of advantages, including:</p> <ul style="list-style-type: none"> - Reduction in loss of parts in transit - Elimination of inventory redundancy - Reduced customer calls for status

Business Problem	Business Solutions
	updates - Improved allocation of staff based on inbound volume - Automated receiving and credit processes - Improved service to Mopar's customers

Resources Related to this Best Practice:

- Oracle® reverse and forward logistics software:
http://www.businesswire.com/portal/site/home/permalink/?ndmViewId=news_view&newsId=20100817005411&newsLang=en
- SAP reverse logistics software:
<http://www.sap.com/solutions/sam/reverse-logistics.epx>
- Kewill Reverse Logistics end-to-end reverse life cycle management system:
http://www.kewill.com/lc/index.php/4/rlm-whitepaper-ga.html?_kk=32b764a6-6031-4658-9438-f08458b51c0b&_kt=5171892263&gclid=CMeB75Pd8KQCFeFM5QodvBbU2A
- Take Supply Chain Enterprise Returns Management software:
<http://www.clearorbit.com/solutions-enterprise-returns-mgmt.php>
- Newgistics' Advance Return Notification™ (ARN) software:
http://www.newgistics.com/corp_documents/Whitepaper22Feb2005ValueOfReturnsVisibility.pdf
- Mopar and UPS case study in reverse logistics automation and collaboration:
http://www.worldtrademag.com/Articles/Feature_Article/BNP_GUID_9-5-2006_A_1000000000000726305

Related Policy:

- **DoDD 4140.1-R, DoD Supply Chain Materiel Management Regulation:** Under section C4.1.1.2 (Requirements), the regulation states “in the case of depot-level reparable items, which are maintained by organic and commercial maintenance facilities, DoD materiel managers shall seek to optimize their interfaces with those facilities (...) and they should work with maintenance facilities to ensure the proper scheduling and completion of make-to-order and make-to-stock workloads to meet customer requirements within negotiated performance metrics.” In addition, under section C4.1.2.4 (Procedures), the regulation states “the DoD Components should have the capability to rapidly produce products to meet new, unique customer requirements (i.e., engineer-to-order materiel requirements) through contingency contracts with private sector manufacturers or agreements with organic manufacturing sources (...) and that capability should include access to any engineering resources that might be required.” By the supplier and customer working closely together and the USAF customer providing the supplier with engineering resources that include historical data, more accurate and realistic forecasting and maintenance planning can be achieved.
- **AFPAM 63-128, Guide To Acquisition and Sustainment Life Cycle Management:** Under Section 3.6.3 of AFPAM 63-128, *Guide To Acquisition and Sustainment Life Cycle*

Management, the USAF supports total asset visibility as a practice under supply support by promoting “the development of a provisioning strategy and plan that balances best value, production, reliability, the industrial base, procurement lead times, availability of vendor provided spares, and the adequacy of commercial data needed to identify replacement parts” and states that “provisioning must be completed on all support equipment acquisitions.” The implementation of total asset visibility by the USAF customer providing the supplier with access to the retrograde data would enhance the strategy for reducing costs through improved repair scheduling, reduced repair flow days, and improved stock availability. In addition, under Section 3.7.1 (Maintenance Planning and Management), it states to “address the requirements and constraints inherent in applicable on-equipment, off-equipment, and depot maintenance for operations and support commands...and consider the entire life cycle of the system, including its requirements during peacetime, wartime, and other contingency scenarios.” By utilizing retrograde data, more accurate and realistic forecasting and maintenance planning can be achieved.

- **“Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending” (A Memorandum for Acquisition Professionals by Dr. Ashton Carter, 14 Sep 2010):** Total asset visibility is a practice that helps (in accordance with the memo) to “incentivize productivity and innovation in industry” by “rewarding contractors for successful supply chain and indirect expense management.”
- **DoD Instruction 8320.04 (Item Unique Identification Standards for Tangible Personal Property):** Under section 5.1 (Procedures) in DoD Instruction 8320.04 (Item Unique Identification Standards for Tangible Personal Property), it states that DoD Components “identify and track government-furnished property through the use of unique item identifiers (UIIs) in transaction-derived data from electronic business transactions, enabled by automatic identification and data capture, and the UII will be used globally as a common key in financial, property accountability, acquisition, supply, maintenance, and logistics systems.” An integrated automated item tracking system using standard item identifiers would support achieving the objectives of total asset visibility as a best practice—enabling greater levels of collaboration by increasing asset visibility in the repair network and supply chain, as well as improved inventory levels, repair cycles, and more accurate repair item forecasting; which in turn, would result in reduced costs.
- **DoD Instruction 4151.19 (Serialized Item Management [SIM] for Materiel Maintenance):** Under the “Policy” section of DoD Instruction 4151.19 (Serialized Item Management [SIM] for Materiel Maintenance), it states “develop broad-based SIM programs that make data about specific items and their respective total populations readily available to maintainers, logisticians, and other functional area managers....and to ensure the compatibility and interoperability of SIM-related processes across Military Departments and Defense Agencies and among public and private sector sources that support DoD items.” This advocacy of maximum visibility of item management and supply inventory promotes increased readiness, reliability, safety, and overall improved weapon system support, thus supporting the total asset visibility best practice.

3.14 Best Practice #14 - Risk Sharing Contracts for Procurement and Supply

3.14.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that requires choosing from different contract options to allow for more flexibility in contracting. Through select contract types, the organization and its suppliers can share risk to increase capacity and ensure long-term sustainment.

Description: Various procurement and supply contracts are designed to share risk between suppliers and buyers for the purpose of reducing risk, providing contract flexibility, and creating stronger relationships among supply chain partners. The process of implementing a portfolio of risk-sharing contracts includes choosing a source procedure during the determination of contract type that provides cost reduction, risk sharing, supplier commitment to production capacity and item support, and flexibility for each product support element. (Note: Government risk-sharing contracts such as cost-plus contracts are similar to the commercial revenue sharing contracts referenced in this BP.)

Implementation of this best practice will result in increased flexibility in contracts, allowing for adjustment to the USAF’s critical missions. Also, a reduction in sustainment costs should result as a network of suppliers is established and cost visibility with those suppliers is improved.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Procure high quality products at the lowest possible total cost of ownership - Reduce the amount of unsatisfied demand - Identify risk mitigation strategies that procurement must follow to deal with commodity price or supply risks - Manage the effect of procurement and supply contracts on market and demand risks - Improve capacity utilization - Drive collaboration through regular meetings that bring together supply chain, transportation, finance, sales, and manufacturing functions to discuss sourcing and pre-build strategies that can reduce raw material and supplies inventory, as well as decrease the growth of transport miles - Increase availability of products with a reduction in warehouse out-of-stock levels 	<ul style="list-style-type: none"> - Align procurement strategy with business strategy - Achieve contract flexibility with suppliers so that they adjust to the government critical missions and financial budget constraints - Achieve sustainment cost reduction by supporting weapon systems throughout their life cycle without having to rely solely on the original equipment manufacturer (OEM) - Establish a broad network of suppliers that are able to provide the best quality support for their weapon systems at the least cost - Increase cost visibility with the supplier network to guarantee compliance and reduction in cost while providing the best value

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Improved supply chain flexibility and ability to respond or react to change - Improved product design, process design (including flexible contracts, dual sourcing, and outsourcing), and system design 	<ul style="list-style-type: none"> - The ability to effectively and efficiently switch from one supplier to another - Achievement of global optimization by allowing buyers and suppliers to share risks and potential benefits

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Reduction in overall cost and risk through revenue sharing contracts in which the buyer and supplier share the revenues for reduced upfront cost - Decreased risk and per item cost through negotiation when an increased salvage value or carcass/exchange credit for items that are returned to the supplier are to be repaired/replaced for bulk purchases 	<ul style="list-style-type: none"> - Leveraging of procurement buying power by negotiating contract pricing terms with OEM component suppliers to commit OEM to production capacity - Reduction in warehouse out-of-stock levels can effectively add production line capacity to the supply chain without any capital expenditures - Reduced risk through buy-back contracts where suppliers buy back any unused/unwanted supplies from buyers at a reduced price

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Paying higher costs than expected for procurement, earning lower procurement savings than anticipated, and having an inefficient procurement function - Creation of barriers between procurement and other business functions, as procurement focuses on unit cost and applying the same strategy across all or almost all procured products - Lack of attention to procurement contracts when profit margins are high 	<ul style="list-style-type: none"> - Government often has to provide government- furnished equipment/material, which drives a huge investment cost and prevents the product support integrator/contractor logistics support (CLS) provider from leveraging supply chain efficiency - CLS contracts are often one year in duration, which undermines vendors' ability to establish the most economical supply arrangements with second- and third-tier suppliers - Parts requirements may be unique to the Government and require sole source arrangements - Buy-back contracts require the supplier to have an effective reverse logistics system and could cause an increase in logistics costs - Risk sharing (government cost-plus) contracts also have limitations as they require the supplier to monitor the buyer's revenue and thus increase administrative costs - Establishment of appropriate contracting procedures - Ensuring competition requirements are met when using a network of suppliers

Financial/Performance Metrics:

- Return on investment
- Reduction in procurement cost
- Reduction in out of stock conditions
- Revenue-sharing benefits: measured as additional revenue gained through sharing
- Discount percent as a result of cost sharing

- Buy-back discount

Industry Techniques/Tools:

- Procurement risk management capability
- Active commodity trading
- Pooling capacity across all available resources (including internal capacity)
- Spot trading
- Risk-sharing contracts
 - o Buy-back contracts
 - o Revenue-sharing contracts
 - o Cost-sharing contracts
- Business process reengineering and industry benchmarking (to improve system, process, or product design flexibility)

Industry Implementation Approach:

- Select contract type based on product family level of demand and criticality to the organization (e.g. firm fixed price contracts).
 - o Identify the need for long-term, fixed-quantity contracts of fixed-quantity. These require buyers to predict both demand and product prices. Predicting product pricing requires a deep understanding of micro (supply and demand) and macro (e.g., war times, drawdown, geo-political issues) conditions, which are difficult to pinpoint. Hence, long-term fixed-quantity contracts are very risky and need to be strategically evaluated.
 - o Determine reliance on long-term contracts versus spot market contracts and how to balance the spot market risks and opportunities and mitigate the risks. For situations that depend on financial impact and commodity price assessed as a percentage of the entire product cost, the figure below depicts appropriate mitigation strategies when price risk is high. This figure shows that high financial impact calls for a proactive approach (as shown) to guarantee supply if demand is higher than expected. Depending on demand uncertainty, option contracts (also referred to as quantity-flexibility contracts), may be required to deal with poor forecast accuracy.

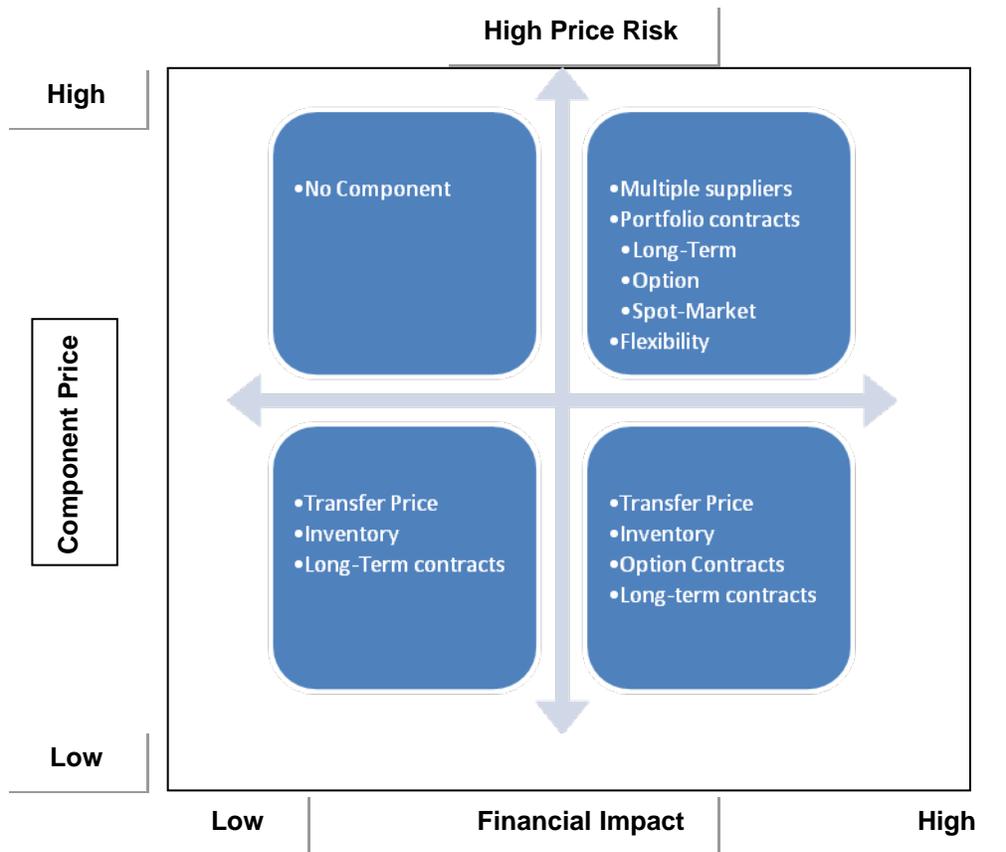


Figure 4. Risk-Mitigation Strategies When Price Risk is High

Supply risk refers to a potential disruption of supply due to a supplier’s financial stability, a supply shortage because of a supplier’s production or distribution problems, product quality problems, or other sources of less predictable risks such as hurricanes or earthquakes. Three different cases can be distinguished, depending on component price and financial impact.

First, when component price is low but financial impact is high, that is, when component shortage will shut down production lines, it is critical to ensure supply. This can be achieved by investing in inventory or by implementing dual sourcing strategies. Alternatively, flexibility achieved through system, process, or product design can deal effectively with supply risks.

Second, consider expensive components with high financial impact and high supply risks, such as engines and transmission systems. These are the items that strongly affect customer experience, and their price is a large portion of total system cost. These are typically referred to as strategic components, and their suppliers are considered strategic suppliers. These components typically have a single supplier. Clearly, the most appropriate supply strategy for these items is to focus on long-term

partnerships with suppliers and implement effective supply contracts where risks are shared with suppliers. In addition, tracking the operational and financial performance of these suppliers and sharing risk mitigation strategies and experiences can help anticipate and reduce the likelihood of an unfortunate supply disruption.

Finally, consider components with low financial impact and price. These components do not contribute a large portion of the product costs, but their supply is risky. Such components typically have few suppliers; therefore, these suppliers enjoy a power position. For these items, ensuring continuous supply, even possibly at a premium cost, is important. This can be done through long-term contracts, by carrying stock, or both.

- Consider option contracts to reduce the risks associated with uncertainty. The buyer prepays a relatively small fraction of the product price in return for a commitment from the supplier to reserve capacity up to a certain level. The initial payment is typically referred to as reservation price or premium. If the buyer does not exercise the option, the initial payment is lost. The buyer can purchase any amount of supply up to the option level by paying an additional price for each unit that is agreed to at the time the contract is signed. The additional price is referred to as the execution price or exercise price. With this type of contract, the total price (reservation price plus execution price) that the buyer pays for each purchased unit is typically higher than the unit price in a long-term contract. Option contracts also provide the buyer with flexibility to adjust order quantities depending on realized demand and, therefore, reduce the buyer's risks. Thus, these contracts shift risks from the buyer to the supplier since the supplier is now exposed to customer demand uncertainty. This is in contrast to long-term contracts in which the buyer accepts all of the risk. Inventory risk is an important procurement driver because high commodity prices imply that inventory is expensive. Similarly, shortage risk is a driver since the high financial impact suggests that shortages may have a devastating effect on the bottom line.
- Simultaneously sign multiple contracts to optimize expected profits and reduce risks. The contracts differ in price and level of flexibility, allowing the buyer to hedge against inventory, shortage, and price risks. This approach is useful for commodity products since a large pool of suppliers is available, each offering a different type of contract. The buyer may select several different complementary contracts to manage risks and reduce expected procurement and inventory holding costs. To identify the most effective portfolio of contracts, the buyer needs to identify the appropriate mix of (1) low price and no flexibility (fixed-quantity) contracts, (2) reasonable price but better flexibility (option) contracts, and (3) unknown price and unknown quantity (spot-market) contracts. The buyer must optimize between the different contracts, long-term (fixed-quantity) commitment, option level (the amount of capacity to buy from companies selling option contracts), and the level of supply that should be left uncommitted. One important characteristic the organization needs when relying on a combination of long-term contracts and spot purchasing is the ability to adapt efficiently to trading with new suppliers.
- Use contracts that share risk with the supplier. The following types of contracts address issues that arise between a buyer and a supplier. The relationships between the buyer and

supplier can be formal or informal, but to ensure adequate supplies and timely deliveries, buyers and suppliers agree on supply contract terms. A variety of supply contracts enable this risk-sharing process, which increases profits for both the buyer and the supplier. The following are contract types that are typically used by industry in support of risk-sharing strategies.

- Buy-back contracts: The seller agrees to buy back unsold goods from the buyer for an agreed price. This provides the buyer with incentives to order more units since the risk associated with unsold units is reduced. At the same time, the supplier's risk clearly increases. Thus, the contract is designed such that the increase in order quantity placed by the buyer and hence the decrease in the likelihood of out-of-stock, more than compensate the supplier for the increase in risk.
- Revenue-sharing contracts: In a revenue-sharing contract, the buyer shares some of its revenue with the seller in return for a discount on the purchase price. Hence, the buyer under that form of contract will transfer a portion of the revenue from each unit sold.
- Cost-sharing contracts: In these types of contracts, the OEM shares some of the production costs with the manufacturer in return for a discount on the purchase price. The issue often is addressed through an agreement in which the OEM purchases from the suppliers of the contract manufacturer one or more components that the contract manufacturer needs. The components remain on the OEM books but are shipped to the contract manufacturer's facility for the production of the finished good.
 - As a comparison, the USAF is currently utilizing cost-sharing with incentives contracts in the area of system acquisition research and development. These contracts are used to reap the benefits of risk sharing, collaboration, and increased supplier capacity.
 - Sole source and limited source items can benefit from cost sharing contracts as they would allow the government to better negotiate reducing the cost of their procured product with their supplier.
 - Commodity Councils can plan price negotiations with suppliers based on depot maintenance needs.

- Build trust between the supplier and the buyer through information sharing.
- Leverage buying power with component suppliers of the OEM.
- Utilize cost sharing procedures when generating contracts.
- Implement procurement systems that automate the requisition process and allow visibility for new suppliers, provide information on price and product quality, allow online negotiation, and allow for contract management and compliance.
- To reap the benefits of sharing risks and reducing the cost of services or products acquired, improve upon the public-private partnership based on arms-length contract agreements in which both parties have equal power and agreement is influenced only by the market, leading to fairness of price, conditions, and terms.

Industry Specialties that Implement this Commercial Best Practice:

Contract Specialists, Supply Chain Managers, Procurement Managers, Financial Managers, Manufacturing and Operations Managers

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The potential benefits are reduced costs, increased capacity, increased flexibility, decreased risk, and maximized profitability through various risk-sharing contracts.

- Use contract types that share risk between the buyer and supplier to increase capacity, reduce cost, and gain more flexibility in their relationship.
- Maximize profitability and facilitate global optimization through the use of risk-sharing contracts.
- Stabilize relationships with suppliers through long-term partnerships and synchronized operations.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Contracting Officer

Others: Logistics Specialist, Financial Manager

Applicable Product Support Elements (PSEs):

- Sustaining and System Engineering
- Supply Support
- Maintenance Planning and Management
- Support Equipment/Automatic Test Systems

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 4.2 Support Equipment Replacement

3.14.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Identify a procurement information system platform that stakeholders (suppliers and buyers) can operate together.
- Align business strategy requirements to the procurement strategy with suppliers.
- Identify product items that are of strategic importance to the organization and will benefit from the flexibility of any of the previously discussed contract types.
- Identify the level of partnership needed with the suppliers (arms-length partnership, joint venture etc.).
- Include internal stakeholders (finance, operations, legal, procurement, strategic planning, etc.) in the decision-making of the contracting agreement.
- Identify the manufacturing process (make-to-order, make-to-stock, make-to-engineer, etc.) for the procured component so that all supply chain partners can strategize the best way to synchronize forecasting.
- Consider which contract types or features described herein may be useful in adding flexibility and reducing risk.

- Identify opportunities to expand partnering beyond maintenance support and drive standardization across services.
- Investigate lessons learned and successes (e.g. Joint Surveillance and Target Attack Radar System, [JSTARS]) to determine the efficacy of hybrid approaches and long-term contracts.

Request for Proposal (RFP) Development Phase:

- Propose various ways of contracting to which the supplier is willing to commit, based on its relationship with the USAF.
- Identify the best way of contracting that will provide best value to the USAF based on cost, quality, and support duration.
- Recognize the utility of various contract types; assess the value and legality of different types and determine the best value contract type to pursue.

Proposal Review/Fact Finding/Negotiating Phase:

- Negotiate service level terms with the suppliers so that all partners agree to the value added to the agreement.
- Negotiate pricing based on the USAF’s purchasing power toward the supplier’s contract manufacturing.
- Create a USAF and industry partnership based on best value capabilities.

Execution Phase:

- Establish a reporting system to stimulate financial and cost reporting equivalency between industry and the USAF, and require cost transparency while respecting the need to protect competition-sensitive information.
- Continuously assess the performance of the suppliers and how the contract agreement helped all parties in reducing risk, providing more flexibility in working together, and reducing costs.
- Assess lessons learned and best practices produced out of the partnership to continue improving the terms of the contracts.

3.14.3 Resources and References

Case Study Abstracts:

Ericsson and Flextronics Apply Cost Sharing Contract Type

Business Problem	Business Solution
Ericsson sells telecommunication network equipment to AT&T and purchases components from a variety of suppliers, such as Flextronics. Due to significant differences in component lead times, the two companies implement different manufacturing strategies. Flextronics has a make-to-stock environment	Flextronics convinced Ericsson to share some of the production costs so that they can have the incentive of producing more units in return for a discount on the purchase price. Hence, both companies signed a cost-sharing contract that requires Flextronics to share its production cost information with Ericsson.

Business Problem	Business Solution
<p>that is dictated, in part, by component lead times, while Ericsson makes production decisions only after receiving an order from AT&T, hence creating a huge risk in inflated forecasting and delivery. The critical challenge in outsourcing and contract manufacturing is the asymmetry of risk faced by both companies and the information available to the OEM and the contract manufacturer. This discrepancy leads to inefficiencies in the supply chain, including shortages and higher costs.</p>	

Blockbuster on Revenue Sharing Contracts with Movie Studios

Business Problem	Business Solution
<p>Video rental stores used to purchase copies of newly released movies from the movie studios for approximately \$65 and rent them to customers for \$3. Due to the high purchase price, rental stores did not buy enough copies to cover peak demand, which typically occurs during the first ten weeks after a movie is released on video. The result was a low customer-service level.</p>	<p>Blockbuster Video entered into a revenue-sharing contract with the movie studios in which the wholesale price was reduced from \$65 to \$8 per copy and studios were paid 30-45% of the rental price of every rental. This revenue-sharing contract had a huge effect on Blockbuster revenue and market share.</p>

Motorola Applying the Cost Sharing Contract Type

Business Problem	Business Solution
<p>Motorola was facing increased competition and losing market share. As a result the company sought opportunities for price reductions.</p>	<p>Motorola used cost-sharing contracts in agreements with its suppliers, leveraging its buying power to purchase key components from the suppliers. Motorola’s buying power allowed it to receive a better price than the contract manufacturer receives from its suppliers, which allowed price reductions that provided a competitive advantage in the marketplace.</p>

Resources Related to this Best Practice:

- J. Kluge, “Reducing the Cost of Goods Sold,” *McKinsey Quarterly*, No.2, 1997.
- Global Trade Benchmarks, Aberdeen, 2005.
- V. Nagali, J. Hwang, D. Sanghera, M. Gaskins, M. Pridgen, T. Thurston, P. Mackenroth, D. Branvold, P. Scholler, and G. Shoemaker, “Procurement Risk Management (PRM) at Hewlett-Packard Company,” *Interfaces*. 38(1), 2005.
- P. Kralijic, “Purchasing Must Become Supply Management,” *Harvard Business Review*. September-October 1983.

- P.E. Pie, D. Simchi-Levi, and T.I. Tunca, “Sourcing Flexibility, Spot Trading, and Procurement Contract Structure,” Working Paper. MIT, Cambridge, MA, 2009.
- D. Simchi-Levi, Operations Rules: Delivering Customer Value through Flexible Operations. The MIT Press, 2010.

Related Policy:

- Federal Acquisition Regulation (FAR) 16.104 (Factors in Selecting Contract Types): Under Federal Acquisition Regulation (FAR) 16.104 (Factors in Selecting Contract Types), there are “many factors that the contracting officer should consider in selecting and negotiating the contract type,” and one includes “type and complexity of the requirement.” More specifically, it states that “complex requirements, particularly those unique to the Government, usually result in greater risk assumption by the Government, and this is especially true when performance uncertainties or the likelihood of changes makes it difficult to estimate performance costs in advance.” Furthermore, the FAR advises that “as a requirement recurs or as quantity production begins, the cost risk should shift to the contractor, and a fixed-price contract should be considered.” Based on this approach, implementing a portfolio of risk-sharing contracts would enable contract flexibility with suppliers so that both the government customer and supplier can effectively adjust to the government critical missions, while mitigating risk and reducing cost. In effect, after a contract is let and as the customer and supplier identify a recurring requirement critical to executing the customer’s mission, the flexibility of a portfolio of risk-sharing contract arrangement would enable the government customer to change to a lower risk type of contract with the supplier, should the customer choose to do so.

Best Practice #15 - Online Tracking of Order and Shipping Information and Status

3.14.4 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that supports order visibility to better manage and optimize transportation systems. This best practice addresses the objectives of reducing costs and increasing the ability of the supply chain to react to changing demands.

Description: Online tracking of order status and shipping information is applicable to day-to-day transportation management of owned assets and the management of suppliers. As organizations adopt lean strategies, they are requiring reduced order lead times and are often placing smaller orders to support inventory reduction goals. Online tracking of orders and other shipping information is key to responding to these increasingly stringent requirements by making the best use of available transportation assets. Government agencies have similar requirements in the management of transportation assets needed to supply parts and materials. Web-based Transportation Management Systems (TMS) support online tracking of order status and shipping information to improve the performance of owned transportation assets. End users will be able to track the status of their order and current location of the parts ordered from shipment to receipt. These systems can also allow users to make adjustments as circumstances change to both supplier-owned and user-owned transportation assets, which

can improve supply chain agility. TMS are identified as an enabler for Best-in-Class organizations. Of these Best-in-Class organizations, 60% use TMS for home country volume and 51% use TMS for import/export volume. While the USAF does have some degree of online tracking capability with stand-alone systems or vendor systems, standard USAF logistics systems are transaction-based and do not offer the tracking, analytical, or decision support system functionality of a TMS.

Implementation of this best practice will result in cost reduction as functions are optimized, increased flexibility to respond to supply chain changes, and increased visibility which will allow for better management of suppliers.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Meet customer demand for shorter lead times and smaller, more frequent orders - Track and improve supplier performance 	<ul style="list-style-type: none"> - Track and evaluate suppliers' delivery performance - Increase supply chain agility - Obtain real time access to the logistics process throughout the supplier value chain - Improve operational flexibility with supply chain visibility

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Ability for business partners to have access to order status information - Improved customer service by providing accurate order fulfillment information and estimates of charges required to ship a particular order - Visibility into the status of shipments related to promotions by merchandising personnel - The use of TMS by carriers to accept tenders and provide status updates - Better management of both private fleets and common carriers instead of operating the two in separate silos - Availability of performance information necessary to score suppliers - Reduced fuel costs through better fleet maintenance and routing - Ability to focus resources, identify performance glitches, develop strategies for supply chain improvements, and determine the total cost of ownership of supply relationships, products, and the entire supply chain through implementation of consistent performance measurements - Increased shipment aggregation, backhauls, continuous moves, pooling, zone skipping, and other cost lowering consolidation methods through more centralized transportation planning 	<ul style="list-style-type: none"> - Improved ability to respond to supply chain disruptions and other variances - Improved optimization of routes and transportation asset usage resulting in greater availability and reduced fuel costs for government-owned transportation assets - Increased on-time delivery of orders and accurate assessment of fulfillment rates for each supplier, resulting in a better estimate of their reliability - Improved ability to assess the performance of suppliers as part of the contracting process - A means for government personnel at different locations to collaborate on order fulfillment - Improved ability to manage suppliers in a more centralized manner to drive shipment aggregation and the selection of the highest performing suppliers for day-to-day operations - Improved maintenance and operations scheduling with improved visibility of inbound cargo - Reduced order lead times - Improved ability to place smaller orders to support inventory reduction objectives - Improved yard management operations by tracking status of shipments to manage

Industry Benefits	Government Outcomes
- Reduced order expediting	anticipated workload and optimize the picking and handling operation

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Investment costs for an order tracking system are likely to be required - Implementing a TMS often requires significant business process redesign - Resistance from transportation service providers that do not want to share detailed status data or do not want to integrate with a TMS system - Data quality, particularly when monitoring inbound materials 	<ul style="list-style-type: none"> - Resistance of suppliers to provide the required detailed order and transportation status information - Supplier and/or government technological inability to meet system interface requirements - Changes in government processes and methods can negatively impact the use of supplier scorecards - Making use of existing order tracking capabilities and technologies beyond just providing status; applying the technology for decision making towards yard management, assessing readiness status of asset monitored, etc. - Some of the benefits will require collaboration across sites that do not have previous experience with this concept - Operational tracking of transportation assets will be a new skill set at some sites and will require training - Increased coordination due to information that is accumulated on supplier performance that will have to be analyzed and then included in contracting activities

Financial/Performance Metrics:

- Perfect order rate (on time and complete product and information delivered)
- Order delivery on time and in full
- Service level order to deliver lead times
- Transportation asset availability
- Fuel costs
- Supplier costs

Industry Techniques/Tools:

- Continual coordination with suppliers from planning through execution stages
- Central supplier management program to coordinate efforts across the company
- Event-based exception alerts
- Data synchronization
- Structured electronic communications
- Compliance control systems
- Supply Chain Event Management (SCEM)

- Scorecards for collecting metrics data and evaluating level of performance

Industry Implementation Approach:

- The ordering and shipping system is examined from a business standpoint with a clear definition of why order and shipping visibility are needed and which business processes are required.
- The ultimate objective is to find better ways for the shipper and carrier to work together, enabling shippers to be more consistent and carriers to more effectively manage surge periods or supply chain disruptions.
- Supplier management of online tracking steps are:
 - o Communicate: How are orders, plans, and statuses physically exchanged between companies and suppliers?
 - o Coordinate: What type of information is shared between companies and their suppliers?
 - o Monitor: How do companies track the status of in-process and in-transit orders from their suppliers and escalate issues? How do companies measure supplier performance?
 - o Control: How do companies intelligently recover from supply disruptions? How can companies insert control points to prevent glitches in the supply process?
- In practice, implementing online tracking systems often means implementing a TMS. Many current TMS that are not web-enabled are being replaced to fully realize benefits.
- Clearly communicate data quality expectations to suppliers. Monitor data quality and use this as an input to the supplier scorecard to weed out underperforming suppliers and encourage continual data improvement.

Industry Specialties that Implement this Commercial Best Practice:

Project Managers, Logisticians, Financial Analysts, End Users, Trainers, Procurement Managers, Information Technology (IT) Systems Engineers and Specialists

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefit is stability through longer contracts and developed partnerships.

- Evaluate suppliers on the availability of online tracking data, incorporating contract rewards for excellence in timeliness and accuracy of data.
- Include online tracking capability as a selection criterion among suppliers.
- Identify the benefits of leveraging tracking technology across multiple products, services or business areas.
- Nurture business partnerships that invest in a TMS.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Logistics Specialist

Others: Financial Manager, Contracting Officer

Applicable Product Support Elements (PSEs):

- Supply Support
- Maintenance Planning and Management
- Support Equipment/Automatic Test Systems
- Packaging, Handling, Storage and Transportation (PHS&T)

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 4.2 Support Equipment Replacement

3.14.5 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Identify collaboration requirements for the sharing of order and transportation tracking data with the USAF Global Transportation Network (GTN).
- Define data quality requirements for online order and transportation tracking and integration with the GTN.
- Define the metrics that will be used to assess stakeholder and supplier performance on scorecards (consider those listed above).

Request for Proposal (RFP) Development Phase:

- Engage the appropriate Integrated Product Teams (IPTs) and other stakeholders to validate requirements and ensure synchronization.
- Identify the expected supplier investment needed to develop a TMS that is interoperable or compatible with USAF systems. Provide guidance on systems requirements.
- Conduct market research to identify suppliers with the necessary online tracking capabilities.
- Provide the inspection and acceptance criteria that will be used to evaluate TMS or other systems that may be proposed to meet the online tracking requirements.
- Incorporate scorecard requirements into contracts that include order tracking and transportation tracking requirements, as well as data quality.

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements. Selection criteria should reward suppliers that provide the necessary order and transportation visibility services.
- Consider suppliers that have one or more carriers that can manage multiple supplier fleets.
- Assess the maturity and efficacy of vendor online tracking systems. Determine the degree of interoperability with existing USAF systems.

Execution Phase:

- Establish and initiate order and shipment tracking reporting.
- Address and resolve interface, data access, and other issues that may hinder successful implementation of a TMS.

- Assess suppliers using scorecards to ensure that agreed upon standards and levels of service are being met.
- Continue to evaluate and drive improvements to data quality. Solicit customer feedback to aid in system assessment and improvement.
- Share lessons learned with DoD and industry.

3.14.6 Resources and References

Case Study Abstracts:

Ryder® Implements an Order Tracking System – RydeSmart®

Business Problem	Business Solutions
<p>Ryder is a provider of transportation, logistics, and supply chain management services. Customers were demanding shorter lead times and more frequent deliveries to support lean strategies. The goal was to improve the customers' uptime.</p>	<p>Ryder implemented its RydeSmart program to provide better customer service. The system allows Ryder to more closely monitor its fleet and identify maintenance issues that need addressed. A "black box" is installed on the trucks that has global positioning technology and transmits information via a wireless network. Customers can access the following types of data using a Web portal:</p> <ul style="list-style-type: none"> - location of their vehicles at all times - driver performance and efficiency - unauthorized vehicle use - vehicle movements in real time - unscheduled stops - vehicle and cargo theft. <p>The system also allows Ryder to refine route design, detect engine inefficiencies and measure driver performance and vehicle efficiency by monitoring speed, hard braking, and idling. The RydeSmart program has reduced fuel consumption between 10% and 15% per truck per day.</p>

Goodyear Centralizes Transportation Management

Business Problem	Business Solutions
<p>Goodyear manages thousands of shipments per day using hundreds of different carriers, including its own private fleet. Transportation planning and execution was done at various plants and distribution centers. The following issues were identified:</p> <ul style="list-style-type: none"> - Processes varied and there was little visibility of transportation opportunities across the supply chain. Ship sites even a few miles apart operated with no coordination. - Shipment consolidation expertise varied by 	<p>Goodyear's goal was to create a business process that would generate better scheduling, visibility of transportation activities and costs, consistent service and quality, and improved transportation procurement. A load planning center was established that was run by Goodyear's lead logistics provider, Exel. Exel used a full-scale TMS to create daily shipment plans that would be executed by the local Goodyear facilities. Manugistics' TMS was selected with implementation divided into four</p>

Business Problem	Business Solutions
<p>planner and there was often not enough time for effective consolidation.</p> <ul style="list-style-type: none"> - Local service considerations determined the carrier that was used, which could lead to higher cost carriers and routing selections. - Transportation spend analysis was done post-shipment on a monthly basis with no forward visibility to the cost impact of transportation decisions. 	<p>phases/areas to provide complete enterprise visibility into all transportation moves. The results were:</p> <ul style="list-style-type: none"> - Improved shipment consolidation, less expediting, and cross-facility planning drove annual contract freight savings of 3% or more for Goodyear. - The average trip weight for Goodyear’s private fleet has increased 6% to 10%, reducing the number of shipments.

Resources Related to this Best Practice:

- Enslow, Beth, 2004, “Supplier Performance Management for Manufacturers,” 2004 International Conference Proceedings, APICS.
- Denning, Carrie and Camille Custin, 2010, “The Good Haul: Innovations that Improve Freight Transportation and Protect the Environment,” Environmental Defense Fund.
- Proctor, Jennifer, February 2007, “In the Fast Lane,” APICS Magazine.
- Viswanathan, Nari, and Melissa Spinks, February 2009, “Perfect Order, Happy Customer: Managing the Order-to-Delivery Cycle,” Aberdeen Group.
- Aberdeen Group, June 2005, “Best Practices in Transportation Management: How Companies are Driving Cost and Service Improvements.”
- The RydeSmart Program: <http://www.rydesmart.ryder.com/landing/home.aspx>
- Heaney, Bob, July 2010, “International Transportation: Optimize Cost and Service in a Global Market,” Aberdeen Group.

Related Policy:

- **AFI 24-203, Preparation and Movement of Air Force Cargo:** Under Chapter 18 (In Transit Visibility Requirements) of AFI 24-203, it states that “successful In Transit Visibility (ITV) is cargo and/or passenger data received by Global Transportation Network (GTN) and links data directly to airlift mission numbers and/or surface transportation mode: truck, train, or ocean vessel.” AFI 24-203 also states that “GTN is the designated DoD system for ITV, providing data that integrates automated information support to the DoD, and that the Air Force goal is 100 percent ITV.” Standard USAF logistics systems are transaction-based and do not offer the tracking, analytical, or decision support system functionality of a TMS.
- **DoDD 4140.1-R, DoD Supply Chain Materiel Management Regulation:** Under Section 8 (Operations and Support Phase) of DoDD 4140.1-R, it lists life cycle sustainment considerations as “supply, maintenance, transportation, sustaining engineering...”, and states that “effective sustainment of systems results from the design and development of reliable and maintainable systems through the continuous application of a robust systems engineering methodology.” The use of online tracking of supply order and shipping status as a best practice supports the advocacy for the use of reliable and robust systems/technologies to help reduce supply chain management costs in the Operations and Support Phase.

3.15 Best Practice #16 – Postponement

3.15.1 Analysis and Industry Information

Assumptions: This best practice is applicable to any sustainment effort that delays decisions on product differentiation where there are multiple similar products and significant demand uncertainty. This best practice addresses the objectives of balancing inventory savings and customer service with product design, material, and manufacturing costs to achieve an overall lower product life cycle cost.

Description: Postponement is a subset of a practice known as "Collaborative Product Design for the Supply Chain." This practice applies to modular design to maximize the number of standard components and to assemble them early in the assembly process. Assembly of components that differentiate a product are postponed until the later stages of the manufacturing process. Light manufacturing/assembly may be done at distribution centers or the point-of-sale. Postponement is a key strategy for achieving mass-customization to meet customer demand for product variety at the lowest possible cost. There are three levels of postponement implementation, which should be integrated to achieve the lowest product life cycle cost:

- (1) **Product postponement:** A product is designed so it consists of independent modules that can be assembled into different forms of the product easily and inexpensively; e.g., adding country-specific power plugs shortly before shipment.
- (2) **Supply network postponement:** The positioning of inventory and the location, number, and structure of manufacturing and distribution facilities are designed to support the postponement strategy. With modularized products, inventories of each final part number are unnecessary, and fewer warehouses between the manufacturer and the end user are needed. A much smaller inventory of customization modules can be carried locally to customize the core module to the final form, fit, and function needed; e.g., computers with a variety of hard drives, memory, and peripheral options.
- (3) **Manufacturing processes postponement:** Manufacturing processes can be designed into independent modules that increase throughput while increasing flexibility of the factory to produce a variety of products. This creates shortened lead times, which translates to rapid response to changing demand.

The resulting undifferentiated product is built and transported to local facilities. The final differentiation occurs as a response to market demands. This strategy allows the realization of many benefits such as reduced lead times and inventory costs as well as reduced complexity in managing system resources. As demand uncertainty, lead time, inventory, and stock-out costs increase, so do cost savings from postponement.

Postponement reduces overall product costs and inventory levels while simultaneously providing greater flexibility through product customization. Postponement of the addition of a product's unique features and functions provides significant savings in production, transportation, and inventory costs due to standardization and modularization of the core

product. Inventory savings include reduced safety stock requirements, as storing undifferentiated products is a form of inventory pooling, which results in less variance and therefore fewer stock-outs. Since replenishment shipments are being made for a single product rather than many differentiated products, savings from increased shipping volumes can be substantial. These savings can more than offset the increased costs at distribution centers and points of sale from the configuration and light manufacturing that may be required. Achieving the cost savings potential of postponement also often means more modular designs and manufacturing processes with significant savings that can more than offset the increased cost for design and materials.

Industry Objectives	Government Objectives
<ul style="list-style-type: none"> - Lower life cycle product costs - Lower inventory levels - Reduce stock-out costs 	<ul style="list-style-type: none"> - Lower overall product price - Reduce inventory - Reduce maintenance complexity and costs - Reduce order lead times - Improve flexibility in sourcing

Industry Benefits	Government Outcomes
<ul style="list-style-type: none"> - Reduced risk of obsolescence of end-products - Expanded customer base due to product customization closer to the end user - Shorter lead times for order fulfillment - Lower inventory levels through inventory pooling - Reduced packaging, resulting in more cost effective shipping and warehousing of products - Reduced transportation costs from more aggregated shipments of undifferentiated products - Reduced manufacturing lead time from more modularized manufacturing processes 	<ul style="list-style-type: none"> - Reduced supply chain inventory footprint - Increased collaboration in design phase - Increased operational flexibility due to increases in component commonality - Reduced spare parts inventory - Shorter order lead times - Increased flexibility to source the parent item, knowing that it can be modified later in the supply chain to satisfy demand for multiple items

Industry Challenges	Government Challenges
<ul style="list-style-type: none"> - Training or hiring of staff with final production skills at distribution centers - Processing at the distribution center may be more expensive than at the manufacturing plant - Material costs can be higher since some lower end products may have components from higher end products - Some functionality may be lost - Various groups within an organization such as marketing, research & development, manufacturing, and finance must cooperate and agree to common measures of performance 	<ul style="list-style-type: none"> - Short order lead times may not support the postponement philosophy - Fluctuation in commodity availability and currency exchanges at acceptance time - Influencing the business practices of suppliers so that postponement strategies are implemented where appropriate - Obtaining approval to participate in the design process to ensure product changes necessary for postponement consider government requirements - Cost of establishing organic capability and acquiring technical data needed to modify the parent item at Air Logistics Centers (ALCs) or

Industry Challenges	Government Challenges
	other repair sources under repair network integration

Financial/Performance Metrics:

- Order fulfillment cycle time
- Inventory carrying costs
- Order fulfillment rates
- Product life cycle costs
- Stock-out costs

Industry Techniques/Tools:

- Warehouse management system (WMS)
- Bar code or radio frequency scanner technology
- Electronic Data Interchange (EDI), or some other technology that would allow the transmission of data between supply chain partners

Industry Implementation Approach:

- Organizational alignment is a first step in strategic supply chain activities such as postponement. Different groups within an organization will have different perspectives on the value of increasing or decreasing product variety.
- Various product, manufacturing, and distribution methods must be analyzed with a consideration of product life cycle costs.
- Any postponement effort must be sustainable as one initial analysis will not solve the underlying business problems. Three components of a sustainable process are (Cargille, 2007):
 - o A repeatable methodology to assess the expected impact of adding, keeping, or removing variety.
 - o A robust decision process with clear roles and responsibilities for product introductions and end-of-life decisions.
 - o Metrics for monitoring variety, including closed-loop processes for controlling the accuracy of the variety-management process.
- For product postponement, modular product structure is a prerequisite, so logistics and/or supply chain management have to be involved in the product development process.
- To support the development process, logistics/supply chain management has to provide a clear estimation of the effects of product design (especially the number of variants) on production and logistics costs.
- Agreements are necessary with suppliers and carriers on:
 - o Delivery time requirements.
 - o Inventory policies at the supplier locations and distribution centers.
 - o Required packaging of items to produce the combined shipment, including generation of packing slips and other documentation.

Industry Specialties that Implement this Commercial Best Practice:

Purchasing Manager, Design Engineer, Marketing Manager, Manufacturing Manager, Warehousing/Shipping Manager, Finance Manager, Research and Development Design Engineer.

Ways to Incentivize Industry to Leverage this Commercial Best Practice:

The benefit is shared knowledge and rewards that can be financial or partnership related.

- Create common product lists and user volume to allow volume discount potential.
- Reward vendors that meet or exceed delivery turn times and quality metrics.
- If possible, reveal other vendors' practices concerning standards, criteria, and peak performance parameters and outputs.

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Systems Engineer, Industrial Engineer
Others: Logistics Specialist, Financial Manager

Applicable Product Support Elements (PSEs):

- Sustaining and System Engineering
- Design Interface
- Supply Support
- Maintenance Planning and Management
- Facilities
- Packaging, Handling, Storage and Transportation (PHS&T)

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 4.2 Support Equipment Replacement

3.15.2 How to Implement this Commercial Best Practice

Requirements Identification/Development Phase:

- Choose target systems/subsystems/components for postponement implementations based on similarity of core functions.
- Based on end user needs, establish point-to-point ordering and shipping minimum and maximum lead times for order placement to manufacture, assemble, and deliver the items.
- Establish materials management requirements and cycle times, per final product configuration, depending on the complexity, risk of loss, and end item purpose and storage costs.

- Provide end user inventory levels (both core module and customization module inventories) and prioritized delivery locations for swap-outs and replacements in an integrated master schedule/plan.
- Where variability exists in end item needs for user delivery, consider averaged minimum/maximum order quantities or state as minimum/maximum orders to be delivered by location.
- Analyze various product, manufacturing, and distribution methods, considering product life cycle costs.
 - o For example, Class VII and IX items could be bought in a common configuration and modified to fit a need at an ALC or other repair site designated by the USAF. In the Repair Network Integration, the USAF intends to network its repair capability across the enterprise (depot, intermediate and base-level) and route items to the repair source with the right capability and most capacity. The USAF can designate the postponement modification responsibilities to the Air National Guard or USAF Reserve. Certain Class IX items could also be candidates for postponement, e.g., avionics items or other items that may have core capabilities but varying software configurations or cable connectors based on mission sets.
- Develop inspection/acceptance criteria by location and volume. Simplify and accelerate inspection/acceptance process.
- Define product design requirements needed to increase the use of common components while maintaining performance requirements.

Request for Proposal (RFP) Development Phase:

- Consider multiple awards and competing task orders for the best price of the end item established at the time of need.
- Include product design requirements needed to increase the use of common components while maintaining performance requirements.
- Determine whether or not volume requirements are high enough for industry to be responsive to a postponement proposal and to have stock available to react to order sensitivity.
- Include inspection/acceptance criteria by location.

Proposal Review/Fact Finding/Negotiating Phase:

- Award best value contract(s) based on shipping/packaging efficiencies, inventory turn times, and end item price.

Execution Phase:

- Initiate inspection/acceptance criteria by location and volume of product ordered. Inspection at site/plant should be conducted in a timely manner.
- Measure performance of vendor. Any deviations should impact a past performance rating and evaluation of the vendor.
- Government approved quality management systems will speed systematic production and delivery. If small businesses are involved, it may require more manpower from the Government to review reporting systems for purchasing, accounting, and quality.

- Monitor and evaluate the effectiveness of the postponement arrangements, and implement processes and other changes to continuously improve performance.
- Manage to the levels of output originally envisioned, with any significant variances in output reviewed quarterly.
- Share lessons learned with DoD and industry.

3.15.3 Resources and References

Case Study Abstracts:

Benetton Group

Business Problem	Business Solution
<p>Forecasting in the fashion goods industry is notoriously difficult. The selling season is short, and manufacturing lead times are long. Prior to the upcoming season, Benetton traditionally would have no insight into customers' color preferences, dying yarn and knitting sweaters with the risk that customers might not prefer the colors, ultimately resulting in the company having to assume large write-off costs.</p>	<p>Benetton identified the bottleneck process—knitting—and decided to knit all sweaters in raw, undyed yarn. Now, Benetton quickly dyes sweaters to replenish actual demand in their stores. Benetton had to redesign their manufacturing process, but is now much more likely to have the stock customers want on the stores' shelves without the penalty of excessive inventory at the warehouse.</p>

Hewlett-Packard

Business Problem	Business Solution
<p>Hewlett-Packard (HP) manufactures and sells the HP Deskjet in many markets, which requires different materials to include power supply to match voltage requirements and instructions in different languages. HP sells over two dozen country-localized versions of the printer. At one time, products were completely assembled for every market at the factory.</p>	<p>Generic printers are now shipped to regional distribution centers where workers combine printers with the right power cords and manuals to meet local demand needs. In other words, product differentiation is postponed from the factory and product localization is assigned at the warehouse. These substantial process changes led to many benefits:</p> <ul style="list-style-type: none"> - Inventory requirements were greatly reduced, leading to substantial cost savings - Final packaging of the printer at the distribution center, just before shipping to the retailer, allowed HP to save an estimated \$3 million per month in shipping costs - Bulk-shipping density was reduced by 250% - This shipping method reduced inventory requirements by 60%.

Paint Manufacturing

Business Problem	Business Solution
<p>Paint manufacturers experienced high costs of inventory to stock a large variety of make-to-stock paint colors. Historically, companies would manufacture each color of paint at an offsite facility, package the different colors, and then ship the product to retail stores. This created large inventories of multiple colors of paint.</p>	<p>What has become the standard today is to use smaller quantities of colors that are mixed to create the entire palette of colors. This enables customization at the point-of-sale. By moving the process of mixing to the end, postponement created huge efficiencies for the industry, dramatically reduced costs, and improved customer satisfaction.</p>

Dell Computer

Business Problem	Business Solution
<p>Dell was experiencing high inventory costs of make-to-stock personal computers (PCs).</p>	<p>Instead of assembling a complete PC, Dell created a supply chain where the company would hold inventory of component parts in a few centralized locations, and as customers placed their orders, a Dell computer would be assembled exactly to the customer’s requirements, then the PC would be shipped directly to the customer. This system allowed Dell to become more flexible and efficient in their supply chain. One such efficiency was reduced lead times. With the Dell model, Dell fully assembles a PC in one to two days, and the customer receives their order by the end of the week, as opposed to experiencing a lead time of 4-6 weeks. This process alone significantly reduces the holding costs incurred during shipping, and improves customer satisfaction. With this strategy of postponement, Dell commonly holds inventory for less than 4 days. By using a postponement assembly strategy, Dell is able to minimize their inventory, generate cash much faster, and reinvest this cash into improving their supply chain model.</p>

Resources Related to this Best Practice:

- Benetton and Hewlett-Packard case studies: Sasser and Marguerita, November 1995, “Postponing Product Differentiation,” *Mechanical Engineering-CIME*.
- Dell case study: Kong and Allan, June 2007, “More on Postponement Adapting Postponement to the Supply Chain,” <http://www.kongandallan.com/>.
- Feitzinger, Edward, and Hau L. Lee, January-February 1997, “Mass Customization at Hewlett-Packard: The Power of Postponement,” *Harvard Business Review*.

- Simchi-Levi, David, Philip Kaminsky, and Edith Simchi-Levi, 2003, Designing & Managing the Supply Chain: Concepts, Strategies & Case Studies, 2nd Edition, The McGraw-Hill/Irwin Series in Operations and Decision Sciences.
- Cargille, Brian and Jane Melia, 2007, “Less is More, Later is Better: Keeping Sales High and Costs Low at Hewlett-Packard,” *APICS Magazine*.

Related Policy:

- **AFPAM 63-128, Guide To Acquisition and Sustainment Life Cycle Management:** Under Section 3.10 (Packaging, Handling, Storage, and Transportation (PHS&T) of AFPAM 63-128 (Guide To Acquisition and Sustainment Life Cycle Management), guidance on the resources, processes, procedures, design considerations, and methods “to ensure that assets are packaged/preserved, handled, stored, and transported properly” is included, and it stresses the “consideration of alternatives that could improve PHS&T efficiency, such as system or subsystem design modularity and standardization.” This supports this best practice as an alternative practice; modular product structure is a prerequisite for product postponement, so logistics and supply chain management should be involved in the product development process.
- **DoDD 4140.1-R, DoD Supply Chain Materiel Management Regulation:** Under Section C4.5.1.1 of Chapter 4 (Make/Maintain) of the DoD Supply Chain Materiel Management Regulation, the requirement states “the DoD Components shall ensure adequate levels of sets, kits, outfits, and component items based on demand planning.” If demand planning is done effectively early in the assembly process and a modular design approach is utilized to maximize the number of standard components, then the postponement (delayed differentiation) best practice proves cost-effective and beneficial in complying with this requirement.

4.0 GOVERNMENT BEST PRACTICES

Table 6. Government Best Practice Applicability by Functional Specialist

Best Practices		Functional Specialist					
		Contracting Officer	Systems Engineer	Financial Manager	Product Support Manager	Industrial Engineer	Program Manager
1	Firm Fixed Price (FFP) Based on Variable Levels of Demand	✓	✓	✓	✓	✓	✓
2	Structure of CLS Contract to Enable Identification of Fixed and Variable Elements of Support	✓		✓	✓		✓
3	Incorporate Labor Hour Range Tables	✓		✓	✓		✓

Best Practices		Functional Specialist					
		Contracting Officer	Systems Engineer	Financial Manager	Product Support Manager	Industrial Engineer	Program Manager
4	Incorporate CLINs to Facilitate Contract Flexibility	✓		✓	✓		✓
5	Competition for Engineering Change Proposals (ECPs)	✓		✓	✓		✓
6	Business Case Analysis & Performance Measurement Framework	✓	✓	✓	✓	✓	✓
7	Align RFP Requirements with Government Funding	✓		✓			

Table 7. Government Best Practices by Integrated Product Support Element

Best Practices		Integrated Product Support Elements											
		Product Support Management	Design Interface	Supply Support	Maintenance Planning & Mgt	Support Equipment	Facilities and Infrastructure	PHS&T	Technical Data	Manpower & Personnel	Training and Training	Computer Resources	Sustaining Engineering
1	Firm Fixed Price (FFP) Based on Variable Levels of Demand	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2	Structure of CLS Contract to Enable Identification of Fixed and Variable Elements of Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3	Incorporate Labor Hour Range Tables	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4	Incorporate CLINs to Facilitate Contract Flexibility	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
5	Competition for Engineering Change Proposals (ECPs)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
6	4.1 Business Case Analysis & Performance Measurement Framework	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Best Practices			Integrated Product Support Elements											
			Product Support Management	Design Interface	Supply Support	Maintenance Planning & Mgt	Support Equipment	Facilities and Infrastructure	PHS&T	Technical Data	Manpower & Personnel	Training and Training	Computer Resources	Sustaining Engineering
7	4.2	Align RFP Requirements with Government Funding	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Users should read each applicable BP in Chapter 4 thoroughly to gain valuable insight into government strategies that have proven successful in improving CLS program and contract management. The functional specialists should apply the applicable BP information to their situation, using the recommended implementation actions or tailor the BP for their purposes, keeping in mind that not all implementation actions may apply to their scenario. Functional specialists may also formulate their own approaches to implementing the BP based on the information and various references provided.

4.1. Government Best Practice #1 – Firm Fixed Price (FFP) Based on Variable Levels Of Demand

4.1.1 Analysis and Information

Assumptions: This best practice is applicable to any sustainment effort that requires aircrew training as well as training device repair. FFP based on variable levels of demand can allow the government contract flexibility/scalability and cost visibility.

Description: For well-defined services, the government can use an Indefinite Delivery/Indefinite Quantity (ID/IQ) services contract to lock in competitive prices for varying levels of demand for those services. For example, pricing matrices for instructing various quantities of students and the contractor logistics support required to support those various throughput levels can be pre-priced to allow greater flexibility.

GBP #1 Objectives, Outcomes and Challenges

Government Objectives

- Allows the government to use pre-priced FFP for services when requirements are well defined but demand may be variable

- Minimizes overhead to oversee contract once awarded
- Increases the government flexibility in ordering services

Government Outcomes

- FFP means government does not have to distribute unpredicted funds.
- Reduces government tracking and overhead costs due to FFP vehicle
- Reduces waste of paying for more students than are actually trained.
- Reduces waste of paying for more training device repair than is necessary

Government Challenges

- Separation of the fixed vs. variable costs

Financial/Performance Metrics: Firm fixed price to train a range of students at the same price. For example, 45-65 students could be trained for a certain price, 66-80 students might be trained for a different price, etc. The pre-priced ranges should encompass the entire quantity of students +/- a percentage around the Most Probable Student Quantity

Ways to Incentivize Industry to Leverage this Government Best Practice: Contractor can charge a higher profit based on assumption of all cost risk.

Government Functional Specialties Responsible to Implement this Government Best Practice:

Primary: Program Manager, Contracting Officer

Others: Financial Manager, Product Support Manager

Applicable Integrated Product Support Elements (IPSEs):

- Product Support Management
- Sustaining/Systems Engineering
- Design Interface
- Supply Support
- Maintenance Planning and Management
- Support Equipment
- Facilities
- Packaging, Handling, Storage and Transportation (PHS&T)
- Technical Data
- Manpower & Personnel
- Training
- Computer Resources

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 1.1 Operations Personnel
- 1.2 Maintenance Personnel
- 1.3 Other Direct Support Personnel
- 3.1 Organizational Maintenance

- 3.3 Depot Maintenance
- 4.1 System Specific Training
- 4.2 Support Equipment Replacement
- 4.4 Sustaining Engineering and Program Management

4.1.2. How to Implement this Government Best Practice

Requirements Identification/Development Phase:

- Clearly define the services which are required.
- Determine the most probable level of services which will be required for each ordering period. For example, the most probable quantity of students to be trained in defined curricula.
- Determine the level of variability around the most probable level of services which is to be pre-priced. For example, determine X% below and Y% above the anticipated level of service to account for demand variability.
- Gather feedback from industry on key requirements.
- For each ordering period, develop price matrices which specify three quantities for desired services: The most probable level of services, X% below, and Y% above. For example, if a student throughput of 100 is anticipated, and the desire is to accommodate 35% below and 30% above, the price matrix would specify quantities of 65, 100, and 130 students. In this example, matrices could also be developed for FFP to provide the necessary CLS to support the student ranges.
- In the Request for Proposal, direct offerors to propose FFP to accommodate the entire specified range. Using the example of student throughput, direct offerors to propose the greatest number of students which can be trained for the same price. The offeror is to price as many offeror-determined ranges as necessary to accommodate the government-specified quantities.

Request for Proposal (RFP) Development Phase:

- Develop final requirements.

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements.
- Down select and validate supplier/integrator capabilities.
- Select supplier/integrator based on RFP requirements and cost proposal.

Execution Phase:

- At contract award, the price matrices become the basis for awarding orders for the required services
- Establish a collaboration agreement.
- Communicate government’s demand forecasts to the supplier.
- Manage supply constraints.
- Test, evaluate and improve the solution.

4.1.3. Resources and References

Case Study Abstract:

C-17 Aircrew Training and Aircrew/Maintenance Training Device Maintenance Contract

Business Problem	Business Solutions
<p>- Find a contracting strategy that provides cost savings, flexibility and cost visibility for the follow-on C-17 Aircrew Training and Training Device CLS contract.</p>	<p>- The program office determined that using FFP price matrices would be appropriate for the C-17 Training System Follow-on program because they were procuring well-defined services as defined in their Performance Work Statement. They were essentially buying "more of the same" C-17 aircrew and maintenance training services that had been ongoing for many years. Since the services are well defined, the offerors could provide firm-fixed prices. Plus, since the program office had the offeror supply his price to perform these services for the entire (potential) 7-year ordering period, the government locked in prices developed during competition. The program office utilized a Performance Price Tradeoff source selection, so the offeror was incentivized to provide his lowest reasonable Total Evaluated Price. The offeror's prices for Instruction and CLS (taken from their price matrix) were major components of the Total Evaluated Price.</p> <p>- The government provided the matrices as part of the RFP package. With their response, the offerors submitted firm</p>

	<p>fixed prices for training offeror-defined ranges of students (i.e., a range of students which they could train for a given price) from 35% below to 30% above the Most Probably Student Quantity (MPSQ). The FFPs were provided for all ordering periods at all known bases. This allowed the government the flexibility to "order" various quantities of students at a pre-negotiated price and to account for reductions and plus-ups without having to renegotiate prices. As stated above, by having the offeror price out all ordering periods during competition, the government realized substantial savings.</p> <ul style="list-style-type: none"> - For the CLS matrix, the program office had the offeror provide the FFP to perform the CLS necessary to support each offeror-submitted student range. - Having well defined requirements for this best practice cannot be overstated.
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Supporting research/documentation related to this Government Best Practice:

- Dudek, Gregor, Collaborative Planning in Supply Chains, A Negotiation-Based Approach, Springer-Verlag, Berlin, c)2004, p.141
- Dietrich, Brenda and Harrison, Terry, Serving the Services Industry, ANALYTICS web publication, Summer 2008, <http://analytics-magazine.com/?p=799>

Related Policy:

FAR Part 16.504 *Indefinite Delivery/Indefinite Quantity Contracts*: An indefinite-quantity contract provides for an indefinite quantity, within stated limits, of supplies or services during a fixed period. The Government places orders for individual requirements. Quantity limits may be stated as number of units or as dollar values.

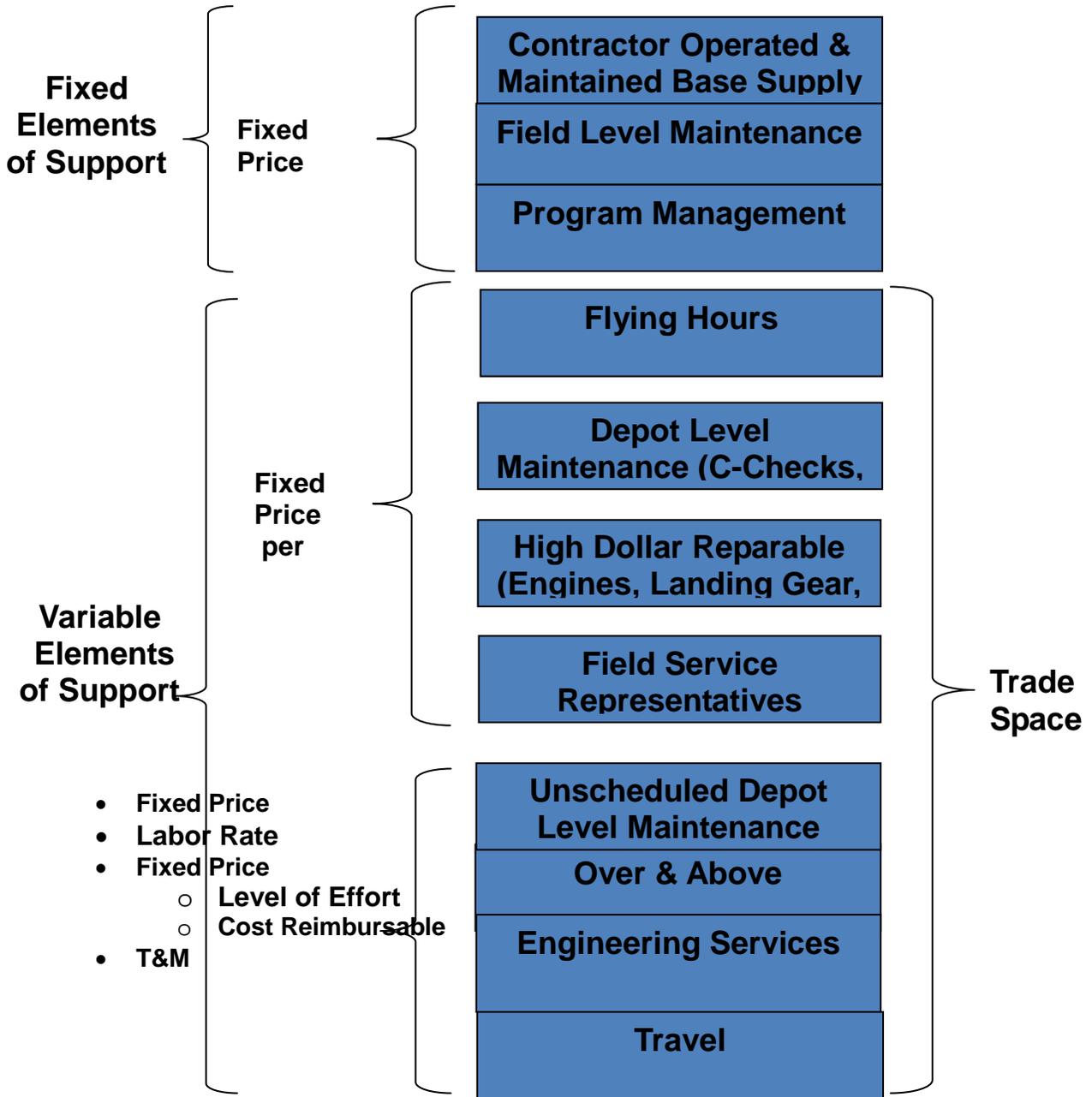
4.2. Government Best Practice #2 – Structure of CLS Contract to Enable Identification of Fixed and Variable Elements of Support

4.2.1. Analysis and Information

Assumptions: This best practice is applicable to any complex system sustainment effort that encompasses multiple support elements (such as aircraft field and depot level maintenance (scheduled and unscheduled), supply chain management, inventory management, distribution, commodity repair and overhaul, maintenance of technical orders/data, software maintenance, sustaining engineering, etc.) and is forecast to experience funding shortfalls/instability over the performance period.

Description: For well-defined services supporting full weapon system sustainment, the government can use an Indefinite Delivery/Indefinite Quantity (ID/IQ) services contract which provides a menu of fixed price services enabling flexibility and scalability of the contract based upon available funding. This provides flexibility. The program office must fund the items listed as “fixed support” in Figure 4.1 below. However, the program office can reduce the variable support items listed in Figure 4.1 below. For example, flying hours can be reduced; fewer Programmed Depot Maintenance (PDM) or C-Checks or high dollar repairs can be purchased.

Figure 5. Contract Flexibility/Scalability Menu Plan



Both “fixed” and “variable” support elements are Firm Fixed Price within the contract. CLINs that are identified as “fixed” in this application are defined as those elements that are necessary and are not dependent on the volume of activity, for example, the manpower necessary to provide flight line maintenance at each operating location. These items become a “fixed cost” of executing the contract or a must pay item. Typically, these CLINs must be fully funded at the beginning of the period of performance.

Support elements/CLINS that are identified as “variable” are defined as those elements that are necessary and vary in volume of activity. These items are only paid for when they are ordered. This enables tradeoffs among these elements to be made in response to funding constraints. Within the variable elements, varying levels of activity may also be incorporated (see below). For example, flying hour price based upon flying hour range per month (notional data).

Price Based Upon Flying Hour per Month

<u>Hourly Ranges</u>	<u>Firm Fixed Unit Price per Range</u>
0-150	\$1200
151-300	\$1150
301-450	\$1115
451-600	\$1100
601-750	\$1090

The USAF can elect to fund varying quantities and combinations of support tasks based upon available funding and Program Office assessment of most effective combination in terms of performance outcomes (i.e. Aircraft Availability, Mission Capable Rate, Non-Mission Capable Supply Rate, Non-Mission Capable Maintenance Rate, War Readiness Engines, Departure Reliability, etc.). For example, some number of engine overhauls may be deferred in order to accomplish all scheduled aircraft PDMs or C-checks.

This best practice identifies and minimizes the “must pay” or fixed elements of the contract while providing the flexibility to incrementally trade off variable support requirements based upon available funding. Decrements to performance metrics are identified and managed individually based upon deferred requirements in the execution year.

Notional Example

TASK (CLIN)	Req. (\$M)	Req. (each)	Funded	Funded (each)	Fixed or Variable
COMBS	6.0	NA	6.0	NA	Fixed
O Level Maintenance	8.0	NA	8.0	NA	Fixed
Program Management	2.0	NA	2.0	NA	Fixed
Total Fixed	16.0		16.0		

Flying Hours	7.9	7200	6.0	5400	Variable
Engine Overhaul	85.9	57	67.5	45	Variable
Main Landing Gear Overhaul	2.1	12	1.7	10	Variable
Nose Landing Gear Overhaul	0.6	3	0	0	Variable
APU Overhaul	9.2	20	4.6	10	Variable
Thrust Reverser Overhaul	5.0	35	3.6	25	Variable
PDM	21.0	28	21.0	28	Variable
Acft Paint	10.0	10	7.0	7	Variable
Acft Unscheduled Maintenance	3.2	5	0.640	1	Variable
Depot Over & Above	20.0	100,000 Hrs	15.0	75,000 Hrs	Variable
Software Maintenance	2.0	5000 Hrs	2.0	5000 Hrs	Variable
Sustaining Engineering	2.7	50 Assignments	1.62	30 Assignments	Variable
Technical Orders	0.6	8000 pages	0.6	8000 pages	Variable
Field Service Representatives	1.1	3	1.1	3	Variable
Contractor Travel	0.32	10 OCONUS 15 CONUS	.256	10 OCONUS 7 CONUS	Variable
Total Variable	171.6		132.6		
Total Program	187.6		148.6		

As shown in the example above, the program is funded at 79% of the requirement. In making tradeoff decisions, the Program Office has determined deferring engine overhaul requirement (12 ea.) is less harmful to system readiness than deferring input of aircraft to PDM. In this example, in order to fund one engine overhaul, two PDM inputs would be deferred resulting in the removal from service of those aircraft and associated impact to aircraft availability. The deferred overhauls may also remove the engines from service impacting War Readiness Engine (WRE) level. Trade-off of variable support requirements and any associated impact to performance metrics are managed in the execution year.

GBP #2 Objectives, Outcomes and Challenges

Government Objectives
<ul style="list-style-type: none"> - Allows the government to use pre-priced FFP CLINs for services within constrained and unstable funding environment while lowering risk of government default on the contract - Increases government flexibility in ordering of services - Allows the government to manage performance-cost trade-offs in the execution year

Government Objectives
Government Outcomes
<ul style="list-style-type: none"> - The ability to minimize “must pay” aspects of performance based contracting at the system level - Increases flexibility and scalability to respond to funding constraints and instability through variable elements - Aligns contract strategy and execution with corporate AF Centralized Asset Management (CAM) concept of operations - Provides price insight at the task level to HHQ - FFP menu enables rapid execution of unpredicted funds (fall out dollars)
Government Challenges
<ul style="list-style-type: none"> - This hybrid methodology moves a step closer to transactional contracting from pure Performance Based Logistics (PBL) but still relies on performance based contracting approach - Increases complexity of government program management and product support integration with resultant government resource requirements - Determining performance requirements that are converted to deliverable outcomes and the impact of requirement trade-offs on those outcomes - Potential adjudication of performance shortfall due to requirement trade-off/failure to fund or other government induced decrements to performance - Developing appropriate metrics, incentives and penalties to drive the desired behaviors and outcomes

Financial/Performance Metrics (dependent upon scope of services):

- Operational Availability
- Mission Capability Rate
- Operational Reliability
- Departure Reliability
- Non-Mission Capable Supply/Total Non-Mission Supply Rate
- Non-Mission Capable Maintenance Rate
- Logistics Response Time
- Quality Deficiency Reports/Rates
- End user satisfaction

Information systems/Tools:

- Maintenance report reviews
- Inventory report reviews
- Engineering assessments (ASIP, MESCEP, DRs etc.)
- Safety/Mishap Reports
- Life Cycle Management Plan
- Engine Life Cycle Management Plan
- Service Bulletins, Airworthiness Directives (applicable to Commercial Derivative Fleets)
- Corrective Action reports (DCMA)

- Independent Government Estimate (IGE)
- Business Case Analysis
- Customer surveys/feedback
- Lessons Learned

Ways to incentivize industry to leverage this government best practice:

Given the current funding constraints, it is difficult to establish monetary incentives. However, the structure of the contract provides economic and non-cost based incentives for the contractor based upon achieving identified performance outcomes. For example:

- Potential to earn additional period of performance (option years) based upon meeting required metrics (Award term).
- The QASP metrics ensure the contractor is measured against performance requirements and incentivizes the contractor to maintain requirements to ensure satisfactory CPARs or incentive options are earned, if applicable.
- The firm fixed price nature of the contract provides the contractor with incentives to control costs to ensure profitability.
- Competition ensures offerors are incentivized to provide the best pricing possible to remain competitive.

Government Functional Specialties Responsible to Implement this Government Best Practice:

Multi-functional team consisting of: Program Manager, Contracting Officer, Logistician, Engineer, Equipment Specialist, Financial Manager, and Legal Advisor.

Team may be supplemented with Data Manager, Cost Analyst, and MAJCOM stakeholders.

Applicable Integrated Product Support Elements (IPSEs):

- Product Support Management
- Sustaining Engineering
- Supply Support

- Maintenance Planning and Management
- Support Equipment
- Facilities
- Packaging, Handling, Storage and Transportation (PHS&T)
- Technical Data
- Manpower and Personnel
- Training
- Computer Resources

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 1.0 Unit Level Manpower (System Level)
- 3.0 Maintenance
- 4.0 Sustaining Support (System Level)
- 4.1 System Specific Training
- 4.2 Support Equipment Replacement
- 4.3 Sustaining Engineering
- 4.4 Program Management
- 4.5 Information Systems
- 4.6 Data and publications
- 4.7 Simulator Operations
- 4.8 Other Sustaining Support
- 5.0 Continuing System Improvements
- 5.1 Modifications or Modernization
- 5.2 Software Maintenance or Modification

4.2.2. How to Implement this Government Best Practice

Requirements Identification/Development Phase (Market research and early industry involvement):

- Risk identification and assessment
- Acquisition strategy development
- Market intelligence
- Requests for Information/Sources Sought
- Industry Day and One-on-one meetings
- In-sourcing capabilities
- Initial small business assessment and strategy inputs
- Information library and historical or data projections (inventory, demand and usage information, maintenance records, etc.)
- Type of contract
- Period of performance (Base period and option periods)
- CLIN structure
- Pricing arrangements
- Performance metrics and measures (desired outcomes and means of measurement)

- Incentive structure
- Waivers and deviations
- Special Terms and Conditions
- Special clauses (H clauses)
- Evaluation criteria
- Budgets
- Source Selection Procedure (Full trade, Price Performance Trade-off, Lowest Price Technically Acceptable, Sole Source)
- Acquisition Schedule

- Contract oversight and evaluation (Service Delivery Summary)
- Source Selection Organization
- Independent Government Estimate (IGE)
- Develop Source Selection Plan, Acquisition Plan, Life Cycle Management Plan etc.
- Draft Request for Proposal (RFP)
- Incorporate and respond to industry comments to draft RFP
- Finalize RFP
- Legal review and clearance
- Release RFP/notice of source selection action

Request for Proposal (RFP) Development Phase:

- Evaluate industry proposals against government requirements.
- Release of clarification and communication evaluation notices
- Evaluation and update evaluations based upon EN responses
- Initial evaluation and competitive range determination
- Request for Final Proposal (FPR)

Proposal Review/Fact Finding/Negotiating Phase:

- Revise evaluations and prepare final evaluation recommendation to Source Selection Authority
- Legal review and clearance
- Complete source selection documentation and notifications of award
- De-briefings to offerors

Execution Phase:

- Update requirement and budget projections based upon contract pricing
- Update Weapon System Agreements (WSA)
- Manage performance through adherence to contract metrics and measures
- Evaluate and document contractor performance at pre-determined intervals (CPARs, Incentive Option or Fee Evaluation Determination)
- Document and share lessons learned

4.2.3. Resources and References

Case Study Abstract:

Technique has been successfully used by AFLCMC VIPSAM/Special Duty Division, Mobility Directorate in support of assigned commercial derivative aircraft.

Supporting Research/Documentation related to this Government Best Practice:

- Factors in determining contract types:
<http://nawctsd.navair.navy.mil/Resources/Library/Acqguide/selecting-contract-types.htm>
- Increasing Competition and Structuring Contracts for the Best Results, EXECUTIVE OFFICE OF THE PRESIDENT, OFFICE OF MANAGEMENT AND BUDGET:
http://www.whitehouse.gov/sites/default/files/omb/assets/procurement_gov_contracting/incr_easing_competition_10272009.pdf
- Performance Based Logistics and Project Proof Point, A Study of PBL Effectiveness, John Boyce and Allan Banghart, Defense AT&L; Product Support Issue March-April 2012, pp. 26-30

Related Policy

- AFI 63-101, Acquisition and Sustainment Life Cycle Management
- Logistics Assessment Process Guide
- AF Independent Logistics Health Assessment Handbook
- Performance Based Logistics: A Program Manager’s Product Support Guide

4.3. Government Best Practice #3 – Incorporate Labor Hour Range Tables

4.3.1. Analysis and Information

Assumptions: This best practice is applicable to any sustainment effort that requires aircrew training, as well as training device repair, and all other contracts with applicable labor categories. FFP based on variable levels of demand can allow the government contract flexibility/scalability and cost visibility.

Description: Build in labor hour range tables to firm fixed price contracts when demand has an extreme amount of variability. Typically 8 hour, 12 hour, or 16 hour days are priced. A range of labor hours is usually decided upon annually and awarded with each option based on known requirements at the time of option award.

GBP #3 Objectives, Outcomes and Challenges

Government Objectives
<ul style="list-style-type: none"> - Reduce costs - Allows the government to use FFP when demand variability is high - Minimizes overhead to oversee contract once awarded
Government Outcomes
<ul style="list-style-type: none"> - Government will receive more detailed contractor costs - Reduces tracking and overhead of costs by government due to FFP vehicle - Allows for flexibility due to demand variability and/or budget constraints

Government Challenges

- Contractors to provide cost data on a firm fixed price contract vehicles
- Handling variability with fixed price contracts (see Government Best Practice #2)
- Number of CLINS can become substantial depending on number of labor ranges, # of platform types, # of locations, etc.

Financial/Performance Metrics:

- Operational Availability
- Operational Reliability
- Cost per Unit Usage (Return on Net Assets)
- Logistics Response Time
- End user satisfaction
- Total Cost of Ownership

Information systems/Tools:

- Performance based logistics measures

Ways to Incentivize Industry to Leverage this Government Best Practice:

- Provide economic based incentives for the contractor based on the PBL metrics they are to achieve

Government Functional Specialties Responsible to Implement this Government Best Practice:

Primary: Program Manager, Contracting Officer

Others: Financial Manager, Product Support Manager

Applicable Integrated Product Support Elements (IPSEs):

- Product Support Management
- Sustaining Engineering
- Supply Support
- Maintenance Planning and Management
- Support Equipment
- Facilities
- Packaging, Handling, Storage and Transportation (PHS&T)
- Technical Data
- Manpower and Personnel
- Training
- Computer Resources

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 1.1 Operations Personnel
- 1.2 Maintenance Personnel
- 1.3 Other Direct Support Personnel
- 3.1 Organizational Maintenance
- 4.1 System Specific Training
- 4.2 Support Equipment Replacement
- 4.3 Sustaining Engineering
- 4.4 Program Management

4.3.2. How to Implement this Government Best Practice

Requirements Identification/Development Phase:

- Develop top level requirements
- Develop FFP labor hour matrices
- Conduct industry day on key requirements.
- Obtain feedback on labor hour matrices
- Try to build in variable costing items using FFP umbrella

Request for Proposal (RFP) Development Phase:

- Develop formal RFP
- Include a thoroughly vetted Range table matrix
- Establish Total Evaluated Price (TEP) using pre-selected cells from the matrix, not disclosed to offerors
- Build in any incentive clauses if required

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements
- Validate supplier/integrator capabilities
- Select supplier/integrator based on RFP requirements and cost proposal

Execution Phase:

- Establish a collaboration agreement
- Communicate government's demand forecasts and any actual data on labor hours to the supplier
- Manage supply constraints
- Test, evaluate and improve the solution
- Document and share lessons learned

4.3.3. Resources and References

Case Study Abstract:

Department of Transportation Paradigm

Business Problem	Business Solutions
Find a contracting strategy that provides cost savings, flexibility and cost visibility for the Department of Transportation.	The Department of Transportation uses this paradigm. An estimated cost and fixed fee are negotiated for the level of effort predicted to be required; the payment of fixed fee clause can be structured to say that the fee will be paid for the furnishing of the level of effort plus or minus a certain percent. So instead of stating the effort as a single number of hours, it is stated as "not less than X hours and not more than Y hours." For any outcome within the range, the contractor will be paid the full fixed fee of the contract. A fee adjustment would only be required if the effort falls outside the range.

Supporting research/documentation related to this Government Best Practice:

- Dudek, Gregor, Collaborative Planning in Supply Chains, A Negotiation-Based Approach, Springer-Verlag, Berlin, c)2004, p.141
- Dietrich, Brenda and Harrison, Terry, Serving the Services Industry, ANALYTICS web publication, Summer 2008, <http://analytics-magazine.com/?p=799>

Related Policy:

- FAR 16.202-1: provides for a price that is not subject to any adjustment on the basis of the contractor’s cost experience in performing the contract. This contract type places upon the contractor maximum risk and full responsibility for all costs and resulting profit or loss. It provides maximum incentive for the contractor to control costs and perform effectively and imposes a minimum administrative burden upon the contracting parties. The contracting officer may use a firm-fixed-price contract in conjunction with an award-fee incentive (see [16.404](#)) and performance or delivery incentives (see [16.402-2](#) and [16.402-3](#)) when the award fee or incentive is based solely on factors other than cost. The contract type remains firm-fixed-price when used with these incentives.

- FAR 16.403-1: provides the Government description of fixed price plus incentive-Firm Target (FPI) contracts. The contract type is implemented by calling out FAR Clause 52.216-16 Incentive Price Revision - Firm Target. This clause captures the Ceiling Price as well as the government share ratio(s). If multiple line items are identified as FPI type, the individual line item information shall be included here; otherwise final contract costs and price are reconciled at the contract level.
- FAR 16.401: explains that incentives are designed to motivate contractors to meet government goals and objectives.

4.4. Government Best Practice #4 – Incorporate CLINs to Facilitate Contract Flexibility

4.4.1. Analysis and Information

Assumptions: This best practice is applicable to any sustainment effort with an applicable CLIN Structure. FFP based on variable levels of demand can allow the government contract flexibility/scalability and cost visibility.

Description: Ensure the Work Breakdown Structure (WBS) is to the lowest level as a contract requirement. Allow the contractors the flexibility to provide input to develop an optimum WBS, or tailor the existing WBS. Use the contract line item number (CLIN) structure to implement tailoring as needed.

GBP #4 Objectives, Outcomes and Challenges

Government Objectives
- Reduce costs - Increase contract flexibility
Government Outcomes
- Flexibility in contract execution. The lowest level CLINs can be cost out but made optional or unexecuted based on government demand. - Reduces tracking and overhead of costs by government due to FFP vehicle - Allows for flexibility due to demand variability and/or budget constraints
Government Challenges
- Extra work for industry to do costing for each WBS / CLIN, especially if this CLIN does not result in additional business for the contractor.

Financial/Performance Metrics:

- Operational Availability
- Operational Reliability
- Cost per Unit Usage (Return on Net Assets)
- Logistics Response Time

- End user satisfaction
- Total Cost of Ownership

Information systems/Tools:

- Performance based logistics measures

Ways to Incentivize Industry to Leverage this Government Best Practice:

- Provide economic based incentives for the contractor based on the PBL metrics they are to achieve
- Develop RFP to reduce overhead in preparing cost volumes

Government Functional Specialties Responsible to Implement this Government Best Practice:

Primary: Program Manager, Contracting Officer

Others: Financial Manager, Product Support Manager

Applicable Integrated Product Support Elements (IPSEs):

- Product Support Management
- Sustaining Engineering
- Supply Support
- Maintenance Planning and Management
- Support Equipment
- Facilities
- Packaging, Handling, Storage and Transportation (PHS&T)
- Technical Data
- Manpower and Personnel
- Training
- Computer Resources

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 1.1 Operations Personnel
- 1.2 Maintenance Personnel
- 1.3 Other Direct Support Personnel
- 3.1 Organizational Maintenance
- 3.3 Depot Maintenance
- 4.1 System Specific Training
- 4.2 Support Equipment Replacement
- 4.3 Sustaining Engineering
- 4.4 Program Management

4.4.2. How to Implement this Government Best Practice

Requirements Identification/Development Phase:

- Structure critical requirements to consider non-traditional solutions and/or small business activities that may be broken out
- Develop WBS associated with requirements
- Ensure that the activity performed in requirements is represented by the appropriate EEIC in the line of accounting
- Conduct industry day on key requirements and WBS
- Obtain feedback on WBS

Request for Proposal (RFP) Development Phase:

- Develop formal RFP
- Include WBS changes based on industry day feedback
- Develop cost proposal requirements that optimize between minimizing contractor estimation expense and between providing cost visibility/flexibility to the Air Force

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements
- Validate supplier/integrator capabilities
- Select supplier/integrator based on RFP requirements and cost proposal

Execution Phase:

- Establish a collaboration agreement
- Communicate government's demand forecasts and any actual data on labor hours to the supplier
- Ensure that the costs of the activity performed are captured with the applicable EEIC in order to ensure that invoices for CLS work completed is appropriately applied to the corresponding line of accounting
- Manage supply constraints
- Test, evaluate and improve the solution
- Document and share lessons learned

4.4.3. Resources and References

Supporting research/documentation related to this Government Best Practice:

- Haugan, Gregory, The Work breakdown in government contracting, © 2003, Management Concepts, Inc.
- The best Performance Based Service Contracts (PBSC):
www.acq.osd.mil/.../Performance%20Work%20Statement/pws_checklist.docx

Related Policy:

- DFARS SUBPART 204.71--UNIFORM CONTRACT LINE ITEM NUMBERING SYSTEM: http://www.acq.osd.mil/dpap/dars/dfars/html/current/204_71.htm
- Signed Memo from Office of the Assistant Secretary of the Air Force (Jun 13 2012) – Contractor Logistics Support (CLS) Element of Expense Investment Code (EEIC) Structure Change Notification
<https://afkm.wpafb.af.mil/ASPs/DocMan/DOCDisplay.asp?Filter=23211&DocID=12284008>
- SAF/FM Comptroller Memo of June 2012; CAIG-to-CLS-EEIC-Map-Spreadsheet

4.5. Government Best Practice #5 – Competition for Engineering Change Requests (ECPs)

4.5.1. Analysis and Information

Assumptions: This best practice is applicable to any sustainment efforts when ECPs can be competed amongst all offerors before a single offeror is selected. FFP based on variable levels of demand can allow the government contract flexibility/scalability and cost visibility.

Description: Options will be priced for all known ECPs in the competitive environment. The program office and user discuss and activate desired modifications to be exercised. The options will be priced under competition but exercised only as needed.

GBP #5 Objectives, Outcomes and Challenges

Government Objectives
- Reduce costs - Increase flexibility
Government Outcomes
- Flexibility in contract execution. - Reduce costs via ECP competition
Government Challenges
- Overhead in competing and evaluating ECPs. - Detailed requirements about future modifications must be known prior to RFP development/release

Financial/Performance Metrics:

- Operational Availability
- Cost per Unit Usage (Return on Net Assets)
- Total Cost of Ownership

Information systems/Tools:

- Performance based logistics measures

Government Functional Specialties Responsible to Implement this Government Best Practice:

Primary: Program Manager, Contracting Officer

Others: Financial Manager, Product Support Manager

Applicable Integrated Product Support Elements (IPSEs):

- Product Support Management
- Sustaining Engineering
- Supply Support
- Maintenance Planning and Management
- Support Equipment
- Facilities
- Packaging, Handling, Storage and Transportation (PHS&T)
- Technical Data
- Manpower and Personnel
- Training
- Computer Resources

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 1.1 Operations Personnel
- 1.2 Maintenance Personnel
- 1.3 Other Direct Support Personnel
- 3.1 Organizational Maintenance
- 3.3 Depot Maintenance
- 4.1 System Specific Training
- 4.2 Support Equipment Replacement
- 4.3 Sustaining Engineering
- 4.4 Program Management

4.5.2. How to Implement this Government Best Practice

Requirements Identification/Development Phase:

- Develop ECP requirements
- Develop WBS associated with requirements

Request for Proposal (RFP) Development Phase:

- Develop ECP streamlined RFP document

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements
- Validate supplier/integrator capabilities
- Select supplier/integrator based on RFP requirements and cost proposal

Execution Phase:

- Establish a collaboration agreement
- Communicate government's demand forecasts and any actual data on labor hours to the supplier
- Manage supply constraints
- Test, evaluate and improve the solution
- Document and share lessons learned

4.5.3. Resources and References

Supporting research/documentation related to this Government Best Practice:

- Value Engineering to implement ECPs:
http://contracting.tacom.army.mil/future_buys/FY10/Conn.pdf

Related Policy

- FAR PART 48 Value Engineering, Subpart 48.1 Policies and Procedures and Subpart 48.2 Contract Clauses
- FAR PART 52 Solicitations Provisions and Contract Clause, Subpart 52.248-1 Value Engineering

4.6. Government Best Practice #6 – Business Case Analysis & Performance Measurement Framework

4.6.1. Analysis and Information

Assumptions: This best practice is applicable to any sustainment effort that includes efforts that would fall under the applicable AFCAIG categories.

Description: Use of BCA and simulation to develop a performance measurement framework (PMF) to be used for organizational alignment and executive decision-making. The PMF is used to identify critical logistics metrics to reduce contractor life cycle logistics costs while increasing aircraft availability.

GBP #6 Objectives, Outcomes and Challenges

Government Objectives
<ul style="list-style-type: none"> - Reduce costs - Improve weapon system availability
Government Outcomes
<ul style="list-style-type: none"> - Improved services for lower cost - Better decision making based on data driven cost data - Improved safety of weapon systems - Aligns industry profit incentive with weapon system support requirements - Fixed Price Contracts With Inherent Incentive to Improve Reliability.... Results in More Profit (Fewer Repairs) - Business Case Analysis (BCA) Must Show Savings/Cost Avoidances or Break Even with Benefits - PMF Changes The Business Relationship, Allowing Shared Risk With Industry
Government Challenges
<ul style="list-style-type: none"> - Accurate data on weapon system or program maintenance/performance data (tied to PBL metrics or balanced scorecard) - Too many metrics (pick critical few) - Organizational Alignment between the procurement contracting activity (NAVAIR, PMA-273), the Operational Command (CNATRA) and contract administration (DCMA). - Develop proper economic incentives for the contractor to meet critical performance metrics - Focus on Enterprise, not just program performance

Financial/Performance Metrics:

- Operational Availability
- Operational Reliability
- Cost per Unit Usage (Return on Net Assets)
- Logistics Footprint
- Logistics Response Time
- End user satisfaction
- Total Cost of Ownership
- Safety measures

Information systems/Tools:

- Business Case Analysis
- Total Lifecycle Product Support (TLPS)
- Use of independent modeling consultants
- Lone Star Corporation TruNavigator simulation and modeling tool
- Performance Measurement Framework

Ways to Incentivize Industry to Leverage this Government Best Practice:

- Provide economic based incentives for the contractor based on the PBL metrics they are to achieve
- Hold contractors accountable through CPARS (effects Past Performance rating for future source selections)

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Program Manager, Product Support Manager, Contracting Officer

Others: Financial Manager

Applicable Integrated Product Support Elements (IPSEs):

- Product Support Management
- Sustaining Engineering
- Supply Support
- Maintenance Planning and Management
- Support Equipment
- Facilities
- Packaging, Handling, Storage and Transportation (PHS&T)
- Technical Data
- Manpower and Personnel
- Training
- Computer Resources

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 1.1 Operations Personnel
- 1.2 Maintenance Personnel
- 1.3 Other Direct Support Personnel
- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 3.2 Intermediate Maintenance
- 3.3 Depot Maintenance
- 4.1 System Specific Training
- 4.2 Support Equipment Replacement
- 4.3 Sustaining Engineering
- 4.4 Program Management
- 4.7 Simulators and Training Devices
- 5.1 Hardware Modifications
- 5.2 Software Maintenance and Modification
- 6.1 Installation Support

4.6.2. How to Implement this Government Best Practice

Requirements Identification/Development Phase:

- Develop top level requirements
- Understand the Requirement and Develop a Few, Simple Metrics with Dependable Measurement Tools
- Create a Performance Work Statement (PWS) with a Performance Measurement Framework (PMF) to provide a common view of performance useful to management

Request for Proposal (RFP) Development Phase:

- Move to a common contract framework: a hybrid at 70% FFP
- Develop formal RFP
- Build in any incentive clauses especially for safety and quality

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements
- Validate supplier/integrator capabilities
- Select supplier/integrator based on RFP requirements and cost proposal

Execution Phase:

- Establish Trust and Eliminate Adversarial Relationships Between Government and Industry
- Communicate government's demand forecast to the supplier
- Manage supply constraints
- Test, evaluate and improve the solution
- Document and share lessons learned

4.6.3. Resources and References

Supporting research/documentation related to this Best Practice:

- Factors in determining contract types:
<http://nawctsd.navair.navy.mil/Resources/Library/Acqguide/selecting-contract-types.htm>
- Increasing Competition and Structuring Contracts for the Best Results , EXECUTIVE OFFICE OF THE PRESIDENT, OFFICE OF MANAGEMENT AND BUDGET:
http://www.whitehouse.gov/sites/default/files/omb/assets/procurement_gov_contracting/increasing_competition_10272009.pdf

- Performance Measurement:
http://www.businessballs.com/dtiresources/performance_measurement_management.pdf

Related Policy:

- FAR 12.301 (f) Agencies may supplement the provisions and clauses prescribed in this part (to require use of additional provisions and clauses) only as necessary to reflect agency unique statutes applicable to the acquisition of commercial items or as may be approved by the agency senior procurement executive, or the individual responsible for representing the agency on the FAR Council, without power of delegation.
- FAR 16.401 explains that incentives are designed to motivate contractors to meet government goals and objectives
- DoD Weapon Systems Acquisition Reform Act (WSARA) of 2009, Product Support Assessment, Provides Recommendations to Improve Weapon System Readiness And Control Product Life Cycle Cost

4.7. Government Best Practice #7 – Align RFP Requirements with Government Funding

4.7.1. Analysis and Information

Description: The program team needs to benchmark the program requirements and associated level of effort so that they understand the bottom end of services that can be procured that will deliver mission requirements at a reasonable cost.

GBP #7 Objectives, Outcomes and Challenges

Government Objectives
<ul style="list-style-type: none"> - Insure RFPs are generated that will maximize competition - Reduce cycle time for the development and approval of the contracting vehicle
Government Outcomes
<ul style="list-style-type: none"> - Generating a bottom end (floor) target funding rate can be used for input and justification in the Planning, Programming, Budgeting and Execution processes - Reduces RFP development costs - Benchmark data will provide important information to assist in vendor selection - Industry Days will: <ul style="list-style-type: none"> o Promote competition o Develop industry understanding of the Government's current vision and objectives pertaining to the current contract. o Allow USAF to utilize industry input to improve the acquisition strategy and requirements in the RFP.
Government Challenges
<ul style="list-style-type: none"> - Getting timely and accurate benchmark data from industry

Financial/Performance Metrics:

- Reduced RFP cycle time

Information systems/Tools associated with this best practice:

- Benchmarking
- Data Analysis
- Market research
- Financial statement analysis

Ways to incentivize industry to leverage this best practice (What is in it for them):

- Contractors that provide benchmarking data information could receive higher contract evaluation ratings in areas of Risk, Cost Realism and Technical

Government Functional Specialties Responsible to Implement this Best Practice:

Primary: Program Manager, Product Support Manager, Contracting Officer

Others: Financial Manager

Applicable Integrated Product Support Elements (IPSEs):

- Product Support Management
- Sustaining Engineering
- Supply Support
- Maintenance Planning and Management
- Support Equipment
- Facilities
- Packaging, Handling, Storage and Transportation (PHS&T)
- Technical Data
- Manpower and Personnel
- Training
- Computer Resources

Applicable Air Force Cost Analysis Improvement Group (AFCAIG) Elements:

- 1.1 Operations Personnel
- 1.2 Maintenance Personnel
- 1.3 Other Direct Support Personnel
- 2.1 Operating Material
- 3.1 Organizational Maintenance
- 3.2) Intermediate Maintenance

4.7.2. How to Implement this Government Best Practice

Requirements Identification/Development Phase:

- Identify metrics for top requirements for the proposal/contract
- Conduct research / benchmarking on key metrics to determine previous cost information and targets
- Conduct industry day on key requirements. Ask each vendor to provide benchmark inputs for the same metrics as identified
- Compare industry data against data from research/benchmarking
- From the data in 4.7.2.1.2 and 4.7.2.1.4 determine if current PPBE funding levels are in line with the cost information

RFP Development Phase:

- Develop initial requirements
- Conduct industry day on requirements
- Include opportunity for vendors to provide benchmarking cost data from previous contracts that are similar

Proposal Review/Fact Finding/Negotiating Phase:

- Evaluate industry proposals against government requirements
- Validate supplier/integrator capabilities
- Select supplier/integrator based on RFP requirements and cost proposal

Execution Phase:

- Establish a collaboration agreement
- Communicate government's demand forecast to the supplier
- Manage supply constraints
- Test, evaluate and improve the solution
- Document and share lessons learned

4.7.3. Resources and References

Supporting Documentation that validates this best practice:

- Antes, Billie J.; Dahl, Linda J.; Keith, Thomas C.; Lilley, Darcy L.; Marr, Stephen B. "BENCHMARKING: APPLICATION OF COMMERCIAL PRACTICES TO AIR FORCE PROCESSES." Air Command and Staff College, Maxwell AFB, AL; 1996
- Hollmann, John K., Editor. Total Cost Management Framework: A Process for Applying the Skills and Knowledge of Cost Engineering, Morgantown, WV: AACE International, 2006.

Related Policy:

- FAR 11.002: In fulfilling requirements of 10 U.S.C. 2305(a)(1), 10 U.S.C. 2377, 41 U.S.C. 253a(a), and 41 U.S.C. 264b, agencies shall— (1) Specify needs using market research in a manner designed to— (i) Promote full and open competition (see Part 6), or maximum practicable competition when using simplified acquisition procedures, with due regard to the nature of the supplies or services to be acquired; and (ii) Only include restrictive provisions or conditions to the extent necessary to satisfy the needs of the agency or as authorized by law.
- FAR 16.403-1: provides the Government description of fixed price plus incentive-Firm Target (FPI) contracts. The contract type is implemented by calling out FAR Clause 52.216-16 Incentive Price Revision - Firm Target. This clause captures the Ceiling Price as well as the government share ratio(s). If multiple line items are identified as FPI type, the individual line item information shall be included here; otherwise final contract costs and price are reconciled at the contract level.

5.0 CONCLUSION

The CSSG supports USAF sustainment personnel in achieving cost reduction, increased cost visibility, and increased flexibility and scalability in their life cycle management practices. The CSSG provides commercial and Government best practices and recommends actions for the implementation of the BPs.

The CSSG provides BPs with complete analysis and reference to applicable government functional specialists. Functional specialists are highly encouraged to read all BPs as they may gain insight or develop ideas for improving program and contracting actions across multiple areas. The CSSG has a substantial amount of information that, if applied, will help the USAF meet its fundamental objectives of cost reduction, increased cost visibility, and flexibility and scalability, among others.

The USAF is known for its rapid implementation of leading technology, and as expected, some of the BPs in this document can be found within the USAF to a limited scope and limited maturity level. Widespread use and fully advanced application of each BP will produce maximum benefit.

Appendix A: ACRONYMS, ABBREVIATIONS, AND NOMENCLATURE

ACO	Administrative Contracting Officer
ACSA	Acquisition and Cross-Servicing Agreements
ACTE	Association of Corporate Travel Executives
AF	Air Force
AFI	Air Force Instruction
AFCAIG	Air Force Cost Analysis Improvement Group
AFMC	Air Force Materiel Command
AFMAN	Air Force Manual
AFPAM	Air Force Pamphlet
AHP	Analytical Hierarchy Process
ALC	Air Logistics Complex
API	Applications, Programs & Indentures
APQC	American Productivity & Quality Center
APS	Advanced Planning and Scheduling
ATP	Available-to-Promise
AWP	Awaiting Parts
BCA	Business Case Analysis
BCN	Business Collaboration Network
BP	Best Practices
BRAC	Base Closure and Realignment
BTM	Business Travel Market
C2S	Cost-to-Serve
CBM	Condition Based Maintenance
CBM+	Condition Based Maintenance Plus
CCA	Contractor Confidentiality Agreement
C-Check	Comprehensive Maintenance Check
CCL	Clarke Chapman Ltd
CDRL	Contract Data Requirements List
CJCS	Chairman of the Joint Chiefs of Staff
CLIN	Contract Line Item Number
CLS	Contractor logistics support
COGS	Cost of Goods Sold
CONOPS	Concept of Operations
COTS	Commercial Off the Shelf
CPARS	Contractor Performance Assessment Reporting System
CPFR	Collaboration, Planning, Forecasting and Replenishment
CPI	Continuous Process Improvements
CRM	Customer Relationship Management
CSSG	Contract Sustainment Support Guide
CSWS	Contractor Supported Weapon system
C-TPAT	Customs -Trade Partnership Against Terrorism
CTC	Concurrent Technologies Corporation
CTP	Capable-to-Promise
DAG	Defense Acquisition Guide

DCMA	Defense Contract Management Agency
DFA	Design For Affordability
DFARS	Defense Federal Acquisition Regulation Supplement
DMSMS	Diminishing Manufacturing Sources and Material Shortages
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
EDI	Electronic Data Interchange
EEIC	Element of Expense Investment Code
ERP	Enterprise Resource Planning
FAR	Federal Acquisition Regulation
FFP	Firm Fixed Price
GAO	Government Accountability Office
GAO/NSIAD	Government Accountability Office/ National Security and International Affairs Division
GQ(I)M	Goal-Question-(Indicator)-Measure
GSA	General Services Administration
GTN	Global Transportation Network
HQ	Headquarters
HHQ	Higher Headquarters
HP	Hewlett-Packard
IDIQ	Indefinite Delivery/Indefinite Quantity
IOC	Initial Operational Capabilities
IP	Intellectual Property
IPSE	Integrated Product Support Element
IPT	Integrated Product Team
ISSR	Inherent, Structural, Systemic, Realized
IT	Information Technology
ITAR	International Traffic in Arms Regulations
ITV	In Transit Visibility
IUID	Item Unique Identification
JSA	Joint Services Agreement
JSTARS	Joint Surveillance and Target Attack Radar System
KPI	Key Performance Indicator
KSA	Knowledge, Skills, and Abilities
LogEA	Logistics Enterprise Architecture
MDM	Master Data Management
MOU	Memorandum of Understanding
MRO	Maintenance, Repair and Overhaul
MSR	Minimum Service Requirements
MTBF	Mean Time Between Failures
MTTR	Mean Time to Repair
NCMA	National Contract Management Association
NMCS	Non Mission Capable - Supply
NPV	Net Present Value
O&S	Operating & Support
OEM	Original Equipment Manufacturer
OMB	Office of Management & Budget

OSHA	Occupational Safety and Health Administration
PDM	Programmed Depot Maintenance
PBA	Performance Based Agreement
PBL	Performance Based Logistics
PBSA	Performance Based Service Acquisition
PC	Personal Computer
PHS&T	Packaging, Handling, Storage and Transportation
PM	Program Manager
PPBE	Planning, Programming, Budgeting & Execution
PRM	Procurement Risk Management
PSE	Product Support Element
PSI	Product Support Integrator
PSM	Purchasing and Supplier Management
QASP	Quality Assurance Surveillance Plan
R&D	Research & Development
RCM	Reliability-Centered Maintenance
RCT	Repair Cycle Time
RFI	Request For Information
RFID	Radio Frequency Identification
RFP	Request for Proposal
ROI	Return on Investment
RONA	Return on Net Assets
S&OP	Sales & Operations Planning
SAF/IEL	Secretary of the Air Force, Installations, Environment & Logistics
SCEM	Supply Chain Event Management
SCOR	Supply Chain Operations Reference
SCP	Supplier Certification Program
SIM	Serialized Item Management
SIM	Shared Inventory Module
SLA	Service Level Agreement
SME	Subject Matter Expert
TAA	Trade Agreements Act
TCA	Technical Consulting Agreement
TCO	Total Cost of Ownership
TLC	Total Landed Cost
TMS	Transportation Management System
TOC	Total Ownership Costs
TSPR	Total System Performance Responsibility
TSSR	Total System Support Responsibility
UII	Unique Item Identifier
USD[AT&L]	Under Secretary of Defense for Acquisition, Technology, and Logistics
UTC	United Technologies Corporation
USAF	United States Air Force
VMI	Vendor Managed Inventory
VPN	Virtual Private Network
WMS	Warehouse Management System
XML	Extensible Markup Language

APPENDIX B: IMPLEMENTATION TOOLS, TECHNIQUES, AND PRACTICES

Acquisition Measurement Systems: Systems that provide means for data collection, analysis, monitoring, and testing, all of which can be used to characterize equipment behavior and condition.

Active Commodity Trading: A commodity is a product that can be purchased from a variety of vendors where the price is determined by market forces. Active commodity trading is typically done for modular components that go directly into the finished product.

Advanced Supply Chain Planning ERP Modules: Integrated computer-based systems used to manage internal and external resources across the supply chain.

Analysis and Diagnostic Tools: Tools that monitor systems and determine performance problems; used in conjunction with analytical tools that provide information for decision-making surrounding resources and repairs based on the information from diagnostic tools.

Analytical Hierarchy Process Modeling: A technique that represents and quantifies elements of a decision problem, relating them to an overall goal and evaluating alternative solutions.

Automated Information Sharing Systems: Software or other tools that enable collaboration among many people allowing for coordination and efficient exchange of information.

Balanced Scorecards: A performance management tool used to track the execution of activities across an organization.

Bar Code or Radio Frequency Scanner Technology: Means of tracking inventory data with each item receiving a different code and the scanner technology providing a means of transferring data about the item to a database to store it or share it with stakeholders.

Benchmarking Tools: Tools used to compare processes and performance to existing best practices.

Bullwhip Effect: An observed phenomenon in forecast-driven distribution channels. It refers to a trend of larger and larger swings in inventory in response to changes in demand, as one looks at firms further back in the supply chain for a product.

Business Case Analysis: Full analysis prepared for decision-making to show that a proposed idea, product, or service is a good one and that it makes financial sense.

Business Collaboration Networks: Networks of businesses that allow suppliers, their buyers, and their suppliers to communicate and collaborate in a secure manner enabling successful business transactions on the global front.

Business Process Flows: A graphical representation of processes that facilitates analysis and improvement.

Business Process Modeling and Analysis: A technique used to manage and improve business processes whereby the organization identifies and represents its business processes, analyzes them, and seeks areas of improvement.

Business Process Reengineering and Industry Benchmarking: Tools used to analyze, compare, and improve current processes, systems, or product design flexibility, based on existing best practices.

Capable to Promise Modules and Systems: Systems that help determine when a new or unscheduled customer order can be delivered and considers constraints that might restrict the production, such as availability of resources, lead times for raw materials or purchased parts, and/or requirements for lower-level components or subassemblies.

Central Supplier Management Program: A supplier management program used across the organization that aids in identifying suppliers and tracking their performance and enables collaboration among stakeholders using suppliers.

Collaborative Planning, Forecasting, and Replenishment Tool: Tool used to seek cooperative management (supplier and retailer) of inventory through joint visibility and replenishment of products throughout the supply chain.

Competitive Analysis: Research and comparison of the competitive landscape, proprietary data practices and constraints, and life cycle assessments including both direct and potential.

Compliance Control System: A system designed to apply constraints imposed by regulations as an integral part of normal business processes to include accumulating the data needed for compliance reporting and auditing.

Cost to Serve (C2S): Managerial tool to support cost based decision making for relationships with clients; this method looks at both income and costs to determine net profit.

Customer Survey Summaries: Customer feedback obtained to support performance evaluation.

Data Analysis: In-depth investigation and analysis of system or process data to identify trends, bottlenecks, etc.

Database Design: The use of databases to facilitate data storage, reporting, and analysis.

Data Synchronization: Process of creating consistency of data among various users of the data that helps ensure data quality and ease of collaboration.

Delphi Method: An interactive forecasting method that relies on a panel of experts to develop the forecasts.

Demand Planning Tools: Tools that support the demand management process (planning demand, communicating demand, influencing demand, and prioritizing demand), weighing both customer demand and a firm's output capabilities to balance the two.

Design for Affordability: Method of re-defining project costs to address fundamental design questions and allow for cutting costly components to reduce cost of the overall project.

Digital Dashboarding/Decision Support Systems: Software tools that support decision makers by providing relevant, real-time information across all data levels.

Earned Value Management Systems: A project management system for measuring progress and performance in an objective manner, typically combining measurements of scope, schedule, and cost into a single integrated system that aids in the forecasting of project performance problems.

Electronic Data Interchange: The structured transition of data between organizations by electronic means.

Embedded Prognostic/Diagnostic Sensors: Sensors that are embedded into equipment/machines that monitor and manage system health.

Enterprise Resource Planning (ERP) Systems: Systems that automate integration of information from various departments/functions within an organization, facilitating its flow among them.

Event Based Exception Alerts: Alerts generated from an electronic system that collects and configures data; alerts are sent via email or other means when defined events occur.

Financial Report Reviews: Analysis of financial reports to identify anomalies or trends that may be useful in planning.

Forecasting Tools: Quantitative/statistical methods used to estimate future values or outcomes (e.g., demand levels).

Global Source Selection Teams: A team comprised of various technical, financial, supply chain, and contracting experts focused on selecting global suppliers based on identified benchmarks and standards.

Goal-Question-(Indicator)-Measure Approach: An approach used to measure software that defines a measurement model at conceptual, operational, and quantitative levels.

Inventory Analysis and Capacity Planning: Determination of appropriate levels of production and inventory needed to meet demand.

Inventory Report Reviews: Analysis of inventory reports to identify anomalies or trends that may be useful in planning.

Inherent, Structural, Systemic, Realized (ISSR) Framework: A program designed to achieve step-change cost reduction of cost drivers associated with inherent costs, structural costs, systemic costs, and realized costs in the areas of design, acquisition, cycle time, structure, and labor efficiency.

Life-Cycle Cost Modeling: The determination of total costs (including procurement, operations and maintenance, and disposal) expected to be accrued over the total life of a system.

Maintenance Management System: Software or other tools which serve as a database for an organization's maintenance operations that helps maintenance be done effectively and also helps decision makers to allocate resources (machines, human, and money).

Maintenance Report Reviews: Analysis of maintenance reports to identify anomalies or trends that may be useful in planning.

Market Analysis: Research of market related factors to determine the need for a product or service; may be performed at a product level or an aggregate level of like products or services.

Master Data Management (MDM): Processes, technologies, and/or tools used to maintain and control accurate master data, allowing for consistency of data across the organization.

Monte Carlo Simulation: The use of random sampling to estimate expected outcomes of a process.

NCMA PBA Best Practices: Information from NCMA on best practices and buying results from PBAs.

On-Site Inspections: Method of validating practices as part of quality inspection programs and root cause failure mode effects analysis programs.

Performance Management Systems: Tools and activities that ensure organizational goals are consistently being met effectively and efficiently.

Pooling Capacity Across All Available Resources: The practice of combining multiple capacities to deliver one or more products or services.

Procurement Risk Management Capability: Technique to manage risks associated with procurement, such as reliability on a critical supplier, guarantee of supply needed, and predicting price.

Product Life Cycle Management Tools: Software tools that automate or support development and sustainment processes, as well as program management processes, and enable increased cost visibility and collaboration.

Product Planning: Process to set product or service requirements based on factors such as customer requirements, market and competitive analysis, sales and market estimates, and overall business strategy.

Production Scheduling Tools: Tools that produce a production schedule to manufacture a certain quantity of a specific item to maximize utilization while meeting business policy constraints.

Prognostic/Diagnostic Test Equipment: Equipment used to automatically diagnose equipment and system condition to determine repairs needed and drive proactive maintenance.

Project Reports: Any regularly (weekly, monthly, quarterly) developed/updated document that provides the project status information, often related to performance metrics.

Quality Assurance Surveillance Plan: A means of ensuring that contract requirements are being met; it provides the approach the Government can use to conduct contract surveillance.

Radio Frequency Identification Infrastructure: The inclusion of automated systems to support inventory or item tracking.

Reverse Logistics Software: Software designed to fully manage reverse logistics to include warranty management, claims processing, returns logistics, repairs, and remanufacturing.

Risk-Sharing Strategies/Contracts: Strategies and/or contracts that address issues that arise between a buyer and supplier and are designed to ensure adequate supplies and timely deliveries as buyers and suppliers agree on supply contract terms. Examples include buy-back contracts, risk sharing contracts, and cost-sharing contracts.

Sales and Market Planning: Determination of the expected customer base and the level of consumption at various levels of distribution and price points.

Sales and Operations Planning: A process through which leadership continually pursues focus, alignment, and synchronization across all organizational functions.

Service Level Analysis: Analysis of system performance under a contract, i.e., investigating whether or not contracted performance measures are being met.

Scorecards: A means of measuring and evaluating supplier performance that can identify potential issues, underperformance, or areas for improvement.

Shared Inventory Module: Optional module that when combined with the Dydacomp[®] Multi-Company Controller Module, enables shared inventory among multiple locations and business entities.

Source Surveys/End Item User Surveys (Global Suppliers): Surveys that address standards of service provided across a supply chain global information service, or direct questionnaires the prime tier provides to have practices certified/validated.

Spot Trading: The purchase or sale of a commodity that is settled immediately, as opposed to a date in the future.

Strategic Business Integration Planning: Strategic planning for future direction of an organization or business on how well their service needs to be integrated across functions and with the organization supplier's network.

Structured Electronic Communications: Communications that occur using a defined data format such as EDI, XML (Extensible Markup Language), or other standard format that structures data so that disparate systems may communicate.

Supply Chain Event Management (SCEM): A process of identifying potential events that can disrupt the supply chain process, from everyday potential delaying issues to random events, and determining prevention strategies as well as courses of actions in the event a disruption occurs.

Supplier Risk and Resilience Scorecard: Tool to rate suppliers' risk management and enable risk analysis associated with the supplier.

Supply Chain Integration Systems: Tools that facilitate the design, planning, execution, control, and monitoring of supply chain activities.

Total Cost of Ownership: Comprehensive cost approach that includes the costs from Total Landed Cost models, but also the costs for research and development, assessing suppliers, manufacturing, distribution, product operation, warranty, reverse logistics, service in the field, and disposal costs.

Total Landed Cost Models: Models used to make cost comparisons by attempting to capture all charges associated with getting a product to its final destination to include costs from order purchasing to storage at the destination as well as vendor payment.

Trust Models: Model comprised of processes designed to provide a certain level of confidence and trust among parties entering into an agreement in which some level of risk exists.

Vendor Managed Inventory Toolkit: Tools by which a contracting organization provides relevant information to a supplier, who takes responsibility for maintaining inventory.

Warehouse Management System (WMS): A system designed to manage various aspects of warehouse operations to include inventory management, shipping and receiving operations, barcode/labeling systems, and picking.

APPENDIX C: PRODUCT SUPPORT ELEMENT DEFINITION

The following descriptions were pulled from AFPAM 63-128, Guide to Acquisition and Sustainment Life Cycle Management.

Sustaining/Systems Engineering: The technical effort required to support an in-service system in its operational environment to ensure continued operation and maintenance of the system with managed risk.

Design Interface: Design Interface considers what is needed to integrate the logistics-related readiness, combat capability, systems commonality, and supportability design parameters into system and equipment design.

Supply Support: Supply Support is the process conducted to determine, acquire, catalog, receive, store, transfer, issue, and dispose of secondary items necessary for the support of end items and support items. The process includes initial support (provisioning) and follow-on requirements (routine replenishment).

Maintenance Planning and Management: This factor documents the process conducted to develop and establish maintenance concepts and requirements for the life-cycle. An acquisition program establishes maintenance plans throughout the development process and concepts that reflect the optimum balance between readiness and life-cycle cost. The process should consider all elements of maintenance support necessary to keep systems and equipment ready to perform assigned missions. This includes all levels of maintenance and implementation of those levels; includes any partnering, organic, and contract support.

Support Equipment/Automatic Test Systems (SE/ATS): SE/ATS considerations include equipment for transportation, ground handling, munitions maintenance, metrology and calibration, test and diagnostics, aircraft battle damage repair, software support and reprogramming, and automatic test along with tools and computer programs.

Facilities: Facilities include the permanent, semi-permanent, or temporary real property assets required to operate and support the system, subsystem, or end-item. (**Note:** Logistics considerations for facilities do not include Civil Engineering areas of responsibility. Logistics considers support requirements such as space for maintenance activities in support of the weapon system, space systems, and Communication-Electronic systems. It may also include storage for spare parts, controlled storage, training space for maintenance and operations, technical orders, operational storage library, mobility equipment, etc.)

Packaging, Handling, Storage, and Transportation (PHS&T): This Element includes the resources, processes, procedures, design considerations, and methods to ensure that assets are packaged/preserved, handled, stored, and transported properly.

Technical Data Management/Technical Orders: This factor addresses technical data and technical orders (TOs), as defined in AFI 63-101. Elements to be addressed include data rights, data management strategy, engineering data, drawings and associated documents, specifications, and the scientific or technical information (recorded in any form or medium) necessary to operate and/or maintain the defense system.

Manpower and Personnel: The manpower and personnel element addresses the people required to operate and support the system over its planned life cycle.

Training: The training element includes training resources and actual training. This element addresses the processes, procedures, curricula, techniques, training devices, simulators, other equipment, and software necessary to train civilian and active duty/reserve duty personnel to operate and support/maintain the defense system; includes acquisition, installation, operation, and support of training equipment/devices.

Computer Resources: This element includes the facilities, hardware, software, documentation, manpower, and personnel needed to operate and support computer systems. Include stand alone and embedded systems (documented in Computer Resources Support/Software Support Sustainment Plans), computer resources used in the design and test environment, and computer systems used to support configuration management.

Protection of Critical Program Information and Anti-Tamper Provisions: This Element addresses efforts and provisions required to protect sensitive information identified in the Program Protection Plan during operations and sustainment.