Architectures Driving Efficiencies into Air Force Operations

By
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Abstract

This case study documents how the Air Force (AF) is leveraging the use of architectures to establish more effective and cost efficient Purchase and Supply Chain Management (PSCM) capabilities for sustaining and maintaining our warfighting resources. The paper provides a brief introduction section to familiarize the reader with the genesis of these architecture initiatives. A follow-on section expounds on how the AF utilized these architecture products to project Rough Order of Magnitude (ROM) savings. The conclusion section contains MITRE observations as to the level of confidence of the AF realizing these projected and other potential benefits.

Introduction

As part of the Procurement Transformation effort, the Secretary of the AF for Acquisition (SAF/AQC) initiated the Enterprise Architecture for Procurement (EAP) "To-Be" development in FY02. The driving vision of the effort was to improve mission responsiveness by leveraging world-class processes and web technology. The vision was to develop a commodity acquisition approach where 98 percent of sourcing actions are accomplished in a web-centric environment. The initial focus was on developing the operational architecture and governance for Commodity Councils (CC) which was later integrated into the PSCM operational architecture.

The Purchasing component focuses on building processes for Strategic Sourcing and Supplier Management

- A strategic center-led approach to purchasing
  - Commodity focused strategy and sourcing perspective with robust governance
  - Leverage spend, performance, and total supply chain costs
  - Performance based contracts/catalogs and decentralized ordering
- On-going analysis of external market drivers
- Proactive supply base development and management; alliances with critical suppliers
- Reduction in acquisition/purchasing lead/cycle times

The Supply Chain component enables integration and collaboration among Customers, Suppliers, and the AF

- Management of the end-to-end supply chain
- Demand analysis and forecasted requirements integrated with supplier capacity planning (synchronize Demand Plan with the Supply Plan)
- Collaboration with suppliers and customers to develop an integrated demand plan
- Managing outsourced functions critical to supply chain responsiveness
- Creating an environment where data is accurate and timely
- Reduction in cycle times
- Linking cost management with supply chain decision making

As part of the Integrated Logistics Transformation effort, USAF Integrated Logistics (ILI), Air Force Materiel Command Logistics Group (AFMC/LG), and Air Force Materiel Command/Contracting (AFMC/PK) initiated the PSCM late in FY02.

The PSCM initiative, with a scope that addresses approximately 25 percent of the overall Aircraft Operation and Sustainment (O&S) cost challenge[1], was to integrate the purchasing and supply processes into a single end-to-end enterprise process to reduce purchasing and supply chain operating costs and improve warfighter readiness (i.e., Aircraft Availability rates).

Both EAP and PSCM shared common objectives[2]. They sought to transform the AF's disjointed materiel management and purchasing processes, integrate the fragmented supply chain, and address underlying supply chain management issues:

- Metrics and incentives throughout the purchase/supply chains are not aligned with strategic goals;
- Budgeting and financial incentives drive behavior to short-term supplier relationships;
- No one entity manages the purchase/supply base and key suppliers from a strategic perspective;
- Life-cycle functions are stove-piped, disjointed, and do not promote a strategic or supplier focus;
- No focused effort to leverage AF Spend; and
- There is a lack of "one view" visibility throughout the purchase-supply chain.

The ultimate objective of an integrated supply chain is to perfectly synchronize the Supply Plan to the Demand Plan so that the rate of supply matches the rate of demand along the entire supply chain (including suppliers and their suppliers). While the principle is inherently simple, the actual complexity of this interaction becomes very apparent in the "As-Is" architectures when it is understood that a balance and unification needs to be achieved at each node of the chain (from the suppliers' suppliers to the business enterprise, to the customers, and then ultimately to the customers' customers). Distorted and delayed processes and information from one end of a supply chain to the other leads to tremendous inefficiencies; excessive inventory investment, poor customer service (i.e., high customer wait times), misguided capacity planning, ineffective transportation, and missed production schedules due to the high occurrences of awaiting parts, which in-turn impacts aircraft availability rates.

Architecture Outcomes and Benefits

EAP - Commodity Procurement

The EAP architecture strategy was to first develop the "To-Be" operational views to be used as the guidance and governance for standing up a CC. The final product, the EAP Commodity Procurement Operational Architecture Guide, was organized in a "Quick Study Guide" format. The architecture artifacts (e.g., Figure 1) were incorporated into the Guide along with a tutorial on "How to Read a Model". The level of detail in this Guide provided:

[1] Extracted form a Senior Leadership briefing
[2] PSCM CONOPS, 14 May 2003

- Sufficient detail to identify and describe "best practices" and desired standardization of processes, roles, and deliverables across all CCs.
- Detailed descriptions for activities that are new or that have been altered from current practices.
- Each CC with the freedom to tailor or add lower level activities/processes as needed for implementation by the individual CCs.

In addition, the EAP eight major CC activities are published in the Air Force Federal Acquisition Regulations (AFFARS) Information Guidance IG5307.104-93, Appendix A.[3]

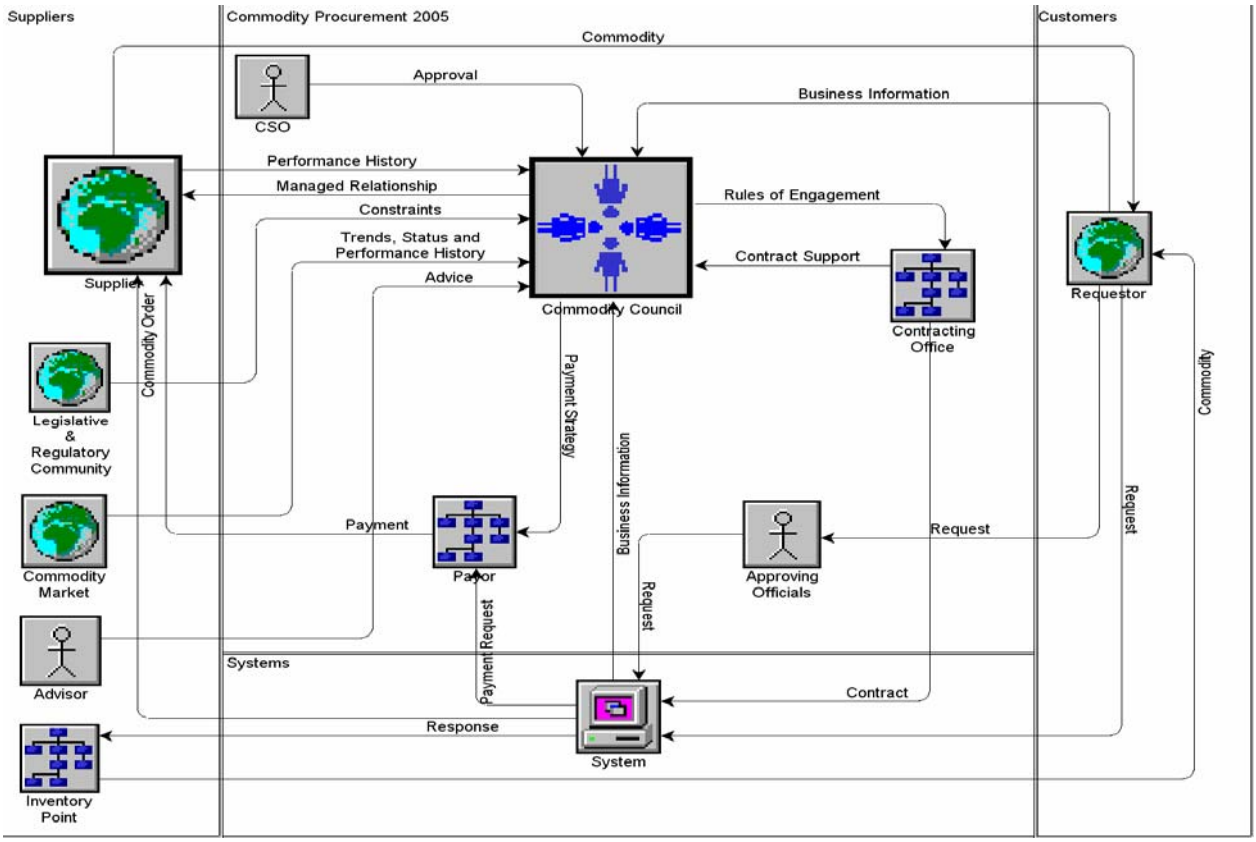

Figure 1. EAP Business Interaction Model (OV-1)

All of the architecture views were developed in accordance with the Department of Defense Air Force (DoDAF) Guidance, captured in and published from the Proforma ProVision Architecture Framework tool.

What Did the Architectures Do?

The first CC stood up by the AF was the Information Technology Commodity Council (ITCC). The EAP architectures provided the ITCC with the blueprints for the eight major activities and high-level processes (OV-5 Activity Models) envisioned for the

[3] http://farsite.hill.af.mil/reghtml/regs/far2afmcfars/af_afmc/affars/IG5307.104.93.htm#TopOfPage

execution of a CC (i.e., Review Current Strategy; Evaluate and Assess Current Market; Forecast Future Demands; Create Future Strategy; Establish Contractual Instruments; Roll Out Strategy; and Monitor and Continuously Improve Strategy) to leverage the AF IT Spend. The architecture artifacts included process inputs and outputs, as well as a description of the minimum data/information (Logical Data Model – OV-7) required to aide the ITCC in establishing a Commodity Acquisition Management Plan (CAMP), in essence the acquisition strategy for fulfilling the AF's IT Desktop requirements.

What Were the Benefits of Using Architectures?

The fact ITCC used the EAP blueprints facilitated the jump starting of the ITCC. This resulted in a CC quick win, end-of-year buy of 12,500 computers instead of 10,000 for the same dollars spent. In an article published in *Federal Times*, then AF CIO, John Gilligan noted: ***"the Air Force bought computers at a 30 percent discount by buying in bulk . . . And it's a strategy that we plan to use more."*** Numerous articles provide additional insights into AF ITCC benefits.[4]

Subsequent pooling of IT (desktops) requirements from six AF MAJCOMs ($20M dollars) resulted in a leveraged buy price of $648.00 versus the $1129.57 when purchased individually. By leveraging their Spend the MAJCOMs were able to buy 29,154 desktops instead of 17,360 if purchased separately. Additional benefits from having standardized desktop computer platforms included simplified training, reduced desktop sustainment, and reduced maintenance costs.

Lessons learned from the ITCC experience have been incorporated in the EAP architectures. The AF has now stood up eight CCs with four additional councils in the planning stages. The success of the AF is now a "best practice" being explored by other Agencies and Services. The DoD Business Transformation Agency (BTA) has now embraced strategic sourcing as a means to achieving the primary goal of its Common Supplier Engagement (CSE) concept. The primary goal of the CSE is to simplify and standardize the methods DoD uses to interact with commercial and government suppliers in acquisition of catalog, stock, as well as made-to-order and engineer-order goods and services[5].

Purchase Supply Chain Management (PSCM)

The PSCM activities were organized around a four-pronged implementation strategy (reference Figure 2 PSCM Development Plan):

1) Using architectures, establish a baseline "As-Is" model;
2) Establish benchmark/pilot projects (e.g., Advance Planning & Scheduling (APS) for F101 engine, Lean Purchase Request (PR)) as a means to analyze

[4] Air Force Forms IT-Buying Council, http://www.fcw.com/fcw/articles/2003/0908/pol-af-09-08-03.asp
Council Ideas Save Air Force $4 million, http://www.fcw.com/fcw/articles/2003/1201/web-airforce-12-05-03.asp
Air Force IT Council Steers New PC Buy, http://www.fcw.com/fcw/articles/2003/0922/pol-af2-09-22-03.asp
Air Force Commodity Council Saves $5.8M for Major Commands, http://www.afmc.af.mil/news/story.asp?storyID=123012219

[5] DoD Enterprise Transition Plan, 30 September 2005

the relevance of the "As-Is" architectures to industry[6] "best practices" (i.e., commercial, SCOR models) at the various Air Logistics Centers;

3) To operationalize CC strategic alliances with suppliers and build "To-Be" models; and,
4) Identify organizational and IT requirements considerations around "To-Be" models in support of developing an e-business strategy to support the AF's future PSCM vision.

This strategy was designed to showcase practical trials of the PSCM architecture tenets, validate recommended process re-engineering candidates, and understand how modern IT capabilities would be configured to enable the PSCM environment. In addition, through these pilot projects, the AF's objective was to identify policy, procedural, organizational, cultural, educational, and training requirements necessary to ensure successful implementation on a broader scale. The specific objectives were to demonstrate measurable improvements in weapon-system support, provide lessons learned in advance of full implementation, and illustrate the use and benefits of strategic supplier relationships. While AFMC executes the majority of the purchase supply chain, all Major Commands (MAJCOMS) participate in the supply chain to some degree.

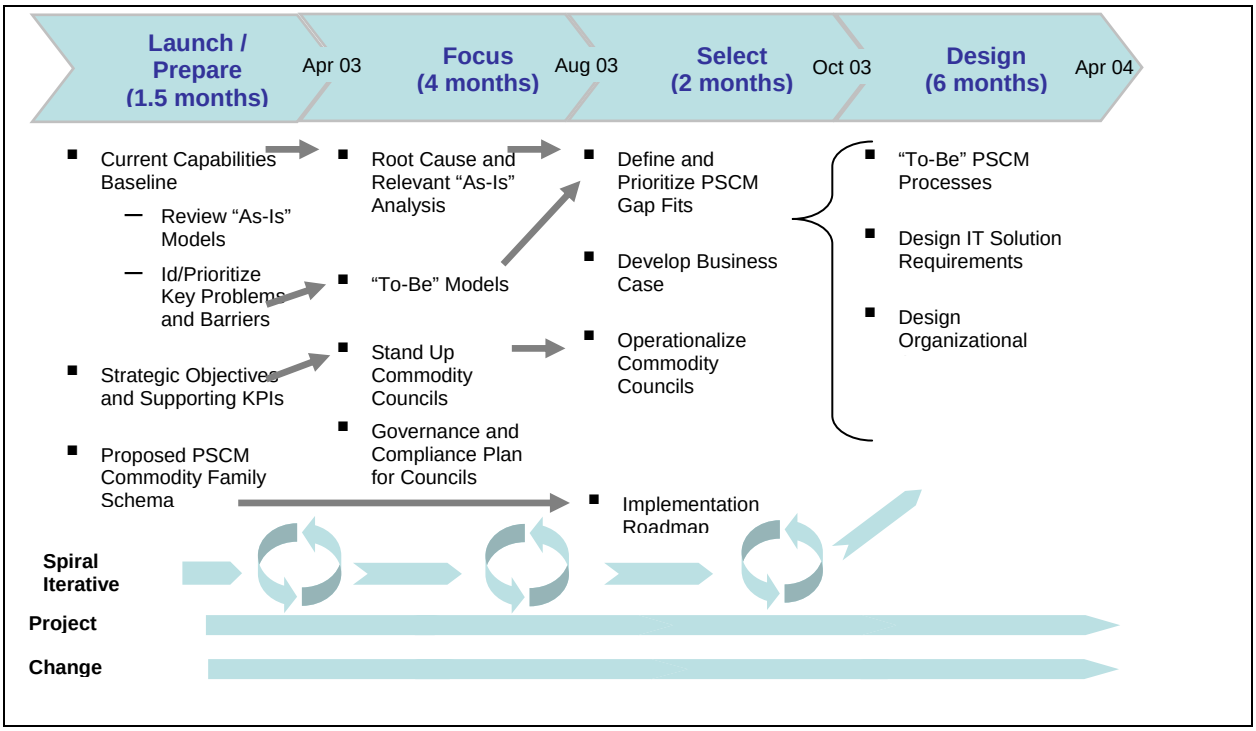

Figure 2. PSCM Development Plan

[6] The Strategic Sourcing concept from a book titled: ***Intellectual Enterprise,*** published by James Bryant-Quinns, 1992. First put into practice by IBM.

What did the Architectures do?

The outcomes form the ITCC and the EAP blueprints in the Commodity Procurement Operational Architecture Guide prompted leadership to probe deeper into the inter-relationships of the Strategic, Demand, and Supply planning processes with the EAP CC processes. They started to realize that different initiatives and audiences shared common objectives. It became clear (reference Figure 3) that real transformation requires collaboration and synergy of efforts both vertically and horizontally within and across mission areas. The EAP/PSCM leadership then began to understand how architecture artifacts could help them understand the complexities and dynamics of their business.

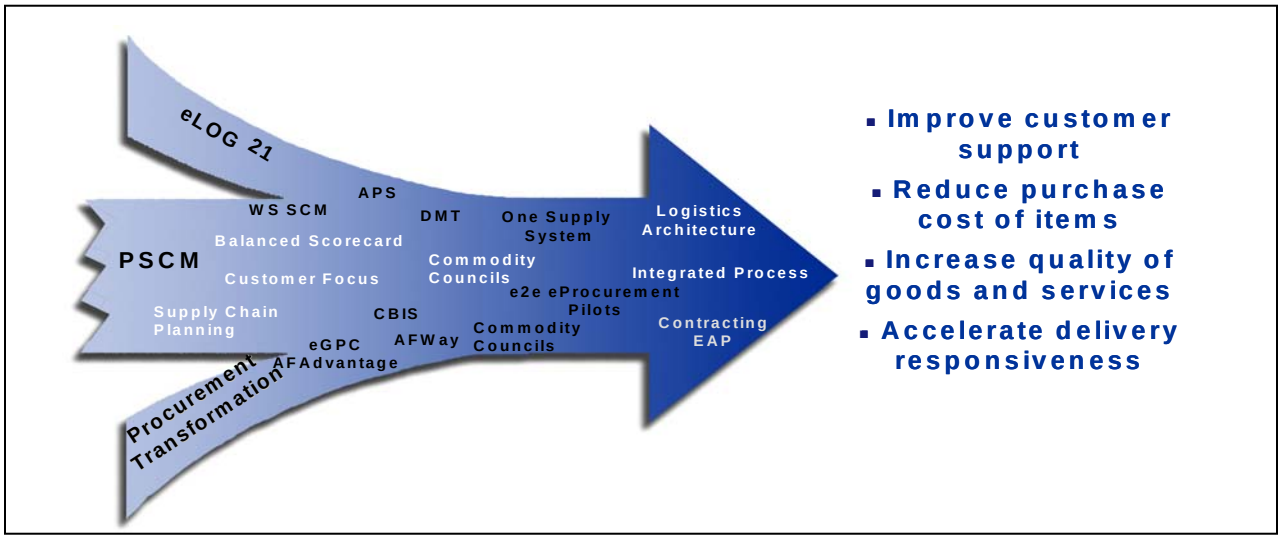

Figure 3. Procurement Transformation

Senior AF leadership mandated the use of the EAP Commodity Procurement Council operational architectures to jump start the PSCM initiative. Figure 4 illustrates how the resulting PSCM architecture artifacts integrated the EAP CC (i.e., strategic sourcing processes) with the major activities of strategic planning, demand planning, supplier relationship management, and supplier relationship management.

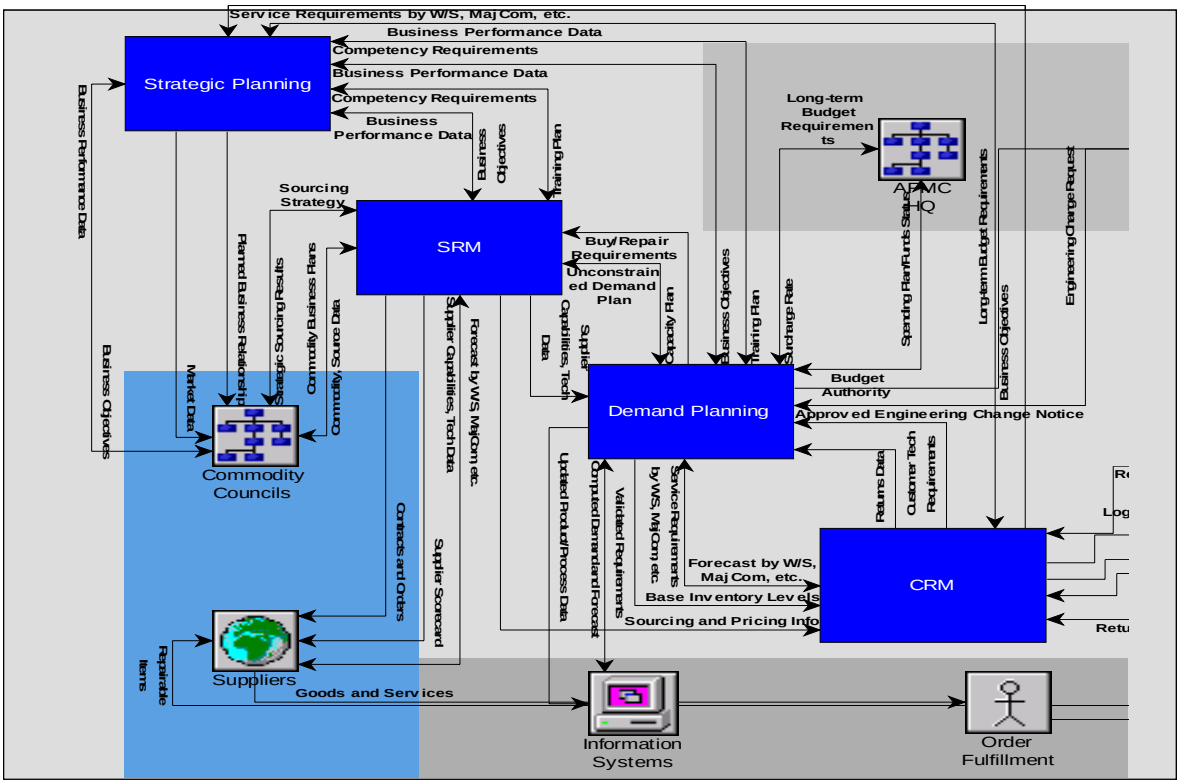

Figure 4. PSCM Business Interaction Model (OV-1)

Leaning out the PR Process…

PSCM subject matter experts, upon completing the development of the PSCM "As-Is" architectures, were challenged by AF senior leadership to lean out their business processes. One of key factors influencing the requirements computation and supply planning processes are the end-to-end cycle-times for initial order fulfillment:

Demand Planning + Purchase Request (PR) + Acquisition Lead-Time + Procurement Lead-Time = 660 days)[7].

In addition, approximately 25-28 percent of the PRs are not fulfilled by their need dates. These are two major contributors to why the AF keeps an estimated $6.8B inventory in the pipeline, much of which is stored in warehouses. In addition, the AF pays and estimated $60M in cost to DLA for transaction costs for processing requisitions for assets management and movement.

What were the Benefits from Using Architectures?

The PSCM Lean PR pilot, using the intellectual capital assembled and represented by their "As-Is" architectures, along with the PR processing expertise, determined that on average 14-16 days could be reduced from the average PR processing time. The architectures provided insights into process behavior that was not visible from their stove-piped organizational perspectives. Their finding revealed the following:

[7] Extracted form a Senior Leadership briefing

1) Complexity reduction of the PR Package (i.e., consolidation and reduction of the number of PR Attachments);
2) Procedural changes could reduce and eliminate coordination and approval thresholds (i.e., Perform Acquisition Method Screening frequency based on out-year demand projections; Perform Engineering Drawing Certification Review at a minimum every three years or on an exception basis);
3) Use of IT enablers to allow multi-collaboration/coordinate processes to process concurrently versus serial;
4) Improved demand and supply planning from IT enablers (e.g., Advance Planning & Scheduling) will eliminate the need to existing PR processes that are necessary to ensure the Item Manager provides a valid set of requirements to the Buyer.

The AFMC has determined that each day of lead-time costs the AF on an average of $4.3M.[8] The elimination of 14-16 days of lead-time nets a projected savings of $60-68M.

The above were preliminary findings identified from studies conducted in the FY04/FY05 timeframe. Since then, additional studies and proof-of-concept pilots are ongoing to validate the above recommendations and to explore other business process re-engineering opportunities. The Lean PR Policy makers and Functional Requirements Review Board are planning to approve an Engineering Change Proposal (ECP) for inclusion in the new AFMC Purchase Request Process System (PRPS) in the March 2006 timeframe.

In addition to dollar savings, there are other benefits realized from these operational architecture development initiatives itemized into the following categories:

Intellectual Capital. Architectures provide a blue-print for the current and future (i.e., "As-Is and To-Be") states. They aide not only the subject matter experts in the mission areas, but also provide the enterprise with a unique framework that links business processes, metrics, best practices, and technology features into a unified structure to support collaboration between stakeholders. It also provides graphical insights into the process dynamics, how they relate to one another, and the rules and constraints under which the activities, processes and event cause and effect behavior patterns influence mission outcomes.

Operational Efficiency/Process Effectiveness. As discussed in this case study, both EAP and PSCM architectures have helped identify, eliminate, and implement complex processes to leverage the AF Spend and potentially reduce the pipeline inventory cost by reducing the acquisition lead-times. Architectures also provide the organization with process improvement opportunities, aide with the gap analysis between "As-Is" and "To Be" to determine transition/migration strategies. They can be used to configure COTS solutions, develop service

[8] AFMC/LGIP Subject Matter Experts, PSCM presentation materials

orchestration maps when designing an implementation of a Service Oriented Architecture (SOA).

Investment Decisions. Operational architectures provide a requirements basis for the identification and utilization of a common suite of capabilities and standards (i.e., System and Technical architectures). It provides capability to align IT resources with specific business needs and provides the basis for the rationale for leveraging IT Spend.

Strategic Direction/Opportunity Creation. The strategic value of addressing important enterprise-wide concerns starts to be realized as the component architectures (e.g., EAP and PSCM) merge to form the Enterprise Architecture (EA). The EA can use these and other mission area architectures to explain the business, assess the impact of strategic direction on business activities, and ensure that long-range strategic and business plans are aligned. The answer as to what has to change to achieve a strategic objective comes in understanding the various benefits that the EA provides and learning which architecture components and relationships must be analyzed in order to achieve specific strategic capability.

Conclusions

The AF EAP Team has been engaged in developing architectures for the past ten years. They have experienced first hand the rewards of subject matter experts discovering more cost-effective alternatives with the aide of architecture methodologies and tools. Although MITRE was only engaged in a few of the AF PSCM pilot team architecture discussions, process simulations, and other related activities, we are confident the results reported are a reasonable basis why the AF should continue investing in architectures. Architectures, whether used for community planning or for building a MITRE facility, provide a common picture of requirements in accordance with governance (i.e., local zoning laws, plumbing and electric wiring standards, infrastructure integration, etc.). These tools provide us with the means to see the simplistic views that all too often get lost in the complexities of how we conduct our day-to-day activities. Having architectures or blueprints helps to eliminate the guess work of what is in the walls, above the windows, etc. They reduce the time, costs, and risks of exploring or reconstructing the unknown (i.e., hidden utilities).

The saving examples provided in this case study are just the tip of the architecture saving iceberg. Architectures are helping us identify those common capabilities and services (i.e., mediation, security, message handling, rules logic engine, workflow, etc.) that are redundantly imbedded in legacy application code (e.g., redundant). All of these are written in a variety of languages, require resources to maintain, and perform varying degrees of functionality promoting unique attributes and rules which add to the complexities and inefficiencies within and across the AF mission areas. Once the common requirements are identified, the AF can promote the reuse and sharing of common components or services. This provides the basis for evolving to the use of Service Oriented Architectures, and understanding of how business enablers can leverage

the use of, and interoperate with, the Net-Centric Enterprise Services (NCES)/GCSS-AF Integration Framework services.

Another savings opportunity which we are exploring is the use of our EAP architectures as documented in simulation modeling tools. In today's environment, it is not unusual for our customers to spend months trying to understand the policy and legacy system impacts of public law changes in Procurement. Our objective is to run simulations of the AF business architectures, similar in concept to modeling simulations on weapon system components. This will provide the decision maker with a thorough analysis of the impacts of change and more accurate cost and schedule data for change execution.