

**Air Force**

**Open Systems**

**Deployment Plan**

**30 August 1996**

## Executive Summary

The Open Systems concept encourages the use of commercial products, processes, specifications and standards. Open Systems streamline the acquisition processes, reduce life cycle cost by emphasizing performance-based standards, eliminate to maximum extent DoD unique requirements, and expand the industrial base for acquisition and sustainment. By facilitating the use of commercial products, we can reduce the cost and risk inherent in the design of new acquisitions and concentrate on the seamless integration of our systems while increasing interoperability and capability for continuous improvement via incorporation of evolutionary technology. As a key component of Open Systems, Systems Engineering will play a leading role in conceiving, developing, and documenting system architectures.

The Air Force plans to implement the Open Systems concept in concert with related on-going efforts. The final Open Systems guidance will integrate all efforts with external requirements (such as the Technical Architecture and Framework for Information Systems Management, Joint Technical Architecture, Defense Information Infrastructure, Single Process Initiative, and Military Specs and Standards reform). The Open Systems concept and an implementation guide will be developed from efforts already underway in the Joint Avionics Commanders Group (JACG) and initiatives such as the Lean Aircraft Initiative.

The Air Force implementation of the Open Systems concept is divided into four efforts: 1) development of an Air Force Open Systems implementation guide, 2) establishing dialog with the JACG and insuring that Open Systems is coordinated with JACG efforts, 3) identification and execution of Air Force demonstration programs for the Open Systems concept, and 4) encouraging industry involvement.

Training of personnel who support the acquisition reform effort and the early distribution of a preliminary Open Systems guide will insure widespread coverage and feedback as the guide matures. The initial guide should be available within three months and updates will be issued as appropriate. A final Air Force Open Systems Guide should be available within 18 months and will be thoroughly coordinated with documents issued by OSD.

concentrate on success stories (and failures) and highlight the initial cost avoidance in the Open Systems approach, as well as the potential life cycle cost reductions. The need for a more structured feedback will be assessed as the relationship between the services and OS-JTF becomes better defined.

### **3.3 JACG Interface**

The second task is to interface with the Joint Aeronautical Commanders Group (JACG). The JACG is leading an effort to create a single document called the Integrated Performance Based Business Environment Guide (IPBBEG). This document is combining several related initiatives into a single coordinated document that will provide guidance to the field on creating a performance based environment. Although they are currently focused on aeronautical equipment, their work will be reviewed by the Systems Engineering Steering Group (SESG) which is led by OSD and includes all the services. The SESG will review the components of the IPBBEG to determine if they can be applied across the services. If they are acceptable they will be inserted into the deskbook as source material for acquisition programs. In order to insure that Open Systems is integrated into the JACG concepts, we intend to review their efforts to date (in-particular the Form, Fit, Function, and Interface (F<sup>3</sup>I) program), develop associated Open Systems guidance, and support coordination and integration of the Open Systems material into the IPBBEG.

### **3.4 Demonstration Programs**

The third effort is monitoring demonstration programs. The Air Force has identified the F-15 Multi-Purpose Display Processor (MPDP) as our initial model program and we are in the process of identifying others. A potential candidate is the F-16 Falcon Flex program. This initiative will institutionalize flexible sustainment and F<sup>3</sup>I as a normal business process. Key in determining the effectiveness of these programs is the monitoring process. We will establish effective metrics for assessing program progress. The guidance will be updated based on the techniques and lessons learned and regularly distributed to the acquisition community.

In addition to the demonstration programs specifically supporting Open Systems, we will also be watching several other initiatives. Although not specifically designated as demonstration programs, we are monitoring the progress of several other initiatives that are utilizing the Open Systems approach (see appendix B for a description of the programs). The information gained from these programs will also be included in the Air Force guide as updates.

The end result of the implementation effort will be an integrated approach for system definition that will be provided to the Air Force as discretionary guidance. Figure 1 diagrams our Open Systems implementation effort. The shaded blocks are the areas of significant activity.

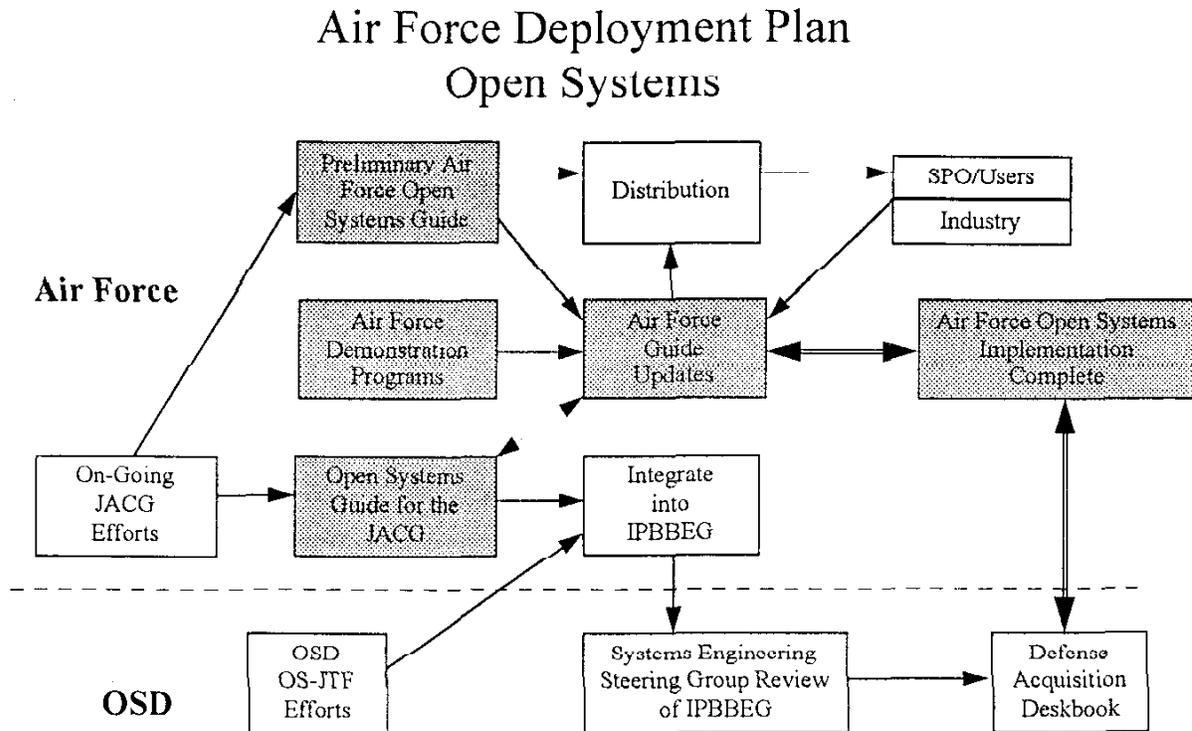


Figure 1  
Air Force Open Systems Implementation Concept

### 3.2 Air Force Open Systems Guide

The first task and a key objective is development of an Air Force Open Systems Guide. It will integrate current Open Systems concepts, and on-going JACG efforts. This guide will introduce acquisition personnel to the concept of Open Systems and provide information on how to establish the requirements and review approaches to Open Systems acquisition. The preliminary guidance document will be generated from existing information. Then, as results from programs implementing Open Systems becomes available, and the Open Systems relationship to the other acquisition processes is determined, the guide will be updated and reissued. The guidance will be distributed throughout the acquisition community using the Internet and the Defense Acquisition Deskbook.

The OS-JTF charter and vision also addresses the use of a "lessons learned process". Initial Air Force implementation will focus on educating the workforce and motivating Air Force management. Initial implementation results will be incorporated into the Air Force Open Systems guidance and supplied as part of the assessments to the OS-JTF. These lessons learned should

*modification process to reduce life-cycle cost and to facilitate effective weapon system intra- and interoperability."* Dr Kaminski's letter also established the Open Systems Joint Task Force (OS- JTF) which is responsible for the implementation of Open Systems processes for DoD. Appendix A describes the OS-JTF and some of their responsibilities.

Although the original direction addressed electronic systems, DoD 5000.2-R (dated March 15, 1996) expanded the role of Open Systems in the acquisition process. Paragraph 4.3.4 states: *"An Open Systems approach shall be followed for all system elements (mechanical, electrical, software, etc.) in developing systems. This approach is a business and engineering strategy to choose specifications and standards adopted by industry standards bodies or de facto standards (set by the market place) for selected system interfaces (functional and physical), products practices and tools. Selected specifications shall be based on performance, cost, industry acceptance, long term availability and supportability, and upgrade potential. For all C4I systems, information systems and weapons systems that must interface with C4I systems or information systems, mandatory guidance is contained in the Technical Architecture Framework for Information Management (TAFIM)."*

Interim policy was issued (SAF/AQ, 95A-003) which is consistent with the direction provided by the OS-JTF, to provide near-term movement toward and implementation of the Open Systems concept by Air Force personnel. Follow-on Air Force discretionary guidance and policy will be issued as the Air Force and OSD continue to define and refine the Open Systems concept.

### **3.0 Implementation**

#### **3.1 Scope**

The Air Force plans to implement Open Systems along with and in concert with other related efforts. The final Open Systems documents will integrate all efforts associated with system definition (i.e. allocated design and interfaces) and impacts of external requirements (such as the Technical Architecture and Framework for Information Systems Management (TAFIM), Joint Technical Architecture (JTA), reduction in Military Specs and Standards, Single Process Initiative, and Defense Information Infrastructure (DII)). We plan to build our Open Systems concept from efforts already underway in the Joint Avionics Commanders Group (JACG) and demonstration programs. We will also collect data and lessons learned from initiatives such as the Lean Aircraft Initiative.

The Air Force implementation of the Open Systems concept is divided into four efforts:

- 1) Developing Air Force Open Systems implementation guidance,
- 2) Establishing a dialog with the Joint Avionics Commanders Group (JACG) in order to insure Open Systems is coordinated with the JACG efforts,
- 3) Identification and execution of demonstration programs for the Open Systems, and
- 4) Developing and encouraging industry participation.

# Air Force

## Open Systems Deployment Plan

### 1.0 Introduction/Background

An Open System is defined by the Open Systems Architecture Working Group as a "System that implements sufficient open specifications for interfaces, services and supporting formats to enable properly engineered components to be utilized across a wide range of components with minimal changes, to interoperate with other components on local and remote systems and to interact with users in a style which facilitates user portability." The key characteristics of an Open System are vendor and technology independence, portability, and interoperability. Open Systems include interfaces for both hardware and software components, subsystems and systems, and applies to all functional disciplines; electrical, mechanical, thermal, etc. Acquisition using Open Systems will be key to efficient and economical weapon system programs.

The discipline of systems engineering is critical to proper implementation of Open Systems. Integral to the systems engineering process is the development of a system architecture. As the system requirements are decomposed into a functional architecture the individual systems and components are identified and interfaces defined. Under acquisition reform system interfaces are assuming a more important role. In the past we managed all aspects of an architecture down to the component level, but now we are identifying and managing systems at the interfaces. Selection of commercial or existing interfaces can guarantee long term sustainment and meet the specific needs of the Air Force at a significantly reduced cost. Common or accepted interfaces facilitate the introduction of new technology.

The actions that the Air Force will take to implement Open Systems are described by this plan. These actions will take advantage of potential cooperative efforts with other services and industry, seek to increase awareness and understanding of the Open Systems concept, build a consensus to make a cultural change to Open Systems based acquisition, provide the tools necessary for Air Force personnel to use the Open Systems process, and incorporate the Open Systems concept within our policies and processes. It also addresses how the Air Force plans to identify Open System demonstration projects and assess the degree of implementation in ACAT Programs.

### 2.0 Policy

On 29 June 1994, the Secretary of Defense issued a policy memo titled "Specifications and Standards -- A New Way of Doing Business." Dr. Perry's initiative is to use performance and commercial specifications and standards instead of military specifications and standards. Dr. Perry's letter was followed by a 29 Nov 94 letter from The Under Secretary of Defense for (A&T), Dr. Kaminski, that stated: *"I am directing that "Open Systems" specifications and standards (electrical, mechanical, thermal, etc.) be used for acquisition of weapon systems electronics to the greatest extent practical. Effective immediately, these systems and subsystems shall be designed, developed, and constructed as Open Systems during the acquisition and*

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### **3.5 Industry Participation**

Industry needs to understand the technology and systems that are available and already developed for current use, either in commercial markets or previous military applications. Performance based acquisitions require industry to propose system solutions rather than describing how to build a Government specified system. If the Government incentivises the use of Open Systems in weapon system developments then the contractors are more likely to use the Open Systems. This interaction will continue to expand as we move away from rigidly defined specifications and standards and more towards program teams for specific acquisition programs. The Air Force Open Systems implementation will need to foster this growing interaction for new programs and also encourage the transition to industry of the results of our basic laboratory technology program. Technology transition has been and will continue to be an area of growing interaction. The other area of industry/Air Force interaction that needs to be addressed is participation in professional associations and societies such as SAE and IEEE as they address Open Systems concepts. These organizations have adopted former military specifications and standards through joint industry government interaction, with the result that some Open Systems have emerged from this process. This interaction, while less formal than program interaction or technology transition, offers high potential for furthering an Open Systems environment and needs to be a part of the Air Force implementation of Open Systems. In short, interaction with industry should involve three methods: acquisition program teamwork, technology transition efforts, and engagement with professional groups and associations.

### **4.0 Training and Education**

Effective implementation of Open Systems concepts in the Air Force will require a comprehensive understanding of the concept at the senior manager level, such as System Program Directors and lead program engineers, as well as the team members in acquisition program offices. The education and training courses developed to support Open Systems implementation will thus have to cover not only senior to staff level personnel, but must also address a wide range of functional areas spanning virtually all the processes associated with acquisition and sustainment support as well as the MAJCOM staffs. New education and training courses will need to be incorporated into the broad programs that now exist to provide knowledge and skills for acquisition. Courses or course material already have been added to: Defense Systems Management College programs, the Acquisition Professional Development and Certification process, Software Engineering Institute (SEI), and the Air Force Institute of Technology (AFIT) curriculum. As the charter and vision statements of the OS-JTF indicate, this activity must continue the role of defining and establishing training and education programs for Open Systems. Initially we will identify the educational programs that should be updated and provide update materials as it becomes available. Dissemination of the Open Systems to the major education centers helped encourage the early use of the concept in larger programs. Continued monitoring and improvement of the educational material is critical for effective implementation of Open Systems in all Air Force programs.

## **5.0 Joint Service Opportunities**

An effective Open Systems implementation program will widen the cross-Service opportunities for "acquire once-use many times" weapon systems and associated support equipment. In the avionics arena there are currently all-Service crossfeed groups such as the Joint Service Review Committee (JSRC) that meet periodically to describe on-going programs and look for multiple use opportunities. Either through these existing organizations, or on an ad hoc basis, the implementing agencies from the Services should meet when initial programs are defined to crossfeed program implementation plans and discuss the role and methods of joint Service interaction.

## **6.0 Assessments**

On 10 July 1996, the Under Secretary of Defense for (A&T), Dr. Kaminski, signed the Open Systems Acquisition of Weapon Systems Memorandum. This memorandum directed all of the services to begin assessments of their pre-Milestone II major weapon systems programs and major modifications. Assessments are a snapshot of the degree of openness of a new program or major modification. To accomplish this, the OS-JTF developed their Open Systems Guide (section 2.5.1), dated 8 November 1995.

The initial assessments, which are due on 15 October 1996, will be self-assessments conducted by the program offices. They will answer the questions in the OS-JTF Guide to establish to what degree their program is using an Open Systems approach. Starting 1 January 1997, the Air Force will provide an annual report on Opens Systems implementation in ACAT programs. The requirement for an assessment of systems implementation will be incorporated in the Milestone reviews for major programs. Initially we will only report on major systems, but once the Open Systems process is better defined, assessments will be extended to all ACAT programs.

## **7.0 Management Structure and Responsibilities**

The Air Force Acquisition Executive has designated SAF/AQR, in cooperation with HQ AFMC/ENP, as primary office of responsibility for the Open Systems initiative and for the actions detailed in this plan. The actual implementation has to occur through the acquisition organizations, including Mission Area Directors, PEOs, DACs, Program Managers, etc., as well as the Air Force Science and Technology community; they will be responsible for exercising their acquisition responsibilities to facilitate the Air Force transition to the Open Systems approach. Further definition of roles and responsibilities will be developed as specific process changes are identified.

### 8.0 Milestones

Figure 2 is a schedule showing the estimated time frames required to complete the Open Systems implementation effort:

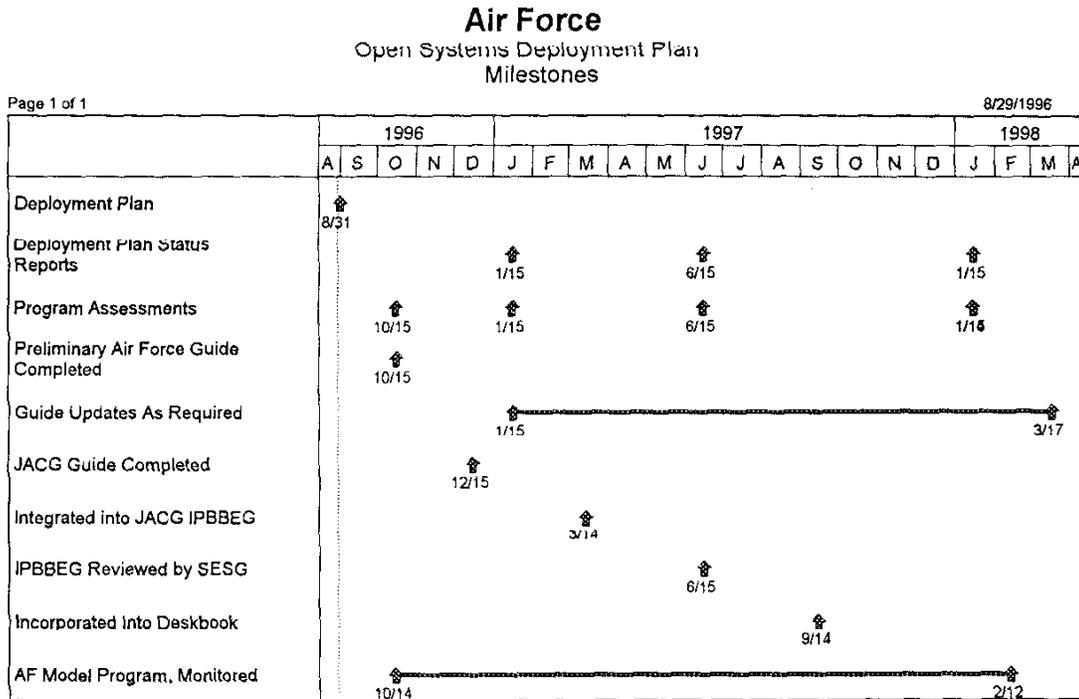


Figure 2

### 9.0 References

1. SECDEF Policy Memorandum, Specifications and Standards -- A New Way of Doing Business, 29 Jun 1994
2. OUSD (A&T) Memorandum, Acquisition of Weapons Systems Electronics Using Open Systems Specifications and Standards, 29 November 1994.
3. SAF/AQ Policy 95A-003 Memorandum, Specifications and Standards -- A New Way of Doing Business, 22 June 1995
4. PDUSD (A&T) Memorandum, Assessment of Open Systems Approach in Major Programs, 11 Jan 1996
5. OUSD (A&T) Memorandum, Open Systems Acquisition of Weapons Systems, 10 July 1996
6. DoD 5000.2-R, Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs, 15 March, 1996

## **Appendix A**

### **OSD Open Systems Implementation Efforts**

#### **A.1 Open Systems Joint Task Force (OS-JTF)** (<http://www.acq.osd.mil/osjtf>)

The Open Systems Joint Task Force (OS-JTF) was chartered on 29 November 1994 when Under Secretary of Defense Kaminski signed an Open Systems policy letter. The vision of the OS-JTF is to "establish in DoD an Open Systems approach as the foundation for all weapon system acquisitions in order to lower life cycle costs and improve weapon system performance." Dr. Kaminski appointed H. Leonard Burke (formerly with NAVAIR) as the Task Force Director. The Task Force is staffed by representatives from each of the Services. The OS-JTF is the heart of OSD's Open Systems initiative. Their web page contains extensive information on Open Systems briefings, papers, and policy.

#### **A.2 Committee on Open Electronic Standards (COES)** (<http://www.acq.osd.mil/osjtf>)

The Committee on Open Electronic Standards (COES) was jointly chartered on 14 Nov 1995 by the director of the OS-JTF and the Chairman of the Standards Coordinating Committee (SCC). The COES was tasked to designate appropriate Open Systems standards for DoD weapons systems use. The key functions and responsibilities of the COES are as follows:

- a. Coordinate and integrate identification and selection of Open Systems specifications and standards for weapons systems and platforms.
- b. Coordinate identification and selection of Information Technology (IT) specifications and standards applicable to weapon systems through the SCC.
- c. Coordinate identification and selection of non-IT specifications and standards (mechanical form factors, power distribution, etc.).
- d. Coordinate DoD requirements for Open Systems specifications and standards for weapon systems. Satisfy these requirements by providing DoD positions and contributions to non-Government standards bodies.
- e. Charter working groups to address specific Open Systems specifications and standards issues and activities as necessary.
- f. Act as the focal point for the services, agencies, and CINCs to resolve issues related to Open Systems specifications and standards for weapon systems.

Key organizations affected by the new "Open Systems" policy were identified in Jul 95 as potential COES members. The Acquisition Executives of the three services, the Defense Airborne Reconnaissance Office (DARO), and U.S. Special Operations Command (SOCOM) were asked to assign an office to represent and speak for them as primary members of the COES.

### Preliminary Findings

The COES has determined that DoD weapon systems should be partitioned into domains that share common technical and electronic attributes where a single set of standards could be logically defined. This approach takes advantage of identifying existing organizations/groups with strong interests in a particular domain to assist in the designation of appropriate standards. The committee's vision is that DoD policy on Open Systems would be implemented in each weapon system domain. The committee has defined an initial list of ten weapon system domains along with corresponding organizational entities that are either the proposed domain "architect" or interested stakeholders.

## **Appendix B Related Open Systems Initiatives**

There are many Open Systems initiatives currently under way in the Air Force or being worked by multi-service groups involving the Air Force. This section will expand as new program are started or old programs develop an Open Systems approach.

### **B.1 JACG Guide Specifications**

(<http://www.wpafb.af.mil/ngs>)

The DoD aviation community is beginning to recognize the significance of product lines. The Joint Aeronautical Commanders Group (JACG) is developing guide specifications for use in acquiring new systems. The guides are organized into 11 templates that roughly correspond to product lines. The templates are: air superiority fighter; air-to-air missile; air-to-surface attack; cruise missiles; smart weapons; special operations (search and rescue, mine sweeping); transports (refueling, medical evacuation); electronic warfare; reconnaissance, surveillance, and command & control; antisubmarine warfare; and helicopter attack. The templates are a place to embed technical architecture requirements for a specific system acquisition.

### **B.2 Integrated Command and Control Experimentation Facility (ICEF)**

The ICEF at the Electronic Systems Command (ESC) is a consolidated laboratory where the latest Command, Control, Communication, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) systems and related technology are explored, applied, integrated, and evaluated. The facility includes the Command and Control Unified Battlefield Environment (CUBE), associated laboratory facilities, a common support infrastructure, and remote communication facilities. The CUBE uses a variety of realistic joint, combined, and coalition operational scenarios to support contingency operations, acquisition programs, and technology infusions. The associated laboratories are specialized in specific systems, mission areas, or domains. They are used individually in support of specific acquisition programs, and they interface in the configuring of systems experiments.

### **B.3 Command and Control Product Line (CCPL)**

The Command and Control Product Line (CCPL) is an ESC acquisition streamlining initiative to reduce the overall development time and cost associated with Command and Control (C2) acquisitions. The CCPL will expedite the fielding of C2 systems by reducing the time necessary to define requirements, develop specifications, and provide system design by eliminating the need for repetitive source selection to initiate the design, development, and fielding of C2 systems with common features. Early prototyping and development of C2 systems using standard, tested components will be initiated by issuing task orders against multiple indefinite delivery/indefinite quantity contracts. By utilizing reusable software engineering technology, software repositories, C2 product line

architecture, and rapid prototyping techniques, a CCPL developer will be able to quickly integrate tested components into functional systems. The CCPL goal is to rapidly design, develop, and deliver quality operational C2 systems that satisfy the majority of user's functional and performance requirements at reduced costs over the standard acquisition process.

#### **B.4 Evolved Expendable Launch Vehicle (EELV)**

The EELV program office will implement an Open Systems approach which encourages the EELV contractors to implement an architecture that defines internal EELV system interfaces by open standards adopted by industry and defined through a consensus process (e.g. Industry standard bodies such as the Institute for Electronics and Electrical Engineers (IEEE)). The intent of the open systems approach is to implement a system design/architecture which facilitates integration and use of commercial products available from multiple sources, consistent with the government's EELV system configuration management and support concepts. This approach discourages the use of proprietary or system unique interfaces."

#### **B.5 Space Communications Protocol Standards (SCPS)**

The SCPS program at SMC is implementing an Open Systems approach in which a set of integrated space/ground communication protocols for spacecraft command and telemetry data that will be used by missions that are cross-supported between Agencies. This initiative lowers the life cycle cost and improves system performance across numerous agencies. The SCPS program was initiated by U. S. Space Command and is in the process of being transferred to SMC.

#### **B.6 Parts Management Best Practice (PMBP)**

The PMBP at SMC facilitates Open System implementation. The application of the PMBP is derived from the mission and systems performance requirements and details the "what" elements of an effective Parts Management process and not the detailed "how to". This process emphasizes the engineering and supplier management elements recognizing the DoD's acquisition reform objective to utilize the commercial industrial base and apply commercial practices and commercial solutions to the maximum extent practical. This best practice has been developed to assist in dealing more proactively with critical parts management issues and to provide guidance for developing comprehensive strategies to manage cost and schedule risk.