Implementing An Integrated Product Data Environment—A Strategic Plan

by

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Introduction.

The Department of Defense (DoD) *Policy for Transition to a Digital Environment* mandates a DoD digital environment by the end of 2002. One of the essential and most data-intensive elements of the logistics portion of this digital environment is "product data". Product data is the technical and management data required to field, to operate, and to sustain Air Force weapon systems. In view of this, the Air Force Product Data Systems Modernization Program Office (AF PDSM PO) has developed a Strategic Plan that will implement an Integrated Product Data Environment (IPDE) for Air Force. The purpose of this Strategic Plan is to provide the Air Force with an organized and systematic strategy for implementing an Air Force IPDE. When implemented, the IPDE will empower product data acquirers, users, and sustainers with universal access to digital product data, both legacy and newly acquired, via modernized product data systems. The Strategic Plan defines the Air Force IPDE, projects IPDE trends, analyzes conditions external and internal to the AF PDSM PO, describes IPDE implementation issues, establishes IPDE implementation goals and objectives, and defines the Air Force IPDE end state.

Integrated Product Data Environment Definition.

From a broad perspective, an Integrated Data Environment (IDE) connects government and industry information enterprises and is the end state of the Department of Defense (DoD) Continuous Acquisition and Life-cycle Support (CALS) initiative. More specifically, however, an Air Force *IPDE*, a product data related subset of an IDE, consists of infrastructure, functional applications, and business processes that enable weapon system digital product data to be produced, acquired, managed, accessed, modified, and sustained by all privileged data users. An IPDE includes the interchange of product data according to national and international data exchange and system interoperability standards.

Trend Analysis 1998-2002.

The following business and technical trends are identified in the latest DoD and Air Force strategic doctrine and are confirmed by government and industry information technology leaders. These trends are categorized and analyzed according to the IPDE elements of infrastructure (hardware, operating systems software, and telecommunications), functional applications (application and application program interface software), business processes, and product data.

1. Infrastructure. Implementation of Defense Information Infrastructure Common Operating Environment (DII COE) and related initiatives will prove favorable to achievement of an IPDE. These initiatives will enable Air Force product data user connectivity to depot-level (wholesale) and organizational (retail) information sources through laptop or personal computers. A byproduct of DII will be increased telecommunications bandwidth and greater use of the Internet that will enable fast interchange of large product data files. DII's Shared Data Environment (SHADE) initiative will exploit neutral product data interchange technologies and take advantage of open systems architecture. A notable increase in government connectivity to contractor-maintained product databases will emerge. The AF PDSM PO may find itself assisting SMs with producing and/or reviewing IPDE Business Cases Analyses (BCAs) due to fiscal pressures stemming from flat or declining information technology budgets. This fiscal pressure could also slow progress of Global Grid implementation, a base-level infrastructure initiative.

2. Functional Applications. Fifty percent of all DoD functional applications are anticipated to be Y2K-compliant by 2000. Because DoD product data systems are Y2K-compliant, this issue is not foreseen to significantly impact product data exchange or IPDE implementation. Great emphasis will be placed on the use of Web browser technologies. Product data users will use browsers as part of their common productivity suites to seamlessly access data from DoD standard information systems. Product data users will more quickly access their data by using web-based tools and high-capacity communication lines. In addition to web-based applications, greater use of Workflow Management tools will be apparent. This trend will create collaborative work environments that exploit SHADE opportunities. Information security solutions will be widely available, but will require tailored implementation based upon organizational requirements. Product data managers must determine security requirements that are to be placed upon their data.

3. Business Processes. Increased publicity of the DII COE concept and of the current Digital Environment policy will generate favorable momentum for Air Force IPDE implementation. In addition, IPDE implementation will be facilitated due to increased availability and affordability of product data management technologies which in turn lends itself to establishment of new, and refinement of existing digital-based business processes. Since there is a strong trend toward interoperability between depot maintenance and flightline maintenance functions, IPDE implementation is an inevitable requirement. Efforts to interface JCALS and IMDS will be the mechanism to achieve this interrelationship. Air Force PDSM systems (JCALS and JEDMICS), which were initially available to some product data users in 1997, will be available to most Air Force product data users by the year 2002. As a result of these business trends, entry-level Air Force training will focus on the use of digital product data technologies.

4. Product Data. Product data trends are proving favorable for Air Force IPDE implementation. The requirement to develop a lean support structure for an aging fleet of aircraft will create explosive demand for digital weapon system support data and digital product data processes. There will be an increased emphasis upon the use of international data interchange standards (e.g., STEP, EDIFACT). Publishing in Standard Generalized Markup Language (SGML) format will grow in acceptance. In addition, product model data files will mature, enabling national and international cooperation and data sharing among industry and allied defense organizations. This product data trend will require the AF PDSM PO to closely monitor data standards maturation. Product data users will broaden the definition of product data (e.g., provisioning technical documentation, support equipment recommendation data, engineering change proposals, etc.), to include all data required to support a weapon system. This will provide the opportunity to examine other types of logistics data for use in the IPDE. Over the next five years, Single Manager (SM) and warfighter goals will include using less paper logistics data in their logistics processes. Satisfying these goals will require the AF PDSM PO fielding of agile weapon system IPDEs (IPDEs that support paper and digital data) in support of the overall Air Force IPDE implementation mission.

External Environmental Analysis.

The following environmental factors, external to the AF PDSM PO, will have an effect on Air Force IPDE implementation:

1. Policy and Strategic Guidance. The current political environment invites Air Force IPDE innovation and implementation. The recent 13 Nov 1997, *Defense Reform Initiative Report* requires the DoD to adopt best industry practices and to incorporate electronic processes within DoD business affairs. Also, on 2 July 1997, Deputy Secretary of Defense John White signed DoD's landmark *Policy for Transition to a Digital Environment* which sets a corporate goal of "digital operations being the method of choice for all acquisition management and life cycle support information" by the end of 2002. It also states that "the overwhelming majority of DoD acquisition and logistics operations should be based on digital methodologies and products." This policy directs DoD Program Managers to establish data management systems and appropriate data environments that allow all program activities to exchange data digitally. To accomplish this goal, on 15 July 1997, the Under Secretary of Defense (Acquisition Reform) issued the *Guidance for Transition to a Digital Environment for Acquisition Reform Programs* which calls for an Integrated Program Management Initiative Executive Steering Group to initiate and to oversee DoD's smooth transition to a digital environment. Also promoting transition to a digital environment, DoD's *Data Conversion Strategy,* 2 April 1997**,** prepared by the DoD CALS Office and the Component services identifies specific requirements and goals for converting non-digital engineering drawings to digital forms in accordance with the CALS specifications. Regarding digital data acquisition *DoD 5000.2R,* "Par. 3.3.4.5 Continuous Acquisition and Life-

Cycle Support (CALS) (Digital Data)," requires DoD Program Managers to prefer on-line access to digital programmatic and technical data and to require specific proposals from industry regarding implementation of an "integrated data environment" to support systems engineering and logistics activities. Finally, the *DoD Logistics Data Strategy,* January 1997 calls for a DoD logistics environment that uses quality, standard, secure data that is shared and interchanged independent of software applications. To accomplish the intent of these strategic documents, the Air Force must implement an IPDE.

2. Organizational. Due to recent reorganizations, the AF PDSM PO is developing new working relationships with organizations who have interests in Air Force IPDE implementation. The AF PDSM PO will work in cooperation with the *Joint Electronic Commerce (EC) Program Office*. This new office, which has subsumed the *Life Cycle Information Integration Office* (LCIIO) (formerly the OSD CALS Office), is managed by the Defense Logistics Agency (DLA) and is responsible for accelerating information technology in DoD life cycle processes. Locally, the AF PDSM PO reports to the *Logistics Information System Program Office* (SPO), HQ Electronic Systems Center (HQ ESC/IL). The Logistics Information SPO mission is to meet the logistics information system needs of the Air Force. In view of this, the Logistics Information SPO will rely on the AF PDSM PO for joint product data systems implementation and for product data interchange and digital product data process standardization. The AF PDSM PO will also work closely with the HQ ESC DII-Air Force office to ensure that all Air Force PDSM initiatives are compliant with DII COE parameters.

3. Initiatives. DoD's foremost infrastructure initiative is the *DII COE*, which is a seamless web of communication networks, computers, software, databases, applications, data, security services, and other capabilities that meet information processing needs for information users. It is a user driven collection of distributed, heterogeneous information systems through which warfighters and other DoD data users can share data from any location. The DII COE will enable logistics information and, more specifically, product data information, to be interchanged in such a way as to achieve the *Joint Vision 2010* objective of *Focused Logistics*, and the *Air Force Global Engagement* goal of Air Force "Information Superiority and Agile Combat Support." Another Air Force initiative complementary to these DoD initiatives is *Lean Logistics*. Lean Logistics is designed to dramatically improve logistics processes by streamlining logistics activities, reducing their costs, and improving manpower utilization rates. The fact that these initiatives need to be implemented at the Air Force base and depot levels necessitates the implementation of an Air Force IPDE.

4. Information Technology Spending. The DoD *Quadrennial Defense Review* was produced on the assumption of flat information technology funding levels over the next five years. As a result, focused scrutiny of information technology investments can be expected. This trend may require the AF PDSM PO to

perform costs analyses for its infrastructure modernization and IPDE implementation efforts.

5. Technological. DoD Chief Information Officers (CIOs) recognize the current challenge of adapting infrastructure and processes to the fast pace of technological change. The current technological environment will promote development of a robust and responsive Air Force IPDE. DoD's exploitation of Internet capabilities to improve its business and information dissemination processes is a case in point. Another technological consideration and foremost DoD priority is data security. Currently, minimal data protection is afforded to most logistics data. In addition, the current product data environment weakly supports the integrity, availability, and confidentiality of data. Also, DoD CIOs continue to recognize that current DoD software applications were developed for dedicated information systems thus impeding their interoperability with each other. The Air Force IPDE efforts must consider these technological factors.

6. IPDE Customers. The AF PDSM PO mission is performed to the benefit of MAJCOM, Single Manager (SM), ALC, and product center product data customers. These organizations rely on the AF PDSM PO for digital data guidance and procedures, JCALS (Joint Computer-aided Acquisition and Logistics Support system) and JEDMICS (Joint Engineering Data Management Information and Control System) implementation, TO conversion, and IPDE consultation. In 1997, *MAJCOM customers* such as Headquarters Air Mobility Command (HQ AMC) and Headquarters Air Combat Command (HQ ACC) have issued and continue to issue digital technical data requirements to all Air Force Single Managers. They have defined digital TO format and delivery media requirements as well as digital TO sustainment processes. SMs have responsibility for digital product data management. In view of this, a <u>Single Managers Guide for Implementing Digital Technical Orders (TOs)</u>, which described the integrated solution for acquiring, converting and sustaining TOs , was published and distributed to all Air Force SMs. *Air Logistics Center (ALC) customers* specifically manage digital data and use digital product data to perform depot repair tasks on Air Force weapon systems. Due to ALC product data customer demand, the AF PDSM PO has trained over 1000 personnel in digital data acquisition procedures and the elements of the IPDE.

7. IPDE Implementation Partners. Many DoD and Air Force organizations will play some role in implementing an IDE. The AF PDSM PO may work directly or indirectly with the following organizations to implement an Air Force IPDE. The Joint EC Program Office will increase its efforts to promote a DoD IDE, of which an Air Force IPDE is an essential element. In addition, PDSM must work with other ESC organizations in its efforts to field an integrated combat support system and to ensure that PDSM systems are standardized for interoperability within the DII. The *Integrated Maintenance Data System* (*IMDS*) program has a mission to acquire modernized information management technology to support base maintenance activities and personnel who support Air Force weapon systems. The

AF PDSM PO will work with this program to ensure integration between base maintainers and other PDSM activities in the DoD logistics enterprise. AF PDSM PO data conversion efforts will necessitate interface with the Defense Automated Printing Service (DAPS) and other industry data conversion organizations. The AF PDSM PO will monitor weapon system IPDE efforts to gather lessons learned for incorporation with a total Air Force IPDE solution. Finally, the *Air Force Institute of Technology* is supporting cultural change toward an IPDE by providing course training to Air Force personnel in TO, engineering data, and digital data acquisition management (to debut in March 1998).

Internal Organizational Analysis. Equally important as the external environmental analysis is an assessment of the internal AF PDSM PO capabilities to meet its mission. The AF PDSM PO possesses many competencies required to implement an Air Force IPDE. The AF PDSM PO is well structured organizationally to accomplish the mission of implementing an Air Force IPDE. The AF PDSM PO has responsibility for deploying standard DoD system applications and infrastructure (JCALS and JEDMICS) within the Air Force. The program office has expertise in optimizing TO and engineering data management processes to enable conversion, acquisition, management, fielding, and sustainment of digital product data. Furthermore, the AF PDSM PO has provided guidance and training in IPDE technologies and techniques to many of its product data customers. This combination of infrastructure and applications deployment and data management process capability exists in no other single Air Force organization. Air Force and other DoD component product data users rely on the AF PDSM PO Home Page on the World Wide Web to access the latest Air Force product data infrastructure, digital product data management, and TO conversion information. In addition to the internal strengths of the program office there remains a few challenges. The greatest internal challenge to the program office is ensuring that JCALS meets the requirements to enable the system to replace the existing outdated TO systems. Successful deployment of JCALS is essential since most Air Force IPDE efforts will rely upon JCALS functionality and infrastructure. Another significant program office challenge is to create and to maintain organizational synergy toward accomplishing the Air Force IPDE implementation mission. The program office will not take a fragmented approach to implementing an Air Force IPDE.

Strategic Issues. The following list of strategic issues represent potential impediments to successful accomplishment of IPDE implementation. They are presented in order of significance with the most important issue presented first.

1. Continuing cultural resistance to wide-scale IPDE implementation.
Although digital data technologies are being inserted in DoD support processes, DoD product data users still resist improving their business processes through the use of digital data and its related technologies. This has specifically resulted in an Air Force support environment where the pace of technology insertion has increased faster than the pace of workforce acceptance and use of that technology.

2. Information technology funding will remain flat or drop by nearly ten percent by the year 2002. Potential destabilization of funding could impede the deployment of standard DoD product data systems and delay conversion of non-

digital legacy product data to digital form. Available funding should be distributed based upon the anticipated and documented benefits and value-added contributions of information technology investments.

3. DoD infrastructure still characterized as fragmented. Since an Air Force IPDE requires connectivity between Air Force, DoD, and industry product data systems, the challenge remains of integrating multiple non-interoperable systems into a workable DII COE compliant solution. Furthermore, connectivity rifts between government depot and flightline maintenance processes are a significant contributor to this challenge.

4. The need to exploit the capability of standard DoD information systems to provide more support to the warfighter. Standard DoD information systems, such as JCALS and JEDMICS, will have much more functionality than is currently secured by the Air Force. With regard to JCALS, enhanced technical manual functionality alone will not represent an adequate return on the investment of this system.

5. Inadequate definition of IPDE security requirements. Although security tools are readily available, Air Force product data interchange security requirements need to be specifically defined.

Air Force IPDE Implementation Goals. Considering the information technology trends, environmental factors, internal AF PDSM PO strengths, and the strategic issues to confront, the AF PDSM PO must accomplish the following goals to implement an IPDE for Air Force Warfighters and Single Managers:

1. Field standard DoD PDSM systems

2. Convert and field legacy product data in standard digital forms

3. Enable the acquisition of digital product data

4. Incorporate proven industry business practices and commercial off- the-shelf (COTS) solutions for product data management

Air Force IPDE Implementation Objectives. To achieve these four IPDE implementation goals, the following measurable objectives must be accomplished.

1. Implement the fielding and sustainment plans for the Joint Computer-aided   Acquisition and Logistics Support (JCALS) System for Joint Technical Manual (JTM) users
2. Investigate other non-JTM functionality for JCALS
3. Implement the fielding and sustainment plans for the Joint Engineering Data Management Information and Control System (JEDMICS)

4. Ensure compatibility of Air Force PDSM activities with Defense Information Infrastructure (DII), Global Combat Support System, and Combat Support Information System (CSIS) initiatives
5. Manage the conversion and fielding of Air Force legacy product data in digital form
6. Develop and maintain digital TO and engineering data acquisition, management, and sustainment procedures
7. Provide support to train Single Managers (SM), Major Commands (MAJCOM), and Air Logistics Center (ALC) personnel in IPDE infrastructure, processes, and tools
8. Recommend product data policy changes to ensure incorporation of IPDE concepts
9. Assist SMs in producing and/or reviewing Business Case Analyses for Air Force IPDE Implementation
10. Develop templates and tools for optimal digital TO interchange

IPDE End State. The following Air Force IPDE characteristics represent the strategic end of the Air Force PDSM PO mission. These characteristics are consistent with and support accomplishment of DoD Logistics Strategic Plan goals of: 1. Reducing logistics cycle times by decreasing response times, achieving Total Asset Visibility (TAV), and improving force mobility; 2. Developing a seamless logistics system by fielding modernized logistics business systems and improving communication of logistics information; and 3. Streamlining logistics infrastructure by implementing proven business practices and reducing the cost of weapon system ownership. The AF PDSM PO will have successfully achieved its mission when SM, ALC, MAJCOM, and other product data users:

1. have universal access to quality digital product data to accomplish weapon system acquisition, deployment, operations and maintenance, and disposal activities.
2. use product data that is standardized, shared, secure, and independent of functional applications.
3. use DII COE compliant, modernized product data management information systems that are interoperable with other Air Force IDE functions (e.g., finance, manpower and personnel), other component IPDEs, and industry digital information enterprises.
4. have access to all active product data in standard digital formats that are usable on modernized product data systems.
5. can access product data through their platform of choice through secure channels, as necessary, and through a seamless connection to the appropriate product data where ever it resides.
6. possess Air Force product data management procedures to guide and tools to support digital product data acquisition, management, and sustainment processes.

Conclusion.

The Air Force IPDE is an important component of the Air Force digital environment. The AF PDSM PO Strategic Plan is designed to support Air Force IPDE implementation efforts and to provide a framework for logisticians to maneuver infrastructure, digital product data, business processes, and applications to meet Air Force logistics goals.