

Engineering Directorate
WR-ALC/EN

Warner Robins Air Logistics Center

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USAF Product
Lifecycle
Management (PLM)
and Configuration
Management (CM)

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The Goal

Transform Air Force Product and Program data related processes from a stove-piped, organizational focus, to a streamlined, transparent, product lifecycle focus.

- Reuse product related information
- Decrease the Air Force's Engineering change cycle times
- Enterprise view with robust processes for OSS&E
- Provide a single authoritative source for accurate product related information
- Improve collaboration



What is eLog21?

- **PLM initiatives are part of the eLog21 transformation campaign that will integrate Air Force supply chain operations**

eLog21:

Expeditionary Logistics for the 21st Century (eLog21) campaign, will transform Air Force Logistics to improve support of the War fighter.

ECSS:

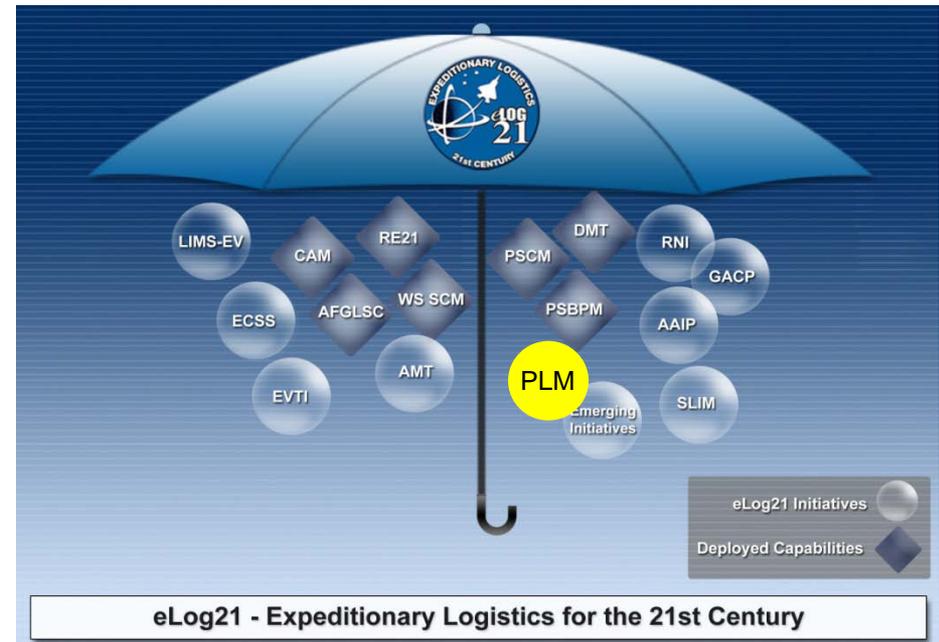
Cornerstone for eLog21. The eLog21 initiatives will be enabled by ECSS not just because ECSS provides a common IT infrastructure, but because ECSS will transform the way the Air Force Logistics community does business

Enterprise Resource Planning (ERP):

ECSS is AF Logistics ERP. A commercial, off-the-shelf (COTS) software product for horizontal integration of business operations

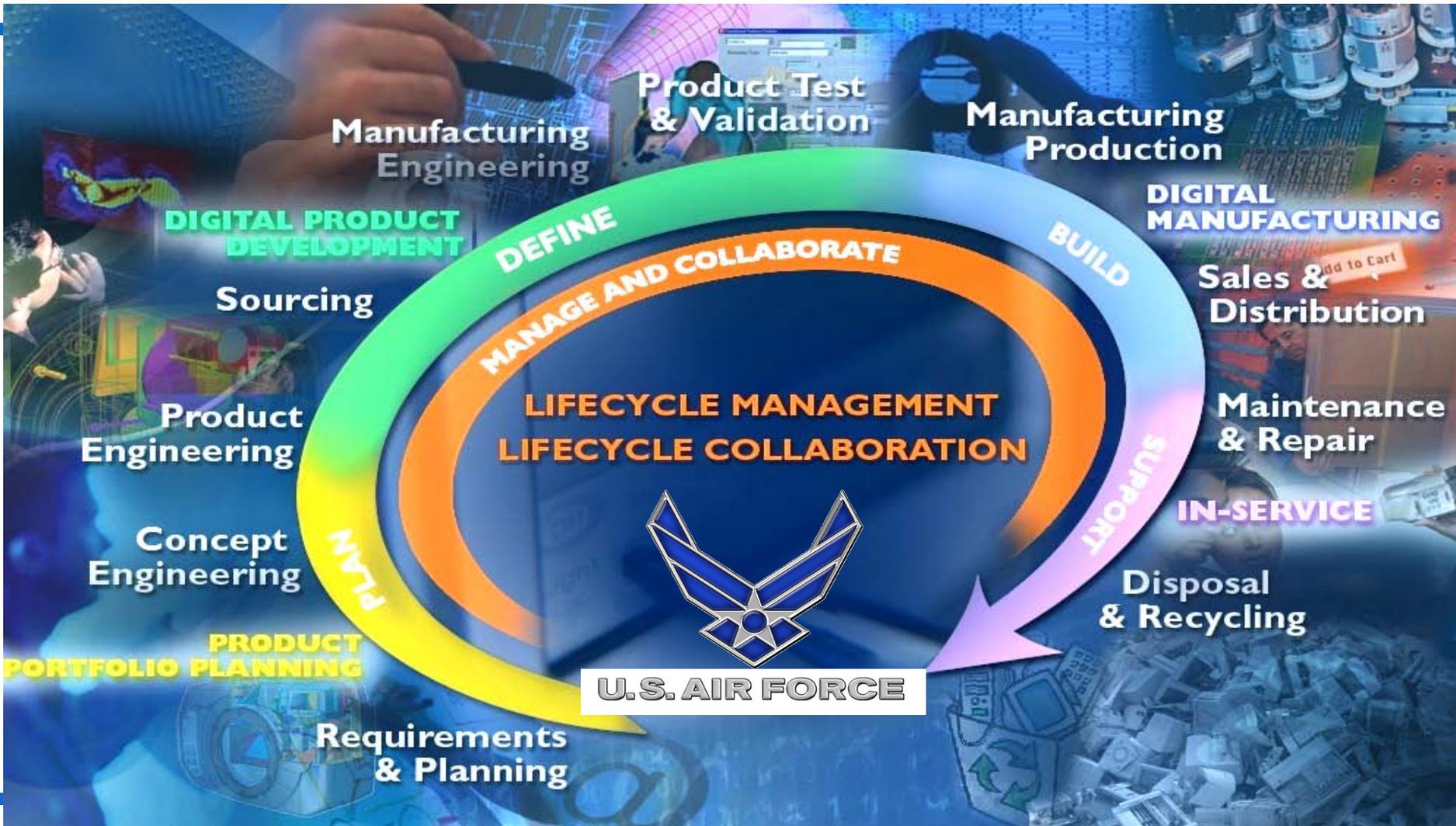
Product Lifecycle Management (PLM):

Process of managing the entire lifecycle of a product from its conception, through design and manufacture, to service and disposal





The Total Weapon System Lifecycle



People First...Mission Always



PLM's Roles in eLog21

D&SWS Business Intelligence

Weapon System/Program Performance Scorecards

Service Requests

Acquisition

- DOD 5K
- Programs
- Budgets
- Quality
- Schedule
- Cost

- Requirements
- DODAF
- Capabilities
- Testing
- Life cycle Plans
- Re-use
- Performance
- Compliance
- RISK

Purchasing

- Contracts
- Purchase order
- Purchase Request
- Indirect sourcing

- Technical Specs
- Manufacture Sources
- Technical Packages
- Product Quality
- KPP/KPA

Supply

- Inventory
- Warehousing
- Distribution
- Logistics
- Transport

- Supplier integration
- Warranty
- Materials Handling
- Storage Specs
- Kitting

Maintenance

- Asset Configuration
- Work Order Planning
- Resource Mgmt
- Maintenance History

- Bills of Material
- Maintenance Programs
- Engineering Drawings
- Engineering Specs
- Technical Orders & TCTO's



- Serialization
- Equipment & Facilities
- Asset mgmt.
- Work Plan & Execute

- Assistance Request
- Configurations & Modifications
- Job Standards & Controls



Planning

- Demand Plan
- Supply Plan
- Deployment Planning
- Resource & Equipment Planning

- Obsolescence
- Resources, Facilities, & Equipment
- Capacity Factors

Reliability

- Structures
- Engines
- Electronics
- RCM
- CBM+

- Root-Cause
- Reliability
- Performance

Core ERP Processes

PLM



PLM Overview



- Is an enabling technology based on **industry's best practices** to support total lifecycle systems management
- Provides a closed loop, **CMII compliant process**
- Provides a **single authoritative source** with effective configuration management of product information
- **Tracks configurations** and attributes of a weapon system and its subassemblies and components
- Accurately **captures the design** from initial concepts to the as-built, as-operated and as-maintained configurations
- Assures the **data is available** for all users facilitating cost effective sustainment of USAF combat capabilities
- Facilitates **reuse of information** for future acquisition efforts such as major system modifications



PLM Capabilities



- Provide a single authoritative source for accurate product related information by managing configuration rigorously from program inception to decommissioning of a system
 - Manage Requirements and perform Systems Engineering
 - Manage program artifacts
 - Manage Master, Planning and Repair BOMs
 - Manage product data
- Improve collaboration
 - OEM and vendors
 - Expose all relevant product data to all Air Force disciplines
 - Improve the communication for concurrent engineering



Why PLM?



- Operational safety, suitability, and effectiveness (OSS&E) demands accurate configuration management in terms of using approved parts and procedures in maintaining Air Force weapon systems
- USAF Engineering must have access to accurate configuration accounting to be effective
- USAF Configuration Management must be governed by accurate, approved, and released engineering data
- Performance Based Logistics emphasizes access to product data on demand and in real-time directly from OEMs
- Improving readiness by moving towards near real time access for product data



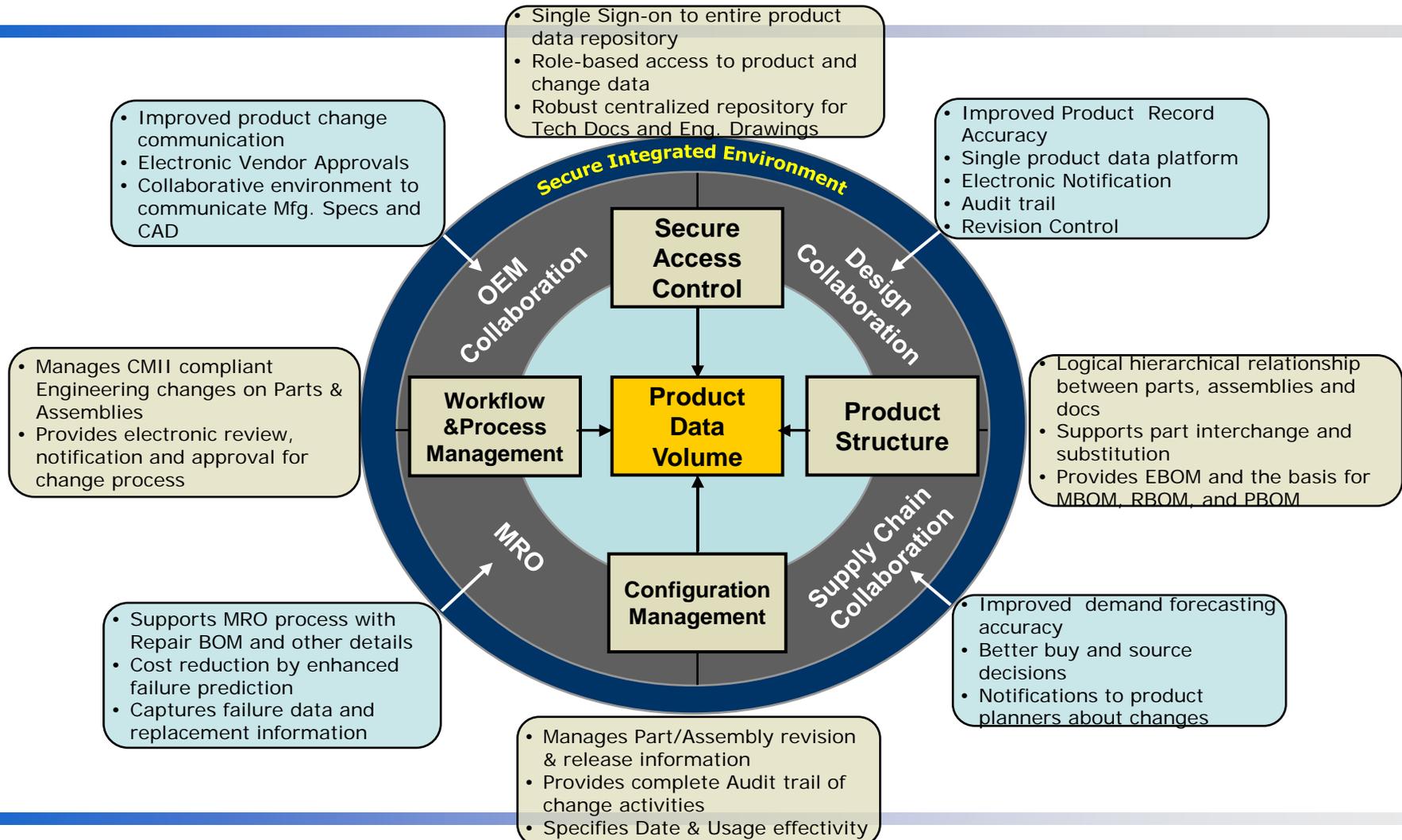
What Does PLM Provide?



- PLM provides the framework to enable total lifecycle systems management
- Manages baselines for requirements and the physical items built to support the requirements
- Manages requests for baseline changes, the approvals to the changes, and the effective release of the approved change for implementation
- Provides the integration points between the design chain and the supply chain



PLM Functional View



People First...Mission Always



PLM Challenges Today

Lack of Enterprise Mgmt Process

- Each weapon system has unique configuration management processes

No Common Intelligent Product Data Formats

- Product data formats and systems to manage product data are not standardized

Not Buying the Correct Data

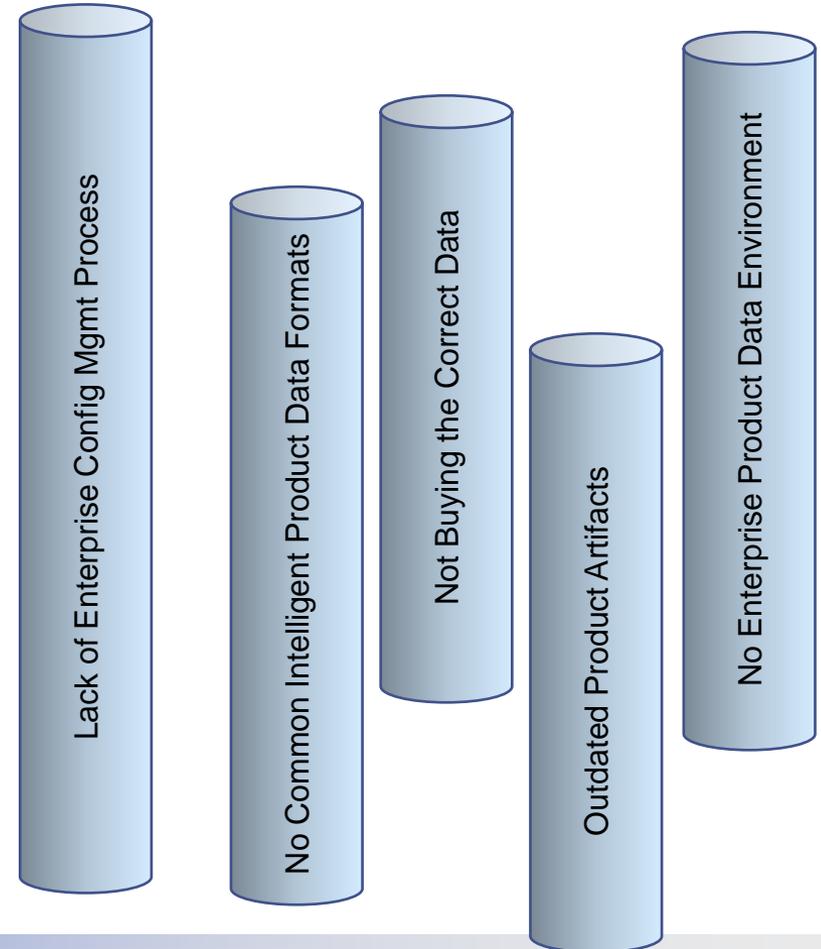
- Rights to technical data are not considered to reduce lifecycle costs
- Not buying complete data

Outdated Product Artifacts

- Product data is primarily image-based formats even when OEMs are utilizing 3D CAD models and structured content

No Enterprise Product Data Environment

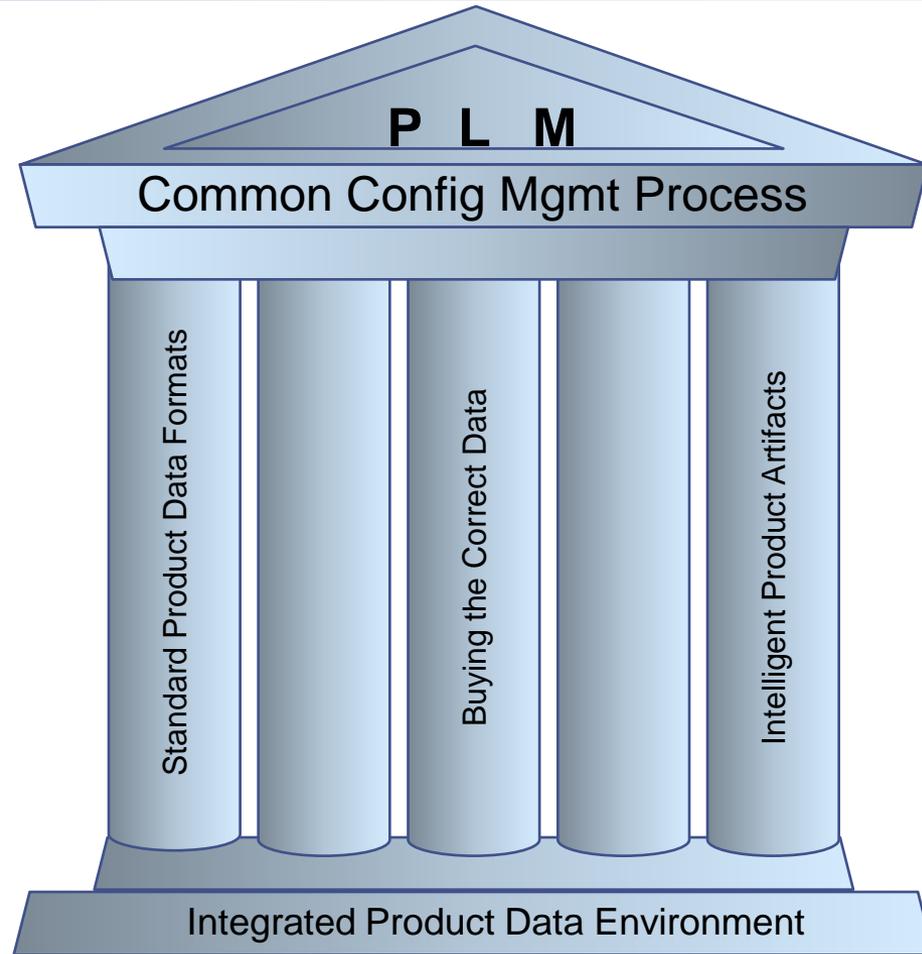
- Silos of data exist; no enterprise visibility





PLM for the Future

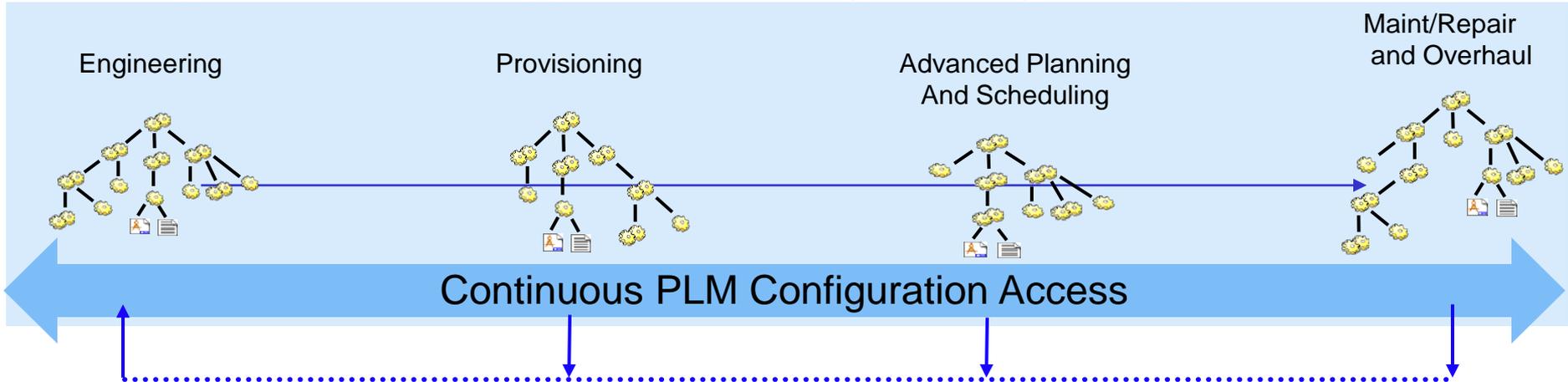
- Common Config Mgmt Process**
 - Single CMII Based Product Management Process
 - Standardized Practices and procedures
- Standard Product Data Formats**
 - Common Product Data Exchange with Vendors
 - Standardized Data across Weapon Systems
- Buying the Correct Data**
 - Adopt A&D industry standards
 - Reduction in OSS&E Costs
- Intelligent Product Artifacts**
 - Database driven Functional Capability
 - Integrated Artifact Data Relationships
- Integrated Product Data Environment**
 - Accurate, timely and efficient data management
 - Common Functional Interface





Product Configuration

The primary value provided by PLM is a comprehensive, single source of authoritative product data that supports Provisioning, Planning, and Repair activities



Integrated Change Control Process

Revision-controlled weapon system data

- ▶ Requirements Traceability
- ▶ Acquisition Documentation
- ▶ Air Worthiness Documentation
- ▶ OSS&E Documentation
- ▶ Engineering Drawings
- ▶ System Specifications
- ▶ Technical Orders
- ▶ Project Documentation
- ▶ Parts and Items Data
- ▶ Deficiency Reports
- ▶ Maintenance Programs
- ▶ Work Instructions

People First...Mission Always



What is CMII?

- CMII shifts the emphasis to integrated process excellence and provides the how-to for:
 1. Accommodating change;
 2. Optimizing the reuse of standards and best practices;
 3. Ensuring that all requirements remain clear, concise and valid;
 4. Communicating (1), (2) and (3) to users promptly and precisely;
 5. Achieving conformance to requirements in each case.
- CMII also promotes continuous improvement in 1 through 5.



What is in CMII?

CMII is an integration of configuration management and other closely related activities as shown below.

CMII

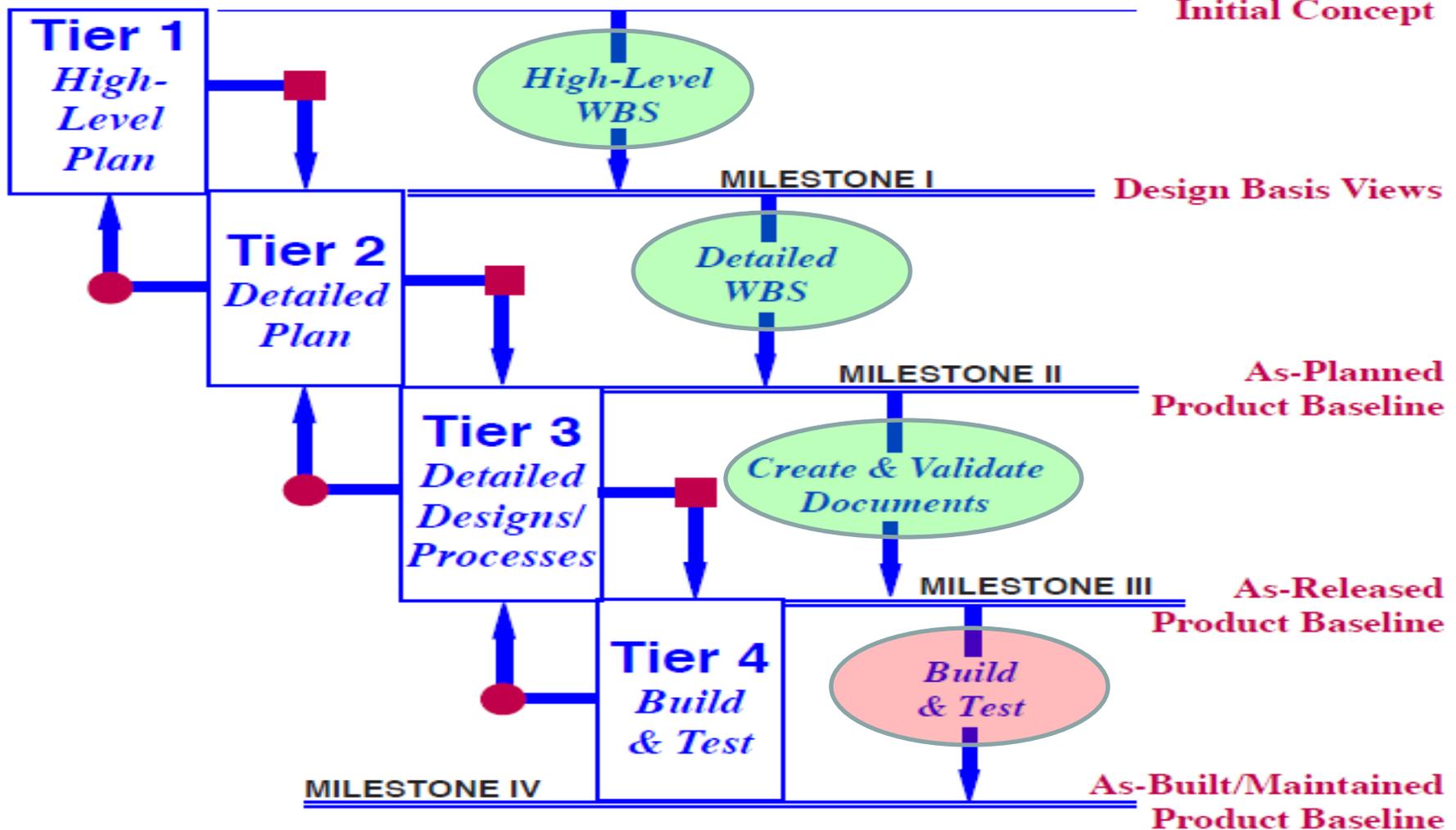
- Configuration Management:** Ensures that configurations conform to released requirements;
- Requirements Management:** Ensures that documented requirements are clear, concise and valid;
- Release Management:** Ensures that documents are authorized and released prior to use;
- Change Management:** Keeps released documents and data up to date;
- Data Management:** Ensures data bases are accurate and deliverable data is secure;
- Records Management:** Retains traceability of work and proof that work products conform;
- Document & Library Control:** Protects knowledge assets and prevents unauthorized changes;
- Enabling Software Tools:** Serve to enhance overall process reliability and efficiency.



The Four-Tier CMII Development Process

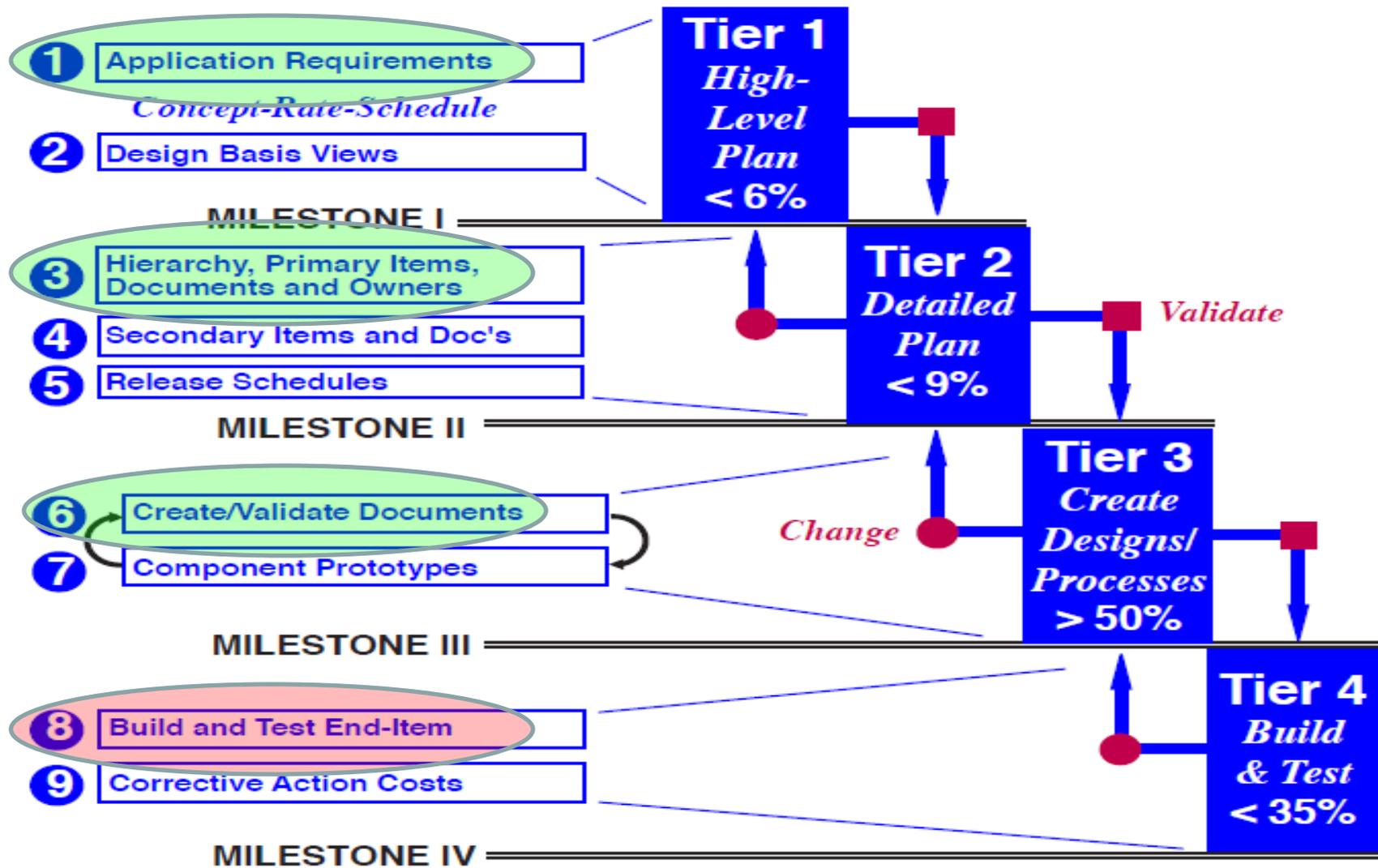


Concept, Build Rate and Schedule





Development Resources By Step Within Each Tier

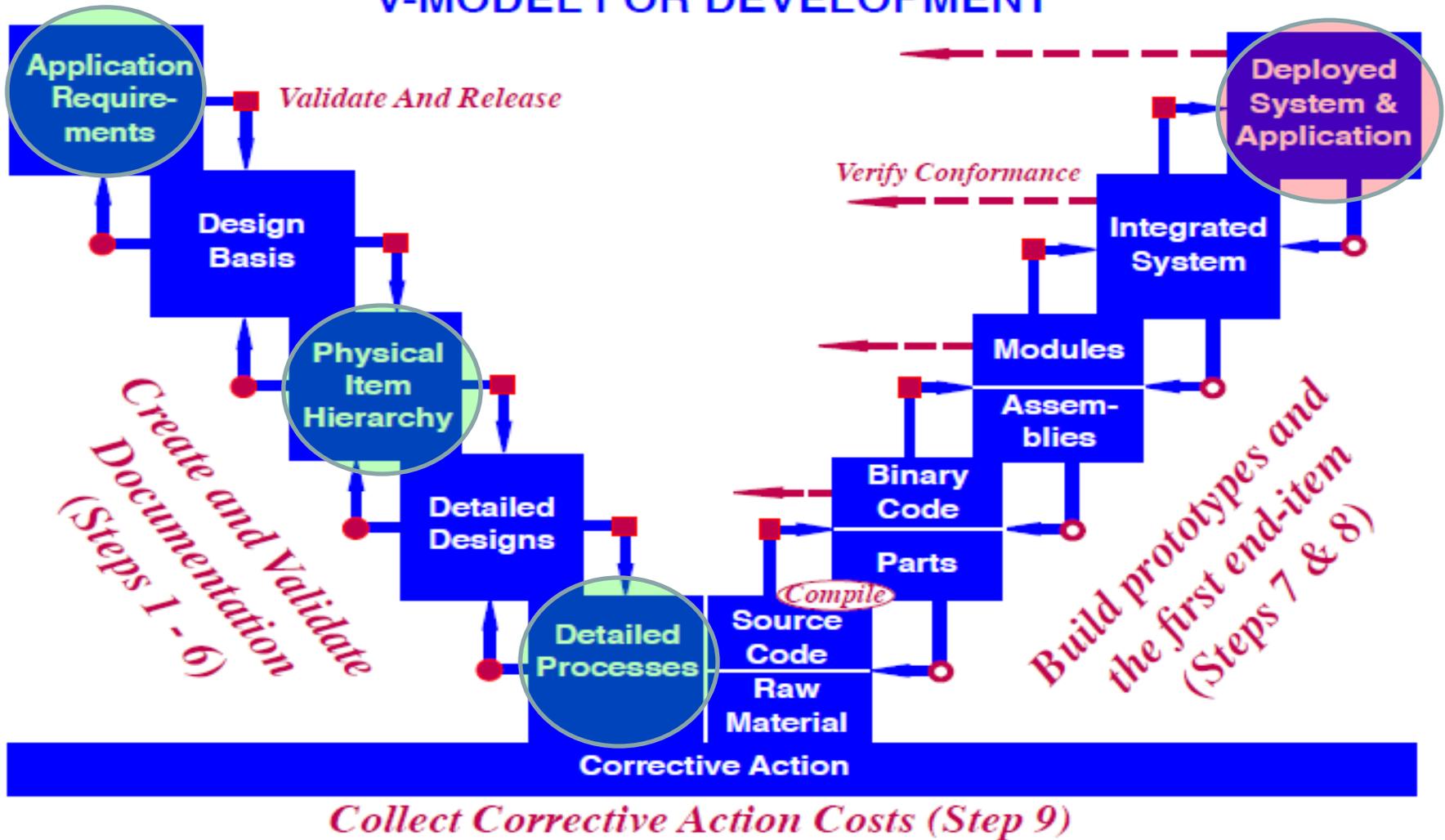




The CMII V-Model for Development



V-MODEL FOR DEVELOPMENT

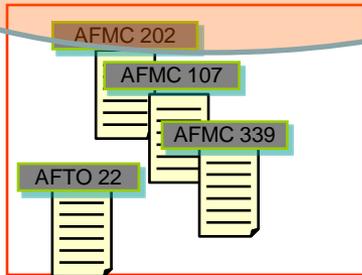




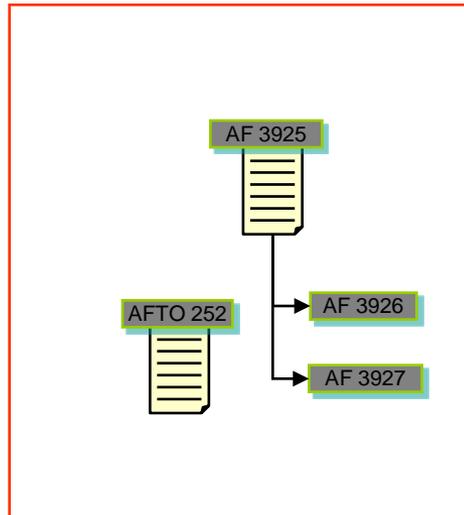
Change Process Mapping

Today

Different, Unconnected Processes

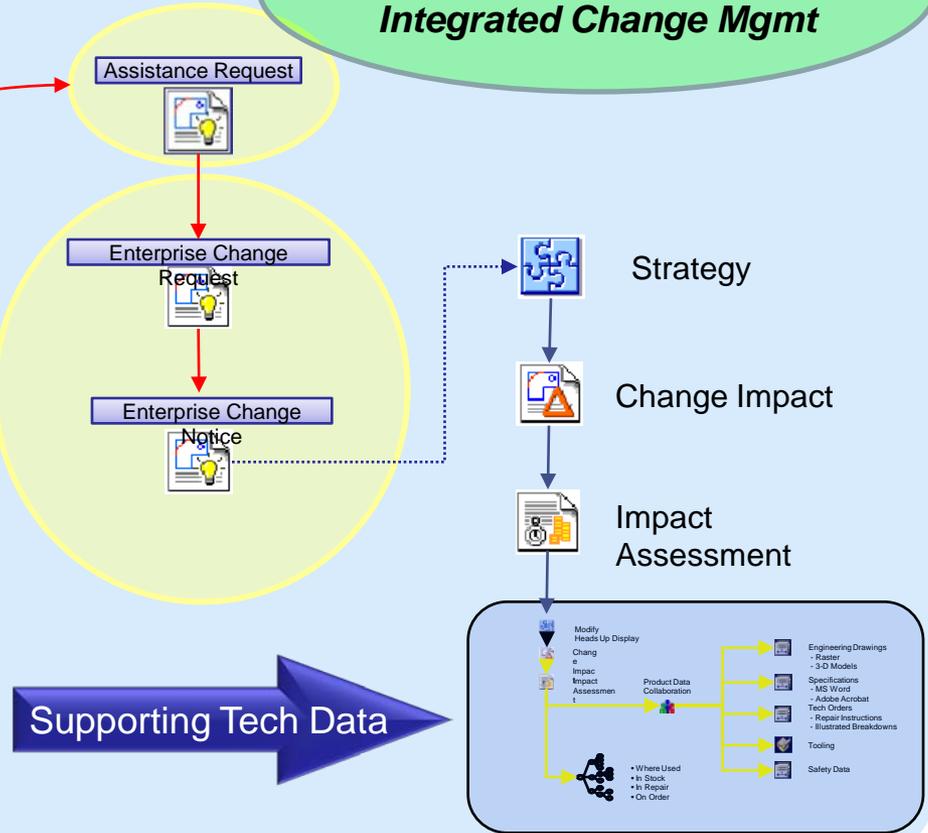


Will Be Replaced By



Will Be Replaced By

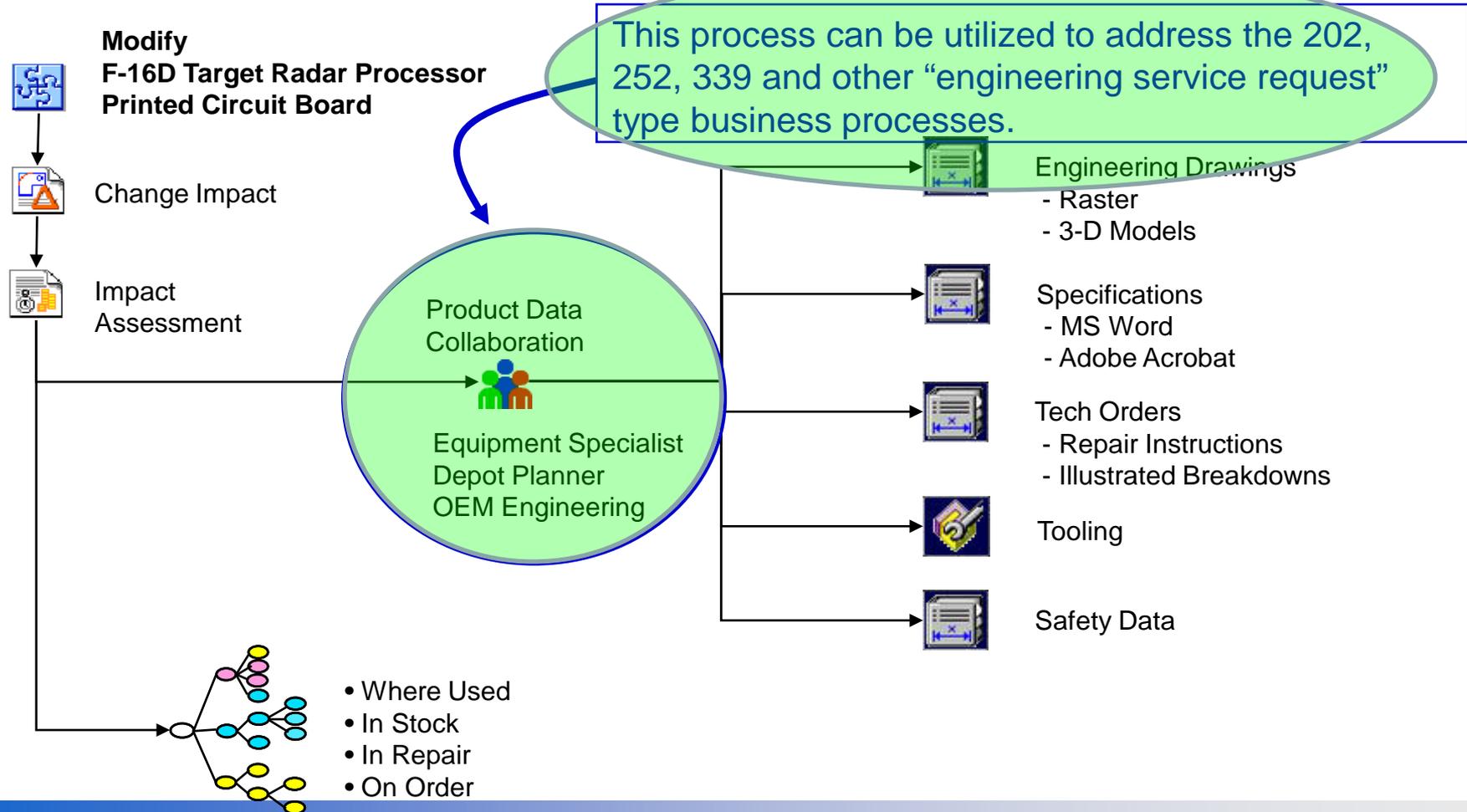
PLM Future State *Integrated Change Mgmt*



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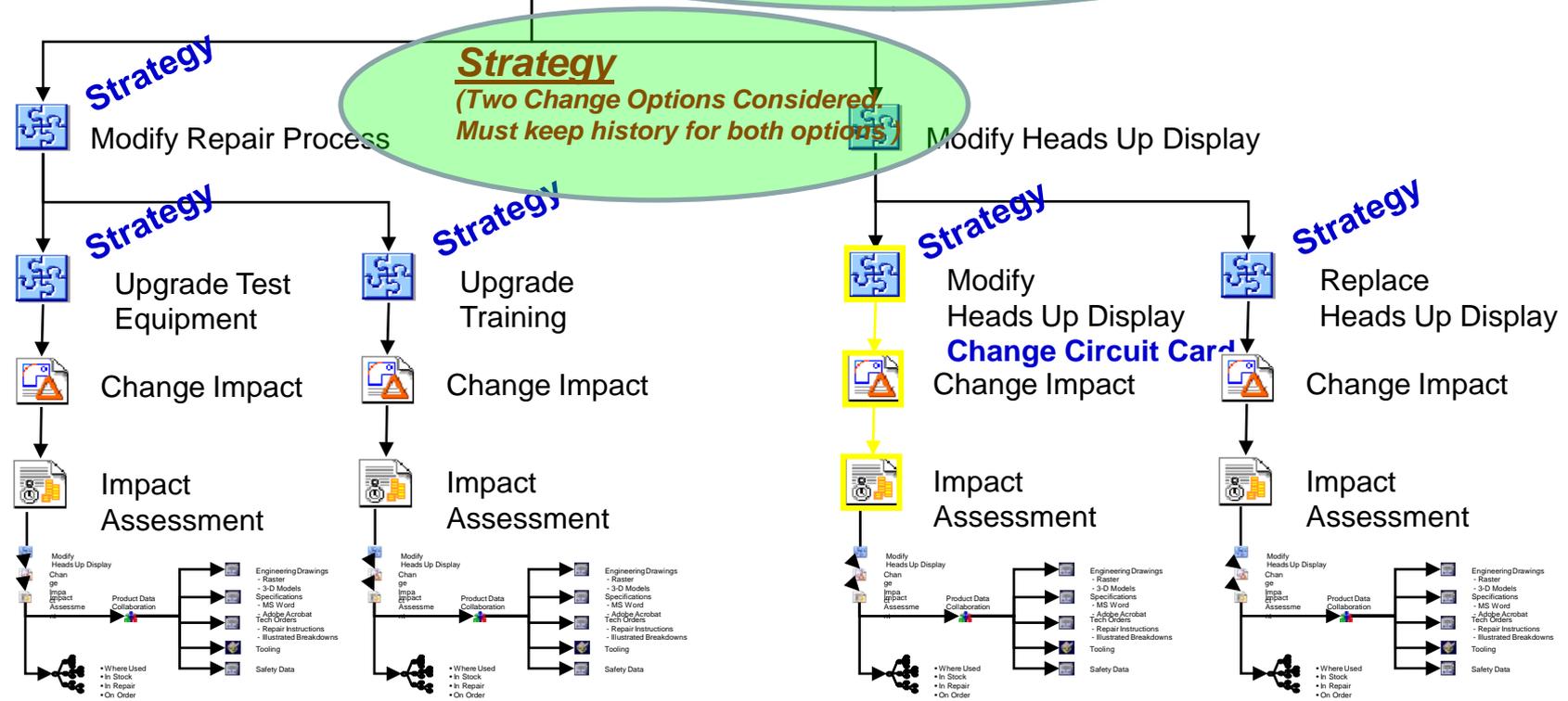


Impact Assessment



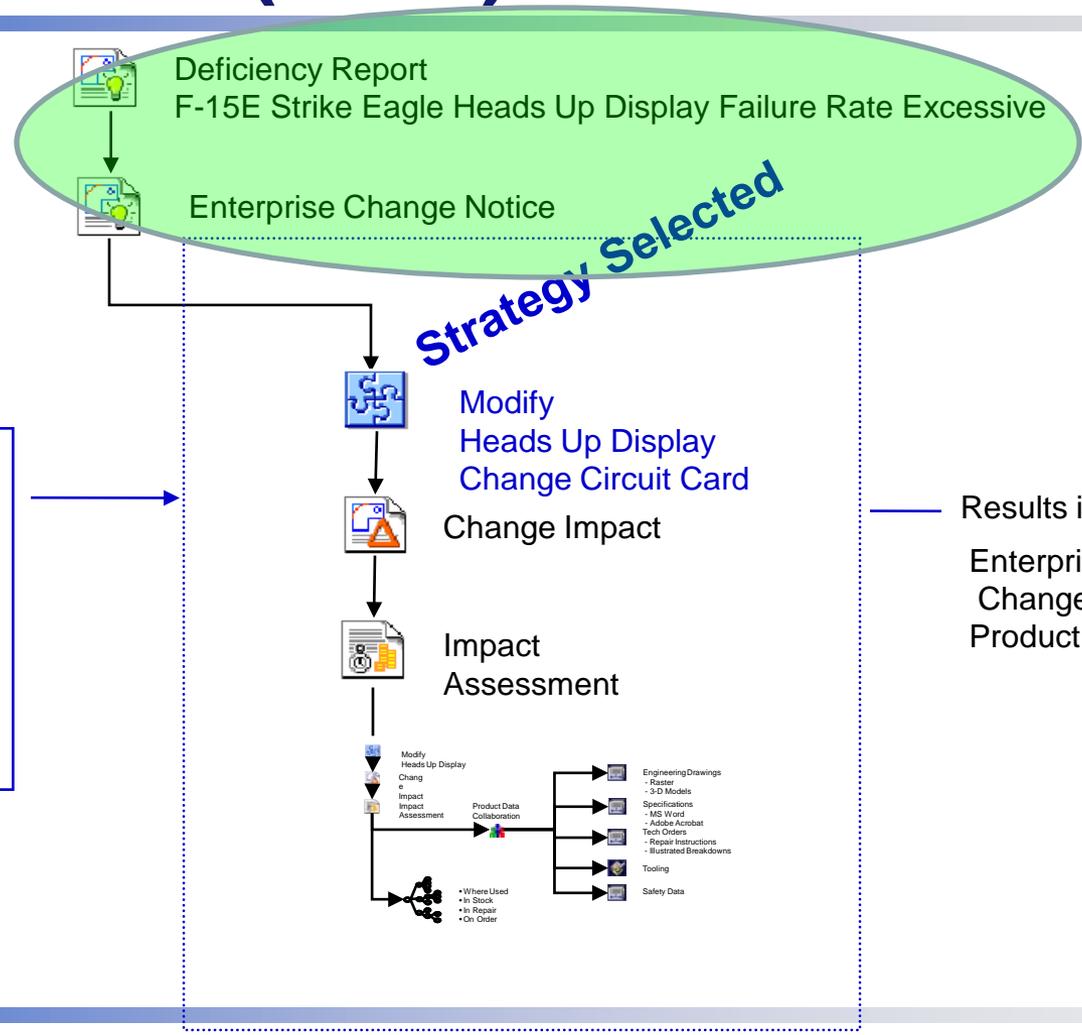


Enterprise Change Request (ECR)





Enterprise Change Notice (ECN)

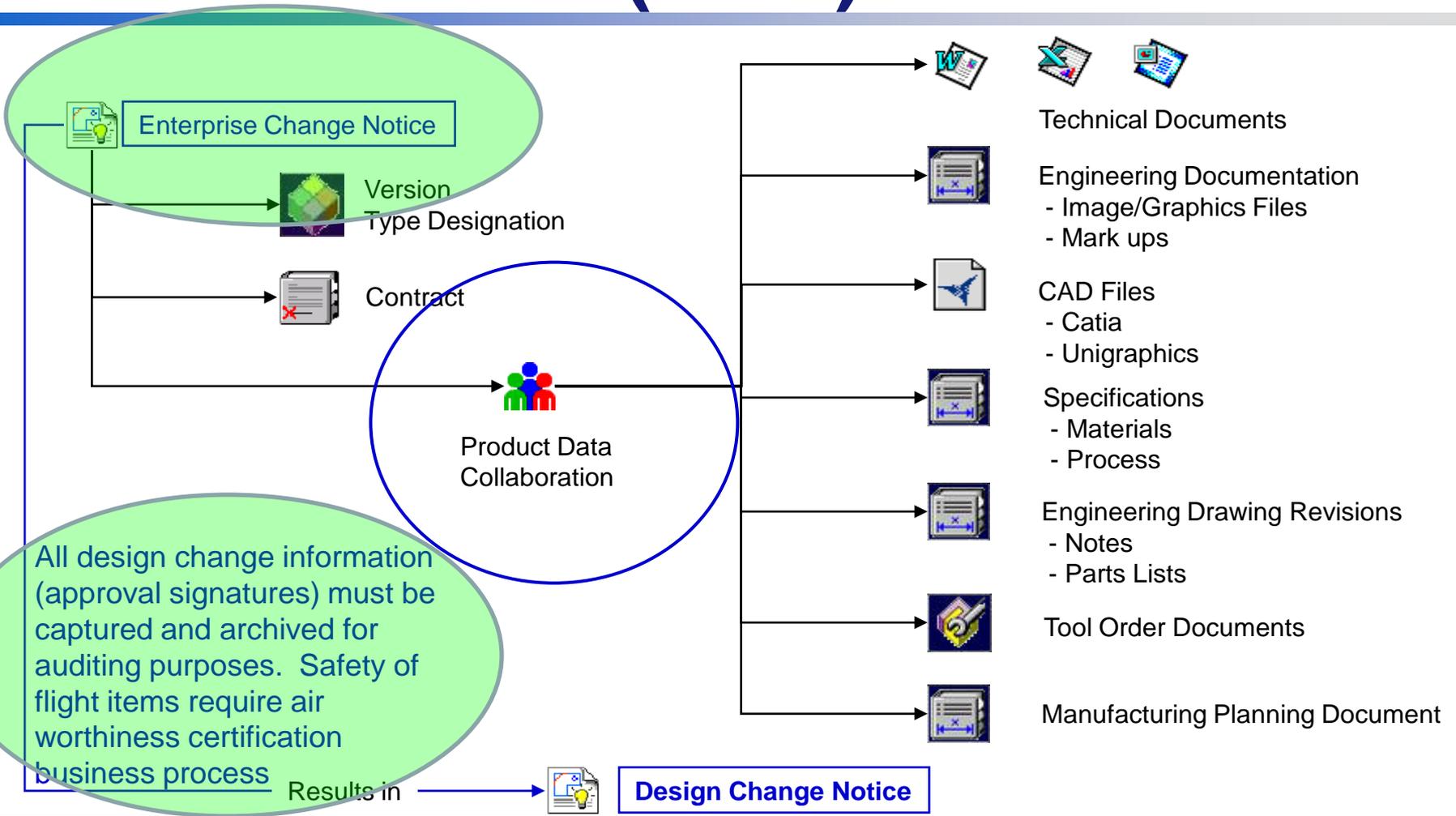


It is crucial to capture the change decision process for reuse in implementing the change, future change considerations and configuration auditing purposes.

Results in → Enterprise Change Notice Product Data for Release



Enterprise Change Notice (ECN)



All design change information (approval signatures) must be captured and archived for auditing purposes. Safety of flight items require air worthiness certification



Product Configuration Components



Single Source of Product Data

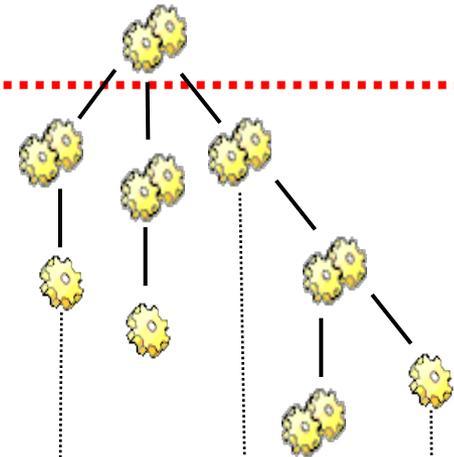
Product Structure (BOM)

Integrated "BOM"



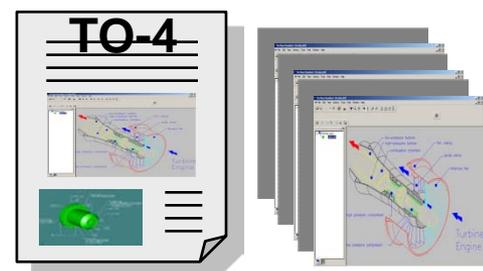
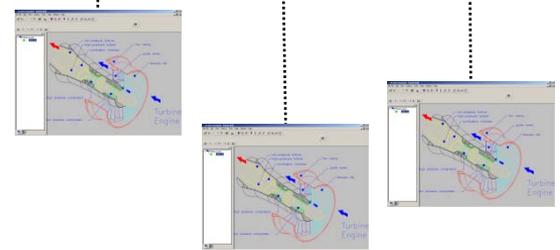
Parts

Process drives configuration change (i.e., 107 339, 202)



Product Definition Tech Data (TOs, Dwgs, Documents)

Impact Assessment, ready access to tech data





Conclusions

Air Force PLM provides a single source of accurate optimized data across the enterprise to improve workflow, improve weapon system availability, and reduce the overall cost of weapon system ownership

- The AF is committed to change
- The AF is moving toward transparency
- Collaborative workflows include OEM, Design, Supply Chain, and Maintenance



Questions & Answers



Questions & Answers

Headquarters U.S. Air Force

Integrity - Service - Excellence

Backup Charts



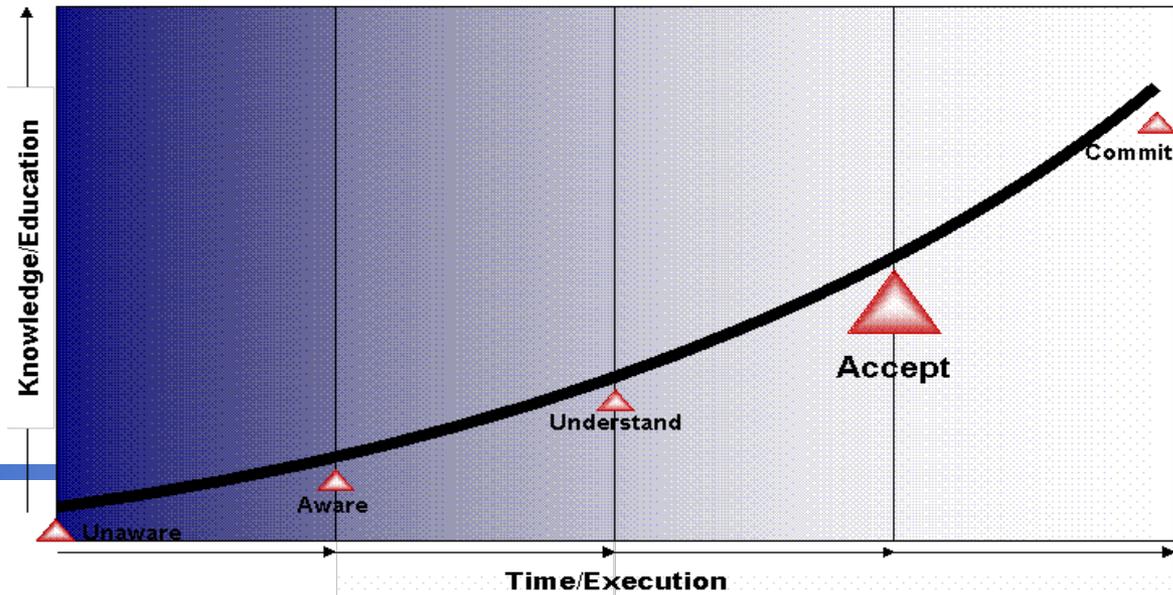
U.S. AIR FORCE



Organizational Change Management



- Implementation of PLM will require a commitment towards change across a wide range of roles
 - Build leadership commitment for PLM
 - Communicate PLM's data exposure capabilities to airmen at all levels
 - Educate Airmen on how to leverage PLM technology effectively in their jobs
 - Change the focus of Airmen from an organizational focus to a product focus
 - Identify Authoritative sources of product data
 - Streamline all product lifecycle processes





Capturing Data From the IPB



➤ Usually a vendor part number used by the AF to identify parts for sustainment

Number of times this part occurs in the Assembly

➤ The Source, Maintenance, Recoverability Code *

➤ Refers to the TO figure number and index value (mapping of the part to the figure) assigned to the part for this document only
➤ Maps to supporting technical information

➤ Vendor unique code
➤ Provides a unique identification for AF sustainment when used in conjunction with the vendor part #

➤ Part description
➤ Also shows the relative indenture of parts (Next Higher Assembly)

➤ The UOC maps part applicability to specific aircraft (tail, block, or model effectivity)

FIGURE & INDEX NO.	PART NUMBER	CAGE	DESCRIPTION							UNITS PER ASSY	USABLE ON CODE	SMR CODE
			1	2	3	4	5	6	7			
1	3810051-101	92003	ACTUATOR ASSEMBLY, Inlet guide vane (9736M98P05; 07482)							1	A	PAOLD
	3810051-103	92003	ACTUATOR ASSEMBLY, Inlet guide vane (9736M98P06; 07482)							1	B	PAOLD
	3733306	92003	COVER, Inspection							1		PADZZ
										2		PADZZ
										1		PADZZ

*
 •Source defines the means of ordering the specific part(s)
 •Maintenance defines the ownership and skill level required
 •Recoverability defines the part(s) disposition



Total Lifecycle Cost

Issues

- The Air Force does not typically purchase the appropriate level of product data in the correct format to be of benefit in PLM
- Product data purchases are based upon a Lifecycle Cost Estimate for a specific SORAP

Solution

- Instead, purchase product data based on COTS PLM Industry standard data and tool requirements (ex. ISO 10303, Standardized viewing format, etc.)
- Provide future options to purchase product data as part of a CSWS/CLS/PBL contract to provide flexibility based on changing SORAP decisions