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Standards-based Product Lifecycle Management -- STEP into PLM

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Standards-based Product Lifecycle Management – STEP into PLM

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Presented at the SME WESTEC 2004 – New Frontiers in Manufacturing Technology Conference, Los Angeles, CA
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Outline

- What is PLM?
- Examples of lifecycle data
- Need for PLM
- Commercial Solutions
- PLM for DoD acquisition lifecycle
- Need for standards
- Recommended standards
- Notional architecture
- Benefits/ Limitations
- Conclusions
What is PLM?

- Product Lifecycle Management (PLM) is an integrated, information-driven approach to all aspects of a product's life, from its conceptual design through manufacture, deployment and maintenance—culminating in the product's removal from service and final disposal.

- PLM software suites enable accessing, updating, manipulating and reasoning about product information that is being produced in a fragmented and distributed environment.

- Another definition of PLM is the integration of business systems to manage a product's life cycle.


PLM = People + Software + Processes
Examples of lifecycle data

Product Design
- 2D Drawings
- 3D CAD models
- Assemblies
- PDM

Concept Design
- 3D Concept models
- R&D Studies

Analysis
- FEA, CFD
- Virtual Prototyping
- Inspection

Manufacturing
- Process Planning
- Numerical Control

Sales/Marketing
- Procurement
- Tech Data Packages

Requirements
- User's SOO
- SOW
- Other documents

Sustainment
- Repair Analysis
- Spare Parts Manufacture
- Maintenance Mgmt.
- Failure Analysis

Disposal
- Environment Laws
- Recycling Data
Example

* Source from Pratt & Whitney

Technical Data has multiple users
Need for PLM

- Integrate product data throughout the supply chain
- Manage and control product data – store once, use many times
- Improve business efficiency
  - Reduce time to market
  - Shorter cycle and lead times
  - Improved productivity
Commercial solutions

- ERP-based
  - SAP
  - MatrixOne
  - Agile

- CAD-based
  - Unigraphics PLM Solutions
  - IBM-Dassault PLM Solutions
  - PTC
PLM for DoD acquisition lifecycle

CONCEPT EXPLORATION
Analysis of Alternatives
Operational Analysis
Business Process Reengineering

COMPONENT ADVANCED DEVELOPMENT
Advance Concept Tech Demo
Systems Architecture Developed
Component Technology Demo

SYSTEM INTEGRATION
System Definition Effort
Preliminary Design Effort
Functional Baseline
Allocated Baseline

SYSTEM DEMONSTRATION
Product Baseline
Detail Design Effort

LRIP - RATE
Establish Manufacturing Capability
Low Rate Initial Production
Initial Operational Test and Live Fire Test
Full Rate Production
Deployment
Tech Manual Development

SUSTAINMENT
Block Modifications
Engineering Change Proposals
Evolutionary Requirement Development
Test and Evaluation

DISPOSAL
Environmental Compliance
Need for standards

- Interoperability
  - CAD-CAD
  - PDM-PDM
  - PLM-PLM
- Open non-proprietary data formats
- Not tied to a specific software solution
- Easier to handle legacy data
- Potential long term solution to archive product data
Recommended standards

- ISO 10103 – Standard for Exchange of Product Data (STEP)
- STEP is made up of several separate protocols (called Application Protocols – AP) covering a wide spectrum of engineering design
- Is already widely used to exchange 3D solid models (AP 203)
- Protocols for other product data types in development
### APPLICATION PROTOCOLS AND ASSOCIATED ABSTRACT-TEST SUITES

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<td>220 Proc, plg, manuf, assy of layered electrical products [X]</td>
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Notional architecture

Prime Contractor
PDM A

Requirements
TDP Validation
Procurement

Conceptual Design (AP203)
Detailed Design
3D Models (AP203)
2D Drawings (AP202)
Analysis Models (AP209)
Manufacturing Models (AP224)
NC Process Plans (AP238/240)

Subcontractor
PDM B

Technical Data Package
Released Design

Supplier
PDM C

Manufacturing

Contractor

Product Support
Limitations

- STEP standards are still evolving
- Standards not available for all types of product data
- PLM vendors will need to support STEP standards
- Configuration management between native and STEP files could be a problem
- Potential loss of data through translators
- Need ERP systems to support STEP as well
Conclusions

- PLM recognized as essential for large enterprises to efficiently manage lifecycle product data
- Companies will use best of breed solutions
- Standards essential for interoperability in the supply chain
- STEP standards are still in infancy but hold great potential
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