17125RC

Visualization enabled product lifecycle management for Army ground systems support

Dr. Raj Iyer
Program Manger for PLM
United States Army Tank Automotive R&D Center,
Warren, Michigan, USA

Presented at the 2007 XVL Solutions World Conference
Tokyo, Japan

RDECOM

TARDEC
U.S. ARMY TANK AUTOMOTIVE RESEARCH, DEVELOPMENT AND ENGINEERING CENTER

Report Documentation Page

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
29 MAY 2007	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Visualization Enabled Product Lifecycle Management for Army Ground Systems Support	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
Iyer,Dr.Raj	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
US Army RDECOM-TARDEC 6501 E 11 Mile Rd Warren, MI 48397-5000	**17125RC**
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	TACOM/TARDEC
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)
	17125RC

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES

Presented at the 2007 XVL Solutions World Conference Tokyo, Japan, The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**SAR**	**11**	

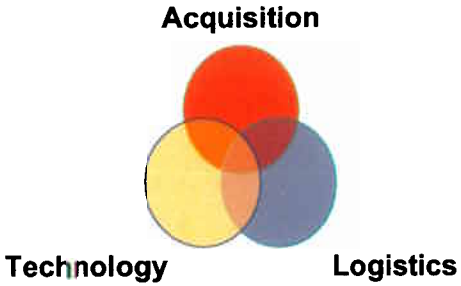
Agenda

- Army PLM Objectives
- Importance of product data
- Product data challenges today
- “As is” product data process with hetrogeneous CAD
- Visualization in a federated environment
- Lattice3D highlights
- Additional requirements

PLM Objectives

Federated Army Lifecycle Collaborative e-Nterprise

To develop and integrate technology, processes and policy for the management of lifecycle product data from cradle to grave, using a federated architecture, standards for interoperability and enterprise integration, and to enable data exchange and collaboration between Army and OEMs



Growing importance of product data

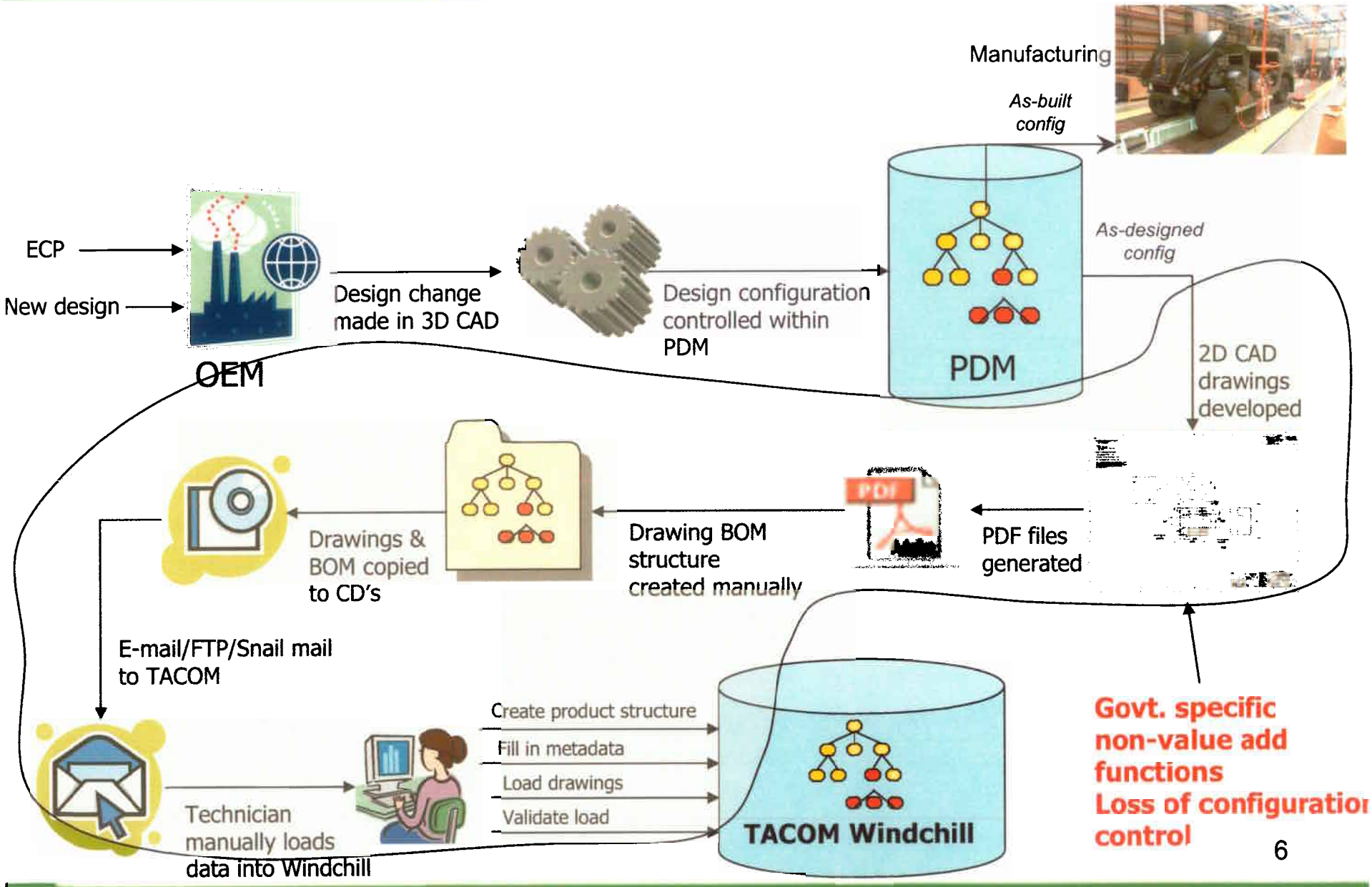
- Many of the current ground weapon systems will continue to be in service for another 20-30 years
  - Need ability to support systems after production
  - Reduce sustainment costs
- Performance Based Logistics emphasizes access to product data on demand and in real-time directly from OEMs
- Need tech data to support overhaul and rebuild efforts at depots to meet surge requirements
- Increased adoption of model based design for system modifications and new development programs
- Ability to support modeling and simulation of vehicles to assess weight increase due to add-on kits, etc. and impact on reliability, safety and survivability
- Long term data retention, archival and reuse of data for decades after initial fielding of systems
- Support for concept studies and validation of war fighter requirements for new systems

Product data challenges today

- Army product data is distributed among organic organizations and OEMs as weapon system moves through lifecycle
- Product data formats and systems to manage product data are not standardized – interoperability issues
- Product data delivered is still primarily un-editable raster-based drawings formats as lowest common format even when OEMs are using 3D CAD models
- On commercial vehicles, OEM unwilling to release CAD data but may be more comfortable releasing visualization data
- Vehicle models are getting larger in size (30,000+ parts) and hundreds of Gigabytes of storage for each vehicle model – need for 64 bit processors to even open models
- Data exchange and collaboration among organizations is inefficient and time consuming – data continues to be delivered on CD/DVDs
- Many of the product data processes (both engineering and logistics) are still based on "digital paper"
  - IETMs are developed much later in the system development phase because of the lack of re-use of model data
  - Provisioning and cataloging is unable to be completed early in the design cycle because of the lack of availability of drawings

The Army needs to modernize product data and leverage commercial best practices and standards and minimize Army unique processes.

"As-is" Product Data Process



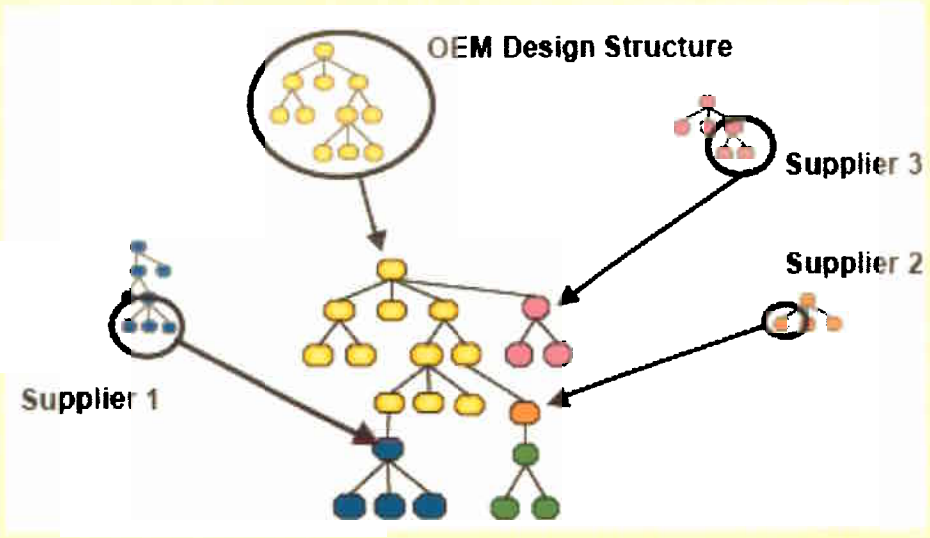
"To-be" Product Data Process

- Federated architecture for accessing product model data directly from OEMs
- Use of open standards for interoperability such as ISO 10303 (STEP), Product Life Cycle Support (PLCS), S1000D and U3D
- Use of visualization models for applications that do not require native CAD data
  - Modeling and simulation, concepts, provisioning and cataloging, Interactive Electronic Technical Manuals (IETM)
  - Platform level analysis of data coming in from multiple OEMs in heterogeneous CAD formats

Maximizing the use of visualization formats can reduce the need for dumbing down model data to drawing formats and increases the potential to reuse model data for downstream applications such as logistics

Need for visualization in a federated data environment

Federated sources manage master model data



Standards based data integration and mode visualization enables a single product structure to be used across multiple application

In a typical vehicle such as the Humvee, the chassis, engine, tires, radios, kits, etc would come from multiple vendors in multiple CAD formats, making the analysis of entire vehicle configurations difficult due to CAD interoperability issues

Requirements for selecting Lattice3D

- Ability to import multiple CAD formats in multiple versions
- Ability to export and import STEP data
- Ability to export and import U3D data
- Ability to retain accuracy of models while not compromising size
- Compressed file size and easy viewing
- Easy corporate wide deployment (5000+ users)
- Access control/ password protection of visualization files (Digital Rights Management)
- Web-based client viewer
- Easy integration with Windchill PDMLink

Areas that require additional evaluation and testing

- Generating S1000D format IETMs (soon to be mandated by DOD on all new contracts)
- Support for 3D annotations and GD&T representation by reading directly from native CAD models
- Viewer that can be installed without the need for administrative privileges
- Ability to embed light viewer in XVL file
- Out of the box integration with PDM systems – without the need for custom development
- Ability to read other visualization formats such as JT Open, ProductView and 3DXML
- Geometry translation validation against input CAD models

Scenarios demonstrated

- Model compression on the Stryker Infantry Carrier Vehicle
- Model compression on the Family of Medium Tactical Vehicles (FMTV) 5 Ton truck
- Hatch door assembly instructions on Stryker
- Joint Light Tactical Vehicle (JLTV) concept model
- Provisioning of heater box assembly for FMTV
- Windchill PDMLink integration