Lockheed Martin and the Digital Tapestry

Purdue PLM Center Fall Meeting

October 19, 2017
Lockheed Martin Aeronautics

- 22,000+ employees
- Ten locations
- Global partnerships

Copyright 2017, Lockheed Martin Corporation. All Rights Reserved.
Sustainment Operations

F-22

F-16

C-130

C-5

P-3

U-2

Copyright 2017, Lockheed Martin Corporation. All Rights Reserved.
LM Aero’s Linchpin Manufacturing Systems

**PLM**
Product Lifecycle Management
LM Aero Solution: Siemens Teamcenter

**ERP**
Enterprise Resource Planning
LM Aero Solution: SAP ECC

**MES**
Manufacturing Execution System
LM Aero Solution: SAP CAMS

**Product realization**
- Mfg. BOM, routings, work instr.
- As-built record

**Production resources**
- Inventory
- Orders
- Master production schedule
- Work centers

**Product definition**
- Designs
- CAD geometry
- Engineering BOM
Aero ERP / MES / PLM Roadmap

**When switch?**

- **ECC 6.0**
  - End of ECC 6.0 mainstream maintenance

- **CAMS v7.0**
  - Nominal end of v7.0 mainstream maintenance

- **CAMS v7.2**
  - End of v7.2 mainstream maintenance

**What next?**

- **Tc v10**
- **Teamcenter v11**

**What role will it play in manufacturing?**

|------|------|------|------|------|------|------|------|------|------|------|

MOM – Part technology, Part marketing

- Business Design Production
- MRP CAD/CAM CIM
- MRP II PDM MES
- ERP PLM MOM

1980s 2000s
IT and OT are Converging
The Digital Thread Begins in PLM

PLM

ERP

Sustain-
ment

MES

Data
Analytics

Information
Technology

Operational
Technology

Augmented
Reality

Optically
Projected Work
Instructions

Industrial
Internet of Things

Seam Validation
Management System

ShopSite

NextGenLM
ISA-95 is a Standard Reference Architecture for Manufacturers

Using a common reference architecture facilitates communication.
New Manufacturing Systems Team Will Formulate Production Operations’ Capability Roadmap

Not a shadow IT organization; The central steward of Prod Ops’ IT requirements.
The Systems Analysis & Design Approach

Enterprise Architecture
“EA³ Cube”

Systems Engineering “V”

Agile Software Development Process

Scott A Bernard:
An Introduction to Enterprise Architecture

**EA³ provides for analysis and design of business information systems, while allowing for differences between lines of business.**
IT is Aligned to the Business Through the Enterprise Architecture Process

Enterprise Architecture
“EA³ Cube”

Systems Engineering “V”

Agile Software Development Process

Enterprise Architecture starts with the business strategy.
Architecture Management Plan Provides the Road Map for Getting from Current State to Future State

Begin with the end in mind.
Strategy Drives the Digital Tapestry

Vertical Thread: Composites Fabrication

Enterprise / Business Operations

Manufacturing Operations Mgmt

Industrial Automation

NextGenLM
Strategy Drives the Digital Tapestry

Horizontal Thread: Serialization Data

- Example Attribute: • Traceability requirement
- Example Attribute: • Data collection requirement
- Example Attribute: • Valid serial numbers
- Example Attribute: • Installed serial numbers