



AM Industry Day Brief 3D Model Based Environment and Additive Manufacturing

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Presented to:

NAVAIR AM Industry Day

Presented by:

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NAVAIR 3D MBE

Problem/Goal Statement

Problem: There is excessive variation and a lack of technical integration in the manner NAVAIR Technical Data Packages (TDP) are developed, acquired, accepted, distributed, controlled and utilized, resulting in missing or unusable data, numerous reverse engineering/translation/healing efforts and scrapped parts

Scope: TDP is considered CAD, CAM, CAE and 2D drawings, including metadata, tooling and manufacturing data

Goals:

Quality: Establish 100% TDP configuration control. Improve TDP quality, usability & availability

Cost: Reduce cost of reverse-engineering/translating/healing data and recreating parts due to incorrect TDPs

CT: Reduce cycle time required to locate TDP and reverse-engineer

Impacts

- Significant amount of CAD / 3D Model Data is incorrect when delivered
- Requires time/effort to correct and validate
- Takes 6 months on average to reverse-engineer a complex part

Enable AM in the future



PROBLEM SUMMARY

“AS-IS” STATE

OEM CAD PACKAGES

- Pro Engineer
- CATIA
- Solid Works
- Promise E
- CADRA
- Solid Edge
- Auto CAD
- UGNX

POOR PROCESS GOVERNANCE
(E.G., ACQUISITION, CM, QA)

DATA MGMT/REPOSITORY

- CM Pro
- ESRS
- Team Center
- Windchill
- LEDS
- TIERS
- CITIS
- JEDMICS

TRANSLATION / REVERSE ENGINEERING

FRC/NAWC CAD PACKAGES

- Pro Engineer
- CATIA
- Solid Works
- Promise E
- CADRA
- Solid Edge
- Auto CAD
- UGNX

CAM TRANSLATION

FABRICATE PART

DISPARATE TOOL SETS & PROCESSES BEING USED ACROSS OEMs & GOVT SITES
ACQUISITION REQUIREMENTS NOT SYNERGIZED WITH LIFECYCLE SUSTAINMENT
DATA QUALITY PROBLEMS RECOGNIZED ONLY AT TIME OF USE

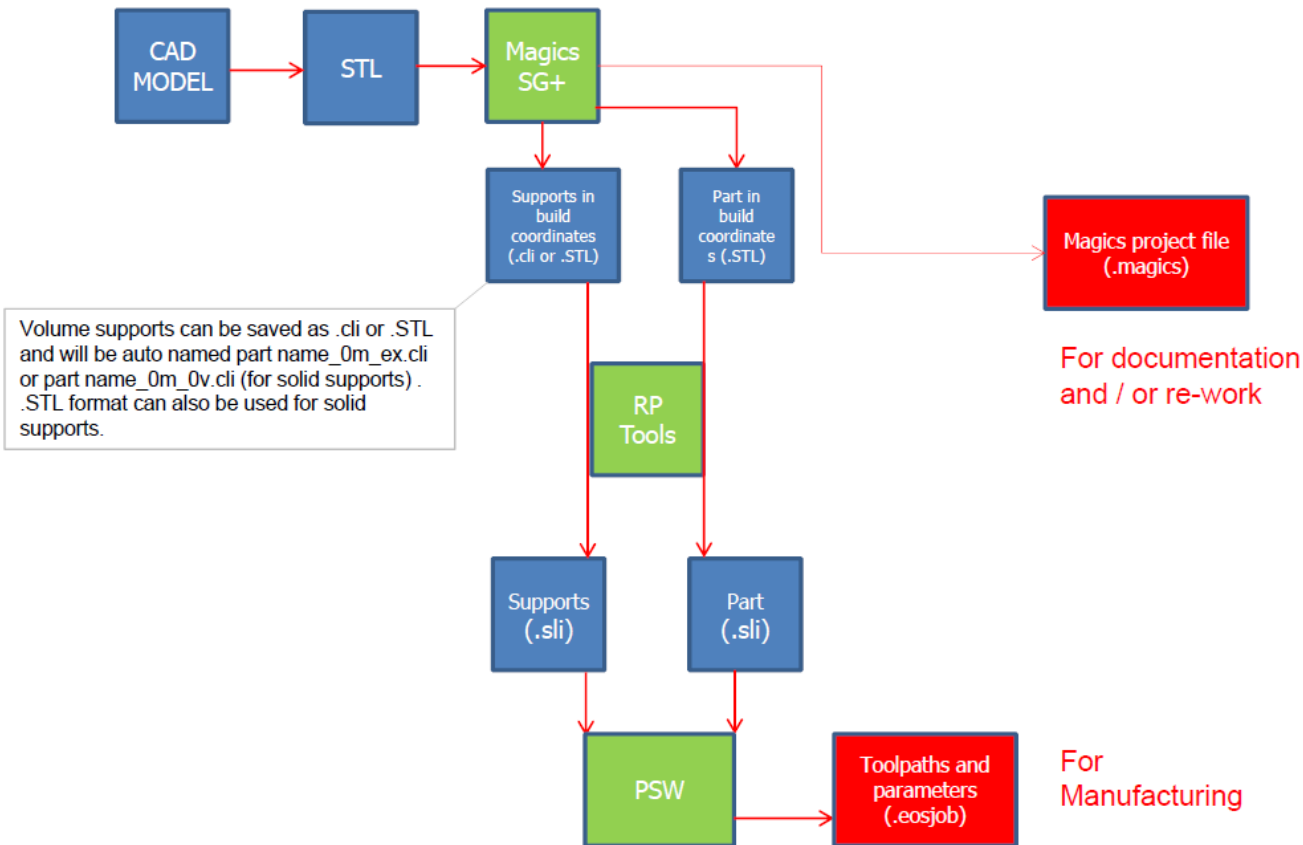
Goals

- Quality:** Establish 100% TDP configuration control. Improve TDP quality, usability & availability.
- Cost:** Reduce cost of reverse-engineering / translating / healing data and recreating parts due to incorrect TDPs.
- CT:** Reduce cycle time required to locate TDP and reverse-engineer TDPs.



AM Unique Files for CM

.STL, .SLI, .eosjob, etc

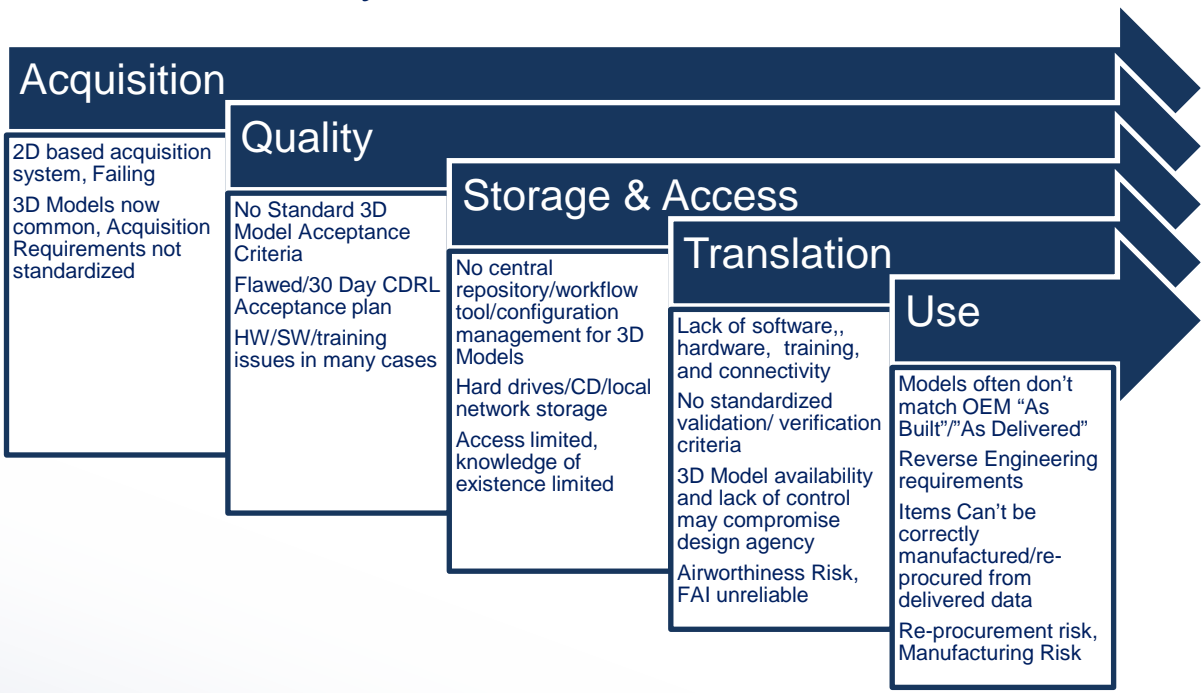


More CM Challenges, Requires update of TDP Standards



TDP Lifecycle Management Issues and Risks

Lack of network connectivity across Enterprise to transfer data electronically



Outcomes

- Loss of TDP ROI
- Sole Source Lock
- Slow Response to Warfighter
- LSI Capability-Constrained
- Reduced Availability
- Significant Cost Growth
- Possible Loss of A/C and Crew





3D MBE and Additive Manufacturing





Operational View

Bridge to Sustainment IT

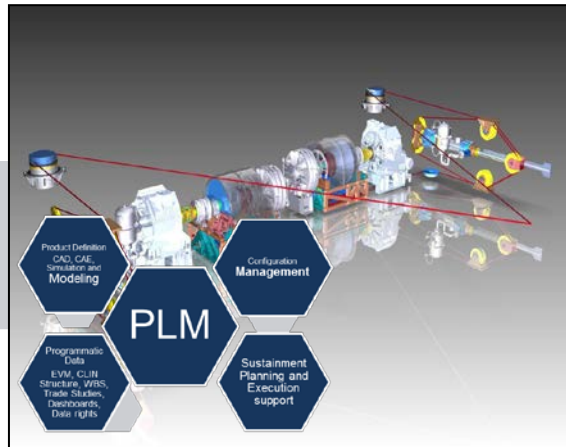
OEM TDP

- Managed in PLM Systems



Data Exchange Services

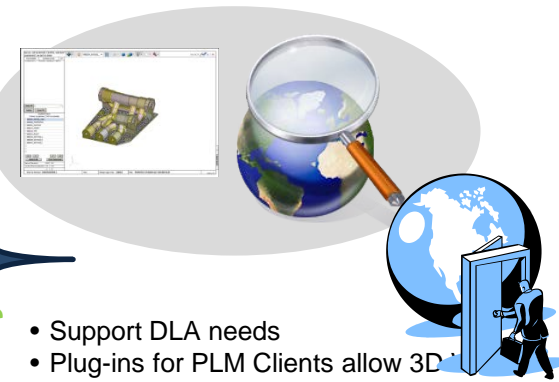
Continuous Technical Assessment
Replication of TDP



NAVAIR PLM

- Single Source of Technical Data, Principal CM tool
- Supports Mgmt. of multiple Native CAD formats
- Leverage existing investment in smart 3D data
- Supports early collaboration on design: OEM&GOV

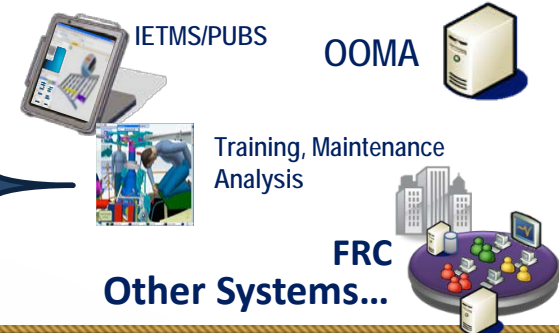
Enterprise Search & Tech Data Gateway



- Support DLA needs
- Plug-ins for PLM Clients allow 3D
- Access to Engineering Definition & Standards

Digital Thread

NAVAIR Sustainment





Enabling the “Digital Thread” for AM

- AM begins with a 3D model from a CAD program
 - Model Design, Organizational Schema and Neutral File Format standards
- ~20% of the output of 3D printers is the final product rather than prototype parts (Penn State)
- Change NAVAIR paradigm
 - Use AM across the Enterprise
 - Better parts (fewer and improved design)
 - Enable rapid qualification
 - Support AM tooling and fixtures
 - Manage all the data
- Additive Manufacturing requires 3D MBE to be successful

Industry Collaboration and Partnership needed