

PLM Road Map™ @ GPDIS 2022
 Digital Transformation and PLM – a call for PLM professionals to re-define and re-position the benefits and value of PLM
 CIMdata® September 27

AEROSPACE & DEFENSE PLM ACTION GROUP

Aerospace & Defense PLM Action Group

Founded in February 2014

AIRBUS

BOEING

GE Aviation

Gulfstream®
A GENERAL DYNAMICS COMPANY

Rolls-Royce

SAFRAN

Administered by:
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Aerospace & Defense PLM Action Group

Mission

An association of aerospace & defense companies within CIMdata’s globally recognized PLM Community Program, which functions as a **PLM advocacy group** to:

- Set the direction for the aerospace & defense industry on PLM-related topics that matter to members
- Promote common industry PLM processes and practices
- Define requirements for common interest PLM-related capabilities
- Communicate with a unified voice to PLM solution providers
- Sponsor collaborative PLM research on member-prioritized industry and technology topics

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Aerospace & Defense PLM Action Group

Membership eligibility

Regular Membership is available to:

- Major¹ commercial aircraft companies
- Major defense companies – Aeronautics and space sectors only

Associate Membership is available for A&D companies that:

- Are not major A&D companies, or
- Are major A&D companies but do not want to make the full investment of time and money

PLM solution providers participate as guest attendees at specific Group meetings

¹ – Focus on companies that rank within the Top ~50 based on revenue, with design authority

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Project Workstreams Evolution

Check out our booth!

Members prioritize topics and fund research and team projects annually

Topic Members	2014-15 4	2015-16 4 -> 5	2016-17 5 -> 7	2017-18 8 -> 10	2018-19 10 -> 11	2019-20 11 -> 10	2020-21 10 -> 9	2021-22 9 -> 8
Global Collaboration	Research Phase 1	Research Phase 2		Team Project Phase 3 --	Team Project -- Phase 3 --	Team Project -- Phase 3 --	Team Project Phase 3	Team Project Phase 4
Obsolescence Management	Research Phase 1	Research Phase 2	Team Project Phase 3	Project Close Out				
Model-based Definition (MBD) and BOM Definition			Team Project Phase 1	Team Project Phase 2	Team Project Phase 3 --	Team Project -- Phase 3 --	Team Project -- Phase 3 --	Team Project -- Phase 3
Multiple-view Bill of Material (Multi-view BOM)			Team Project Phase 1	Team Project Phase 2	Team Project Phase 3	Team Project Phase 4 --	Team Project -- Phase 4	Team Project Phase 5
Model-based Systems Engineering (MBSE)				Team Project Phase 1	Team Project Phase 2	Team Project Phase 3	Team Project Phase 4	Team Project Phase 5
Standards Working Group						Team Project Phase 1	Team Project Phase 2 --	Team Project -- Phase 2
Digital Twin/Digital Thread								Team Project Phase 1

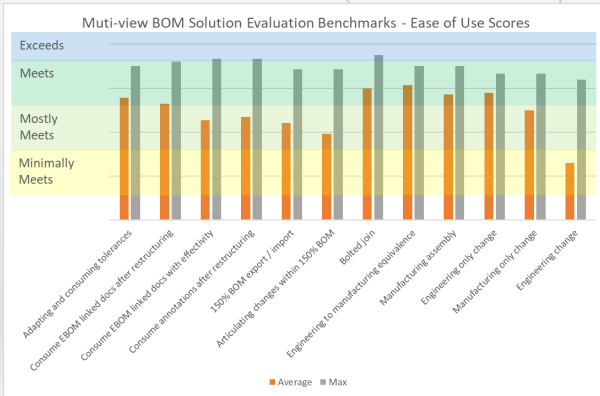
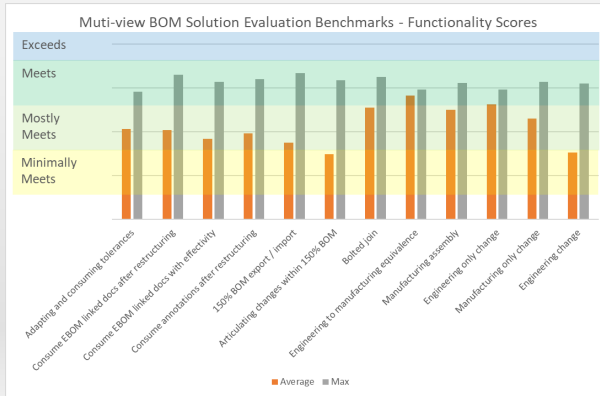
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Multi-view BOM Solution Evaluation Benchmarks

Results

- A&D OEM Multi-view BOM management requirements were met or mostly met by multiple commercially available PLM software solutions
- Usability of commercially available PLM software solutions' Multi-view BOM management capabilities will not inhibit adoption or efficiency



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Communication Strategy

Influence the direction of the PLM ecosystem beyond A&D on PLM-related topics

AD PAG website launched Nov 2017, making AD PAG project artifacts publicly available (at www.ad-pag.com)

Content

- Direction statements (3)
- Research reports (5)
- Position papers (11)
- Benchmark report (1)
- A&D PLM Glossary
- CIMdata A&D webinars (5)
- CIMdata Road Map A&D conference presentations (16)

Status

- First document download by Stephen Burton, Gulfstream
- Over the period from Nov 2017 to May 2022
 - 1,822 individuals
 - 2,752 sessions
 - 17,698 documents downloaded

Industry	Downloads (May2022)
A&D	5,307
Academic	605
Automotive	378
Construction	118
Consulting	924
Consumer Goods	166
Electronics /Hi Tech	535
Fabrication & Assembly	236
Government	412
Mechanical Machinery	222
Medical Device	242
Other	1,763
Other Transportation (non Auto)	146
Process / Petro Chemicals	82
Shipbuilding	202
Solution Provider	6,151
Utilities	209
Total downloads	17,698

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Collaborative Research Program

Study Digital Thread current state and future trends



Sponsors



Objective

The A&D PLM Action Group members and the PLM solution provider sponsors share a common objective for this research

To gain understanding of needs and opportunities within industry that will inform Digital Thread solution strategy and roadmap

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Research Program Components

Multiple stakeholder perspectives addressing engagement, dialogue, and contribution

- Announcement webcast: initiating the conversation and encouraging AD PLM professionals to join in
- Interviews with *Digital Thread* thought leaders will be posted on the CIMdata Blog
 - Leaders from Aras, Eurostep, Jama Software, PTC and Siemens DISW
 - Key industrial company customers of the sponsors
 - A&D PLM Action Group members

Please read and comment!
- A global survey targeting industrial end users to understand how they learn about and adopt new technology and their status and plans for *Digital Thread* realization within their companies
- CIMdata will report the results at the end of the program

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Global Industrial End User Survey

Line of inquiry – Topics

- Definition of the digital thread
- Significant characteristics of the digital thread
- What has changed to elevate interest in digital thread
- Extent of current implementation and investment plans
- Maturity of digital thread strategy realization
- Inhibitors to digital thread strategy realization
- Product lifecycle views linked as a digital thread
- Digital thread use cases
- Digital thread technologies
- Extent of digital thread community
- Future digital thread investment priorities
- Digital thread implementation configuration(s)
- Gaps in commercial solutions
- Alignment or misalignment with solution providers

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Get Involved!

Read and comment on the thought leader interviews, complete the survey

CIMdata will be publishing interviews with *Digital Thread* thought leaders at the sponsor companies and their lead customers, and at A&D PLM Action Group member companies.

Join the conversation at:

<https://www.cimdata.com/blog/>

Please complete the cloud-based *Digital Thread* survey!

ALL industrial respondents who complete the survey will get a summary report of research findings and will be entered into a drawing for one of ten \$100 and ten \$50 Amazon gift certificates.

<https://bit.ly/ADPAGDigitalThreadSurvey2022>

This is a chance for you to influence Digital Thread solution strategy and roadmap and to learn what is going on with Digital Thread in industry

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Aerospace & Defense PLM Action Group

Further information

For further information or to inquire regarding membership

please contact **CIMdata**

Charles Ditchendorf, Senior Business Development Manager, email: c.ditchendorf@cimdata.com

or

James Roche, A&D Practice Director, email: j.roche@cimdata.com

or

any A&D PLM Action Group member

Backup Slides

Aerospace & Defense PLM Action Group

Cooperative action

Topics and issues

Priorities set annually

Categories of action

- Research
- Direction statements
- Requirements
- Policy

Guiding principle regarding standards

A&D PLM Action Group will participate in standards groups and promote standards adoption in support of common industry PLM practices, but will not manage standardization process or content

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Project Workstreams Evolution

Project descriptions (1 of 2)

Global Collaboration – Define A&D collaboration patterns between airframe and engine OEMs, determine best practices for sharing electronic data throughout the lifecycle, and create a template to facilitate data standard formats and exchange practices for setup and connection of OEMs and their suppliers

Model-Based Definition (MBD) and Bill of Material Definition – Define the minimum data content in Model Based Definition type design required to meet manufacture, inspect, and regulatory certification requirements. Evaluate existing standards and tools to provide an industry standard data delivery process to regulatory agencies.

Multiple View Bill of Material (Multi-BoM) – Define scope (e.g., eBoM, mBoM, sBoM) and use cases (e.g. reconciliation, consistency-traceability, add-replace-suppress part); agree on high level objectives; define a desired future state and requirements; and validate those requirements by testing with commercially available solutions.

Model-based Systems Engineering (MBSE) – Evaluate current capabilities of a typical aerospace OEM and supplier to produce, exchange, and consume digital information via a collaborative shared data site using commercial MBSE software tools (i.e., SysML) and related data exchange standards.

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Project Workstreams Evolution

Project descriptions (2 of 2)

Standards Working Group – Coordinate across AD PAG projects to reinforce consistency of PLM standardization activities according to business requirements; identify relevant PLM interoperability standards for development and usage; identify relevant PLM Interoperability Implementer Forums to speed up deployment; and issue recommendations for PLM Interoperability Standards for development and usage.

Digital Twin / Digital Thread – Define the objectives, requirements, and roadmaps for Digital Twin/Digital Thread solutions for creating and managing the digital representation of a product through the various stages of the product lifecycle; and identify, define use cases/user stories to demonstrate digital twin/thread value propositions.

Project Workstreams Evolution

Multiple-view Bill of Material (Multi-view BOM) Stage 4 – Solution Evaluation Benchmarks

Over several years, project work progressed through defined stages

1. Problem statement
2. Desired state
3. Requirements

Over this same period, commercial PLM solutions had advanced to a level where enablement of the Multi-view BOM Approach might be achievable

The question on the table in the spring of 2019 was whether commercial PLM technologies had matured to a level where implementation of Multi-view BOM management within an aerospace OEM would be a practical possibility

Determining the answer to that question was the goal of the Multi-view BOM Solution Evaluation Benchmarks

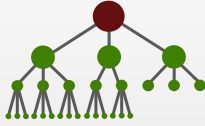
Multi-view BOM Solution Evaluation Benchmarks

BOM Management Concepts – Three approaches to managing the transition of BOM definition

Single BOM Approach

A common data organization for Engineering and Manufacturing

Engineering = Manufacturing

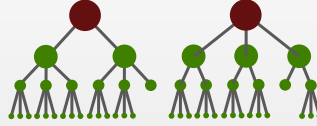


- Engineering content structured in Manufacturing view and augmented with Manufacturing content
- Single authority for release and change
- Unambiguous, single definition (i.e., reconciliation and synchronization are not an issue)
- No Engineering view
- Manufacturing change is slow and costly

Dual BOM Approach

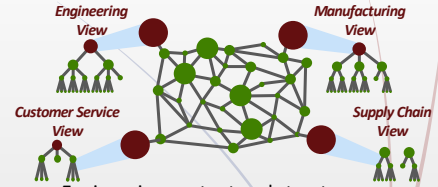
Two separate data organizations for Engineering and Manufacturing

Engineering ≈ Manufacturing



- Engineering content and structure maintained; restructured and augmented for Manufacturing
- Independent authorities for release and change
- Engineering and Manufacturing optimized views
- Manufacturing change is timely and efficient
- Manual reconciliation
- Manual synchronization

Multi-view Approach



- Engineering content and structure maintained; restructured and augmented for Manufacturing
- Independent authorities for release and change
- Engineering and Manufacturing optimized views
- Manufacturing change is timely and efficient
- Automated reconciliation
- Automated synchronization
- Extensible to additional domains

Multi-view BOM Solution Evaluation Benchmarks

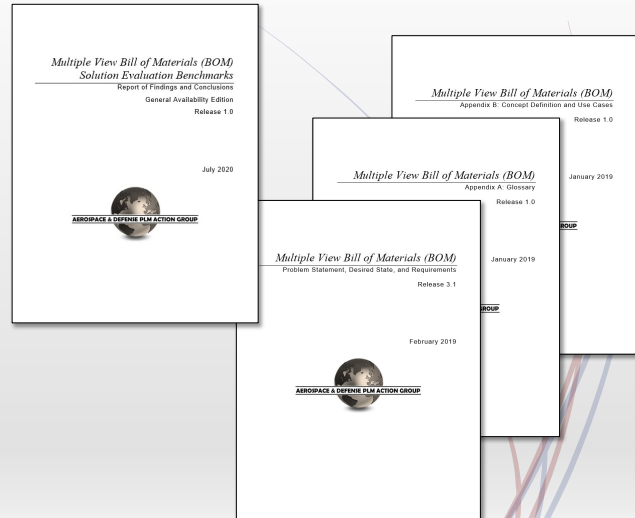
Reports

Multiple View Bill of Materials (BOM) Solution Evaluation Benchmarks [Jul 2020]

- Report of Findings and Conclusions

Multiple View Bill of Materials (BOM) [Feb 2019]

- Problem Statement, Desired State, and Requirements
- Appendix A: Glossary
- Appendix B: Concept Definition and Use Cases



Available on the AD PAG website at www.ad-paq.com

Collaboration with PLM Solution Providers

Four-step process to achieve member objectives

Step 1: Intention

- Inform PLM software providers of topic as an A&D PLM Action Group priority
- PLM software providers participate in 1st round of research

Step 2: Direction

- Conduct 2nd round of projects; Formulate direction statement
- Inform PLM software providers of direction and request response
- PLM software providers respond in writing and in person at A&D PLM Action Group meeting
- Revise direction statement and distribute to PLM software providers

Step 3: Requirements

- Conducts 3rd round of projects; Formulate requirements
- Inform PLM software providers of requirements and request response
- PLM software providers respond in writing and in person at A&D PLM Action Group meeting
- Revise requirements and distribute to PLM software providers

Step 4: Procurement policy (individual members)

- Convert requirements to procurement policy language

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Collaboration with PLM Solution Providers

PLM software provider engagement process evolution

In 2017 and again in 2018

PLM software providers of interest were engaged and invited to review project position papers and project information packages and then meet individually for in person review and discussion of their response with A&D PLM Action Group leadership during their annual meeting

- Apr 2017 at Embraer in Sao Jose dos Campos, Brazil
- Mar 2018 at Safran in Paris, France

In 2019

The engagement was elevated to a more strategic level and in person review and discussion doubled to 3-4 hours

- Apr 2019 at Bombardier and Pratt & Whitney, Montreal, Canada

In 2020

Four (4) PLM software providers were invited to support Multi-view BOM solution evaluation benchmarks

In 2021

A new strategic engagement model is emerging, which may involve a broader range of solution providers

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