

Applying Digital Thread in Commercial Aviation



Applying Digital Thread in Commercial Aviation Digital Authorized Release Certificate

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G-31 Digital Communications Committee

PLM Road Map™ & PDT North America 2024

*Value Drivers for Digitalization of the Product Lifecycle
Insights for the PLM Professional—Why the investment, what are the
returns, and how are they achieved?*

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May 8 & 9

-eurostep-



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Abstract

Historically, the Authorized Release Certificate (ARC) regulatory requirement of providing part lifecycle traceability has been accomplished with paper documentation. The associated cost of compliance is substantial, and the method is error prone. Digitization of ARC-related artifacts offers the ability to simplify compliance by quickly searching and retrieving the supporting documentation.

The use of digital thread combined with distributed ledger technology has proven to be a successful digital solution. The ARC digital thread addresses the digitization, traceability, provenance, and accessibility of part data across the part product lifecycle from design to final disposition and illustrates the broader potential of A&D ecosystem interoperability.

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Agenda

- Introduction – Complexity of Documentation in the Aircraft Lifecycle
- The Authorized Release Certificate (ARC)
- The Challenge
- The Solution
- Update – AD PAG’s Digital Thread PLM Benchmark Study
- Q&A

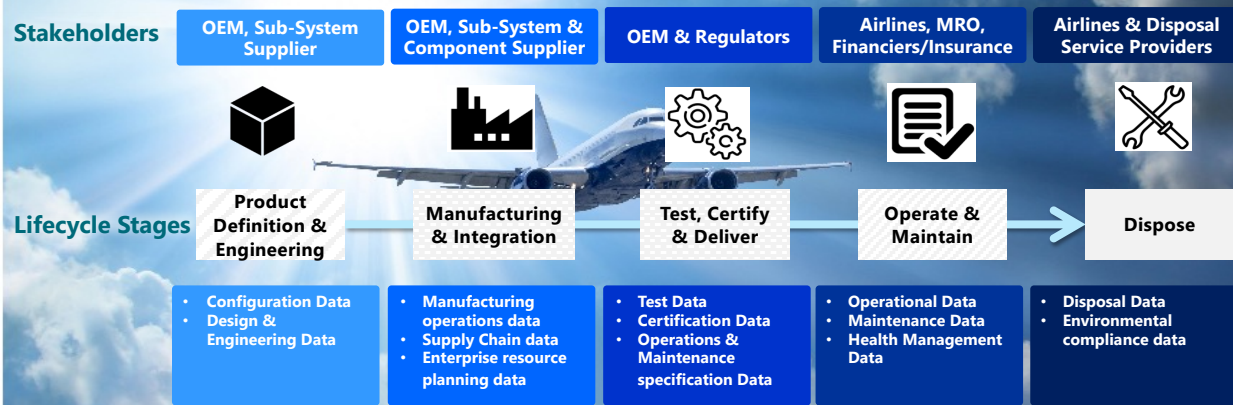
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The Aircraft Lifecycle is Complex

Need for End-to-End data connectivity & collaboration from As-Designed to As-Manufactured to As-Operated to As-Maintained



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How Many Documents?

And what is the cost?

- An aircraft check involves up to 600 documents.
- One large US airline conducts over **200,000** aircraft checks annually.
- In 2020 the labor cost to file one document: **\$20.00**.
- Between **2%** and **5%** of documents are lost or misfiled.
- Approximately 90 percent of this documentation is currently handled on paper, a single bolt can amount to dozens of pages.

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What is an Authorized Release Certificate?

- The ARC form is used to verify identification and enable traceability of products and articles throughout the global aviation system
- The originator must retain FAA Form 8130-3 for no less than 5 years for products and articles, and 10 years for critical parts
- Form 8130-3 may be completed and retained in an electronic format, provided the electronic file contains all of the information required on FAA Form 8130-3

1. Approving Civil Aviation Authority/Country: FAA/United States		2. AUTHORIZED RELEASE CERTIFICATE FAA Form 8130-3, AIRWORTHINESS APPROVAL TAG		3. Form Tracking Number:	
4. Organization Name and Address:			5. Work Order/Contract/Invoice Number:		
6. Item:	7. Description:	8. Part Number:	9. Quantity:	10. Serial Number:	11. Status/Work:
12. Remarks:					
13a. Certifies the items identified above were manufactured in conformity to: <input type="checkbox"/> Approved design data and are in a condition for safe operation. <input type="checkbox"/> Non-approved design data specified in Block 12.			13b. <input type="checkbox"/> 14 CFR 43.9 Return to Service <input type="checkbox"/> Other regulation specified in Block 12 Certifies that unless otherwise specified in Block 12, the work identified in Block 11 and described in Block 12 was accomplished in accordance with Title 14, Code of Federal Regulations, part 43 and in respect to that work, the items are approved for return to service.		
13b. Authorized Signature:		13c. Approval/Authorization No.:	14a. Authorized Signature:		14c. Approval Certificate No.:
13d. Name (Typed or Printed):		13e. Date (dd/mm/yyyy):	14b. Name (Typed or Printed):		14d. Date (dd/mm/yyyy):
User/Installer Responsibilities					
<p>It is important to understand that the existence of this document alone does not automatically constitute authority to install the aircraft engine/propeller/article. Where the user/installer performs work in accordance with the national regulations of an airworthiness authority different than the airworthiness authority of the country specified in Block 1, it is essential that the user/installer ensure that his/her airworthiness authority accepts aircraft engine/propeller/article(s) from the airworthiness authority of the country specified in Block 1.</p> <p>Statements in Blocks 13a and 14a do not constitute installation certification. In all cases, aircraft maintenance records must contain an installation certification issued in accordance with the national regulations by the user/installer before the aircraft may be flown.</p>					
<small>FAA Form 8130-3 (02-14) NSN: 0052-00-012-9005</small>					

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The Challenge

Improve the quality certification documentation by establishing a digital data exchange format for quality certification documents in the aerospace sector

The Goal

Estimated that the aerospace industry could save €80 million annually in Europe alone by digitizing quality certification documentation.

The Prototype

The Cert-Trace platform developed by Helmes allows all parties to the supply chain to upload and store certificate-of-conformity documentation on a secure encrypted cloud.

Reference: <https://www.helmes.com/airbus-adopts-software-solution-developed-by-helmes/>

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dARC Proof of Concept to Operational Use

Challenge

AIRBUS

Airbus has over 125,000 employees worldwide and business operations on six continents. Airbus is a leader in designing, manufacturing, and delivering aerospace products, services, and solutions to customers worldwide.



Commercial



Helicopters



Defence



Space

The challenge

Aviation is one of the most highly regulated sectors in the world. An aircraft manufacturer must comply with rigorous standards developed by industry organizations regarding the design and manufacturing processes and sourcing parts from suppliers. A key aspect of manufacturing airlines is the implementation of new technical standards.

As a result, Airbus saw a need for a fully customized project management platform that would simplify the daily work of its internal standardization team.

The company envisioned a platform fully customized to their needs that would:

- gather all documentation on a central platform and provide a comprehensive overview of all standardization projects;
- visualize resource allocation and facilitate budget planning;
- ramp up the user experience and cut the manual work for the standardization team.

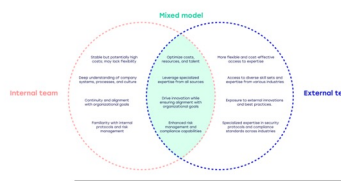
Because the standardization projects are planned in yearly cycles, it was crucial to roll out the new system by July 2022. Otherwise, the launch would have been postponed by a year.

Solution

Helmes

Helmes specializes in custom software development and consulting, offering tailor-made services in strategy, service design, system integration, software, and mobile app development. Our 1,400 employees serve our international clients from offices in 14 locations.

Cert-Trace®



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Solution Partners

Helmes

- A multinational digital innovation company with 30+ years of experience in business-critical software development all over the world.
- Customers
 - Airbus
 - Tallinn Airport
 - KUEHNE+NAGEL
 - BH-Training
- <https://www.helmes.com/>

TraCert®

- TraCert is a German-Estonian company set on solving one of the challenges facing the aerospace industry today – the digitalization of quality certification documentation.
- The Cert-Trace® platform for digital certification
- <https://cert-trace.com/>


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Why did this work?

- A fully customizable project management platform that simplifies the daily work of the OEM internal standardization team
- Focused on specific value opportunity
- Scoped to validate concept within a defined period of time
- Partnered with knowledgeable solution providers: Helmes, Cert-Trace
- Leveraged readily available cloud-based service capabilities
- Collaborating with SAE International to establish industry recommended practice
- Realizing over €20 million savings annually


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SAE International – Digital Communications

- SAE Aerospace Information Report (AIR)
 - SAE AIR 7123 - Digital Authorized Release Certificate Mid 2024
- SAE Aerospace Recommendation Report (ARR)
 - End of 2024

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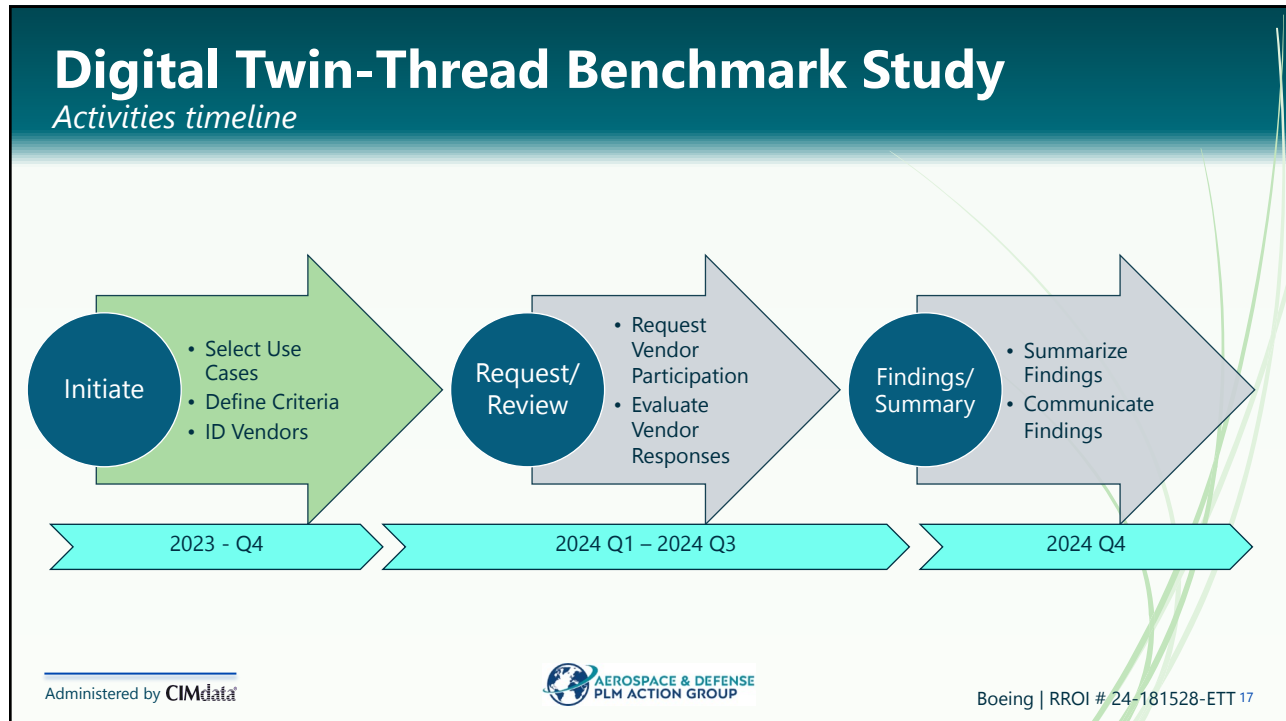
AD PAG Digital Twin/Digital Thread Project

Benchmark study (Phase 5)

Purpose

- Invite organizations, standards groups, consortiums to participate with AD PAG in conduction the Digital Twin/Tread Benchmark study (Phase 5)
- Who: AIAA, ASME, committees, **OMG Digital Twin Consortium**, Prostep IVIP – CDT, and **SAE International G-31 Digital Communications**
- Why:
 - AD PAG
 - Increase consensus and acceptance of results within the A&D PLM ecosystem
 - Increase brainpower being invested in the project
 - Increase leverage with PLM software providers that we invite to participate in the project
 - Non-AD PAG
 - Have their digital twin/digital thread definitions and use cases tested in benchmark demonstrations by PLM software providers
 - Share perspectives and learnings with a broad community of thought leaders

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Digital Twin-Thread Benchmark Study

Progress

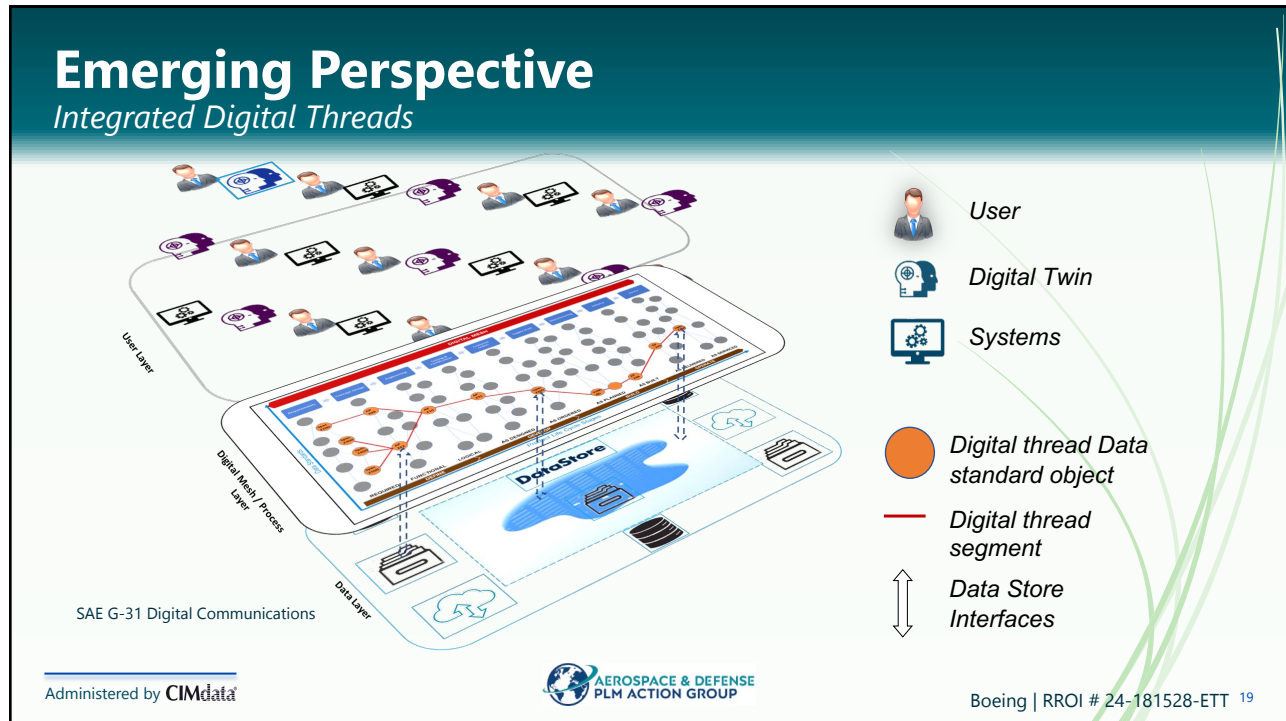
- Digital Thread Use Cases
 - Over 20 Digital Thread use cases defined across full product lifecycle.
 - Data attributes categorized supporting Digital Twin definitions.
- Synergy with Industry Standards Organizations
 - OMG Digital Twin Consortium
 - SAE International – Digital Communication Committee
 - In-work: AIAA, Prostep IVIP, AFNOR
- Emerging Digital Thread Patterns
 - Traceability and Provenance
 - Recursive Utility
 - Collaboration
 - Traveling Data

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Questions and Answers

What's on your mind?



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