Model Based Quality Assurance – Integrating Standardized Quality Data into the Digital Thread

2026 MBE & QIF Summit

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April 15, 2026



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What Is the Joint Strategic Quality Council?

A collaborative, non-competitive industry/government partnership, improving quality and safety performance through mutually beneficial quality assurance initiatives that align with industry strategies and mission urgency

Government

NASA

Defense Contract Management Agency

Federal Aviation Administration

Under Secretary of War for Research and Engineering

Associations

IAQG International Aerospace Quality Group

AIA Aerospace Industries Association

NDIA

Industry

Rolls-Royce

Bell

RTX

L3Harris

Boeing

Lockheed Martin

Blue Origin

BAE Systems

Northrop Grumman

Honeywell

Click Bond

General Dynamics

Elbit Systems

Long Term Strategy

Improve product quality, eliminate unnecessary industry and government requirements through detection to prevention

Key Focus Areas

Aligning Standard Work



Proactive Engagement / Reducing Oversight



Future Quality Technologies



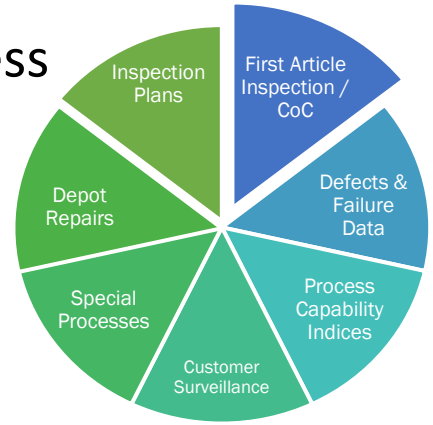
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Introduction to the Model Based Quality Team

- Joint Strategic Quality Council sponsored the Model-Based Quality (MBQ) Team
- The MBQ Team initially chose the First Article Inspection (FAI) process to standardize and digitize quality data, and expanded to include Certificate of Conformance (CoC)
- DID and Guidebook in ASSIST review process

Model-Based Quality (MBQ)

The application of quality parameters to the digital model(s) throughout the product and process lifecycle.



The MBQ Vision is an ***industry standardization of quality data*** *(parameters)* ***integrated within the digital model throughout the product lifecycle*** *(focus: early quality engagement)* ***reducing the risk burden contributed by quality and enabling optimization of customer oversight.*** *(providing "quality view" guidance / requirements)*

JSQC MBQ Working Group Representation:

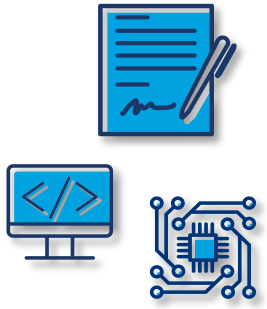
- Department of War (DoW)
- Defense Contract Management Agency (DCMA)
- National Aeronautics & Space Administration (NASA)
- Aerospace Industries Association (AIA)
- International Aerospace Quality Group (IAQG)
- SAE International
- BAE
- Lockheed Martin
- Northrop Grumman
- Pratt & Whitney
- Raytheon Technologies (RTX)
- Others

…this led to the creation of the Model Based Quality Assurance – Data Framework (MBQA-DF)

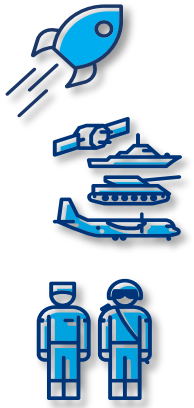
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MBQA-DF Seamlessly Integrates in the Digital Thread

- Content, structure, and format ensures quality assurance data is digitally interoperable with Product Lifecycle Management (PLM) systems, digital thread frameworks, and other lifecycle systems.
- Aligned with and interfaces with DMSC MBC 1.0 – 2024 and ISO 23952 QIF to provide standardized, cross-domain integration and persistent identification of model-based quality characteristics.
- These connections ensure a unified approach to design, manufacturing, and quality processes within the digital ecosystem.



As-Designed	As-Built	As-Fielded
• Drawings • Specifications • Contractual Requirements • Technical Data Package	• Inspection Data • Test Data • Actual data from fabrication and assembly	• Field/Theater data • Repair data • Retrofit data



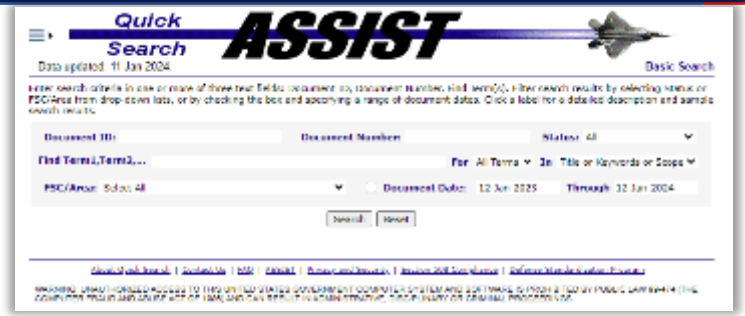
Digital Thread

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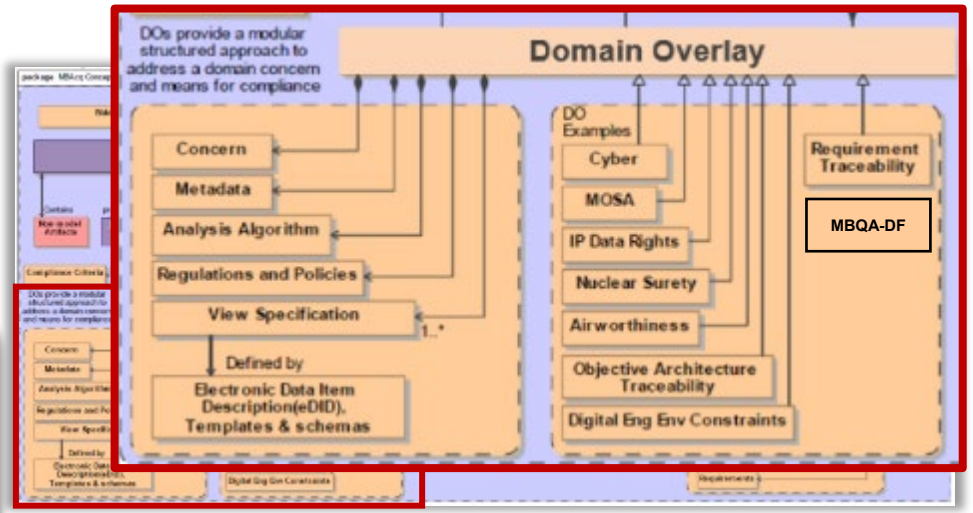
Following OMG Domain Overlay Approach

- JSQC MBQ Approach Followed the OMG Domain Overlay (DO) Approach (Outlined and documented in DID Guidebook)
  - Stakeholders and Associated Concerns Outlined
  - Regulations and Policies Identified and Addressed
  - Standardized Data Structure and Metadata Defined
  - Validation Algorithms Identified for Automatic Model Correctness
  - View Specifications outlined for standard data exposure

Object Modeling Group (OMG) Model Based Acquisition (MBAcq) Domain Overlay: A collection of constructs needed to support analysis for a domain specific concern using a standardized framework.



DLA DID Repository: https://quicksearch.dla.mil/qsSearch.aspx

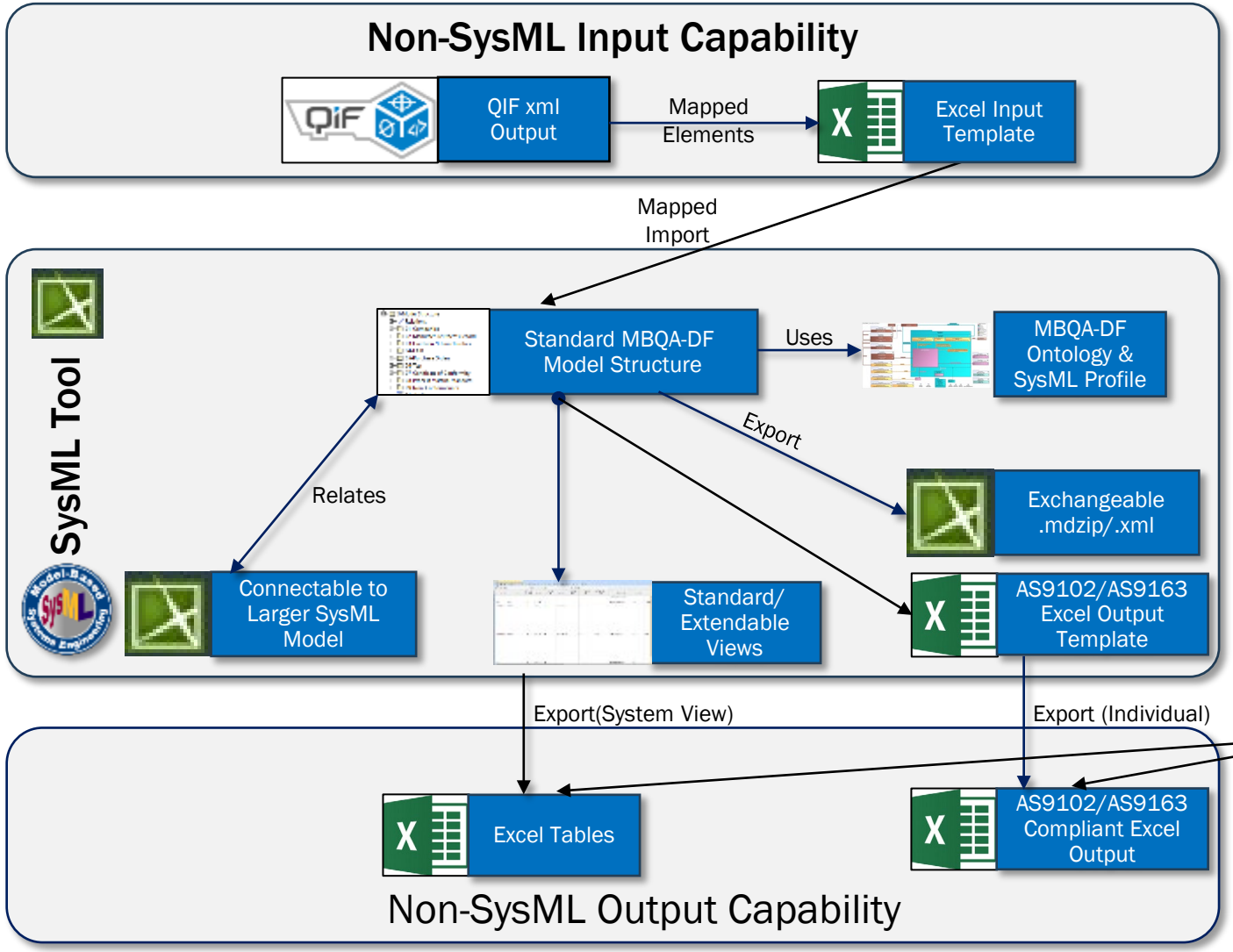


Ongoing work from the Object Management Group (OMG) Model-Based Acquisition (MBAcq.) effort

Hart,L., Actionable Architecture Using Aspect Modeling, 2018; Hart, L., Anderson, R., *OMG UAF Model-based Acquisition Analytic Viewpoint Overlays*, 2022; Ongoing work from the Object Management Group (OMG) Model-Based Acquisition (MBAcq) effort

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MBQA-DF Profile Input and Output Process



MBQA-DF SysML (V1) Profile lays the foundational framework for quality model-based practices, accelerating industry adoption through seamless integration and superior interoperability with mainstream tools, facilitating expansive collaboration within the SysML ecosystem.

Output provides both traditional individual output and system view outputs

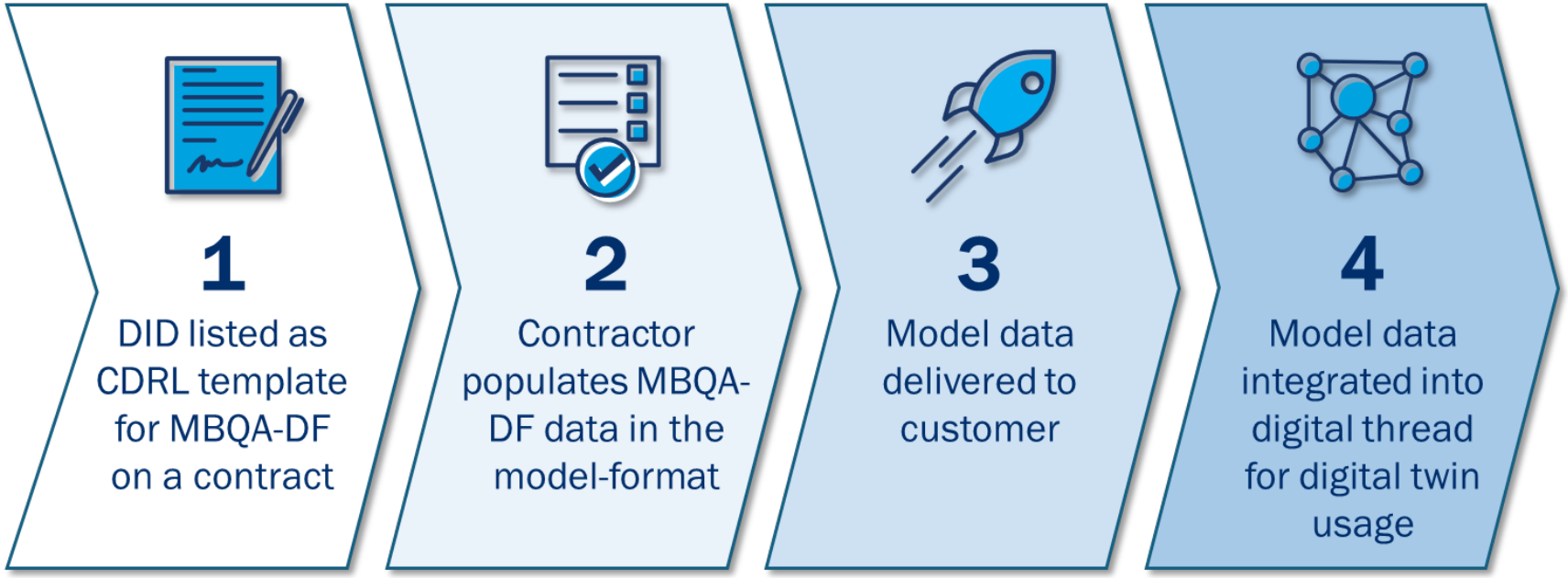
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Demonstration

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Executing Programs With MBQA-DF

- MBQA–DF will be defined in a Data Item Description (DID)
  - The MBQA-DF Profile and Reference Architecture in SysML format and a guidebook, will accompany the DID
- Contracts will require FAI and CoC data to be submitted via a CDRL using the MBQA-DF format
  - Goal is to have this DID on a pilot contract by FY 2026



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