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Exchanging Digital Artifacts for the Engineering Life Cycle

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Abstract

As the Department of Defense (DoD) digital engineering effort has advanced, a need has emerged for a way to articulate the exchange of graphical and non-graphical digital artifacts among diverse stakeholders and digital technologies. The DoD Systems Engineering office proposes a construct, the Digital Engineering Information Exchange Model (DEIXM), that can form the foundation for an agreed-upon approach across the aerospace and defense sectors of government, industry, and academia. Fluid and seamless exchanges of digital artifacts enhances our ability to maintain a technological edge. As the U.S. Government collaborates with industry and academia on the realization of a DEIXM, we can enable parties to offer, request, and exchange digital artifacts. To achieve this end, we are broadening our initial DoD-focused development through collaboration with NDIA and INCOSE. The outcome of this initiative will be a DEIXM that establishes conventions on how the engineering of systems defines, creates, uses, and exchanges digital artifacts for the life cycle management of its systems and products. The desired benefits of a DEIXM result in full-spectrum solutions for digital engineering, private and public leaders innovating the way we do business, and technical practitioners improving their performance.

The Challenge

Why is it so hard to exchange engineering artifacts in a digital era?

The Digital Exchange Context

Crossing the Buyer-Seller-User Boundaries

Upstream DEIX

Downstream DEIX

N-Tier Suppliers

- Service Providers
- Manufacturers
- Wholesalers
- Resellers

1st Tier Suppliers

- Prime Contractors
- System Integrators
- Major Distributors

Organizations of Interest

- Acquisitions Org.
- Procurement Org.
- Sponsor Org.

Users / Consumers

- Operators
- Logisticians
- Maintainers

Digital Artifacts Conversion Occurs

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How do we exchange digital artifacts using historical contracting-language from a document-based tradition?

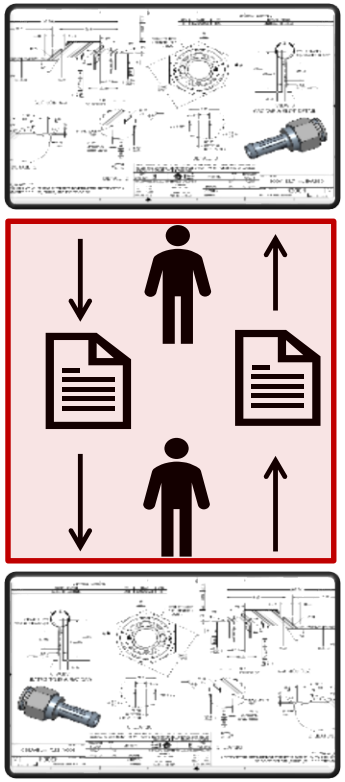
Problem Statement:
Digital Artifact Conversion Occurs

The World of Data Item Descriptions (DID) & Contract Data Requirements List (CDRL)

"The Cycle of Create and Recreate"

ACQUIRER

1. Acquirers Create in Tools
2. Converts to e-Documents for dissemination
3. Suppliers Recreate in Tools



SUPPLIER

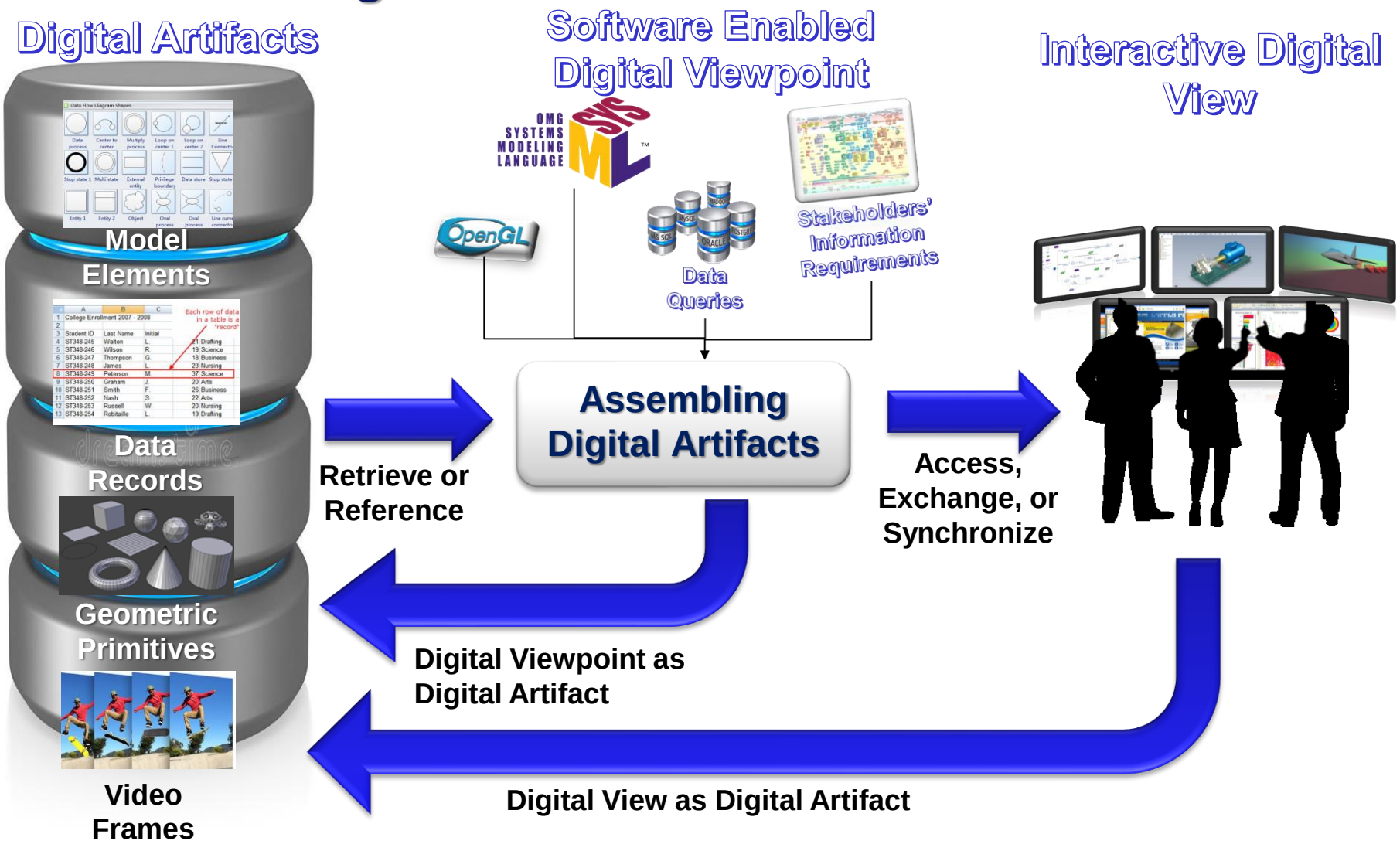
1. Suppliers Create in Tools
2. Converts to e-Documents per Acquirer's Instructions
3. Acquirers Recreate in Tools

A Conceptual Approach

A New Way of Thinking about Exchanging Digital Engineering Information

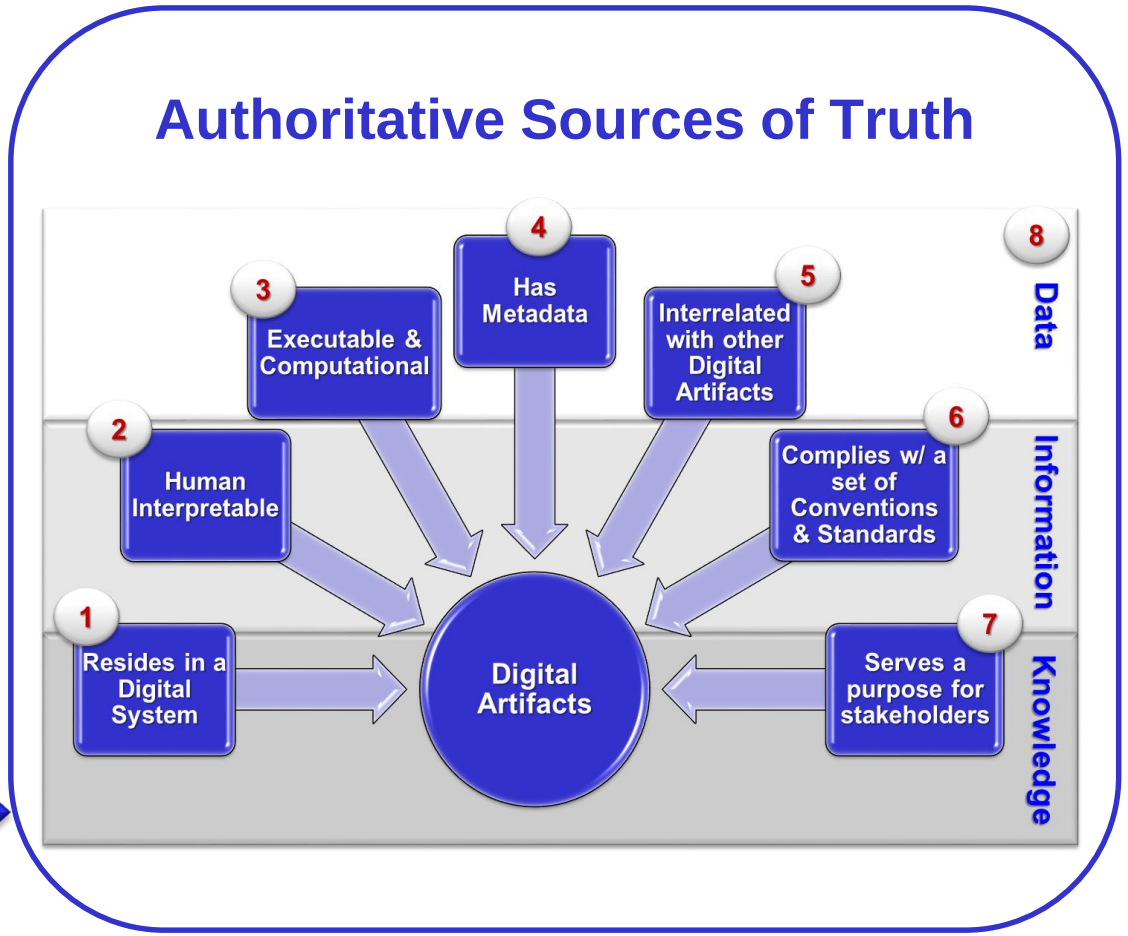
The Computer-Aided Conversion:

From Digital Artifact to Stakeholder Wisdom



An Evolved Concept of Digital Artifact

- Any digital object produced with digital technology
- It represent concepts, items, or phenomena.
- Contains following Characteristics:



Converting Digital Artifacts to Digital Views

Digital Viewpoint

- An information model or design
- Selects, compiles, and displays digital artifacts
- Software enabled conversions
- Catalyst for digital artifact exchange

Examples Digital Viewpoint Conventions

OMG SYSTEMS MODELING LANGUAGE SysML™

OpenGL

Query Languages

User Experience Design (UXD) / User Interface Design (UID)

API
Application Programming Interface

MBSE ML™

Converting Digital Views to Stakeholder Wisdom

The Digital View

- An interactive view on a digital display device
- It includes one or more assembled digital artifacts
- It enables stakeholders' unique activities
- It conforms to its digital viewpoint

Examples of Digital Views

The Payoff

Leverage the power of digital automation and multimedia displays

Opportunity Statement:

Automated, Synchronized, & Interactive Digital Artifacts

The World of Digital Engineering Information Exchange

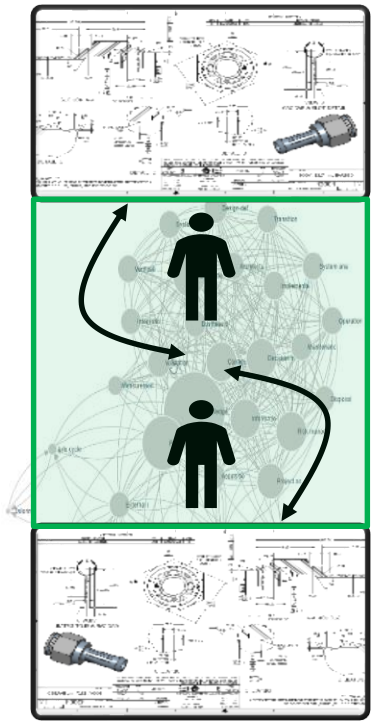
"Seamless Exchanges in a Digital Ecosystem"

1. Acquirer Creates Digital Artifacts
2. Software Enables Digital Viewpoints
3. Acquirer Grants Access to Digital Views

And / Or

4. Acquirer exchanges or synchronizes Digital Artifacts

ACQUIRER



SUPPLIER

1. Supplier Creates Digital Artifacts in tools
2. Software Enables Digital Viewpoints
3. Supplier Grants Acquirer Access to Digital Views

And / Or

4. Supplier exchanges or synchronizes Digital Artifacts

How You Can Help: Digital Engineering Information Exchange Working Group (DEIX WG)

- **Primary Goal of DEIX WG:**
  - To identify conventional ways to define, request, offer, and exchange graphical and non-graphical digital artifacts between stakeholders across the systems life cycle.

- **Need Volunteers for Products:**
  - Digital Artifacts List (DAL): *Systems engineers* to define digital artifacts required for ISO/IEEE/IEC 15288 audits & reviews
  - DEIX Model: *Modelers* to define & model aspects of the DE information exchange concepts
  - DEIX Encyclopedia/Wikipedia: *Writers* to write encyclopedia entries on relevant concepts
  - DEIX Framework of Standards: *Researchers* to research, catalog, and perform gap analysis of existing and emerging standards

For more Information go to OMG MBSE Wiki: http://www.omgwiki.org/MBSE/doku.php

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Solving Problems Today – Designing Solutions for Tomorrow










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