1400 – Welcome
1405 – The Charter
1415 – Relative roles of academia, industry, and government in DEDMWG
1420 – An OUSD(R&E) perspective to DEDMWG and Digital Engineering
1435 – Digital Engineering Handbook
1450 – ASME MBE Committee
1505 – Additive Manufacturing TDP Sub Committee
1525 – TDP Training Curriculum
1535 – DoD Data Management and the DID
1545 – Adjourn
DOD – Jeff Windham - US Army Armament Center

Jeff Windham has over 35 years’ experience as a systems engineer and configuration manager for the US Army Armament Center at Rock Island Arsenal, Illinois. He is currently the chief of the Small Caliber Systems Configuration Management Branch. He has a Master’s Certification in Enterprise Configuration Management from CMPIC, is NDIA certified in Configuration and Data Management and teaches configuration management throughout the Army. He holds a BS in Aerospace Engineering from Mississippi State University and an MS in Business Administration from East Texas State University.

INDUSTRY – Ben Kassel - LMI

Ben Kassel is a Digital Engineering Senior Consultant at LMI and guest researcher at the NIST Engineering Laboratory in the areas of Digital Engineering and the Digital Thread enabled Model-Based Definition. Ben is proud to say he served NAVSEA for almost 37 years using, developing, and implementing Computer-aided Design technology at the David Taylor Model Basin and the NAVSEA 05 Computer-Aided Engineering Division.

ACADEMIA – Greg Harris Ph.D, PE - Auburn University

Following a most distinguished career with the US Army highlighted by leading the establishment of the Digital Manufacturing and Design Innovation Institute Greg returned to academia where he is the Director of the Interdisciplinary Center for Advanced Manufacturing Systems (ICAMS) at the Auburn University Samuel Ginn College of Engineering.
Established in 2008 as the DoD Engineering Drawing and Modeling Working Group

Established a group of subject matter experts across the DoD to address the acquisition of technical data within a Model-Based Enterprise

Primary focus was to adjust MIL-DTL-31000C from a drawing based to a model based paradigm

Renamed after the release of MIL-STD-31000 to emphasize being dedicated to the 3D Model-Based Definition
I. Scope:
The availability and flow of product model and other technical data in all phases of a product lifecycle focusing on the acquisition, creation, and use of shape and product manufacturing information necessary to enable manufacturing, digital information visualization, and the digital twin within the sustainment phase.

II. Goals & Objectives:

a. Maintain a network of technical data subject matter experts (SMEs) across the DoD.
b. Develop guidance for DoD organizations to establish requirements for acquisition of technical data to support product lifecycle activities.
c. Advocate for the tools, technologies, and standards that support technical data management across the product lifecycle.
d. Advocate for the availability of product model and other technical data within the OSD Digital Engineering Working Group (DEWG).
e. Advocate the DoD position for product model and other technical data within the INCOSE Digital Engineering Information Exchange Working Group (DEIXWG).
f. Assess tools and technologies for potential implementation into DoD systems.
g. Identify technical data standards, their status, and the conditions for their use.
h. Participate in the development of product model and other technical standards as directed by the Deputy Assistant Secretary of Defense for Systems Engineering (DASD(SE)).
i. Coordinate with the Defense Standardization Program Office and non-government standards bodies to ensure DoD requirements are being met.

III. Organization & Operation

a. Definitions
i. General Working Group Members – Active participants from government, industry or academia with interests in the activities defined in the scope of the working group.
ii. Advisory Board – The Advisory Board consists of each of the Tri-Chairs and between two (2) and four (4) general members. DoD civilian employees or active military shall always make up the majority of the Advisory Board.
iii. Tri-Chairs – Three members selected by the Advisory Board to lead the working group. One of the Tri-Chairs shall be from DoD, one of the Tri-Chairs shall be from industry, and one of the Tri-Chairs shall be from academia.

b. Functions and Responsibilities
i. Advisory Board
   1. Appointment and removal of the chairs.
   2. Appointment and removal of the Advisory Board members.
   3. Request working group meetings.
   4. Approval of minutes of the working group meetings.
   5. Setting the priorities of the working group.
   6. Responses to questions from any of the Advisory Board member organizations.
   7. Responses to questions from any external organization.
   8. The DoD Tri-Chair shall lead the Advisory Board.
   9. Removal of a General Member.
   10. Report to ODASD(SE) as required.
ii. Tri-Chairs
   1. Record and maintain meeting outcomes, decisions, actions, and referrals.
   2. Maintain an official list of the working group members.
   3. Maintain an official list of the Advisory Board.
   4. Schedule meetings.
   5. Lead meetings.
iii. Working Group
   1. Submit ideas for consideration of the advisory board
   2. Attend working group meetings
   3. Participate in DEDMWG activities

IV. Duration:
This charter will remain in effect until the Deputy Assistant Secretary of Defense for Systems Engineering (DASD(SE)) determines the scope, goals, and objectives have been accomplished. Changes to this charter may be made on an as-needed basis by consensus of the advisory board.

V. Approval:
The authority for this charter is authorized by the Deputy Assistant Secretary of Defense for Systems Engineering (DASD(SE)).
Tracee Walker Gilbert, Ph.D.
Contractor Support, Engineering Tools and Environments
Office of the Under Secretary of Defense (Research & Engineering)

April 16, 2021
USD(R&E) Mission

- Ensure Technological Superiority for the U.S. Military
  - Set the technical direction for the Department of Defense
  - Champion and pursue new capabilities, concepts, and prototyping activities throughout the DoD research and development enterprise

- Bolster Modernization
  - Pilot new acquisition pathways and concepts of operation
  - Accelerate capabilities to the warfighter

“Our mission is to ensure that we, if necessary, reestablish and then maintain our technical advantage.”
- Under Secretary Griffin, April 2018
Digital Engineering

“An integrated digital approach that uses authoritative sources of systems’ data and models as a continuum across disciplines to support life cycle activities from concept through disposal” - DAU Glossary
Digital Engineering Implementation

Dr. Griffin

“This strategy describes the “what” necessary to foster the use of digital engineering practices. Those implementing the practices must develop the “how” – the implementation steps necessary to apply digital engineering in each enterprise.”

Service Strategies and Plans

Outlines DoD’s five strategic goals for Digital Engineering Initiatives

Collaborative Activities

- Collaboration
  - Digital Engineering Working Group / Community of Practice
    - Tiger Teams
  - Systems Engineering Research Center
  - INCOSE/NDIA Digital Engineering Information Exchange Working Group; Conferences, etc
  - Engineering WF Task Force
- DoD Digital Engineering Body of Knowledge (DEBoK)
- Align understanding of Modeling and Simulation with Digital Engineering

Implementing Digital Engineering Across the DoD

Distribution Statement A: Approved for public release. Distribution is unlimited.
Digital Engineering Working Group
Community of Practice

Deputy Director of Engineering, Chief Engineering Council
- Jeanette Evans-Morgis – USA
- Bill Bray – USN
- Yvette Weber - USAF

DEWG Leadership
Michael Guitley USA
Michael Doctor USN
Kyle Hurst USAF
Krist Norlander MDA
Phil Zimmerman OSD ETE

OSD DE support team

Industry & Academia Engagement

DEWG Other Focus Interests
Use Cases
Ecosystem/Requirements
Competencies
DEBoK evolution
DE Credentials
Others?

DoD Data
Lisa Fitzgerald, USAF

Digital Ecosystem
Phil Z, OSD
Darryl Howell, Contr. Lead

Cyber Security
Kyle Hurst, USAF

DE Implementation
Nathaniel Norwood
DASH (RDT&E)

DEBoK
Phil Z, OSD
Brandon Quash, Contr. lead

231 Infrastructure
Phil Z, OSD
Dr. Tyesia Alexander, Contr. lead

Services Prioritized DE Pain Point centric Tiger Teams (6)

**DoD Data** – DoD lacks the enterprise data management to ensure Authoritative Data & Models are widely available to or accessible.

**Digital Ecosystem** – DoD needs technical solutions to provide collaborative, agile, secure, interoperable, & responsive digital ecosystems.

**Cyber Security** - DoD needs cybersecurity protection to data, networks and hosting environments while managing access controls, data at rest, spillage control and exfiltration mitigation.


**DEBoK** – The DoD lacks a uniform and common understanding of what the DEBoK should be and what it should contain. There needs to be a structured, shared knowledge that is existent and accessible to the Engineering community.

**231 Infrastructure** – The National Defense Authorization Act (NDAA) for FY20, Section 231 (Public Law 116-92) directs the Sec of Def to establish a DE capability to support automated approaches for testing, evaluation, and deployment throughout the defense acquisition process.
Summary/Next Steps

- Driving Digital Engineering transformation through a focus on implementation
  - Addressing challenges, shares best practices, and facilitates tiger teams
  - Sponsoring research on metrics, curation, and tool innovation
  - Shaping initiatives across industry to drive digital engineering transformation

- Shaping the Digital Engineering Community of Practice/Practitioners
For Additional Information

Ms. Philomena M. Zimmerman
Deputy Director, Engineering Tools and Environments
DDR&E(AC)
Office of the Under Secretary of Defense
for Research and Engineering
571.372.6695
Philomena.m.Zimmerman.civ@mail.mil
Digital Engineering Handbook
Development

Jeff Windham
US ARMY DEVCOM Armament Center
April 2021 DEDMWG

James.j.Windham.civ@mail.mil
Digital Engineering Handbook Background

• DOD Digital Engineering Strategy released in 2018. Established 5 fundamentals:
  1. Formalize the development, integration, and use of models to inform enterprise and program decision making
  2. Provide an enduring, authoritative source of truth
  3. Incorporate technological innovation to improve the engineering practice
  4. Establish a supporting infrastructure and environment to perform activities, collaborate and communicate across stakeholders
  5. Transform the culture and workforce to adopt and support digital engineering across the lifecycle

• DE Strategy is very high level document, basically a 30k ft. view.
• Many programs are trying to implement the DE Strategy but are asking for help.
• NAVSEA undertook effort to develop a handbook to aid programs in implementing DE. Other services have joined the effort.
• Still early in the handbook content creation process.
• Goal is to provide more detail than the DE Strategy (think 1k ft. view). Less than 100 pages.
• Asking DEDMWG to be the first group to provide review/feedback.
• Scope, Foreword and definitions sent for DEDMWG review in Jan 2021. 134 comments received.
  • Need clarity on scope of handbook.
  • Initial document heavy on 3D CAD Model Based Definition.
  • Lots of differing opinions on definitions, e.g. “what is a digital twin?”
  • Who is the handbook written for?
• Attempting to settle on a title:
  • Digital Engineering Handbook
  • Model Based Enterprise/Digital Engineering Handbook
  • Model Based Digital Engineering Enterprise Handbook
  • Digital Engineering and Modeling Handbook

• Need a better understanding of the problem statement to help scope and bound the handbook.
• Take the Digital Engineering Strategy and articulates it at a level programs can actually implement.
• Program Managers unable to interpret the developed models.
• Understand how model data is interconnected with other disciplines/functional areas for consumption.
• Provide guidance with current digital engineering efforts that I can benchmark against.
• How are they effectively communicating the right digital engineering path forward using the government contracting process.
• How modeling fits in with digital engineering or vice versa.
• MBSE Tools access and use.
• Training personnel on how low to go with models before ready for use of tool which causes lack of understanding of value.
• Leadership support seems to lose its traction over time with pushback of personnel.
• Funding methodology (digital ecosystem) individual PMO or Enterprise?
• Understanding the CM DM aspects for version control and permissions to edit/view information.
John Schmelzle

NAWCAD LKE Additive Manufacturing and Model Based Definition Lead
Technical Data Package (TDP) definition: The authoritative technical description of an item (MIL-STD-31000B).

Critical manufacturing process: A process that is the only known manufacturing method that will result in the production of an acceptable item. (MIL-STD-31000B)

Product Definition Data Set (PDDS): A collection of one or more data file(s) that discloses, directly or by reference, by means of graphic or textual presentations, or combinations of both, the physical or functional requirements of an item. (ASME Y14.41- 2012).

Additive Manufacturing Data Package (AMDP): A separately released NAVAIR Document specifying the additive manufacturing process of an item.

Material Validation Plan: A NAVAIR Document embedded in the PDDS specifying material validation requirements for each AM part. (Typically involves testing of coupons manufactured concurrently with the AM component)
2021 DoD Engineering Data and Modeling Working Group

Additive Manufacturing Data Package

- Provides a document for the Manufacturing Process
  - Removes manufacturing information from the PDDs
  - Stores build Files, Process Parameters
- Separately controlled. Revisions do not affect the PDDS
- Aligns with the US Army
- Published similar to an Associated list (AM+Drawing Number)
- Complies with MIL-STD-31000B
  - The AMPD is a critical Manufacturing process IAW paragraph 5.14.4
2021 DoD Engineering Data and Modeling Working Group
Additive Manufacturing Build Files

- Attached to AMDP
- Also Controls Software/Parameters
- Actual Build Files attached to document

<table>
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<th>Build File</th>
<th>Printer</th>
<th>Authorized Materials</th>
<th>Material PIN</th>
<th>Material CAGE</th>
<th>Printer Software Version</th>
<th>Processing Parameters</th>
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<td>Use Default Parameters</td>
</tr>
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</table>

**Purpose:** This Build File documents the authorized materials as well as the printers, associated software and parameters required to be used with the corresponding and attached build files to manufacture PIN 4212AS0299-0-AM in accordance with AM4212AS0299.
2021 DoD Engineering Data and Modeling Working Group
Configuration Control

PDDS (Assembly)
- Standards Bearing Install Procedure
- Specification Bearing

PDDS (Link Post Processing)
Attached STEP File Validation Cert

PDDS (AM Build)
Attached STEP File MVP Validation Cert

AMDP (AM Build)
Attached Build Files SH check sum

Standards
- Standard Practice for Liquid Penetrant Testing
- Specifications Penetrant Inspection Material

Standards
- Coupons Test Methods

Standards
ISO 9000
## Technical Data Package Guidance

<table>
<thead>
<tr>
<th>Qualification Level</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
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<tbody>
<tr>
<td>Criticality</td>
<td>Minimal</td>
<td>Low</td>
<td>Medium</td>
<td>High</td>
</tr>
</tbody>
</table>

### TDP Guidance

**PDDS Attachments**
1. STEP File
2. Model file validation Certificate
3. Required processes unique to part

**AMDP**
Separate Document not called for in the PDDS and not in the TDP

Required as a critical Manufacturing Process, called for in the PDDS, and thus becomes part of the TDP

### Organic Manufacture Package

1. AMDP
2. TDP

### Acquisition Package Contents

1. TDP
2. FAT requirements

### Contract CDRL Guidance

1. 100% check of all Major Characteristics called for in the TDP
2. 100% check of all Characteristics called for in the TDP
3. 100% check of all Characteristics called for in the TDP
4. Material Validation Report
5. Material Validation Report
6. FAT Report
TDP Training Development

Jeff Windham
US ARMY DEVCOM Armament Center
April 2021 DEDMWG
James.j.Windham.civ@mail.mil
TDP planning, development and ordering practices are poor.

- Lack of understanding of what the purpose of a TDP is, or how it will be used throughout the lifecycle.
- Lack of understanding of 3D TDP requirements.
- 3D based TDPs are highly specialized and require significant degree of knowledge.
- Those writing SOWs in DOD are generally not CAD or TDP experts.
- Often times, the TDP Option Selection Worksheet is filled out and placed in an SOW with no other detailed description of what is required.
- Confusion by contractors on what they are suppose to deliver.
- Data Rights not understood or fully delineated.
- Access vs Deliver vs Control not detailed.

Bottom Line: Government doesn’t know what they need, contractors don’t know what they are being asked to deliver, confusion reigns.
• Part of the fix to this problem is a better understanding of the TDP, what it is, how its used, and how to order it.

• TDP training curriculum needs to be developed and offered, ideally via DAU.

• DEDMWG should work with DAU (or other training body) to develop class (most likely online, self paced).
Modernization of DOD Data Ordering Practices

Jeff Windham
US ARMY DEVCOM Armament Center
April 2021 DEDMWG

James.j.Windham.civ@mail.mil
Per DOD data management policies, to obtain data from a contractor, three things are required:

1. A Statement of Work (**SOW**) describing the work task to be conducted.
2. A Contracts Data Requirements List (**CDRL**) (DD form 1423) (An index which includes time, place, frequency and method of delivery.)
3. A Data Item Description (**DID**) describing the data format.
• DIDs were created to force standardization of data format at a time when data was created via typewriter and mainframe computer.

• Currently, data manipulation/reformatting tend to be trivial exercises.

• Many DIDs say nothing but “provide in contractor’s format”.

• In today’s environment, a high degree of specialization of data format is the norm. This is especially true in the engineering data arena.

• Getting approval of one-time DIDs is a time consuming, non-value added work-around.

• Requiring DIDs in many cases is more of a hindrance than a benefit.
• Get rid of the requirement that you must have a DID to obtain data.
• Get rid of the restriction on “tailoring up” a DID.
2021 DoD Engineering Data and Modeling Working Group

Whats next